

Pertanika Journal of
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& HUMANITIES**

JSSH

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PERTANIKA JOURNAL OF SOCIAL SCIENCES & HUMANITIES

About the Journal

Overview

Pertanika Journal of Social Sciences & Humanities is the official journal of Universiti Putra Malaysia. It is an open-access online scientific journal. It publishes original scientific outputs. It neither accepts nor commissions third party content.

Recognised internationally as the leading peer-reviewed interdisciplinary journal devoted to the publication of original papers, it serves as a forum for practical approaches to improve quality on issues pertaining to social and behavioural sciences as well as the humanities.

Pertanika Journal of Social Sciences & Humanities currently publishes 6 issues a year (*February, April, June, August, October and December*) periodical that considers for publication original articles as per its scope. The journal publishes in **English** as well as in **Bahasa Melayu** and it is open for submission by authors from all over the world.

The journal is available world-wide.

Aims and Scope

Pertanika Journal of Social Sciences & Humanities aims to develop as a pioneer journal for the social sciences with a focus on emerging issues pertaining to the social and behavioural sciences as well as the humanities. Areas relevant to the scope of the journal include Social Sciences—architecture and habitat, consumer and family economics, consumer law, education, media and communication studies, political sciences and public policy, population studies, psychology, sociology, and tourism; Humanities—arts and culture, dance, language and linguistics, literature, music, philosophy, and sports.

History

Pertanika Journal of Social Sciences & Humanities was founded in 1993 and focusses on research in social and behavioural sciences as well as the humanities and its related fields.

Vision

To publish journal of international repute.

Mission

Our goal is to bring the highest quality research to the widest possible audience.

Quality

We aim for excellence, sustained by a responsible and professional approach to journal publishing. Submissions can expect to receive a decision within 120 days. The elapsed time from submission to publication for the articles averages 180 days. We are working towards decreasing the processing time with the help of our editors and the reviewers.

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Pertanika Journal of Social Sciences & Humanities is now over 32 years old; this accumulated knowledge and experience has resulted the journal being abstracted and indexed in SCOPUS (Elsevier), Clarivate Web of Science (ESCI), EBSCO, DOAJ, Agricola, ASEAN CITATION INDEX, ISC, Microsoft Academic, Google Scholar, and MyCite.

Citing Journal Articles

The abbreviation for Pertanika Journal of Social Sciences & Humanities is *Pertanika J. Soc. Sci. & Hum.*

Publication Policy

Pertanika policy prohibits an author from submitting the same manuscript for concurrent consideration by two or more publications. It prohibits as well publication of any manuscript that has already been published either in whole or substantial part elsewhere. It also does not permit publication of manuscript that has been published in full in proceedings.

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≤ 20% – PASS; > 20% – REJECT.

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An ISSN is an 8-digit code used to identify periodicals such as journals of all kinds and on all media—print and electronic.

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Authors are not permitted to add or remove any names from the authorship provided at the time of initial submission without the consent of the journal's Chief Executive Editor.

Manuscript Preparation

Most scientific papers are prepared according to a format called IMRAD. The term represents the first letters of the words *Introduction, Materials and Methods, Results, And Discussion*. IMRAD is simply a more 'defined' version of the "IBC" (*Introduction, Body, Conclusion*) format used for all academic writing. IMRAD indicates a pattern or format rather than a complete list of headings or components of research papers; the missing parts of a paper are: *Title, Authors, Keywords, Abstract, Conclusions, References, and Acknowledgement*. Additionally, some papers include *Appendices*. For manuscripts in **Bahasa Malaysia**, the title, abstract and keywords should be written in both **English** and **Bahasa Malaysia**.

The *Introduction* explains the scope and objective of the study in the light of current knowledge on the subject; the *Materials and Methods* describes how the study was conducted; the *Results* section reports what was found in the study; and the *Discussion* section explains meaning and significance of the results and provides suggestions for future directions of research. The manuscript must be prepared according to the journal's **Instruction to Authors** (http://www.pertanika.upm.edu.my/Resources/regular_issues/Regular_Issues_Instructions_to_Authors.pdf).

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Authors who complete any submission are notified with an acknowledgement containing a manuscript ID on receipt of a manuscript, and upon the editorial decision regarding publication.

Pertanika follows a **double-blind peer -review process**. Manuscripts deemed suitable for publication are sent to reviewers. Authors are encouraged to suggest names of at least 3 potential reviewers at the time of submission of their manuscripts to *Pertanika*, but the editors will make the final selection and are not, however, bound by these suggestions.

Notification of the editorial decision is usually provided within 120 days from the receipt of manuscript. Publication of solicited manuscripts is not guaranteed. In most cases, manuscripts are accepted conditionally, pending an author's revision of the material.

As articles are double-blind reviewed, material that may identify authorship of the paper should be placed only on page 2 as described in the first-4-page format in *Pertanika*'s Instruction to Authors (http://www.pertanika.upm.edu.my/Resources/regular_issues/Regular_Issues_Instructions_to_Authors.pdf).

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In the peer review process, 2 or 3 referees independently evaluate the scientific quality of the submitted manuscripts. At least 2 referee reports are required to help make a decision.

Peer reviewers are experts chosen by journal editors to provide written assessment of the **strengths** and **weaknesses** of the written research, with the aim of improving the reporting of research and identifying the most appropriate and highest quality material for the journal.

Operating and Reviewing Process

What happens to a manuscript once it is submitted to *Pertanika*? Typically, there are 7 steps to the editorial review process:

1. The journal's Chief Executive Editor and Editor-in-Chief examine the paper to determine whether it is relevance to the journal's needs in terms of novelty, impact, design, procedure, language as well as presentation and allow it to proceed to the reviewing process. If it is not appropriate, the manuscript is rejected outright and the author is informed.
2. The Chief Executive Editor sends the article-identifying information having been removed, to 2 to 3 reviewers. They are specialists in the subject matter of the article. The Chief Executive Editor requests that they complete the review within 3 weeks.

Comments to authors are about the appropriateness and adequacy of the theoretical or conceptual framework, literature review, method, results and discussion, and conclusions. Reviewers often include suggestions to strengthening the manuscript. Comments to the editor are in the nature of the significance of the work and its potential contribution to the research field.

3. The Editor-in-Chief examines the review reports and decides whether to accept or reject the manuscript, invite the authors to revise and resubmit the manuscript, or seek additional review reports. In rare instances, the manuscript is accepted with almost no revision. Almost without exception, reviewers' comments (to the authors) are forwarded to the

authors. If a revision is indicated, the editor provides guidelines to the authors to attend to the reviewers' suggestions and perhaps additional advice about revising the manuscript.

4. The authors decide whether and how to address the reviewers' comments and criticisms and the editor's concerns. The authors return a revised version of the paper to the Chief Executive Editor along with specific information describing how they have addressed the concerns of the reviewers and the editor, usually in a tabular form. The authors may also submit a rebuttal if there is a need especially when the authors disagree with certain comments provided by the reviewers.
5. The Chief Executive Editor sends the revised manuscript out for re-review. Typically, at least 1 of the original reviewers will be asked to examine the article.
6. When the reviewers have completed their work, the Editor-in-Chief examines their comments and decides whether the manuscript is ready to be published, needs another round of revisions, or should be rejected. If the decision is to accept, the Chief Executive Editor is notified.
7. The Chief Executive Editor reserves the final right to accept or reject any material for publication, if the processing of a particular manuscript is deemed not to be in compliance with the S.O.P. of *Pertanika*. An acceptance notification is sent to all the authors.

The editorial office ensures that the manuscript adheres to the correct style (in-text citations, the reference list, and tables are typical areas of concern, clarity, and grammar). The authors are asked to respond to any minor queries by the editorial office. Following these corrections, page proofs are mailed to the corresponding authors for their final approval. At this point, **only essential changes are accepted**. Finally, the manuscript appears in the pages of the journal and is posted online.

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Foreword

Welcome to the first issue of 2026 of the *Pertanika Journal of Social Sciences and Humanities* (PJSSH)!

PJSSH is an open-access journal for studies in the field of Social Sciences and Humanities published by Universiti Putra Malaysia Press. It is independently owned and managed by the university for the benefit of the world-wide science community.

This issue contains 25 regular articles. The authors of these articles come from different countries namely Bangladesh, Bosnia and Herzegovina, Indonesia, Malaysia, Nigeria, Slovenia, Thailand, Turkiye, Uganda, United Kingdom, and Vietnam.

A regular article titled “Techno-Invasion and Contextual Performance Among Malaysian Telecommuters: Moderating and Mediating Effects” explores the impact of technology-induced stress on employee performance in remote work settings. Grounded in the Job Demands–Resources (JD-R) Theory and Contextual Performance Theory, the study investigates the mediating role of work exhaustion and the moderating effect of emotional intelligence. Based on empirical data from Malaysian telecommuters, the findings reveal that while techno-invasion does not directly affect contextual performance, it contributes to work exhaustion, highlighting the importance of organisational support and coping mechanisms. This study offers valuable insights into managing technostress in evolving digital work environments. The detailed information of this article is presented on page 645.

An article entitled “Psychometric Properties of the Malay Child Adjustment and Parent Efficacy Scale (CAPES)” evaluates the reliability and validity of a culturally adapted psychological assessment tool within the Malaysian context. Employing a quantitative cross-sectional design and confirmatory factor analysis, the study validates the Malay version of CAPES among parents of early adolescents. The findings reveal strong psychometric properties and highlight significant relationships between parental self-efficacy and adolescent emotional and behavioural outcomes. By providing a linguistically and culturally appropriate measurement instrument, the study contributes to advancing mental health assessment and intervention strategies in Malaysia, particularly in addressing the growing concerns surrounding adolescent well-being. Further details of the study can be found on page 781.

Another significant contribution titled “Integrating Bugis Local Wisdom with Social Pillars of Sustainable Development: A Model for Aligning Cultural Practices” examines the alignment between indigenous cultural values and global sustainable development frameworks. Drawing on qualitative analysis of the *Pangngajak Tomatoa* and insights from community stakeholders, the study highlights how Bugis local wisdom—rooted in leadership integrity, social responsibility, and collective resilience—supports the social dimensions of the United Nations Sustainable Development Goals (SDGs 1–5). By integrating sociological theories such as Structuration Theory and Habitus Theory, the study proposes a culturally grounded model that bridges traditional practices with modern sustainability agendas. The findings underscore the relevance of indigenous knowledge systems in promoting inclusive, community-driven development. The detailed information of this article is presented on page 971.

We anticipate that you will find the evidence presented in this issue to be intriguing, thought-provoking and useful in reaching new milestones in your own research. Please recommend the journal to your colleagues and students to make this endeavour meaningful.

All the papers published in this edition underwent Pertanika’s stringent peer-review process involving a minimum of two reviewers comprising internal as well as external referees. This was to ensure that the quality of the papers justified the high ranking of the journal, which is renowned as a heavily-cited journal not only by authors and researchers in Malaysia but by those in other countries around the world as well.

We would also like to express our gratitude to all the contributors, namely the authors, reviewers, and Editorial Board Members of PJSSH, who have made this issue possible.

PJSSH is currently accepting manuscripts for upcoming issues based on original qualitative or quantitative research that opens new areas of inquiry and investigation.

Editor-in-Chief

Puvaneswaran Kunasekaran



Strengthening the National Border Management Agency (BNPP) Through Multiparty Collaboration

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ABSTRACT

This study examines how multiparty collaboration strengthens the institutional capacity of the National Border Management Agency (BNPP) in managing border areas in West and North Kalimantan, Indonesia. Border governance in these regions is characterised by fragmented authority, weak inter-agency coordination, and limited involvement of non-state actors. Existing studies on border management largely emphasise security or decentralisation perspectives, leaving limited empirical explanation of how collaborative mechanisms operate institutionally, particularly in developing country contexts. Employing a qualitative explanatory approach, data were collected through in-depth interviews, direct observations, focus group discussions, and document analysis conducted between August and November 2024. The findings reveal that BNPP's coordinating capacity is strengthened through four interrelated collaboration mechanisms: coordination, integration, synchronisation, and simplification, supported by information and communication technology (ICT). ICT functions as an institutional enabler that enhances communication, reduces fragmentation, and facilitates cross-level governance. The study contributes to collaborative governance literature by demonstrating how a coordinative public agency with limited formal authority can enhance institutional capacity through ICT-enabled multiparty collaboration. Policy implications emphasise strengthening BNPP's coordinating mandate, institutionalising non-state actor participation, and expanding ICT capacity at the local level.

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Keywords: Border governance, collaborative governance, ICT, institutional capacity, multiparty collaboration

INTRODUCTION

Border governance constitutes one of the most complex policy domains in contemporary

public administration, particularly in developing countries characterised by vast territories, institutional fragmentation, and uneven regional development. National borders no longer function solely as rigid territorial demarcations of state sovereignty; rather, they have evolved into dynamic governance spaces where security, development, economic exchange, and socio-cultural interaction intersect. In this context, border areas are expected to perform a dual role: as frontlines of national sovereignty and as front porches that reflect state presence, welfare provision, and development performance. However, empirical conditions in many border regions reveal persistent governance challenges that undermine this dual function.

In Indonesia, border areas remain disproportionately affected by structural underdevelopment, limited infrastructure, low access to public services, and high vulnerability to transnational threats such as illegal trade, smuggling, human trafficking, and environmental exploitation. These challenges are particularly evident in land border regions such as West Kalimantan and North Kalimantan, which share extensive boundaries with Malaysia (Daldjoeni, 1991; Saiman, 2017). Despite their strategic geopolitical importance, these regions continue to face governance constraints rooted in fragmented authority, sectoral policy approaches, and weak coordination between central and regional governments. The persistence of these issues highlights the limitations of conventional border management paradigms that prioritise security enforcement while marginalising governance and development considerations.

The establishment of the National Border Management Agency (Badan Nasional Pengelola Perbatasan/BNPP) represents the Indonesian government's institutional response to these complex challenges. Mandated by Law No. 43 of 2008, BNPP is tasked with coordinating border management and development across ministries, agencies, and subnational governments. Unlike line ministries with direct operational authority, BNPP's role is primarily coordinative, requiring it to align diverse actors with varying mandates, resources, and institutional capacities. This unique positioning places BNPP at the centre of a highly fragmented governance network, where effectiveness depends less on hierarchical control and more on the ability to foster collaboration among multiple stakeholders.

However, the coordinative nature of BNPP also presents inherent limitations. BNPP operates within a governance environment characterised by overlapping legal frameworks, decentralised administrative authority, and strong sectoral autonomy among ministries and regional governments. As a result, BNPP frequently encounters challenges related to weak inter-agent communication, inconsistent policy implementation, overlapping programmes, and limited engagement of non-state actors such as private sector entities, civil society organisations, and local communities. These constraints raise critical questions regarding how BNPP can effectively strengthen its institutional capacity and fulfil its mandate in managing border areas.

Existing academic literature on border governance has largely approached the issue from three dominant perspectives. First, security-oriented studies emphasise border control, territorial defence, and sovereignty protection, often framing border areas as spaces of threat and vulnerability. Second, decentralisation and regional autonomy perspectives focus on the distribution of authority between central and local governments, highlighting both opportunities and coordination challenges arising from multi-level governance. Third, international relations and cross-border cooperation studies examine borders as sites of inter-state interaction and diplomacy. While these approaches offer valuable insights, they tend to underexplore the institutional mechanisms through which collaborative governance strengthens the capacity of a national border authority, particularly in developing country contexts.

In parallel, the growing body of literature on collaborative governance and multiparty collaboration emphasises the role of cross-sector and cross-level partnerships in addressing complex public problems that cannot be resolved by single actors. Collaborative governance frameworks highlight the importance of coordination, trust-building, shared problem definition, and joint action among heterogeneous stakeholders. Yet, empirical applications of these frameworks to border governance remain limited, especially in understanding how collaboration operates as an institutional capacity-building mechanism for a coordinative agency such as BNPP.

Moreover, recent advances in digital governance have drawn attention to the role of information and communication technology (ICT) in facilitating collaboration within fragmented governance systems. ICT enables real-time communication, data sharing, monitoring, and coordination across organisational and geographical boundaries. In border governance contexts—characterised by remote locations, limited infrastructure, and dispersed institutional actors—ICT has the potential to function as a critical enabler of collaborative capacity. Nevertheless, empirical research examining ICT as an integral component of multiparty border governance remains scarce, leaving a significant gap in both theory and practice.

This study seeks to address these gaps by examining how multiparty collaboration strengthens the institutional capacity of BNPP in managing border areas in West and North Kalimantan. Rather than treating collaboration as a normative ideal, this research analyses collaboration as a set of concrete governance mechanisms that enable BNPP to perform its coordinating role effectively despite limited formal authority. Specifically, this study conceptualises multiparty collaboration through four interrelated mechanisms: coordination, integration, synchronisation, and simplification. These mechanisms provide an analytical lens for understanding how diverse actors are aligned, how programmes and policies are harmonised, how actions are synchronised across institutions, and how procedural complexity is reduced within border governance arrangements.

Accordingly, this study is guided by three research questions: (1) How does multiparty collaboration operate in strengthening BNPP's institutional capacity in managing border areas? (2) What roles do state, private, and community actors play within this collaborative governance arrangement? (3) How does ICT facilitate coordination, integration, synchronisation, and simplification among stakeholders involved in border management? By addressing these questions, the study aims to contribute to the literature on collaborative governance and institutional capacity while offering policy-relevant insights for strengthening border governance in Indonesia.

Positioned within the field of public governance, this research advances the understanding of border management beyond security-centric and administrative perspectives. It highlights the importance of collaborative governance mechanisms and digital enablers in managing complex policy environments. Practically, the findings are expected to inform policymakers on how BNPP and similar coordinative institutions can enhance their capacity through structured multiparty collaboration, thereby supporting more inclusive, integrated, and sustainable border area development.

LITERATURE REVIEW

Collaborative Governance and Multiparty Collaboration

Collaborative governance has emerged as a prominent framework in public administration to address complex public

problems characterised by uncertainty, interdependence, and institutional fragmentation. Ansell and Torfing (2014) define collaborative governance as governance arrangements in which public agencies engage constructively with non-state actors in collective decision-making processes that are formal, deliberative, and consensus oriented. This approach departs from traditional hierarchical governance by emphasising interaction, shared responsibility, and joint problem-solving among heterogeneous actors (Torfing, 2019).

Multiparty collaboration represents a broader conceptualisation of collaborative governance by highlighting the involvement of multiple actors across sectors and levels of governance. Gray and Purdy (2018) argue that multiparty collaboration is particularly relevant for addressing “wicked problems” that cannot be resolved by single organisations due to their complexity and cross-sectoral nature. Rather than focusing solely on participation, contemporary collaboration literature emphasises governance mechanisms that enable coordination, trust-building, alignment of interests, and effective collective action (Ahmed & Lee, 2024; Lawrence et al., 2023).

In the public sector context, multiparty collaboration typically involves government agencies, private sector actors, civil society organisations, academic institutions, and local communities (Banerjee et al., 2020). Each actor brings distinct resources, authority, interests, and capacities, which can both enrich collaboration and generate conflict. As such, the effectiveness

of collaboration depends not only on actor inclusion but also on institutional arrangements that manage interdependence and mitigate power asymmetries (Bryson & Crosby, 2006; Gray et al., 2022).

Despite its growing prominence, collaborative governance is not without challenges. Scholars note that collaboration can be hindered by sectoral ego, weak leadership, unclear accountability, and institutional rigidity (O'Leary & Bingham, 2009). These challenges are particularly acute in contexts where lead organisations lack formal authority over participating actors, as is often the case in coordinative agencies. (O'Leary et al. 2010). This highlights the importance of understanding collaboration as an institutional capacity-building process rather than merely a participatory arrangement.

Institutional Capacity in Public Sector Organisations

Institutional capacity refers to the ability of public organisations to perform their mandated functions effectively by mobilising resources, coordinating actors, and adapting to dynamic governance environments. Grindle and Hilderbrand (1995) conceptualise capacity as a multidimensional construct encompassing institutional arrangements, human resources, organisational processes, networks, and the broader policy environment. Similarly, Wu et al. (2015) emphasise that policy capacity extends beyond technical expertise to include analytical, operational, and political capabilities.

In collaborative governance settings, institutional capacity is increasingly shaped by relational and network-based capabilities. Lead organisations must function as boundary spanners that connect actors across institutional, sectoral, and territorial boundaries (Howlett et al., 2020). This role requires skills in coordination, negotiation, facilitation, and information management rather than command-and-control authority. Consequently, institutional capacity in such contexts depends on the ability to orchestrate collaboration rather than to impose decisions.

For coordinative agencies like BNPP, capacity constraints are often structural. Limited formal authority, dependence on other institutions' resources, and overlapping mandates can undermine effectiveness. However, scholars argue that these constraints can be mitigated through governance mechanisms that enhance coordination, integration, and alignment among actors (Kekez et al., 2018). Understanding how such mechanisms operate empirically is therefore critical for advancing institutional capacity theory in fragmented governance systems.

Border Governance as a Multidimensional Policy Arena

Border governance literature has evolved significantly from traditional geopolitical perspectives that conceptualise borders as fixed lines of sovereignty. Contemporary border studies emphasise borders as dynamic governance spaces characterised by flows of people, goods, capital, and

information (Brunet-Jailly, 2011; Guo, 2012; Newman, 2016). In this view, border areas are not merely peripheral zones, but central arenas where national, regional, and local governance intersect (Keban, 2014).

Brunet-Jailly (2005, 2011) proposes a multidimensional framework for border governance that integrates market forces, cross-governmental policies, political participation of border communities, and local cultural contexts. This framework underscores the need for governance arrangements that balance security concerns with socio-economic development and community well-being. In practice, however, many developing countries continue to prioritise security-oriented approaches that marginalise development and participatory dimensions.

In Indonesia, border governance is further complicated by decentralisation and regional autonomy. While decentralisation aims to empower local governments and improve service delivery, it has also generated coordination challenges due to fragmented authority and varying institutional capacities across regions. Studies indicate that decentralisation alone has not resolved disparities in border development and, in some cases, has exacerbated policy incoherence (Hadiwijoyo, 2009).

These dynamics highlight the necessity of collaborative governance mechanisms that can integrate central authority with regional autonomy and local participation. Border management agencies operating in such contexts must navigate complex institutional landscapes, making multiparty

collaboration a functional necessity rather than a normative choice.

ICT as an Enabler of Collaborative Governance

The growing literature on digital governance emphasises the transformative potential of information and communication technology (ICT) in public administration. ICT enables governments to enhance transparency, efficiency, and coordination by facilitating real-time communication, data integration, and monitoring across organisational boundaries (Howlett et al., 2020). In collaborative governance contexts, ICT can reduce transaction costs, improve information symmetry, and support collective decision-making.

In geographically remote and institutionally fragmented settings such as border areas, ICT assumes heightened importance. Digital platforms—including integrated reporting systems, surveillance technologies, and inter-agency communication networks—enable for coordination across distances and administrative levels. ICT thus functions not merely as a technical tool but as an institutional enabler that reshapes governance processes and interaction patterns.

However, scholars caution that ICT alone cannot resolve governance challenges. Its effectiveness depends on institutional readiness, human resource capacity, and supportive regulatory frameworks (Wu et al., 2015). In the absence of these conditions, digital initiatives risk reinforcing

existing inequalities and fragmentation. Empirical studies that examine ICT within specific governance contexts are therefore essential for understanding its enabling and constraining effects.

Despite its relevance, empirical research on ICT-enabled collaboration in border governance remains limited. Most studies focus on e-government or digital service delivery rather than on how ICT supports institutional coordination and collaborative capacity. This gap is particularly evident in developing country contexts, where digital infrastructure and institutional capacity vary significantly across regions.

Analytical Framework: Collaboration Mechanisms

Building on collaborative governance, institutional capacity, border governance, and digital governance literature, this study employs an analytical framework based on four collaboration mechanisms: coordination, integration, synchronisation, and simplification. Coordination refers to aligning actors and activities through communication and information exchange. Integration involves harmonising policies, programmes, and institutional roles. Synchronisation ensures that actions and timelines are mutually reinforcing across actors, while simplification aims to reduce procedural complexity and bureaucratic barriers.

These mechanisms operationalise multiparty collaboration as a capacity-building process rather than a static arrangement. They provide a structured

lens for analysing how BNPP navigates institutional fragmentation and leverages ICT to strengthen its coordinating role. By applying this framework to empirical data from West and North Kalimantan, the study seeks to advance theoretical understanding of collaborative governance while offering practical insights for border management institutions.

RESEARCH METHODS

Research Design and Approach

This study adopts a qualitative explanatory research design to examine how multiparty collaboration strengthens the institutional capacity of the National Border Management Agency (BNPP) in managing border areas. A qualitative approach is appropriate given the study's objective to explore governance processes, interaction mechanisms, and institutional dynamics that cannot be adequately captured through quantitative measurement. Qualitative research allows for an in-depth understanding of complex social phenomena within their natural contexts and is particularly suitable for analysing collaborative governance arrangements involving multiple actors, interests, and institutional settings (W. Creswell & D. Creswell, 2018).

The explanatory orientation of this study emphasises not only describing collaborative practices but also explaining how and why specific collaboration mechanisms contribute to institutional capacity strengthening. This design aligns with the study's analytical framework, which conceptualises multiparty collaboration

through four interrelated mechanisms: coordination, integration, synchronisation, and simplification.

Research Sites

The research was conducted in West Kalimantan and North Kalimantan, Indonesia. These provinces were purposively selected due to their strategic geopolitical position as land border regions adjacent to Malaysia and their relevance to national border governance policy. Both provinces host Integrated Border Crossing Posts (Pos Lintas Batas Negara/PLBN) and are actively involved in BNPP-coordinated border management and development programmes. The selected sites represent typical characteristics of Indonesian land border areas, including geographical remoteness, infrastructural limitations, and multi-level governance arrangements involving central, provincial, and district authorities.

Informants and Units of Analysis

The units of analysis in this study consist of organisations and actors involved in multiparty collaboration in border governance. Informants were selected using purposive sampling based on their institutional roles, responsibilities, and direct involvement in border management and development activities. This sampling strategy ensured that data were obtained from actors with relevant knowledge and experience of collaborative governance processes.

Key informants included: (1) officials from the National Border Management Agency (BNPP); (2) officials from Provincial and District Border Management Agencies (BPPD); (3) heads and staff of Integrated Border Crossing Posts (PLBN); (4) representatives of sectoral agencies operating at border posts, such as customs, immigration, health quarantine, and agricultural quarantine; (5) local government officials and community leaders in border sub-districts; (6) academics and university representatives involved in research and community service programmes in border areas; and (7) representatives of micro, small, and medium enterprises (MSMEs) and other local economic actors. This diversity of informants enabled a comprehensive examination of multiparty collaboration across sectors and governance levels.

Data Collection Techniques

Data were collected between August and November 2024 using multiple qualitative data collection techniques to enhance depth and credibility. First, in-depth semi-structured interviews were conducted with key informants. Interview guides were designed to explore perceptions, experiences, and institutional practices related to multiparty collaboration, coordination challenges, and the role of ICT in border governance. Semi-structured interviews allowed flexibility to probe emerging themes while maintaining consistency across interviews.

Second, direct field observations were undertaken at selected border

locations, particularly at PLBN facilities and surrounding border communities. Observations focused on interaction patterns among institutions, coordination practices, use of ICT tools, and day-to-day governance activities related to border management. Field notes were systematically recorded to capture contextual insights that complemented interview data.

Third, focus group discussions (FGDs) were conducted with local stakeholders, including community representatives, local officials, and economic actors. FGDs were used to validate preliminary findings, capture collective perspectives, and identify shared challenges and expectations related to border governance. Finally, secondary data were collected through document analysis of laws, regulations, policy documents, institutional reports, and relevant academic literature to contextualise and triangulate primary data.

Data Analysis

Data analysis followed an interactive qualitative analysis process. All interviews and FGDs were transcribed verbatim. The transcripts and field notes were then subjected to systematic coding to identify recurring concepts and themes. Open coding was initially applied to capture key ideas emerging from the data, followed by axial coding to group related codes into broader analytical categories.

The analytical categories were aligned with the study's four collaboration mechanisms: coordination, integration, synchronisation, and simplification. Pattern matching and thematic analysis were

employed to link empirical findings with the analytical framework and research questions. Manual data processing was applied throughout the analysis to allow close engagement with the data and iterative refinement of interpretations.

Trustworthiness and Ethical Considerations

To ensure the trustworthiness of the findings, this study employed several validation strategies. Source triangulation was applied by comparing data from interviews, observations, FGDs, and documents. Informant triangulation was achieved by engaging actors from different institutional backgrounds and governance levels. Member checking was conducted through follow-up communications with selected informants to confirm interpretations and clarify ambiguities. In addition, expert triangulation involving academics with expertise in governance and border studies was used to enhance analytical rigour (Denzin & Lincoln, 2018).

Ethical considerations were observed throughout the research process. Informants were informed about the purpose of the study, and participation was voluntary. Anonymity and confidentiality were maintained by removing identifying information from transcripts and reports.

RESULTS AND DISCUSSION

Multiparty Collaboration in Border Governance: Empirical Overview

The empirical findings demonstrate that border governance in West and

North Kalimantan involves a complex constellation of actors operating across multiple governance levels and sectors. These actors include central government institutions coordinated by BNPP, provincial and district border management agencies (BPPD), sectoral agencies operating at Integrated Border Crossing Posts (PLBN), local governments, community actors, academics, and limited private sector participants. While formal institutional arrangements for collaboration exist, their effectiveness varies significantly depending on coordination capacity, institutional alignment, and enabling resources.

BNPP occupies a central position within this governance network as a coordinating institution mandated to align border management and development policies. However, its limited formal authority constrains its ability to directly command other institutions. As a result, BNPP's institutional capacity relies heavily on collaborative governance mechanisms that facilitate alignment, cooperation, and collective action among diverse stakeholders. The findings reveal that this capacity is operationalised through four interrelated mechanisms: coordination, integration, synchronisation, and simplification.

Coordination as a Foundational Mechanism

Coordination emerges as the most fundamental mechanism underpinning multiparty collaboration in border governance. BNPP facilitates coordination through both formal and informal channels,

including inter-agency meetings, reporting systems, and hierarchical communication pathways linking central, provincial, and district institutions. These arrangements aim to reduce fragmentation and ensure that border-related information flows effectively across governance levels.

The use of information and communication technology (ICT) significantly enhances coordination capacity. Digital reporting systems, WhatsApp coordination groups, and real-time monitoring tools such as CCTV and digital dashboards enable rapid information exchange regarding border crossings, security incidents, logistical challenges, and development needs. These tools are particularly valuable given the geographical remoteness and infrastructural limitations of border areas.

Nevertheless, coordination remains uneven. Differences in ICT infrastructure quality, digital literacy, and organisational capacity across regions constrain consistent implementation. Local-level actors often face limitations related to internet connectivity and human resource skills, which reduce the effectiveness of digital coordination mechanisms. Despite these challenges, ICT-supported coordination represents a critical advancement compared to previous reliance on fragmented and delayed communication channels.

Integration of Programmes and Institutional Roles

Integration refers to the alignment and harmonisation of policies, programmes, and institutional roles among stakeholders

involved in border governance. The findings indicate that integration is more advanced among government actors than between government and non-state actors. Vertical integration between BNPP and regional BPPD is facilitated through shared planning frameworks, policy documents, and coordinated development programmes.

However, integration across sectors and non-state actors remains limited. Private sector involvement is largely confined to investment activities without systematic incorporation into governance processes. Similarly, community and civil society actors primarily engage in monitoring, local conflict resolution, and informal consultations rather than structured policy participation. This limited integration reflects the absence of institutionalised mechanisms for non-state actor engagement within BNPP's governance framework.

The findings suggest that integration is constrained not only by institutional design but also by differing priorities and incentive structures among actors. While government institutions prioritise administrative compliance and policy coherence, private and community actors emphasise economic opportunity and social welfare. Without formal integration mechanisms, these divergent priorities limit the potential benefits of multiparty collaboration (Clarke & MacDonald, 2019).

Synchronisation of Actions and Policy Cycles

Synchronisation involves aligning the timing, sequencing, and implementation

of programmes and activities across institutions to ensure coherence and mutual reinforcement. The study finds that synchronisation is partially achieved through centralised planning cycles and ICT-enabled reporting systems that allow BNPP to monitor ongoing activities across regions.

Despite these efforts, synchronisation challenges persist due to differences in institutional mandates, budget cycles, and operational priorities. Sectoral agencies often operate according to their own timelines and performance indicators, which may not align with BNPP-coordinated plans. These discrepancies can result in delayed implementation, overlapping initiatives, or gaps in service delivery.

ICT tools help mitigate synchronisation challenges by increasing transparency and enabling faster feedback loops. Real-time reporting allows BNPP to identify misalignments and initiate corrective coordination. However, ICT alone cannot fully overcome structural constraints arising from fragmented authority and regulatory rigidity. Effective synchronisation, therefore, requires both technological support and institutional commitment to shared planning and accountability.

Simplification of Collaborative Procedures

Simplification focuses on reducing procedural complexity and bureaucratic barriers that hinder effective collaboration. The findings indicate that BNPP has

initiated efforts to simplify coordination and reporting processes through digitalisation. Standardised reporting formats, streamlined communication channels, and centralised information systems have reduced administrative burdens and improved efficiency.

Nonetheless, simplification remains constrained by overlapping legal mandates and rigid regulatory frameworks governing border management. Multiple laws, regulations, and ministerial decrees create procedural complexity that limits BNPP's ability to streamline collaborative processes fully. As a result, simplification efforts often operate within narrow administrative boundaries rather than addressing systemic fragmentation.

The findings underscore that simplification is not merely a technical exercise but an institutional challenge that requires regulatory harmonisation and political support. Without such reforms, procedural complexity will continue to undermine collaborative capacity despite technological advancements.

ICT as an Institutional Enabler of Collaborative Capacity

Across all four mechanisms, ICT functions as a critical institutional enabler rather than a standalone solution. ICT enhances BNPP's boundary-spanning capacity by facilitating communication, information sharing, and monitoring across organisational and geographical boundaries. By reducing transaction costs and improving information symmetry, ICT strengthens BNPP's ability

to coordinate actors despite limited formal authority.

However, the enabling role of ICT is contingent on institutional readiness, human resource capacity, and supportive governance arrangements. Where these conditions are absent, digital tools risk reinforcing existing inequalities and fragmentation. The findings therefore support arguments in digital governance literature that technology must be embedded within broader institutional reforms to achieve transformative impact.

Theoretical and Practical Implications

From a theoretical perspective, this study contributes to collaborative governance literature by demonstrating how a coordinative public agency can strengthen institutional capacity through structured collaboration mechanisms supported by ICT. The findings extend institutional capacity theory by highlighting relational and network-based capacities as critical dimensions in fragmented governance systems.

Practically, the results suggest that strengthening BNPP's role requires a strategic focus on institutionalising collaboration mechanisms rather than expanding hierarchical authority. Policies should prioritise enhancing coordination infrastructure, formalising non-state actor participation, harmonising regulatory frameworks, and investing in ICT capacity at the local level. These measures can collectively improve the effectiveness and sustainability of border governance.

CONCLUSION

This study demonstrates that strengthening the institutional capacity of the National Border Management Agency (BNPP) in managing border areas depends less on the expansion of formal hierarchical authority and more on the effectiveness of multiparty collaborative governance mechanisms. In the context of border management in West and North Kalimantan, BNPP operates within a highly fragmented governance environment characterised by overlapping mandates, sectoral autonomy, and multi-level institutional arrangements. Under such conditions, BNPP's capacity is shaped primarily by its ability to coordinate, align, and mobilise diverse actors rather than to directly command them.

The findings reveal that multiparty collaboration strengthens BNPP's institutional capacity through four interrelated mechanisms: coordination, integration, synchronisation, and simplification. Coordination enables information exchange and alignment among actors; integration harmonises policies, programmes, and institutional roles; synchronisation ensures coherence in timing and implementation; and simplification reduces procedural complexity that often undermines collaboration. Together, these mechanisms function as a governance architecture that allows BNPP to perform its boundary-spanning role effectively despite limited formal authority.

A central contribution of this study is the identification of information and communication technology (ICT) as a

critical institutional enabler of collaborative capacity. ICT enhances communication, reduces fragmentation, and supports both vertical and horizontal coordination across geographically dispersed border areas. However, the study also confirms that ICT alone is insufficient to resolve governance challenges. Its effectiveness depends on institutional readiness, human resource capacity, and supportive regulatory frameworks. Without these conditions, digital tools risk reinforcing existing inequalities and coordination failures.

Policy Implications

The findings yield several policy implications for strengthening border governance in Indonesia. First, border governance policies should explicitly recognise BNPP as a collaborative coordinator rather than merely an administrative institution. Strengthening BNPP's mandate to convene, integrate, and synchronise sectoral and regional programmes is more critical than expanding its hierarchical authority.

Second, the institutionalisation of non-state actor participation should be prioritised. Formal mechanisms for engaging private sector actors, civil society organisations, and border communities—such as structured consultation forums and partnership frameworks—can enhance inclusivity, legitimacy, and sustainability in border development initiatives.

Third, continued investment in ICT infrastructure and digital governance systems is essential, particularly at the local level. Such investments should be accompanied

by capacity-building programmes to ensure effective utilisation and to reduce disparities in digital readiness across regions.

Limitations of the Study

This study has several limitations. The empirical analysis focuses on two land border provinces, which may limit the generalizability of the findings to other border contexts in Indonesia, such as maritime border regions. In addition, the qualitative research design prioritises depth of analysis over breadth and does not quantitatively measure collaboration outcomes or development impacts.

Directions for Future Research

Future research could adopt comparative or mixed method approaches to examine collaborative border governance across different regions or countries. Quantitative assessments of collaborative performance and long-term socio-economic and security outcomes would complement the qualitative insights offered in this study. Further research may also explore the role of leadership, political dynamics, and regulatory reform in sustaining ICT-enabled collaborative governance in border areas.

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REFERENCES

- Ahmed, K., & Lee, S. (2024). Game theory applications in multi-party negotiations: A review. *Negotiation Journal*, 38(3). <https://doi.org/10.1111/nejo.12345>
- Ansell, C., & Torfing, J. (2014). *Public innovation through collaboration and design*. Routledge. <https://doi.org/10.4324/9780203795958>
- Banerjee, A., Murphy, E., & Walsh, P. P. (2020). Perceptions of multistakeholder partnerships for the sustainable development goals: A case study of Irish non-state actors. *Sustainability*, 12(21), 8872. <https://doi.org/10.3390/su12218872>
- Brunet-Jailly, E. (2005). Theorising borders: An interdisciplinary perspective. *Geopolitics*, 10(4), 633-649.
- Brunet-Jailly, E. (2011). Special section: Borders, borderlands and theory: An introduction. *Geopolitics*, 16(1), 1-6. <https://doi.org/10.1080/14650045.2010.493765>

- Bryson, J. M., & Crosby, B. C. (2006). The design and implementation of cross-sector collaborations: Propositions from the literature. *Public Administration Review*, 44-55. <https://doi.org/10.1111/j.1540-6210.2006.00665.x>
- Clarke, A., & MacDonald, A. (2019). Outcomes to partners in multi-stakeholder cross-sector partnerships: A resource-based view. *Business & Society*, 58(2), 298-332. <https://doi.org/10.1177/0007650316660534>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Daldjoeni, N. (1991). *Dasar-dasar geografi politik*. Citra Aditya Bakti.
- Denzin, N. K., & Lincoln, Y. S. (2018). *The SAGE handbook of qualitative research* (5th ed.). SAGE Publications.
- Gray, B., & Purdy, J. M. (2018). *Collaborating for our future: Multistakeholder partnerships for solving complex problems*. Oxford University Press.
- Gray, B., Purdy, J., & Ansari, S. (2022). Confronting power asymmetries in partnerships to address grand challenges. *Organization Theory*, 3(2). <https://doi.org/10.1177/26317877221098765>
- Grindle, M. S., & Hilderbrand, M. E. (1995). Building sustainable capacity in the public sector: What can be done? *Public Administration and Development*, 15, 441-463. <https://doi.org/10.1002/pad.4230150502>
- Guo, R. (2012). *Cross-border resource management: Theory and practice* (2nd ed.). Elsevier. <https://doi.org/10.1016/B978-0-08-098319-6.00004-2>
- Hadiwijoyo, S. S. (2009). *Batas wilayah negara Indonesia: Dimensi, permasalahan dan strategi penanganan*. Gava Media.
- Howlett, M., Ramesh, M., & Perl, A. (2020). *Studying public policy: Principles and processes* (4th ed.). Oxford University Press.
- Keban, Y. T. (2014). *Enam dimensi strategis administrasi publik* (3rd ed.). Gava Media.
- Kekez, A., Howlett, M., & Ramesh, M. (2018). Varieties of collaboration in public service delivery. *Policy Design and Practice*, 1(4), 243-252. <https://doi.org/10.1080/25741292.2018.1532026>
- Lawrence, A., Weber, J., Van der Heijden, H., & Wasieleski, D. M. (2023). *Business and society: Stakeholders, ethics, public policy*. McGraw-Hill.
- Newman, D. (2016). Contemporary research agendas in border studies: An overview. In D. Wastl-Walter (Ed.), *The Ashgate research companion to border studies* (pp. 33-48). Routledge.
- O'Leary, R., & Bingham, L. B. (2009). *The collaborative public manager*. Georgetown University Press.
- O'Leary, R., Van Slyke, D., & Kim, S. (2010). *The future of public administration around the world*. Georgetown University Press.
- Saiman, S. (2017). Kepentingan pemerintah pusat dalam pembangunan infrastruktur perbatasan Kalimantan Indonesia-Malaysia. *Jurnal Sosial Politik*, 3(1), 142-160. <https://doi.org/10.22219/sospol.v3i1.4405>
- Torring, J. (2019). Collaborative innovation in the public sector: The argument. *Public Management Review*, 21(1), 1-11. <https://doi.org/10.1080/14719037.2018.1430248>
- Wu, X., Ramesh, M., & Howlett, M. (2015). Policy capacity: A conceptual framework for understanding policy competences and capabilities. *Policy and Society*, 34(3-4), 165-171. <https://doi.org/10.1016/j.polsoc.2015.09.001>

Continuance Intention of Users to Use E-Learning in Professional Qualification Certification: A PRISMA-based Systematic Literature Review

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ABSTRACT

This paper aims to identify and analyse the key factors that affect the continuance intention of users to use e-learning for professional qualification certification and conduct a comprehensive review of the main research results in the literature. While systematic reviews on e-learning continuance intention exist, few specifically focus on the unique context of professional certification, which is characterised by exam-driven pressures and career-oriented motivations. This study addresses this gap. The study adopts the systematic literature review (SLR) method, draws on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, and retrieves relevant articles from electronic databases such as Web of Science, Scopus, Emerald, and Science Direct. The research focuses on key factors and user characteristics. The results of the systematic analysis show that the main factors affecting the continuance intention of users include: (1) the

technical quality and functionality of the learning platform, system usability, platform functions and technical support; (2) users' internal learning motivation and demand for professional certification; (3) the quality of course design, customisation flexibility and learning efficiency; (4) social influence, the construction of learning community and environment factors have a significant effect on user emotions and resource security. The study provides detailed, context-specific optimisation suggestions for e-learning system designers and educational institutions.

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Improving technical performance, enhancing course design, and strengthening social support can significantly improve users continued use intention, especially in the rapidly changing environment after the epidemic.

Keywords: Continuance intention, e-learning, Prisma, professional certification, systematic literature review

INTRODUCTION

In the post-epidemic era, e-learning has transformed from a short-term alternative to traditional education to a long-term, effective learning model, demonstrating its lasting impact in the field of modern education. With the advancement of technology, e-learning has proven to be not only an emergency measure but also an important part of the future of education (Li, 2022). With the increasing attention paid to the Sustainable Development Goals (SDGs) and the concept of lifelong learning in global education, e-learning provides a new opportunity to achieve this goal (Holmes et al., 2022). For students of professional qualification certificates, the study of their continuance intention to use e-learning is crucial. E-learning provides a flexible and efficient learning environment for professional qualification certification. By providing a rich variety of teaching videos, interactive simulations, and assessment tools, students can learn independently according to their tight schedules, which is particularly suitable for working people who need to find a balance between work and study (Xavier & Meneses, 2022). At the same time, e-learning systems are often equipped with intelligent algorithms, which can provide personalised learning paths to meet the needs of different students

and improve the efficiency of learning (Liu et al., 2023). E-learning is very cost-effective. It can reduce expenses such as venues, transportation, and materials, while providing free or low-cost course options, so that more learners can easily obtain the required knowledge (Meryem et al., 2023).

Considering the development of e-learning, modern professional qualification students also face other challenges in the learning process. Unstable network connections and equipment failures seriously threaten the learning experience. For students with low technical skills, the highly technology-dependent e-learning environment poses additional difficulties (Kassymova et al., 2020). In addition, many e-learning courses are not accredited by formal educational institutions, which also has a negative impact on students' academic recognition (Groome & Cunningham, 2024). There are also obvious problems with the user experience of e-learning platforms, such as complex operation processes, which further reduce students' learning enthusiasm (Nedungadi & Raman, 2012). Inaccuracy of information and outdated content are challenges that e-learning platforms need to face (Sun et al., 2008). With the widespread application of e-learning platforms, data security and user privacy issues have become more important.

Once students' personal information and learning data are leaked, it will affect their learning motivation (Anwar, 2021). In addition, some students are sceptical about e-learning due to their distrust of e-learning methodology, and they prefer traditional face-to-face teaching methods (Terblanche & Lubbe, 2024). Long-term e-learning also requires students to have a high degree of self-motivation and good time management skills, but many students may find it difficult to continue learning in an environment without external supervision (Al-Awlaqi & Aamer, 2022).

Many problems have made us focus on how to enable users of professional qualification certificates to use them from short-term replacement in the post-epidemic era to long-term use, which requires exploring users' continuance use intentions, as well as their attitudes and preferences for e-learning. Through a review of relevant literature, this study can gain a deeper understanding of users' needs in using e-learning.

Continuance Intention refers to a user's intention and tendency to continue using a service or product after their initial experience. In the e-learning environment, it reflects students' psychological state and behavioural tendencies to continue participating in and using a specific online learning model or platform (Rabaa'i et al., 2021). The study of continuance intention originated from information systems and consumer behaviour theory. Initially, it focused on how user satisfaction affects their continuance intention. A solid theoretical

foundation underpins this concept, primarily drawn from models such as the Expectation-Confirmation Model (ECM) (Khan & Saleh, 2023), the Technology Acceptance Model (TAM) and its extensions (Tbaishat et al., 2026), and the Unified Theory of Acceptance and Use of Technology (UTAUT/UTAUT2) (Scharron, 2025). Furthermore, Self-Determination Theory (SDT) (Zhou & Zhang, 2024) provides insights into the role of intrinsic and extrinsic motivation. Building upon this foundation, the theoretical roots of continuing intention research extend back to foundational work conducted well before 2020. Bhattacharjee (2001) pioneered the application of the Expectation-Confirmation Model (ECM) to information systems, proposing the IS continuance model, which remains a cornerstone of the field. Subsequently, researchers integrated ECM with models like TAM and the Theory of Planned Behaviour (TPB) to create more comprehensive frameworks (Hsu et al., 2004). Nabavi et al. (2016), in their systematic review of 191 studies on information technology continuance intention published between 2001 and 2014, demonstrated the sustained growth of this research stream and the establishment of expectation confirmation, perceived usefulness, satisfaction, and habit as core variables.

As e-learning diversified, research in the years immediately preceding the pandemic expanded these foundational insights into new contexts. Zhou (2017) extended the ECM to examine learners' continuance intention in MOOCs for online collaborative

learning, finding that knowledge outcome, social influence, and satisfaction were significant predictors. S. Yang et al. (2019), drawing on self-determination theory, investigated mobile learning continuance among Chinese college students, revealing that perceived learning support, self-management of learning, and peer influence significantly affected learning involvement and subsequently continuance intention. Dai et al. (2020) further advanced the field by incorporating habit and perceived MOOC performance into an extended ECM framework, revealing that habit was a significant determinant of continuance intention beyond the traditional cognitive factors. Collectively, these studies not only validated earlier theoretical frameworks across new contexts (mobile learning, MOOCs, diverse cultural settings) but also introduced novel constructs such as metacognition, habit, and interactivity, thereby enriching the theoretical landscape.

While these theories are widely applied in general e-learning contexts, their specific interplay and relative importance in the goal-oriented, high-stakes environment of professional qualification certification remain underexplored. Based on theories such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), users' perceived ease of use, perceived usefulness, and satisfaction will directly affect their continuance intention (T. Yang et al., 2023). Educational institutions and learning platforms can take a series of measures to improve users' continuance

intention (Sitar-Tăut, 2024). Although several systematic literature reviews have examined continuance intention in broader e-learning or MOOC contexts (Alshammari et al, 2024; Romadhon et al, 2023), there is a scarcity of reviews focussing specifically on professional qualification certification. At present, there are few literature reviews on the continuance intention of e-learning for professional certificate students, especially SLR. This review aims to fill this gap by synthesising post-pandemic literature (2021-2024) to uncover factors unique to this context, such as exam pressure, certification value, and career advancement motives, thereby offering distinct insights beyond general e-learning reviews. This article will analyse the factors affecting users' continuance intention from the perspective of the post-epidemic era.

Therefore, the main research question designed in this paper is: What factors in e-learning affect the continuance use intention of professional certificate students? In the field of professional certification, a deep understanding of the continuance use intention of e-learning users is the key to promoting research development (Lee, 2010; Zhang et al., 2017). Clarifying this research question will not only help find the motivation for continuance participation in the e-learning environment but also provide a theoretical basis for designing more effective learning platforms. The systematic literature review in accordance with the PRISMA model has been used to address this research question to provide educational institutions and policymakers

with insights into the underlying factors impacting the continuance use of e-learning.

METHODOLOGY

The PRISMA is an established set of reporting guidelines that form the academic literature's methodological underpinning of systematic reviews and meta-analyses (Lee, 2010; Sun et al., 2008). The current study attempts to identify significant determinants of e-learning continuance intention in professional certification students through a systematic review of 22 empirical studies. Thus, this study aims to investigate the following research question: "What are the factors of e-learning that impact the continuance use intention of students for professional certificates? By synthesising extant findings, this study deepens our understanding of the complex e-learning continuance behaviour, especially in professional certification contexts, and guides future research pathways.

To ensure the analytical manageability and focus of the review, the selection remained tight with clear parameters. Only articles from 2021 to 2024, which covered post-pandemic education trends, were included—English-language publications only, with no geographical limitation (extensive coverage, ideally worldwide). We acknowledge that excluding non-English literature may introduce a selection bias, potentially overlooking relevant studies from non-English speaking regions. Furthermore, studies were excluded based on the following methodological and relevance criteria: (1) the research topic

was irrelevant to the core focus of this review, specifically, studies not centered on e-learning for professional, vocational, or career-oriented certification; (2) the studies exhibited fundamental methodological limitations, such as an unsound scientific premise or an insufficient sample size for quantitative studies, this was defined as a sample size below 100 (White, 2022). This threshold was chosen as smaller samples may lack statistical power for the complex multivariate analyses commonly used in this field, potentially yielding unstable parameter estimates (Lakens, 2022). For qualitative studies, the assessment was based on the depth and justification of the sample (Hennink & Kaiser, 2022); and (3) the publications were non-peer-reviewed or duplicates. Ultimately, the goal is to provide deep insights into the use of e-learning resources, with recommendations for institutions and policymakers. Our systematic exploration aims to enhance professional education and qualification certification systems through deeper academic scrutiny and research focused on Professional Education and Certification. We strive to frame and foster the ongoing and emerging trends in standards and qualification frameworks in an educational environment through methodological discourse.

The literature review encompassed multiple electronic research repositories, strategically selecting platforms such as Emerald, Science Direct, Scopus, Web of Science, and IEEE Xplore. These databases provide extensive scholarly resources,

enabling a multidisciplinary exploration of relevant research literature across various academic and professional fields.

Strategic Systematic Searching for Articles of Selection Process Identification

Researchers then identified relevant academic literature addressing user continuance intention in the context of e-learning for professional qualification certificates as part of the systematic literature review's initial phase. This identification stage started by identifying key research keywords (i.e., relevant terms associated with the subject being examined). For the purpose of selecting the main keywords, we chose the keywords "e-learning", "continuance use intention", "professional qualification certificate", and "user participation", with an additional search for potential synonyms.

Consultation with dictionaries, thesauruses, encyclopedias, and prior research publications illustrated an expanded keyword search. This strategy provided complete retrieval of literature reflecting different semantic expressions. The keywords were broadened to include terms like "online learning", "digital education", and "virtual learning" for "e-learning".

Similarly, "continuance use intention" was expanded to include similar terms, such as "Continuing Intentions", "continuous use", and "long-term Use". Other terms that were added to the already diverse terminology describing "occupational qualification certificate" and user involvement were abbreviations like "Occupational

License Accreditation", "virtual learning environment", "occupational certification programme", "workplace qualification validation", and "e-education". This broad inclusion criterion allowed for a more comprehensive and refined literature search. After assembling a comprehensive list of keywords and synonyms, we constructed search strings to guide the systematic search in multiple databases. These search strings used logical operators (AND, OR, NOT) to effectively combine keywords. The search strings were constructed as follows:

("E-Learning Continuance Intention" OR "Continuing Intentions in Online Education" OR "E-Learning Engagement" OR "Online Learning Satisfaction" OR "Long-term Use of Online Learning Platforms" OR "Continuity of Online Education" OR "Factors Influencing E-Learning Continuance" OR "Online Learning Sustainability") AND ("Occupational License Accreditation" OR "Virtual Learning Environment" OR "Occupational Certification Programme" OR "Workplace Qualification Validation" OR "E-Education")

Screening

To maintain research rigour and precision, we established comprehensive screening criteria for article selection. Inclusion criteria include: the selected articles must be English journal articles published between 2021 and 2024 to ensure that the research results can

reflect the trend of the post-epidemic era; the scope of literature research covers the world and is not restricted to specific regions (Figure 1). Exclusion criteria include non-journal articles, non-English language articles, literature published before 2020, irrelevant research topics, lack of scientific rigour or lack of rigorous methodology, and literature with too small a sample size or not peer reviewed. At the same time, for possible duplicate articles in the database,

strict duplication was carried out during the screening process. In the preliminary screening stage, the research team used four electronic databases, Emerald, Science Direct, Scopus, and Web of Science (WoS), to search for relevant literature by keywords, and retrieved a total of 170 documents, and removed 6 duplicate records. The remaining 164 documents entered the further screening stage.

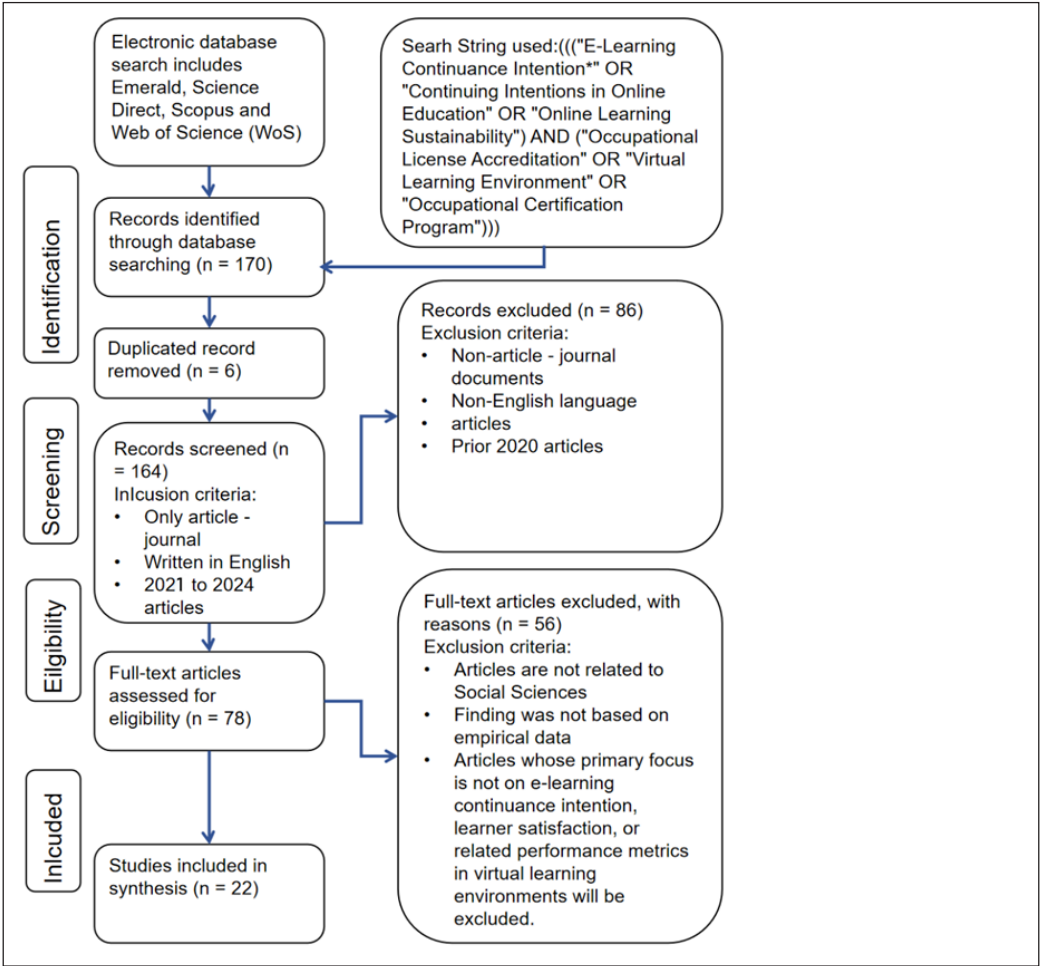


Figure 1. Identification of studies via databases and registers from PRISMA 2020

During the initial screening process, the literature was screened according to the following inclusion and exclusion criteria: the inclusion criteria included only selecting articles published in journals, and these articles must be written in English and published between 2021 and 2024; the exclusion criteria included non-journal articles, articles not written in English, and literature published before 2020. In the end, a total of 86 articles were excluded, and only 78 articles entered the next stage of full-text reading and in-depth analysis.

Eligibility

During the full text evaluation stage, the research team conducted an in-depth analysis of 78 articles, focusing on the title, abstract, and main content of the articles to ensure that they met the inclusion criteria of the review. The exclusion criteria included the following: first, articles whose research topics were not related to the field of social sciences, specifically, studies not within education, information systems, psychology, or management domains relevant to technology adoption; second, articles whose research findings were not based on empirical data; third, articles whose core focus did not involve e-learning continuance use intention, learner satisfaction, or performance indicators related to virtual learning environments. Following the rigorous screening process, 22 articles successfully passed the selection criteria and were subsequently incorporated into the comprehensive analytical review, with 56 articles being eliminated during the initial screening phase.

Data Extraction

Summary data from the 22 included studies were abstracted systematically using a standard data extraction form. Data extracted included the author(s) and year, country, study design, sample description, theoretical background adopted, primary independent and dependent variable of interest, as well as main findings related to continuance intention. Synthesis was conducted using thematic analysis. Initially, determinants of continuance intention were inductively coded from the results sections. These codes were clustered to derive themes through an iterative approach of discussion and consensus among researchers, which resulted ultimately in the formation of four main themes and twelve sub-themes described in the results section.

Quality Assurance

The research involved the use of an expert evaluation panel consisting of four experts in the fields of online learning research, organisational behaviour, and professional education. Specialists carried out extensive evaluations of candidate articles using the PRISMA framework. To ensure consistency and resolve discrepancies, the team held calibration meetings to establish a common interpretation of the inclusion/exclusion criteria. Key criteria included a clear sample definition, valid and reliable measurement of outcomes, appropriate statistical analysis, and management of confounding factors. All studies met the basic threshold for inclusion. For articles where initial screening decisions differed, a consensus was reached through

discussion. This process enhances inter-coder reliability. The selection of the articles required consensus between the assessment team. They analysed and deliberated articles with any divergent opinion, including those that fulfilled the study's aims and methods with respect to research. This strong evaluation strategy added to the study's scientific robustness as well as credibility.

RESULTS

According to this systematic literature review based on the PRISMA method, the geographical coverage of the research is wide, involving multiple countries and regions, mainly concentrated in Asia, the Middle East, Europe, and North America (Figure 2). A total of 6 studies were conducted in India, which is the country with the largest number of studies in this review (Deshpande et al., 2024; Ghosh & Patra, 2024; Shah & Khanna, 2024a; Lexman et al., 2024; Deshmukh & Mehta, 2024). The predominance of Indian research could be explained by the huge size of online education in the country, large number of academics being proficient in English and great emphasis on IT and professional skill certification. A total of 4 studies were conducted in China, focusing on the application of learning management systems (LMS) and digital education transformation (Cheng, 2024a; Cheng, 2024b; C. Wang, 2024; Y. Wang, 2023). Three studies were conducted in Malaysia, focusing on learner behaviour and technology support in e-learning platforms (Sokro, 2024; Tee,

2024; Mohamad et al., 2024). One study was conducted in Saudi Arabia, exploring the impact of cultural factors on the adoption of learning technologies (Al-Mamary et al., 2023). One study was conducted in the Philippines, focusing on the experience of using e-learning platforms in developing countries (Himang et al., 2023). One study was conducted in Somalia, analysing learner engagement in the context of scarce local technology resources (Kineber et al., 2024). One study was conducted in Pakistan, studying the relationship between the adoption of e-learning technology and sociocultural support (Miao et al., 2024). One study was conducted in each of the following countries, focusing on different aspects of e-learning: Canada (Cocosila, 2024), Ghana (Sokro, 2024), Romania (Sitar-Tăut et al., 2024), Europe (Sobodić et al., 2024), Thailand (Puriwat and Tripopsakul, 2021), and Malta (Fiorini et al., 2022).

It can be observed that the research is concentrated between 2021 and 2024 (Figure 3), especially in the post-epidemic period (2023-2024), when the relevant research has increased significantly. One study was published in 2021 (Puriwat and Tripopsakul, 2021). One study was published in 2022 (Fiorini et al., 2022). Three studies were published in 2023, the year with the most studies (Himang et al., 2023; Wang, 2023; Al-Mamary et al., 2023). Seventeen studies were published in 2024 (Kineber et al., 2024; Sobodić et al., 2024; Ghosh & Patra, 2024; C. Wang, 2024; Sitar-Tăut et al., 2024; Sokro, 2024; Cocosila, 2024; Lexman et al., 2024; Mohamad et al., 2024; Deshpande

et al., 2024; Shah & Khanna, 2024a; Shah et al., 2024b; Miao et al., 2024; Tee, 2024; Cheng, 2024a; Cheng, 2024b; Deshmukh & Mehta, 2024). Most studies focus on a single country context, analysing the unique impact of culture, economy, and technology on e-learning. India focuses on improving professional skills through MOOCs (massive open online courses) and micro-certification technology. China explores the role of media richness and interactivity in promoting learners' continuous learning behaviour. Malaysia studies the application of learning management systems based on the UTAUT model (Unified Theory of Technology Adoption Model).

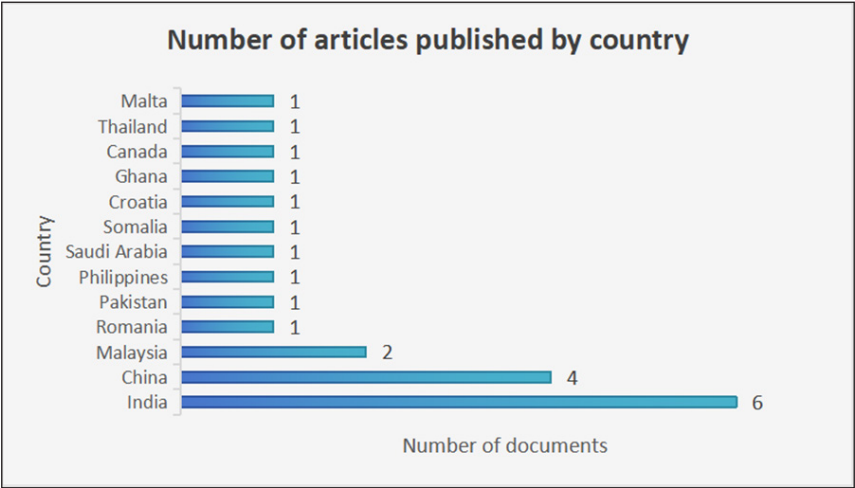


Figure 2. Countries where the studies were conducted

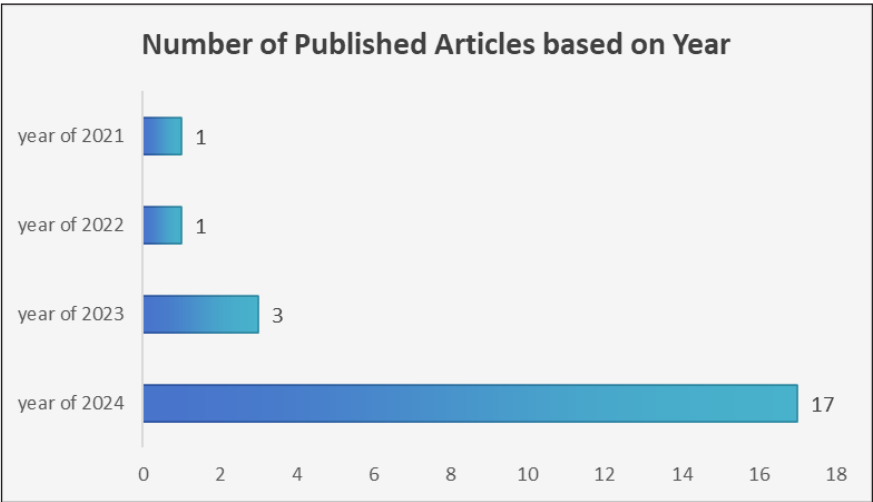


Figure 3. Year of publication

Some studies attempt to make regional comparisons. Sobodić et al. (2024) studies usability factors in the field of digital skill acquisition.

In addition, the research subjects include higher education students, working professionals, and mixed sample groups (Table 1). The research time range is concentrated from 2021 to 2024, and the regions involved include China, India, Malaysia, Saudi Arabia, Canada, and other countries, reflecting the global attention to the use of online learning platforms and user behaviour patterns. These studies analyse different user groups, some focus on specific groups (such as students or professionals), and some analyse cross-group behaviour patterns through mixed samples.

Main Finding and Synthesis

Based on the results of previous studies, this study identified four themes and twelve sub-themes, which are summarised in Tables 2, 3, and 4. Rather than merely describing individual study findings, a synthesis reveals several key patterns and comparisons. The study found that the continuance intention of users is affected by a combination of factors, among which perceived usefulness and motivation play a role. Especially after the epidemic, the critical advantages of online learning (course evaluation, emotional support) have significantly increased the user's dependence on the e-learning platform. Specifically, the quality of course design, content flexibility, and system quality have a significant impact on the user's learning experience, which

in turn affects the user's participation. The study found that a high-quality learning experience can significantly improve the user's persistence. For students pursuing vocational qualification examinations, if the platform's course content is more closely integrated with the actual examination requirements and provides a systematic learning path, this directly addresses their primary goal of certification and significantly improves perceived usefulness and learning efficiency. This distinguishes the professional certification context from general e-learning, where the link to a high-stakes exam is less pronounced.

In addition, high levels of interactivity (including human-computer interaction and interpersonal interaction) significantly enhance users' emotions, cognition, and social participation. Learning groups and tutors' online Q&A functions can significantly improve the accuracy of their learning. Through timely feedback and communication, communities and users can feel a higher degree of learning participation, which in turn further increases their intention to continue using. At the same time, the role of users' technical adaptability and positive emotions in online learning cannot be ignored. These factors shape a more stable behavioural foundation in the learning process.

The learning behaviour of vocational qualification students is highly goal-oriented, and they generally face significant time pressure and exam preparation pressure. This pressure directly shapes their demand for and use of online learning platforms.

Table 1
E-learning users and country

Authors	E-learning users	Country
Sitar-Tăut et al. (2024) Y. Wang et al. (2024) Shah & Khanna (2024a) Shah et al. (2024b) Miao et al. (2024) Ghosh & Patra (2024) Al-Mamary et al. (2023) Cocosila, et al. (2024) Puriwat & Tripopsakul (2021)	Higher education students	Romania, China, India, Pakistan, Saudi Arabia, Canada, Thailand
Deshpande et al. (2024) Sobodić et al. (2024) Y. Cheng (2024a) Kineber et al. (2024) Deshmukh & Mehta (2024) Himang et al. (2023)	Working professionals	India, Croatia, China, Somalia, India, Philippines
C. Wang (2024) Y. Cheng (2024b) Tee, et al. (2024) Sokro et al. (2023) Lexman et al. (2024) Mohamad et al. (2024) Fiorini et al. (2022)	Mixed sample population	China, Malaysia, Ghana, India, Malta

Unlike students in general higher education, vocational qualification students have clear exam preparation tasks, and they are more inclined to choose platforms they perceive as capable of effectively improving learning efficiency to meet their exam needs and career development goals. In contrast, there is a positive feedback relationship between intrinsic motivation and exam preparation-driven learning pressure. Students' internal goals are clearer, and if the platform can effectively relieve learning pressure and

improve exam preparation efficiency, it will further strengthen its internal driving force and encourage students to continue using it.

Cross-study Analysis

A meta-synthesis of the included studies provides some valuable insights and patterns. First, while perceived usefulness and satisfaction are universally important constructs, their antecedents and meanings differ between general student populations and working professionals seeking certification.

Table 2
Outcomes of included studies

Authors	Research approach	Data analysis	Findings
Sitar-Tăut et al. (2024)	A quantitative approach through the questionnaire as an instrument	The research involved a survey of 953 university students, employing structural equation modelling (SEM) to assess the relationships between variables and test the proposed hypotheses.	Online learning satisfaction significantly influences students' inclination towards online study and their dropout intentions. Factors such as technological adaptability, health safety, and social isolation shape students' experiences and attitudes in digital education during COVID-19.
Deshpande, et al. (2024)	A quantitative approach through the questionnaire as an instrument	Data from 220 working professionals were analysed using multiple regression analysis and analysis of variance (ANOVA)	The intention to continue pursuing e-learning courses is significantly influenced by three independent variables, namely, perceived usefulness (PU), motivation (MO), and satisfaction (SA). Among them, satisfaction is the most important thing for working professionals, followed by perceived usefulness and motivation.
Y. Wang et al. (2024)	A quantitative approach through the questionnaire as an instrument	The sample size was 270 valid samples, and partial least squares structural equation modelling (PLS-SEM) and importance-performance matrix analysis (IPMA) were used for calculation.	There is a positive relationship between expectation confirmation, perceived usefulness, flow experience, learning self-efficacy and MOOC satisfaction, while perceived usefulness, flow experience, learning self-efficacy and MOOC satisfaction also have a positive impact on continuance use intention.
Shah & Khanna (2024a)	A quantitative approach through the questionnaire as an instrument	1,350 samples were from millennial MOOC users, and partial least squares structural equation modelling (PLS-SEM) was used for data analysis	Satisfaction and continuance intentions in MOOCs are affected by performance expectations, effort expectations, social influence, and personal innovation.
C. Wang (2024)	A quantitative approach through the questionnaire as an instrument	The sample size was 1,350 participants, and confirmatory factor analysis (CFA) was used to assess the fit of the measurement model, and the analysis was based on the two-step method recommended by Anderson and Gerbing (1988).	Personalised learning environments and high learning satisfaction significantly improve the effectiveness of e-learning on platforms like Moodle, compared to traditional methods.

Table 2 (continued)

Authors	Research approach	Data analysis	Findings
Sobodić et al. (2024)	A quantitative approach through the questionnaire as an instrument	The sample size was 353 primary and secondary school teachers from six European countries, and the data analysis used structural equation modelling (SEM) to test the fit of the model and the hypothesised relationships.	Teacher satisfaction and perceived usefulness directly influence the ongoing use of the CRISS platform, with no moderating effects from computer skill level or usage time.
Shah et al. (2024b)	The quantitative research used an online questionnaire survey method.	The sample size was 389 students, and structural equation modelling (SEM) was used for data analysis. Smart PLS 3 software was used to evaluate the measurement model and structural model.	The UTAUT2 model factors like performance expectations and facilitating conditions have a significant positive impact on the learning experience and the intention to continue using, with the sample demographics matching the representative sample.
Cheng (2024a)	Quantitative research, using structural equation model (SEM) for data analysis	A total of 393 questionnaires were analysed using AMOS 5.0 and SPSS 8.0 for structural equation modelling, including confirmatory factor analysis.	Perceived network externalities, personalisation, and sociability in MOOCs positively influence cognitive, psychological, and social learning engagement, enhancing learning persistence.
Tee et al. (2024)	Quantitative research design, using a self-reported questionnaire survey method	A total of 354 valid questionnaires were analysed using AMOS statistical software and SPSS PROCESS macros.	Course design factors such as flexibility, system quality, and content quality significantly impact the learning experience, which mediates learner engagement and influences willingness to pay more, with pleasure during learning strengthening this effect.
Sokro et al. (2023)	Quantitative research design, using a self-reported questionnaire created using Google Forms.	Data from 540 completed responses were processed using the partial least squares structural equation modelling (PLS-SEM) technique with SmartPLS software.	System quality significantly enhances learner success, and learner satisfaction positively affects learner attitudes.
Kineber et al. (2024)	A combination of qualitative and quantitative methods, using the survey method and literature review,	Out of 148 collected student responses, 128 were analysed using partial least squares structural equation modelling (PLS-SEM) and artificial neural network (ANN) methods.	Factors like course design quality, instructor reputation, and student support significantly influence students' continuance intention and satisfaction in MOOCs.

Table 2 (continued)

Authors	Research approach	Data analysis	Findings
Ghosh and Patra (2024)	The study adopted a quantitative research method, combining statistical tests and text mining methods.	The sample of 622 Indian college students was analysed using IBM AMOS 23.0 for covariance-based structural equation modelling (CB-SEM) and bootstrapping for moderation analysis.	Online learning benefits, health considerations, and course assessments significantly affect students' intentions to pursue online education, with positive emotions and trust observed in sentiment analyses.
Lexman et al. (2024)	A combination of qualitative and quantitative.	Partial least squares structural equation modelling (PLS-SEM) was used to analyse 212 samples.	Intrinsic motivation positively correlates with behavioural intention, while extrinsic motivation has a limited impact, and gender differences significantly affect perceptions of self-development and usefulness.
Cheng (2024b)	A quantitative approach through the questionnaire as an instrument	The sample size of 309 was analysed using AMOS 5.0 and SPSS 8.0, employing confirmatory factor analysis and structural equation modelling techniques.	Media richness, human-computer interaction, and human-human interaction positively impact emotional, cognitive, and social learning engagement in MOOCs for medical professionals, contributing to their learning persistence.
Miao et al. (2024)	A quantitative research method was adopted to collect data through a questionnaire survey.	The data were collected from university students in Karachi through convenience sampling methods, and the PLS-SEM technique was used to analyse the data.	Autonomous motivation (AM), perceived usefulness (PUn) and perceived learning (PL) have significant positive effects on attitude towards using technology (AT), and attitude (AT) has a significant positive impact on behavioural intention (BI), but controlled motivation (CM) and perceived challenge (PC) have no significant relationship with AT, and labor market conditions (LMC) fail to moderate the relationship between AT and BI.
Al-Mamary et al. (2023)	A quantitative approach through the questionnaire as an instrument	The study used 445 undergraduates as a sample for a questionnaire survey. The specific calculation method includes structural equation modelling	The study found that effort expectancy (EE), social influence (SN), attitude toward behaviour (ATB), and perceived behavioural control (PBC) were significantly positively correlated with students' intentions to use learning management systems (LMS). In addition, there was a strong relationship between students' intention to use LMS and actual use.

Table 2 (continued)

Authors	Research approach	Data analysis	Findings
Deshmukh and Mehta (2024)	Quantitative research method, using a purposive sampling technique.	The sample size was 386 responses from Indian IT professionals, and the structural equation model (SEM) analysis was conducted using SPSS-AMOS tool.	The study found that performance expectancy (PE), effort expectancy (EE), perceived benefit (PB) and management support (MS) had a strong positive impact on online learning continuation intention (OLCI), while social influence (SI) had no significant effect on OLCI.
Cocosila, et al. (2024)	The study used a cross-sectional online survey method.	Collected data from 247 Canadian students and used partial least squares structural equation modelling (PLS-SEM) for data analysis.	Students' usefulness of online learning, perceived monetary benefits relative to costs, and positive online learning habits, combined with positive expectation confirmation, satisfaction, and positive attitudes, significantly influenced their intention to continue online learning.
Himang et al. (2023)	Qualitative research, using the Deterministic Decision Making Experiment and Evaluation Laboratory (DEMATEL) method.	The Fuzzy Decision Experimentation and Evaluation Laboratory (DEMATEL) method was used, and the researchers also used fuzzy set theory to deal with uncertainty in expert opinions.	Technology pedagogical knowledge of self-efficacy (TPK-SE), intrinsic motivation (IM), and extrinsic motivation (EM) had significant effects on the intention to continue using digital educational technologies. Technostress (TS) and burnout (BO) were the effects of other causal constructs.
Mohamad et al. (2024)	A combination of qualitative and quantitative. The study adopted a cross-sectional method and collected data through a questionnaire survey.	The sample size was 121 users. The data analysis methods included structural equation modelling (SEM), including analysis of measurement models and structural models, and mediation analysis.	Perceived usefulness, expected effort, social influence, facilitating conditions, and trust were identified as key antecedents before and after the adoption of PADLET as an e-learning tool. The study also confirmed the partial mediating effect of user satisfaction between confirmation and continuance intention.
Puriwat and Tripopsakul (2021)	A quantitative approach through the questionnaire as an instrument	185 valid questionnaires were used for data analysis. The study used structural equation modelling (SEM) to analyse the data and was conducted through AMOS 20.0 software.	E-learning quality (ELQ), composed of course content and design (CCD), instructor and learner characteristics (ILC), and administrative and technical support (ATS), has a significant positive impact on Thai higher education students' satisfaction and continuance intention during the COVID-19 pandemic, and student satisfaction partially mediates the relationship between the two.
Fiorini, et al. (2022)	A combination of qualitative and quantitative. Data was collected through a questionnaire survey.	The research subjects were "part-time adult undergraduates". The Mann-Whitney U test was used to analyse the association between different factors and online learning satisfaction.	Adult part-time students generally have a positive attitude towards online lectures, adapt quickly, and hope to continue after the epidemic. Women benefit more because they need to balance work and family.

For the latter, "usefulness" is strongly correlated with tangible outcomes such as job advancement and certification success, a connection that is less prevalent in reviews of general education. This review's focus allows us to highlight that it is this instrumental, career-oriented utility that is uniquely critical.

Second, there are clear regional patterns in the literature. Research in Asian countries, especially India, primarily focuses on utilitarian aspects like performance expectancy and facilitating conditions, often through the lens of the UTAUT model. This likely reflects a particular regional emphasis on scalable, cost-effective solutions for skill

certification in competitive job markets. By contrast, the European study (Sobodić et al., 2024) incorporates concerns such as usability and teacher-specific satisfaction, perhaps reflecting different institutional or cultural emphases on pedagogical quality.

Third, the depth and focus of theoretical integration differ among the studies. Studies drawn on the ECM emphasise the satisfaction-confirmation loop particularly strongly, while those using UTAUT2 incorporate a wider array of predictors, including hedonic motivation.

Fourth, the predominance of research in Asia suggests that these findings on continuance intention may be particularly

Table 3
Themes and sub-themes of the findings

Theme	Sub-theme	Authors
Technical factors	System availability, platform functionality, and technical support	Al-Mamary et al. (2023) Mohamad et al. (2024) Sobodić et al. (2024) Cocosila et al. (2024) Shah et al. (2024) Cheng (2024a) Puriwat and Tripopsakul (2021)
User Features	User motivation, technology familiarity, and educational background	Kineber et al. (2024) Sokro et al. (2023) Lexman et al. (2024) Fiorini, et al. (2022) Sitar-Tăut et al. (2024)
Content and course design	Content quality, interactivity, customised learning	Tee et al. (2024) Y. Wang et al. (2024) C. Wang (2024) Shah and Monica (2023) Cheng (2024b)
Social influences and environmental factors	Social influence, Learning community, Environmental factors	Miao et al. (2024) Deshmukh and Mehta (2024) Ghosh and Patra (2024) Sokro et al. (2023) Cocosila, et al. (2024)

Table 4
Themes and sub-themes of the findings

Authors	Technical factors			User features				Course design			Social and environmental factors		
	SA	PF	TS	UM	TF	EB	CQ	IN	CL	SI	LC	EF	
Sitar-Tăut, et al. (2024)			✓		✓								
Deshpande et al. (2024)		✓											
Y. Wang, et al. (2024)							✓				✓		
Shah & Khanna (2024a)				✓						✓			
C. Wang (2024)	✓		✓		✓			✓					
Sobodić et al.(2024)										✓			
Shah, et al. (2024b)					✓	✓			✓				
Cheng (2024a)				✓				✓	✓				
Tee et al. (2024)	✓		✓				✓						
Sokro et al. (2023)				✓		✓					✓		
Kineber et al.(2024)					✓							✓	
Ghosh & Patra (2024)	✓							✓	✓		✓		
Lexman et al. (2024)		✓		✓			✓						
Cheng (2024b)	✓						✓						
Miao et al. (2024)			✓		✓	✓				✓			
Al-Mamary et al. (2023)		✓	✓						✓				
Deshmukh & Mehta (2024)				✓						✓		✓	
Cocosila et al. (2024)	✓		✓									✓	
Himang et al. (2023)				✓									
Mohamad, et al.(2024)		✓				✓		✓					
Puriwat & Tripopsakul (2021)	✓												

Note. Technical factors and user features

SA = System Availability; UM = User Motivation; PF = Platform Functionality; TF = Technology Familiarity; TS = Technical Support; EB = Educational Background

shaped by specific cultural and economic contexts, such as the pronounced emphasis on formal certifications and competitive job markets, and their immediate generalisability to other global regions is not assured.

DISCUSSION

In 22 relevant papers, various factors were studied to determine how they affect the continuance intention of e-learning users, as this is the main goal of this study. Therefore, among the 22 selected articles, 17 adopted quantitative methods, 4 mixed methods, and 1 adopted qualitative methods. In the final selected articles, as shown in Figure 4, to effectively analyse these influencing factors and construct a systematic framework, the researchers divided the factors into four main themes: technical factors, user features, course content design, social influences, and environmental factors. These four themes provide a multi-dimensional theoretical framework for understanding the continuance intention of e-learning.

Technical Factors

One of the major themes is technical factors, which encompass several parameters, including platform performance, technical features, and user experience, and significantly affect the continuance intention of e-learning. According to research, users will continue using the platform based on their perceived usefulness of the platform. The effect of continuing to use the platform will be much more significant if the platform is perceived to be helpful. Pham et al. (2019) and Cocosila et al. (2024) indicate

that perceived usefulness is more than just the relevance of learning content but also relates to the platform's capacity to facilitate learners' career advancement.

Research shows that individual users' perceptions of the platform's usefulness are decisive for future use. If the usefulness of the platform is perceived to be high, it has a strong tendency to continue. Shi Hui et al. (2021) and Mihail Cocosila et al. (2024) argued that perceived usefulness involves the relevance of the learning content and is associated with the platform's role in enhancing learners' career development. Deshmukh and Mehta (2024) perceived usefulness as having a significant impact on the continued intention to use online learning (2024). This means that if learners think that online learning benefits them in a practical sense, malfunctioning in terms of outcomes due to learning and career growth, they are more likely to keep to these platform providers. Related to this, Cheng (2024b), and Shah & Khanna (2024a) further emphasised that learners think that online learning will contribute to learning outcomes and facilitate career development. This understanding further increases their intention to continue using it.

In the professional certification context, this perceived usefulness is uniquely tied to exam success. The platform is not just a source of knowledge, but a tool for achieving a specific, high-stakes goal. Features that directly support exam preparation, such as practice tests, performance analytics, and content aligned with certification blueprints, are therefore not merely nice-to-have additions but core drivers of continuance intention.

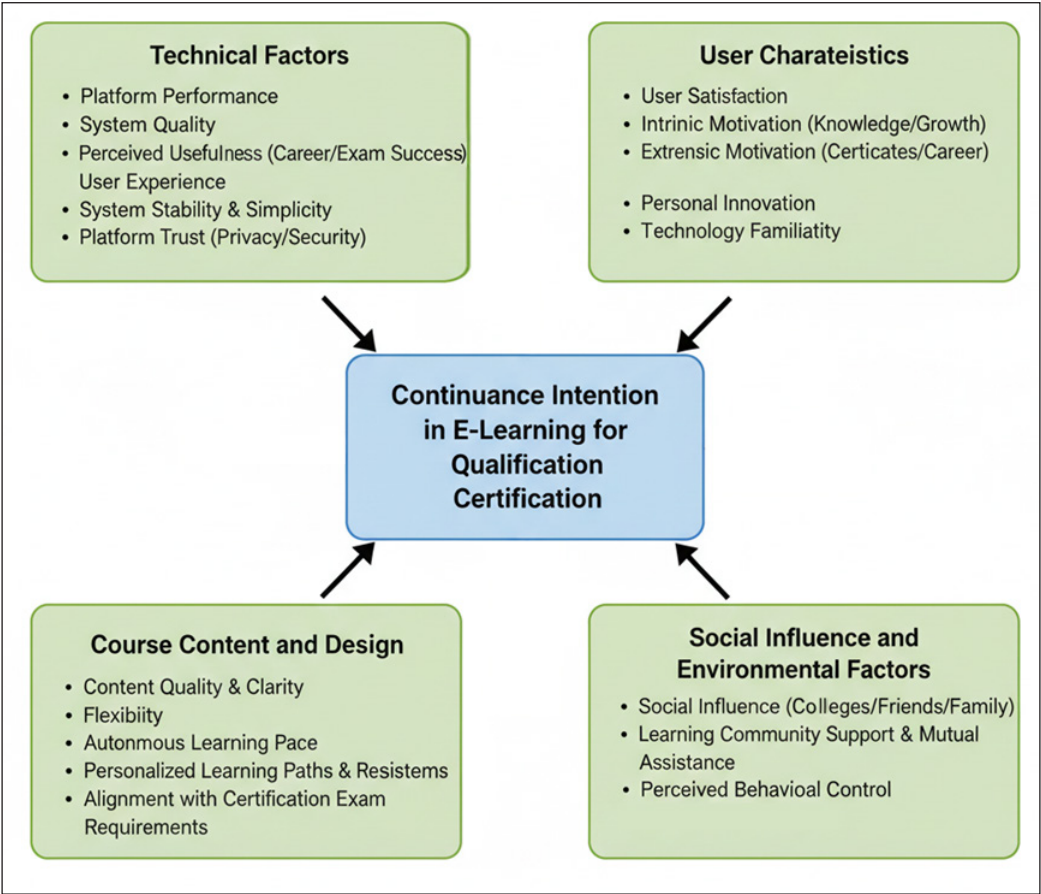


Figure 4. A systematic framework of factors influencing continuance intention

Apart from that, system quality, such as the platform's stability, simplicity, and the availability of technical support, also significantly affects the user experience. Moreover, Platform trust is also a central component of the technical factor. Users, most likely, will stick to platforms they have trusted for many years, particularly in terms of trusting their privacy protection and data security. As Cheng (2023) found, when the platform is perceived as a trustworthy entity that can secure learners' data, they are

more likely to continue using that platform. Compatible technical designs can also more accurately deliver user needs, which helps enhance the learning experience. Sitar-Tăut et al. (2024) highlighted the strong association between learners' technology adaptability and online learning satisfaction. Then, if the platform can directly align with what learners need in terms of how it is technically designed, learners' satisfaction and intention to use it will also increase.

User Characteristics

Another area of interest is user characteristics, which examine how the personal traits of learners and their intrinsic motivation influence their continued use of intention. The core driver of user retention is user satisfaction. The longer students are happy with their overall learning experience on the platform, the more time they spend on the platform. User satisfaction in online learning for professional qualification certificates is closely related to learners' learning outcomes, which further affects learners' continued intention to use online learning platforms. Deshpande et al. (2024) found that the satisfaction of working professionals with online learning platforms was a leading factor in the decision to continue using the platform. This satisfaction is the result of the entire user experience in the platform, the quality of the learning resources, the effectiveness of the technical support, interactive design, and the accomplishment of academic and professional goals. Similarly, Sobodić et al. (2024) reported front-line teachers decide whether to provide long-term use of the platform based on whether they are satisfied with the platform or not, and content practicality, convenience of teaching tools, attitude toward training and technical support, and other factors affect it. Moreover, it has been accounted that the quality of e-learning greatly affected the students' satisfaction and the ongoing intention to benefit from the local educational establishments during the COVID-19 epidemic (Puriwat &

Tripopsakul, 2021). However, the impact of realisation in MOOCs (massive open online courses) based on students' satisfaction and the intention to continue to use the course is one such research finding by Ahmed (2024). Overall, higher satisfaction suggests that learners value the platform's utility for learning and feel like the platform can help them reach learning outcomes. Such positive emotion helps reduce dropout risk effectively, thus, in turn, deepening learners' intention to continue using it on a longer horizon.

The intrinsic ones include interest in knowledge and desire for personal growth, and the extrinsic ones include obtaining certificates and getting career development opportunities, and both are key to influencing learners' behaviour decisions. According to Jinal Shah and Monica (2023), student motivation and encouragement of continuance learning intention can be improved by factors including personal innovation and social influence. Furthermore, Lexman et al. (2024), and Cigdem et al. (2024) also emphasise that the motivation of students includes both external incentives and personal interest, which makes a case for students' continual learning behaviour. The heterogeneity of user attributes renders this dimension crucially influential on the use of continuance intention.

Course Content Design

Several researchers point out that the design of course content is a significant factor contributing to the intention to keep using

e-learning. Good course design can greatly enhance learners' sense of participation, learning effects, and overall evaluation of the platform. The researchers Tee et al. (2023) suggested that clarity and structure of course content are important for enhancing students' learning intentions and helping learners to fully experience the effectiveness of the learning content.

For professional certification, content design must go beyond general interest. It must be perceived as directly relevant to the certification exam. Flexibility and system quality were found to be of notable importance in course design; the study further indicated. Kineber et al. (2024) and Poh Kiong Tee et al. (2024) indicated that modular course configuration, autonomous learning pace, and good system functions, like smooth operation, stable operation, and user-friendly interface, all greatly improve the learning experience. When learners can freely schedule their study time according to their own needs and get a wide variety of rich learning resources based on the platform, they are more likely to use the platform for a long time.

Moreover, the design of high-quality courses should be scientific and systematic — practical; it should provide learners with a clear learning path, facilitating effective knowledge transfer. Moreover, in course design, personalised learning experience is one necessary consideration that will not be abandoned. Personalised learning environment (such as customised learning path, personalised recommendation system, etc.) has shown that it has a profound effect

on improving learners' satisfaction and learning efficiency (C. Wang, 2024)

Social Influence and Environmental Factors

Shah and Khanna (2024a) found that social influence (such as the positive attitude of colleagues, friends and family towards e-learning) and learners' innovative ability significantly enhance learning willingness. Social influence, especially the views of family, peers, or colleagues, will affect individuals' online learning decisions and intentions. Cigdem et al. (2024) and Mohamad et al. (2024) showed that there is a significant positive relationship between social influence and learners' intention to adopt online learning tools. Deshmukh and Mehta (2024) further pointed out that although social influence has a smaller impact on the continuance learning intention of some professional workers, it is still a factor that cannot be ignored.

Especially after the COVID-19 pandemic, the impact of social influence on students with professional certificates is more significant. During the epidemic, distance learning became the main way for many students to obtain professional certificates. When students choose online learning platforms, they are more influenced by the opinions and suggestions of their families, colleagues, or friends. The support of social networks, especially the mutual assistance and shared learning experience provided during the epidemic, significantly enhanced students' learning motivation and participation.

Cigdem et al. (2024) further showed that when learners feel that the surrounding environment supports their learning behaviour, their learning motivation will be significantly improved. In addition, learners' sense of behavioural control also has an important impact on continuance of learning intention. If learners believe that the threshold for using the platform is low (for example, easy-to-use interface, rich tutorials, and technical support), their learning intention and participation will be significantly enhanced. For professional learners, they often balance work and study, and an environment that provides both social encouragement and the practical means to engage with the platform is critical for sustained use.

CONCLUSION

This systematic review screened relevant literature from the Web of Science (WoS), Scopus, Emerald, and ScienceDirect databases based on the PRISMA 2020 method to ensure the relevance of the selected articles and summarise them. The findings were narratively synthesised to form the four major themes and twelve sub-themes. Most of the studies in the selected articles used empirical data analysis techniques, primarily partial least squares structural equation modelling (PLS-SEM), to verify the variables. In addition, a qualitative study that supports the overall findings of this review was included. In summary, this study extracted four major themes and twelve sub-themes from the presented research results, which best

represent the key variables discussed in the selected literature. By focusing on the under-reviewed context of professional qualification certification, this review offers novel insights into how exam pressure and career utility shape continuance intention, distinguishing it from reviews of general e-learning.

First, the themes and sub-themes highlighted in this review provide important practical recommendations for promoting users' continuance of use intention in the field of professional qualification certification. These recommendations can be used as a reference for educational technology platforms and relevant stakeholders to help them identify key factors that have a significant impact on user behaviour and platform use intention, thereby optimising platform functions and services. Specifically, platform developers should prioritise the technical factors (system stability) and course design factors (exam-aligned content) identified as crucial for professional learners. Second, relevant organisations can benefit from the findings of this study and take specific measures to improve user experience, enhance user satisfaction, and user intention by targeting the factors identified in the themes, thereby promoting the long-term development of the overall platform. Third, the research findings in this review are of great significance in the current rapidly changing and uncertain market environment. The themes and sub-themes proposed in the study provide management insights for platform managers in the field of professional qualification

certification to deal with uncertainty and complex environments.

Fourth, in terms of academic contribution, this study lays a theoretical foundation for future researchers who wish to explore user continuance use intention in the field of professional qualification certification. Future researchers can conduct in-depth research based on the themes and sub-themes discussed in this review and previous literature. An important research gap found in the process of this systematic review is "brand trust and user loyalty management based on e-learning platforms", which is rarely mentioned in previous literature. Future research should empirically investigate how specific platform attributes (e.g., certification authority partnerships, success rate transparency, and alumni networks) build brand trust and foster loyalty among professional learners. It is hoped that more research will focus on this area in the future to further explore its important impact on user continuance use intention.

Fifth, it is recommended that future researchers conduct more exploratory and quantitative research to identify more variables that affect user continuance use intention, so as to promote the further development of professional qualification certification e-learning platforms. Specifically, we suggest: (1) Longitudinal studies to track how continuance intention evolves through the certification journey; (2) Experimental research on the impact of AI-driven personalisation and adaptive learning systems on professional learners'

engagement; (3) Investigations into the role of gamification elements in sustaining motivation for exam preparation; and (4) Comparative studies across different cultural and regional contexts (e.g., Europe, North America, Africa) to test the generalisability of the factors identified in this Asia-centric review. In addition, this study also found some limitations. First, this review focuses only on published articles in well-known databases such as Web of Science (WoS), Scopus, Emerald, and ScienceDirect, so there may be selection bias, and some studies that are not published or not included in high-impact journals may be excluded. Second, the articles selected in this study mainly cover articles in Asia, and the research samples in these regions may not be sufficient to represent the global perspective. Therefore, it is recommended that more relevant studies centred on the United States or other regional perspectives be conducted in the future. Overall, the limitations revealed by this study provide a clear direction for future research in the field of professional qualification certification.

Limitations and Recommendations for Future Research

Despite its contributions, this study has several limitations that future researchers should consider. First, the review relies exclusively on peer-reviewed articles from selected databases such as Web of Science, Scopus, Emerald, and ScienceDirect. This creates a potential selection bias, as it excludes grey literature, non-English publications, and articles not indexed in high-

impact journals, potentially overlooking diverse insights. Furthermore, the review's methodology was limited to thematic synthesis. It did not include a quantitative meta-analysis or formal weighting of evidence of quality, which could have provided a different level of insight into the relative strength of the identified factors. Second, the geographic focus of the selected articles is predominantly on Asian regions, which may limit the generalisability of the findings to a global context. Hence, future studies should broaden the geographic scope to include research from Western countries, Africa, and Latin America, to offer more comprehensive cross-cultural perspectives.

Furthermore, an evident research gap lies in brand trust and user loyalty management in e-learning environments—an aspect that has received minimal attention in the existing literature. Future research should explore this dimension in depth to understand how trust-building mechanisms and loyalty programmes influence user continuance intention. Additionally, it is recommended that researchers employ a combination of exploratory, quantitative, and longitudinal methods to discover new influencing variables and to verify the dynamic nature of user behaviour over time. Investigating the impact of emerging technologies like AI-powered personalisation, adaptive learning paths, and gamification on the continuance intention of professional certification seekers represents a crucial future direction. Investigating platform-specific features, personalisation algorithms, and gamification effects could also enrich our understanding of how to

sustain user engagement in professional certification contexts.

By addressing these limitations and exploring under-researched areas, future studies can contribute to the refinement and advancement of e-learning platforms for professional qualification certification in an increasingly digital and globalised educational environment.

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REFERENCES

- Al-Awlaqi, M. A., & Aamer, A. M. (2022). Islamic financial literacy and Islamic banks selection: An exploratory study using multiple correspondence analysis on banks' small business customers. *International Journal of Emerging Markets*, 18(12), 6285-6299.
- Al-Mamary, Y. H. S., Siddiqui, M. A., Abdalraheem, S. G., Jazim, F., Abdulrab, M., Rashed, R. Q., & Alhaji, A. A. (2023). Factors impacting Saudi students' intention to adopt learning management systems using the TPB and UTAUT integrated model. *Journal of Science and Technology Policy Management*.
- Alshammari, M. F., Yusoff, R. C. M., & Abas, H. (2024). A systematic literature review of factors influencing satisfaction and continuance intention to use e-learning systems in higher education. *Advances in Social Sciences Research Journal*, 11(8), 326-346.

- Anwar, M. (2021). Biodiesel feedstocks selection strategies based on economic, technical, and sustainable aspects. *Fuel*, 283, Article 119204.
- Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, 25(3), 351-370.
- Chen, T., Peng, L., Yin, X., Rong, J., Yang, J., & Cong, G. (2020). Analysis of user satisfaction with online education platforms in China during the COVID-19 pandemic. *Healthcare*, 8(3), Article 200.
- Cheng, Y. M. (2024a). Can media richness and interaction act as stimulants to medical professionals' learning persistence in MOOCs via fostering learning engagement? *Interactive Technology and Smart Education*, 21(2), 214-244.
- Cheng, Y. M. (2024b). How to animate learners persist in learning massive open online courses? An application of the stimulus-organism-response paradigm. *Information Discovery and Delivery*.
- Cigdem, H., Ozturk, M., Karabacak, Y., Atik, N., Gürkan, S., & Aldemir, M. H. (2024). Unlocking student engagement and achievement: The impact of leaderboard gamification in online formative assessment for engineering education. *Education and Information Technologies*, 29(18), 24835-24860.
- Cocosila, M., Trabelsi, H., & Farrelly, G. (2024). An empirical investigation of student online learning continuance intention in the post-COVID-19 pandemic era. *Journal of Systems and Information Technology*, 26(3), 447-472.
- Dai, H. M., Teo, T., & Rappa, N. A. (2020). Understanding continuance intention among MOOC participants: The role of habit and MOOC performance. *Computers in Human Behavior*, 112, Article 106455.
- Deshmukh, S. C., & Mehta, M. (2024). IT professionals' post-pandemic online learning: UTAUT model study. *Journal of Workplace Learning*, 36(8), 709-728.
- Deshpande, A., Raut, R., Gupta, K., Mittal, A., Raheja, D., Ekbote, N., & Kaul, N. (2024). Predictors of continued intention of working professionals for pursuing e-learning courses for career advancement. *Information Discovery and Delivery*, 52(2), 175-184.
- Fiorini, L. A., Borg, A., & Debono, M. (2022). Part-time adult students' satisfaction with online learning during the COVID-19 pandemic. *Journal of Adult and Continuing Education*, 28(2), 354-377.
- Ghosh, A., & Patra, P. (2024). Online education-bane or boon? A quantitative plus text mining approach. *International Journal of Educational Management*, 38(7), 1801-1820.
- Groome, D., & Cunningham, C. (2024). From vocational to graduation: A mixed methods study of support needs for vocational learners pursuing post-graduate education in South Africa. *African Journal of Emergency Medicine*, 14(3), 263-267. <https://doi.org/10.1016/j.afjem.2024.08.008>
- Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science & Medicine*, 292, Article 114523.
- Himang, C. M., Cernias III, R., Corbes, R. U., Alicer, M. J. M., Colobong, B., Olarte, J. M., ... & Ancheta Jr., R. (2023). Modelling the utilization of digital technology in education during the COVID-19 pandemic through an expert-based analytic tool. *International Journal of Information and Communication Technology Education (IJICTE)*, 19(1), 1-23.
- Holmes, J., Moraes, O. R., Rickards, L., Steele, W., Hotker, M., & Richardson, A. (2022). Online learning and teaching for the SDGs—exploring emerging university strategies. *International Journal of Sustainability in Higher Education*, 23(3), 503-521.

- Hsu, M. H., Chiu, C. M., & Ju, T. L. (2004). Determinants of continued use of the WWW: An integration of two theoretical models. *Industrial Management & Data Systems*, 104(9), 766-775.
- Kassymova, G., Akhmetova, A., Baibekova, M., Kalniyazova, A., Mazhinov, B., & Mussina, S. (2020). E-learning environments and problem-based learning. *International Journal of Advanced Science and Technology*, 29(7), 346-356.
- Khan, M. I., & Saleh, M. A. (2023). Facebook users' satisfaction and intention to continue using it: Applying the expectation confirmation model. *Social Science Computer Review*, 41(3), 983-1000.
- Kineber, A. F., Elshaboury, N., Mostafa, S., Alasow, A. A., & Arashpour, M. (2024). Influence of massive open online courses implementation on satisfaction and continuance intention of students. *International Journal of Educational Management*.
- Lakens, D. (2022). Sample size justification. *Collabra: Psychology*, 8(1), Article 33267.
- Lee, M. (2010). Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation-confirmation model. *Computers & Education*, 54(2), 506-516. <https://doi.org/10.1016/j.compedu.2009.09.002>
- Lexman, R. R., Baral, R., & Aboobaker, N. (2024). Psycho-social drivers influencing the adoption of asynchronous EdTech tools: A gendered perspective. *International Journal of Educational Management*.
- Li, J., Yang, S., Chen, C., & Li, H. (2022). The impacts of COVID-19 on distance education with the application of traditional and digital appliances: Evidence from 60 developing countries. *International Journal of Environmental Research and Public Health*, 19(11), Article 6384.
- Liu, Y., Han, T., Ma, S., Zhang, J., Yang, Y., Tian, J., & Ge, B. (2023). Summary of ChatGPT-related research and perspective towards the future of large language models. *Meta-Radiology*, Article 100017.
- Meryem, M., Najat, R., Jaafar, A., & Salmane, B. (2023). Impact of e-learning on the environment and the optimization of the use of natural resources. In *E3S Web of Conferences* (Vol. 412, Article 01098). EDP Sciences.
- Miao, M., Ahmed, M., Ahsan, N., & Qamar, B. (2024). Intention to use technology for micro-credential programmes: Evidence from technology acceptance and self-determination model. *International Journal of Educational Management*, 38(4), 948-977.
- Mohamad, W. M. W., Jaafar, R. E., Wahidin, I. S., & Amer, N. (2024). PADLET as e-learning tools: Pre and post adoption on UTAUT and ECM model. *Asian Journal of University Education*, 20(2), 380-392.
- Nabavi, A., Taghavi-Fard, M. T., Hanafizadeh, P., & Taghva, M. R. (2016). Information technology continuance intention: A systematic literature review. *International Journal of E-Business Research (IJEER)*, 12(1), 58-95.
- Nedungadi, P., & Raman, R. (2012). A new approach to personalisation: Integrating e-learning and m-learning. *Educational Technology Research and Development*, 60, 659-678.
- Pham, L., Limbu, Y. B., Bui, T. K., Nguyen, H. T., & Pham, H. T. (2019). Does e-learning service quality influence e-learning student satisfaction and loyalty? Evidence from Vietnam. *International Journal of Educational Technology in Higher Education*, 16(1), 1-26.
- Puriwat, W., & Tripopsakul, S. (2021). The impact of e-learning quality on student satisfaction and continuance usage intentions during COVID-19. *International Journal of Information and Education Technology*, 11(8), 368-374.
- Rabaa'i, A. A., Almaati, S. A., & Zhu, X. (2021). Students' continuance intention to use Moodle:

- An expectation-confirmation model approach. *Interdisciplinary Journal of Information, Knowledge, and Management*, 16, 397.
- Romadhon, M. S., Junus, K., Santoso, H. B., Ahmad, M., & Purwandari, E. P. (2023). Factors influencing students' continuance intention in learning through MOOCs: A systematic literature review. *The Indonesian Journal of Computer Science*, 12(2), 425-441.
- Scharron, C. (2025). *Examining adoption factors of AI-enabled workplace training through the lens of the UTAUT2 and extended factors* (Doctoral dissertation).
- Shah, J., & Khanna, M. (2024a). Determining the post-adoptive intention of millennials for MOOCs: An information systems perspective. *Information Discovery and Delivery*, 52(2), 243-260.
- Shah, J., Bhat, I. H., & Gundugola, S. (2024b). Unraveling the post-adoptive hybrid learning experience: Perspectives from information systems. *Information Discovery and Delivery*.
- Sitar-Tăut, D.-A., Mican, D., & Moisesescu, O.-I. (2024). To be (online) or not to be? The antecedents of online study propensity and e-learning-dependent dropout intention in higher education. *Technological Forecasting and Social Change*, 207, Article 123566. <https://doi.org/10.1016/j.techfore.2024.123566>
- Sobodić, A., Balaban, I., & Granić, A. (2024). The impact of usability factors on continuance intention to use the system for acquisition and evaluation of digital competences in the domain of education. *Technology in Society*, 77, Article 102551.
- Sokro, E., Obuobisa-Darko, T., & Okpattah, B. (2024). Learner attitudes, satisfaction and success in online learning environments: A mediation-moderation model for higher educational institutions. *International Journal of Educational Management*.
- Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, 50(4), 1183-1202.
- Tan, K. H., Chan, P. P., & Mohd Said, N. E. (2021). Higher education students' online instruction perceptions: A quality virtual learning environment. *Sustainability*, 13(19), Article 10840.
- Tbaishat, D., Al Fandi, O., Hamad, F., Bukhari, S. M. S., & Al Muhaisen, S. (2026). Modelling generative AI adoption in higher education: An integrated TAM-TPB-SDT framework with SEM validation. *Computers and Education: Artificial Intelligence*, Article 100541.
- Tee, P. K., Cham, T. H., Aw, E. C. X., Khudaykulov, A., & Zhang, X. (2024). Marketing micro-credentials: Understanding learners' engagement and willingness to pay more. *International Journal of Educational Management*, 38(4), 1001-1020.
- Terblanche, E. A. J., & Lubbe, I. (2024). Assessments in accounting: Experiences and perceptions of educators during COVID-19. *Accounting Education*, 33(5), 712-730.
- Wang, C. J. (2024). Improving students' perceived learning outcomes through experiential learning: A course design of the blended e-learning environment. *Library Hi Tech*.
- Wang, Y., Chaw, L. Y., Leong, C. M., Lim, Y. M., & Barut, A. (2023). Massive open online courses learners' continuance intention: Shaping a roadmap to micro-credentials. *International Journal of Educational Management*.
- White, M. (2022). Sample size in quantitative instrument validation studies: A systematic review of articles published in Scopus, 2021. *Heliyon*, 8(12).
- Xavier, M., & Meneses, J. (2022). Persistence and time challenges in an open online university: A case study of the experiences of first-year

- learners. *International Journal of Educational Technology in Higher Education*, 19(1), 31.
- Yang, S., Zhou, S., & Cheng, X. (2019). Why do college students continue to use mobile learning? Learning involvement and self-determination theory. *British Journal of Educational Technology*, 50(2), 626-637.
- Yang, T., Yang, F., & Men, J. (2023). Understanding consumers' continuance intention toward recommendation vlogs: An exploration based on the dual-congruity theory and expectation-confirmation theory. *Electronic Commerce Research and Applications*, 59, Article 101270. <https://doi.org/10.1016/j.elerap.2023.101270>
- Zhang, M., Liu, Y., Yan, W., & Zhang, Y. (2017). Users' continuance intention of virtual learning community services: The moderating role of usage experience. *Interactive Learning Environments*, 25(6), 685-703.
- Zhou, J. (2017). Exploring the factors affecting learners' continuance intention of MOOCs for online collaborative learning: An extended ECM perspective. *Australasian Journal of Educational Technology*, 33(5).
- Zhou, Z., & Zhang, Y. (2024). Intrinsic and extrinsic motivation in distance education: A self-determination perspective. *American Journal of Distance Education*, 38(1), 51-64.

Navigating Dual Roles: The Impact of Work-Family Conflict on Mental Health and the Essential Role of Counselling Services for Malaysian Professional Women

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ABSTRACT

In recent years, balancing work and family responsibilities has become increasingly challenging for professional women in Malaysia. This study explores the relationship between work-family conflict, mental health, and attitudes toward seeking professional counselling as a vital support mechanism. Although the impact of work-family conflict on mental health is well-documented, there is a lack of comprehensive analysis on how counselling can moderate this relationship among Malaysian professional women. Addressing this gap is crucial, as it highlights the mental health challenges faced by this demographic. Utilising data from a sample of 362 professional women, the analysis of moderator variables revealed significant relationships concerning their mental health. A positive correlation was found between the need for counselling services and mental

health ($\beta = 0.263$, $p < 0.001$), indicating that greater reliance on counselling is associated with improved mental health outcomes. The relationship between work-family conflict and mental health was also significant ($\beta = 0.077$, $p = 0.009$), though its impact was relatively smaller in magnitude. Importantly, counselling services emerged as a significant moderator of the work-family conflict-mental health relationship ($\beta = 0.138$, $p = 0.019$), suggesting that counselling can alleviate the negative effects of work-family conflict on mental health.

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The moderation effect size ($f^2 = 0.09$) indicates a small to moderate practical significance. These findings underscore the importance of integrating counselling interventions into support programs for professional women. The implications for stakeholders, including practitioners, policymakers, and mental health advocates, are profound. By recognising the critical role of counselling services, targeted strategies can be developed to enhance the mental health of professional women in Malaysia, fostering improved outcomes and a healthier work-life balance that can benefit women in similar contexts worldwide. However, the cross-sectional design precludes causal conclusions, and self-report data may introduce response bias. Future longitudinal research is needed to establish temporal relationships.

Keywords: Conflict, counselling, effect size, mental health, moderation, professional women

INTRODUCTION

Professional women around the world, especially in Malaysia, find it difficult to juggle their commitments to their families and their careers. Research from the United States, like Smith and Johnson and Smith (2020), shows that women are under a lot of pressure to reach this balance. According to Chen and Wong (2019), research conducted in Singapore, the information technology (IT) industry has similar challenges. Similar issues in the European legal and medical fields are described by Müller et al. (2018). Furthermore, research on mental health conducted in the US by Jones and Smith (2020) and Spain by García-Ael et al. (2021) shows that women are under pressure to manage their personal and professional lives. Flexible work schedules and support initiatives can help women worldwide deal with these challenges (Chen & Wong, 2019; Garcia, 2023; Jones & Smith, 2020; Müller et al., 2018; Smith & Johnson, 2020).

Person-Centred Therapy (PCT), developed by Rogers (1961), provides a foundational framework for understanding how counselling can support professional

women experiencing work-family conflict. PCT emphasises three core conditions, unconditional positive regard, empathy, and congruence, that create a safe therapeutic environment for clients to explore their experiences and mobilise their innate self-actualising tendencies (Rogers, 1957). For professional women navigating dual roles, PCT offers a non-judgmental space to examine the tensions between work and family demands, validate their emotional experiences, and develop authentic, self-directed solutions. This study applies PCT as a theoretical lens to understanding how counselling services may moderate the relationship between work-family conflict and mental health outcomes. Ahmad and Omar's (2019) study on the hotel industry in Malaysia shows that work-family conflict is detrimental to mental health. Studies conducted worldwide, like those by Smith and Johnson (2020) in the US and Chen and Wong (2019) in Singapore, emphasise the need for assistance and expertise to address these problems (Kamaruddin et al., 2024; O'Neill & Follmer, 2020).

Work-family conflict has become a significant concern in modern society, particularly among professional women who navigate the dual demands of career and family life. Competing expectations from these roles often lead to heightened stress, reduced productivity, and adverse mental health outcomes (Sharma & Mishra, 2022). Research indicates that unresolved work-family conflict can result in burnout, anxiety, and even long-term psychological distress, highlighting the need for comprehensive support systems (Smith et al., 2023). Professional women are uniquely impacted due to societal expectations and workplace pressures that demand high levels of performance in both domains.

Addressing these challenges requires not only organisational changes but also individual-level interventions, such as counselling services, which have shown potential in mitigating the negative effects of work-family conflict. Counselling provides professional women with strategies to manage emotional regulation, improve coping mechanisms, and enhance their overall mental well-being (Lim et al., 2021). However, the moderating role of counselling services in this context remains underexplored, particularly within the cultural and occupational frameworks of developing countries.

This study investigates the relationship between work-family conflict and mental health among professional women. Additionally, it aims to assess the moderating effect of counselling services in reducing the adverse outcomes of such conflicts. By focusing on these areas, this research

contributes to a growing body of literature emphasising the importance of workplace support and individual interventions in fostering psychological well-being.

Rational and Objective Study

The purpose of the study is to investigate the effects of work-family conflict, mental health, social support, and the need for counselling services among Malaysian professional women.

The following research questions are put forth to help achieve this goal:

The first study question aims to ascertain the degree of work-family conflict, mental health state, and need for counselling services among Malaysian professional women.

Alternative Hypothesis (Ha1): There is a significant degree of work-family conflict, poor mental health, and a notable positive attitude toward professional help-seeking among Malaysian professional women.

The second research question investigates whether there is a substantial relationship between the need for counselling services and mental health among Malaysian professional women.

Alternative Hypothesis (Ha2): There is a significant positive relationship between the attitudes toward counselling services and mental health among Malaysian professional women.

The third study question examines whether work-family conflict and mental

health significantly correlate among Malaysian professional women.

Alternative Hypothesis (Ha3): There is a significant correlation between work-family conflict and mental health among Malaysian professional women.

The last study question examines the potential moderating role of work-family conflict and the help-seeking attitudes on mental health among Malaysian professional women.

Alternative Hypothesis (Ha4): The need for counselling services significantly moderates the relationship between work-family conflict and mental health among Malaysian professional women.

In summary, the study aims to thoroughly investigate the dynamics of work-family conflict, social support, mental health, and counselling service demands among Malaysian professional women. Each research question focuses on a particular dimension of this complex problem.

Significance of the Research

This study highlights the need for counselling services as a moderator to lessen the effects of work-family conflict on professional women's mental health in Malaysia (Smith et al., 2023). Theories on how social support affects mental health are advanced by examining the relationship between social support and work-family conflict (Johnson et al., 2019). Yahya et al. (2020a) claim that emphasising the moderating function of counselling services enhances

understanding of how interventions can lessen the negative effects of work-family conflict and increase the beneficial effects of social support.

This study directly supports Sustainable Development Goal 5 (SDG 5): Achieve gender equality and empower all women and girls, particularly Target 5.4, which specifically calls for recognising and valuing unpaid care and domestic work and promoting shared responsibility within the household (United Nations, 2015). By examining work-family conflict among professional women, this research addresses the structural barriers that perpetuate gender inequities in both the workplace and domestic spheres. Furthermore, SDG Target 3.4 (reduce premature mortality from non-communicable diseases and promote mental health) is advanced through the study's focus on counselling interventions as protective factors for women's psychological well-being. The findings provide evidence to support policy initiatives that recognise work-family balance not merely as a women's issue, but as a fundamental component of sustainable development and gender equality (Ibrahim & Zaimah, 2021; Khetrapal & Bhatia, 2020; UN Women, 2021).

Study Area

This study focuses on Malaysian professional women in grades 41 and up who work in a range of fields, such as academics, administration, and technical professions, as the subject of this study. It aims to understand the challenges they face, particularly with regard to work-family

conflict, and how they impact their mental well-being. By emphasising the value of counselling services as a moderator, the study aims to improve support programs for Malaysian professional women. To provide useful information on enhancing the well-being of Malaysian professional women, this study will examine the connection between mental health and work-family conflict as well as the moderating impact of counselling services.

LITERATURE REVIEW

Work-family conflict (WFC) arises when the demands of work and family roles conflict, leading to stress and adverse effects on mental health (Greenhaus & Beutell, 1985). In Malaysia, studies have shown that WFC negatively impacts professional women, increasing their stress levels and emotional exhaustion (Rochat, 2023a; C. Tan et al., 2020). This dual burden often results in burnout and deteriorates mental well-being, especially in societies with traditional gender norms (Noor, 2004).

Counselling services are widely recognised as a vital resource for addressing psychological challenges and enhancing mental health. Counselling equips individuals with strategies to manage stress, improve emotional resilience, and adapt to role conflicts (Lim et al., 2021). For professional women, counselling provides critical support to navigate the dual demands of work and family, reducing the risk of mental exhaustion and burnout (Sharma & Mishra, 2022).

In the workplace, counselling serves as both a preventive and remedial measure,

offering a confidential space to address challenges, develop coping strategies, and enhance mental health awareness. This is especially valuable in culturally conservative societies, where stigma around seeking help may persist (Smith et al., 2023). In Malaysia, culturally tailored counselling programs have proven effective in mitigating the adverse effects of WFC on professional women (Yahaya & Mansor, 2009).

Counselling plays a significant moderate role in the relationship between WFC and mental health. It provides emotional support, practical coping mechanisms, and tailored interventions to help individuals manage stress from conflicting roles (Greenhaus et al., 2003). Workplace counselling programs focusing on time management, stress reduction, and communication skills have been shown to effectively promote work-life balance and mental well-being (Wang et al., 2022).

While the importance of counselling is evident, research on its moderating role in WFC is limited, particularly in non-Western contexts. Further studies are needed to explore culturally specific approaches and the long-term effectiveness of counselling interventions in supporting professional women holistically (Allen et al., 2021).

Person-centred Therapy as a Framework for Workplace Counselling

Person-Centred Therapy (PCT) is remarkably relevant to understanding how counselling interventions may benefit professional women undergoing work-family conflict.

Rogers (1959) posited that psychological suffering arises from incongruence between the self-concept and the experience of an individual. For professional women, the challenging demands of work and family roles often create such incongruence, leading to feelings of guilt, failure, and stress (Joseph, 2021).

The therapeutic conditions of PCT directly address the psychological needs of women in conflict:

- i. Empathy allows counsellors to understand the unique pressures women face in balancing careers and family within Malaysia's cultural context.
- ii. Unconditional positive regard counters the self-criticism and perfectionism commonly reported by professional women.
- iii. Congruence models authentic self-expression, encouraging women to acknowledge and articulate their needs without shame.

Studies have demonstrated the effectiveness of PCT in workplace settings. Joseph and Linley (2020) found that person-centred approaches in employee assistance programs significantly reduced stress and improved coping among working mothers. In Malaysia, culturally adapted PCT interventions have shown promise in addressing the stigma associated with help-seeking among professional women (Kamaruddin et al., 2024). By providing a non-pathologising framework that respects clients' autonomy and cultural values, PCT aligns well with the needs of Malaysian professional women navigating work-family conflict.

MATERIALS AND METHODS

This study used quantitative approaches in the form of a survey design. The survey questionnaire was emailed to female professionals collected from the Human Resources Department of a Malaysian government organisation and disseminated online using Google Forms.

Demographics and Samples

As of July 2023, 3711 female professionals from all around Malaysia made up the study's population; they were assembled from one department's human resources. A cluster sample strategy was chosen based on Malaysia's topography and geographic extent, divided into 14 states. In total, 362 respondents were categorised into 14 groups based on the states of Malaysia.

The type of analysis used, structural equation modelling (SEM), was considered while calculating the sample size. The exact sample size is unknown; however, Hair et al. (2010) recommended a minimum of 200, Krejcie and Morgan (1970) suggested a minimum of 346 for a population of 3711. Following Roscoe's (1975) recommendation, a larger sample size - a minimum of 30 and a maximum of 500 - is necessary to prevent misleading correlations.

Research Tool

The research tool consisted of five sections: mental health status, work-family conflict, respondent demographics, and attitudes towards psychological assistance. A particular focus was on Grade 41 female professionals to learn more about their

experiences dealing with personal and professional pressures.

Counselling Service Requirements Survey

We used Fischer & Farina's (1995) Attitudes towards Seeking Professional Psychological Help Questionnaire to assess the need for counselling services. Openness and the value of seeking help while coping with emotional issues are evaluated by this 10-item Likert scale test. A more positive attitude is indicated by higher ratings. It has good research validity and a Cronbach's alpha of 0.9, making it reliable (Adnan, 2013; Vogel et al., 2005). Validity ensures that the questionnaire appropriately captures the desired concepts (Taherdoost, 2016).

Questionnaire on Mental Health

The Mental Health Questionnaire is based on the General Health Questionnaire (GHQ-12), which was developed by Goldberg & Williams (1988). The purpose of its twelve items is to assess the respondents' current mental health. This questionnaire uses a 4-point Likert scale, where higher scores indicate poorer mental health and lower numbers indicate better mental health. This questionnaire shows strong validity and reliability with an internal consistency reliability value of 0.85 and a Cronbach's alpha of 0.9 (El-Metwally et al., 2018; Farhan et al., 2021). Mental health status was measured using the 12-item General Health Questionnaire (GHQ-12), a widely used screening tool for detecting psychological distress (Zulkefly & Baharudin, 2010).

Items are scored on a 4-point Likert scale, with higher scores indicating poorer mental health (i.e., greater psychological distress). This scoring direction is consistently applied throughout all analyses and interpretations in this study.

The Scale of Work-family Conflict

The Work-Family Conflict (WFC) Questionnaire was created by Gutek et al. (1991) and has eight parts. There are five points on this questionnaire's Likert scale: scales 1 through 5, strongly disagree, disagree, uncertain, agree, and strongly agree, to measure the level of conflict between work and family among the Malaysian professional women who participated in the study. This questionnaire, translated into Malay by Adnan (2013), has a Cronbach's Alpha of 0.78 and an internal consistency reliability rating of 0.9, indicating that it is suitable for use in research and has strong validity and reliability. Values in the range of 0.60 to 0.85 are considered acceptable for validity and reliability coefficients.

Method and Procedure for Data Collection

This authorisation was the first step in the data-gathering technique. The researcher asked the human resources department for permission to conduct the study among professional women. The Human Resources Department provided the researcher with the survey questionnaire and informed consent form, which were emailed to the chosen respondents.

To engage professional women in the chosen replies, official notice letters were also distributed to all centres. The goal of this strategy is to prevent study participants' information from being lost.

Method of Data Analysis

The study employed IBM-SPSS-Amos and partial least squares structural equation modelling (PLS-SEM) to investigate correlations between different components after initial data inquiry and description using SPSS, with a focus on respondent demographics. Among the components of mental health, work-family conflict, counselling services, and the effectiveness of research procedures, a pilot study comprising sixty selected women demonstrated good reliability. Any shortcomings in the research design were fixed by the study, which also made it possible to adjust to raise the standard of the study and better align it with participant needs. High reliability scores, such as a Cronbach's Alpha value of 0.956 for counselling services, 0.964 for mental health, and 0.978 for work-family conflict, demonstrated the consistency of the tests. Early participant feedback enabled the required adjustments, ensuring the overall efficacy and integrity of the study's design and implementation, as well as enhancing the relevance of the interventions to meet the needs of the target population.

RESULTS

The study's respondents' demographic profile reveals a varied group of Malaysian women professionals, largely of Malay

origin, mostly married, and primarily between the ages of 30 and 49. The vast majority have a bachelor's or master's degree, and they are well-represented from different Malaysian states. With 45.9% having more than 25 years of service and 31.8% having 11-15 years, many have a lot of job experience. Nearly half of them are childless despite their work obligations, and others are responsible for several dependents, highlighting the diverse range of family duties they balance. Most of them work seven to ten hours a day, with their job sites evenly distributed between rural and urban areas. This demographic overview highlights the need for specialised therapy services and is essential for comprehending the relationship between work-family conflict, social support, and mental health.

The Analysis of Confirmatory Factors (CFA)

In empirical research, Confirmatory Factor Analysis (CFA) is essential for confirming measurement models. To assess model fit, our study used a variety of fit indices, including Standardised Root Mean Square Residual (SRMR), d_{ULS} , d_G , Chi-Square (χ^2), and Normed Fit Index (NFI). A pooled-CFA technique was used to examine all constructs together. The fit indices for the measurement model were evaluated using multiple criteria, as recommended by Hair et al. (2019). The Standardised Root Mean Square Residual (SRMR) value of 0.073 for both the saturated and estimated models falls below the conservative threshold of 0.08, indicating acceptable absolute fit (Hu & Bentler, 1999).

The Normed Fit Index (NFI) value of 0.714 requires careful interpretation. While traditional guidelines suggest NFI values above 0.90 indicate good fit (Bentler & Bonett, 1980), several considerations support the acceptability of the current model:

First, NFI is sensitive to sample size and model complexity. Kenny (2020) notes that NFI can underestimate fit in models with many parameters, particularly when sample sizes are moderate. Our model includes multiple latent constructs with numerous indicators, which can suppress NFI values even when other fit indices suggest adequate model fit.

Second, the NFI does not penalise for model complexity, whereas our SRMR value of 0.073—which is less sensitive to complexity—meets conventional thresholds. The consistent SRMR value across both saturated and estimated models (0.073) provides stronger evidence of absolute fit than any single index alone (Hair et al., 2017).

Third, in exploratory research contexts, particularly in non-Western settings where measurement instruments developed elsewhere are being validated, slightly lower fit thresholds are often considered acceptable. Awang (2015) suggests that for social science research in developing contexts, NFI values above 0.70 can be provisionally accepted when supported by other fit indices and theoretical justification.

Fourth, the Chi-square statistics (7111.170) were expectedly high given our sample size ($N = 362$) and model complexity.

Chi-square is notoriously sensitive to sample size, and significant values are common in models with >200 cases (Schermerle-Engel et al., 2003).

The d_{ULS} (4.817) and d_G (4.078) values represent the squared Euclidean distance and geodesic distance, respectively, with lower values indicating a better fit. While there are no established cutoffs for these indices, their consistency with the SRMR suggests acceptable model specification.

Taken together, the combination of acceptable SRMR, theoretically consistent factor loadings, and the study's exploratory nature in the Malaysian professional women context supports the conclusion that the measurement model demonstrates adequate fit for the purposes of this investigation, while acknowledging room for improvement in future research. All things considered, these findings support the validity and sufficiency of the suggested measurement model in precisely describing the connections between the variables being studied.

Pooled-CFA Measurement Model

The factors that have been researched, such as social support and work-family conflict, are all integrated and analysed collectively in the Pooled-CFA approach. This aids in our comprehension of the simultaneous relationships between various variables. By doing this, we can solve model identification issues and improve how we analyse our data. Pooled CFA facilitates our analysis and aids in a more accurate interpretation of the data.

Validation

Convergent Validity

Convergent validity analysis is crucial to ensure strong correlations between indicators and measured variables. This analysis examines factor loadings, with results above 0.7 considered valid. Evaluating measurement models, such as the Pooled-CFA, is essential for accurately representing intended concepts. Confirmatory Factor Analysis (CFA) assesses how well the model fits the data. Convergent validity confirms strong correlations between indicators assessing the same construct, while discriminant validity ensures that different constructs are distinct. Establishing construct validity is necessary for precise and trustworthy data interpretation.

Root Mean Square Theta

Analysing model fit is crucial in the context of Pooled-CFA to evaluate the combined measurement model. Several criteria are applied, such as RMS Theta, SRMR, and NFI. The model's RMS Theta values exceed the intended cutoff, but the SRMR and NFI values satisfy the fit requirements. As a result, while not perfect, the model shows a reasonably acceptable degree of fit. The standardised root mean square values for the saturated and estimated models were identical: SRMR at 0.073, d_ULS at 4.757, d_G at 4.022, Chi-Square at 7090.786, and NFI at 0.714. Although the model does not meet all fit criteria, these results are still considered acceptable and supported by several studies. Hair et al. (2017) emphasise

the importance of assessing model fit holistically, while Marsh, Hau, and Wen (2004) demonstrate that a model can still be deemed acceptable even if it does not meet all criteria if the values of several fit indices are appropriate. Therefore, the conclusion is that the model provides a reasonably good representation of the observed data, albeit not perfect.

Discriminate Validity

Discriminate validity analysis is necessary to guarantee the uniqueness of every construct in the pooled Confirmatory Factor Analysis (CFA) measurement model. For this, we applied cross-loading analysis and the Fornell-Larcker criterion. By demonstrating stronger connections within constructs than between them, the Fornell-Larcker criterion validated discriminant validity. Construct validity was further reinforced by cross-loading analysis, which showed that indicators reliably measure the desired variables. As a result, our model satisfies discriminant validity requirements, guaranteeing the indicators' dependability and distinctiveness.

Another essential stage in confirming the consistency and dependability of the constructs in the pooled CFA model is reliability analysis. Composite Reliability (CR) and Average Variance Extracted (AVE) are important measures for this investigation. Our results demonstrate that all constructions satisfy the convergent validity criterion, which is shown by an AVE value greater than 0.5.

Similarly, all structures fulfil the requirement for appropriate internal consistency, as indicated by CR values greater than 0.60.

All things considered, each construction in the integrated measurement model satisfies the reliability standards, demonstrating that the indicators accurately measure the desired variables. Evaluations of validity and reliability are essential to guarantee that study findings are reliable and appropriately interpreted. When the model's data meets the predetermined standards, they are legitimate and trustworthy for measuring the intended variables.

Assessing the Normality of the Combined Construct Measurement Model (Pooled-CFA)

After verifying that the model fit the data, we evaluated data normalcy using skewness and kurtosis tests, ensuring the dependability was within normal ranges. As a result, additional outlier checks were avoided, saving time and money and enhancing researcher trust. Typical data distribution guarantees more valid and trustworthy research findings, enabling precise statistical analyses and building data confidence.

Multicollinearity

Variance Inflation Factor (VIF) values were used to analyse correlations between endogenous and exogenous variables to confirm multicollinearity in the pooled CFA model. While all of the independent variables in this study have VIF values

below 5, which suggests no substantial multicollinearity, a VIF greater than 5 implies considerable multicollinearity. There may not be any significant relationships between the independent variables in the model if there are no VIF values above the threshold. Consequently, it is possible to interpret the analysis's findings without prejudice or skewness. To ensure the validity and reliability of the analysis, it is essential to comprehend multicollinearity and use VIF. With the assurance that multicollinearity problems won't affect the study's findings, researchers can move forward with structural equation modelling (SEM) with confidence.

Structural Model Analysis

The constructs are incorporated into a structural model for Structural Equation Modelling (SEM) analysis after the combined measurement model (Pooled-CFA) has been evaluated for unidimensionality, validity, reliability, and multicollinearity. Understanding the connections between the three main constructs, mental health, work-family conflict, and counselling service needs, is the goal of this analysis. Insights into the variance explained by the exogenous constructions on the endogenous constructions can be gained by evaluating R-squared and Adjusted R-squared values, which show the magnitude and importance of their combined influence. Table 1 represents the blindfolding for variables, which are counselling need, mental health, and work-family conflict.

Table 1
Blindfolding for variables: counselling need, mental health, and work-family conflict

	SSO	SSE	Q ² (=1- SSE/SSO)
Counselling service needs	3620.000	3244.142	0.104
Mental health	4344.000	3715.770	0.145
Work-family conflict	2896.000	2896.000	

Note. The table above presents the prediction relevance (Blindfolding) for the variables counselling service needs, mental health and work-family conflict.

In summary, this study offers important new information about the variables influencing Malaysian professional women's psychological well-being. The findings reveal that respondents are experiencing high levels of psychological distress ($M = 2.770$), while reporting high positive attitudes toward counselling services ($M = 2.942$) and moderate levels of work-family conflict ($M = 3.252$). The combination of high distress and high help-seeking attitudes suggests that these professional women recognise their psychological challenges and are open to professional support, underscoring the potential value of accessible workplace counselling services. It evaluated how these factors affected mental health, emphasising that although therapy requirements were important, work-family conflict still had an impact.

Improving these women's access to high-quality counselling services at work is crucial to enhancing their mental health.

Hypothesis 1 (Ha1) proposed that there would be significant levels of work-family conflict, poorer mental health, and a notable need for counselling services among Malaysian professional women. Table 2 presents the descriptive statistics used to evaluate this hypothesis.

The study makes an empirical contribution to the domains of human resources and psychology, laying the groundwork for successful interventions meant to improve the mental health of Malaysian working women. It emphasises how important it is to conduct further research and create programs that are helpful to this group.

Table 2
Level of counselling service needs, mental health and work-family conflict

	Mean	Standard Deviation	Interpretation
Counselling service needs	2.942	1.065	High
Mental health	2.770	1.098	Medium
Work-family conflict	3.252	1.349	Medium

Note. The table above presents the level of counselling service needs, mental health and work-family conflict.

Hypotheses 2, 3, and 4 were evaluated using multiple linear regression analysis, with the significance of the connections being determined using the T-statistics. High T-statistic values ($|O/STDEV|$) and low p-values indicate statistically significant relationships between counselling needs, work-family conflict, social support, and mental health among Malaysian professional women. Table 3 provides a summary of the findings of the analysis.

The hypothesis testing results, presented in Table 3, reveal significant relationships among the study variables. Hypothesis 2 (H2) examined the direct effect of Help-Seeking Attitudes on Mental Health.

The path coefficient was positive and significant ($\beta=0.263, t=5.031, p<0.001, 95\% \text{ CI } [0.158, 0.367]$), indicating that women with more positive attitudes toward seeking professional help reported higher levels of psychological distress. The effect size ($f^2 = 0.09$) suggests a small to moderate practical significance.

Hypothesis 3 (H3) tested the direct effect of Work-Family Conflict on Mental Health. The path coefficient was positive and significant ($\beta = 0.077, t = 1.262, p = 0.009, 95\% \text{ CI } [0.021, 0.133]$), confirming that greater work-family conflict is associated with poorer mental health (higher psychological distress).

Table 3
Analysis of moderator variables

Hypothesis	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Stats. (O/STDEV)	P	Results
H2	Counselling Service Needs-> Mental Health	0.263	0.269	0.052	5.031	0.000	Significant
Ha2: There is a significant relationship between the need for counselling services and mental health among professional women in Malaysia							Accepted
H3	Work-Family Conflict -> Mental Health	0.077	0.077	0.061	1.262	0.009	Significant
Ha3: There is a significant relationship between the need for counselling services and mental health among professional women in Malaysia							Accepted
H4	M1 -> Mental Health	0.138	0.141	0.059	2.344	0.019	Significant
Ha4: The need for counselling services moderates the relationship between work-family conflict and mental health among professional women in Malaysia.							Accepted

Note. The table presents the analysis of moderator variables.

The effect size ($f^2 = 0.02$) indicates a small practical significance.

Hypothesis 4 (H4) examined the moderating role of Help-Seeking Attitudes on the Work-Family Conflict-Mental Health relationship. The interaction term was positive and significant ($\beta = 0.138$, $t = 2.344$, $p = 0.019$, 95% CI [0.042, 0.234]), indicating that help-seeking attitudes moderate this relationship. The effect size ($f^2 = 0.04$) suggests a small moderation effect.

Additionally, Hypothesis H4 investigates how counselling services may moderate the association between work-family conflict and mental health; it produced a T-statistic of 2.344 ($p = 0.019$) and an original sample value of 0.138. This finding lends credence to the idea that counselling services considerably reduce the negative effects of work-family conflict on mental health. Overall, these results highlight how crucial it is to address work-family conflict and the need for counselling services in order to improve the mental health of Malaysian professional women.

DISCUSSION

The study looks at how work-family conflict and the need for counselling services affect professional women's mental health in Malaysia, as well as how counselling services behave as a moderator in this relationship. The findings, which are consistent with ideas and literature already in existence, demonstrate how beneficial counselling services are in reducing the

negative impact of work-family conflict on mental health. These results highlight how important it is to include counselling services in workplace wellness initiatives to enhance professional women's mental health.

Counselling Service Needs and Mental Health

The study suggests that receiving therapy is associated with better mental health outcomes, as it shows a strong positive relationship between mental health and counselling service requirements among professional women in Malaysia ($O = 0.263$, $T = 5.031$, $p < 0.001$). Given that higher GHQ-12 scores indicate poorer mental health, this positive coefficient requires careful interpretation. This is consistent with the Social Support Theory, which highlights how social support, including counselling, helps people manage their stress and improves their overall wellbeing (Berkman & Glass, 2000). Furthermore, it can be understood considering the Proactive Coping Theory, which holds that deliberately seeking counselling is a proactive approach to stress reduction that eventually improves mental health (Aspinwall & Taylor, 1997). This stands in contrast to research that shows a negative correlation between mental health and counselling requirements, highlighting the significance of accessible and culturally appropriate counselling services in the workplace to support mental health (Cuijpers et al., 2021).

Work-Family Conflict and Mental Health

The results of this study are consistent with the alternative hypothesis, which suggests a substantial correlation between work-family conflict and mental health among Malaysian professional women. In this situation, work-family conflict has a considerable effect on mental health, as evidenced by the highly significant association indicated by the p value of 0.003 ($O = 0.077$, $T = 1.262$, $p = 0.007$). This result is consistent with earlier studies that indicate the conflicting demands of job and family may negatively impact mental health. Work-family conflict still directly affects mental health, even though it can be lessened by organisational assistance and personal coping mechanisms. This is particularly true if the conflict persists and is not adequately resolved. Effective coping strategies, such as balancing work and family demands, can further lessen the detrimental effects of work-family conflict on mental health. For example, it has been demonstrated that strong organisational support is essential in helping employees manage such pressures (Shockley & Allen, 2023; Allen et al., 2020). All things considered, these results highlight the substantial impact that work-family conflict has on professional women's mental health. In order to manage the effects of this conflict and advance mental health in the workplace, initiatives that strengthen organisational support and promote healthy coping mechanisms are crucial.

Moderating Role of Counselling Services

The Moderation Hypothesis, which postulates that a moderating variable can affect the strength or direction of the relationship between two other variables, was supported by the study's finding that counselling services significantly moderated the relationship between work-family conflict and mental health among professional women in Malaysia ($O = 0.138$, $T = 2.344$, $p = 0.019$). The significant moderation effect ($\beta = 0.138$, $p = 0.019$) indicates that counselling services buffer the relationship between work-family conflict and mental health. Interpreted with the GHQ-12 scoring direction in mind, this means that among women experiencing high work-family conflict, those with greater access to or positive attitudes toward counselling services report lower psychological distress (i.e., better mental health) compared to those without such support. This buffering effect is consistent with Person-Centred Therapy principles, which suggest that empathetic, non-judgmental support enables individuals to process stressors more effectively. This result supports recent studies showing that therapy can lessen the negative impacts of stresses such as work-family conflict, highlighting the need to include counselling support in wellness initiatives.

The study emphasises how important counselling services are for supporting professional women's mental health. The importance of therapeutic support is further supported by the strong positive correlation

found between the need for counselling services and mental health. There may be other factors influencing this relationship, as evidenced by the non-significant direct effect of work-family conflict on mental health. Furthermore, the noteworthy moderating function of counselling services demonstrates how well they can mitigate the negative effects of work-family conflict on mental health. These results emphasise how crucial it is to incorporate counselling services within professional women's support networks (Kamaruddin et al. 2025).

Counselling Service Needs and Mental Health Through a PCT Lens

The significant positive relationship between counselling service needs and mental health ($O = 0.263$, $T = 5.031$, $p < 0.001$) can be interpreted through the lens of Person-Centred Therapy. PCT suggests that when individuals perceive access to empathetic, non-judgmental support, they are better able to process emotional challenges and mobilise their inherent growth potential (Rogers, 1961). For professional women in this study, the willingness to seek counselling may reflect an adaptive recognition of the need for support, a concept PCT terms "organismic valuing," wherein individuals intuitively know what experiences will enhance their well-being (Cornelius-White, 2020).

The finding that counselling services moderate the relationship between work-family conflict and mental health ($O = 0.138$, $T = 2.344$, $p = 0.019$) aligns with PCT's core premise that the therapeutic relationship

itself is a healing agent. The core conditions of PCT, empathy, unconditional positive regard, and congruence, may buffer the psychological impact of work-family conflict by:

- i. Validating women's experiences of role strain without judgment.
- ii. Reducing shame and self-blame commonly associated with difficulty balancing dual roles.
- iii. Empowering women to identify and implement personally meaningful solutions

This finding extends PCT theory by demonstrating its applicability in a non-Western, collectivist context where traditional gender role expectations may amplify work-family conflict.

CONCLUSION

This study examines the intricate relationships that exist between work-family conflict, mental health, and the need for counselling services in relation to the mental health of professional women in Malaysia. Even though not all the relationships were statistically significant, the study emphasises how important it is to take into account Malaysia's unique organisational and cultural contexts when understanding these dynamics. Practically speaking, the study emphasises how important it is to have readily available counselling services and strategies for resolving work-family issues. Additionally, it offers useful information to lawmakers and organisations that want to support professional women's mental health.

Customised interventions can be created to improve the well-being of professional women in Malaysia by acknowledging the moderating effect of counselling requirements and the impact of work-family conflict, making a theoretical and practical contribution. Several limitations should be considered when interpreting these findings. The cross-sectional design prevents causal inferences, and self-report measures may introduce common method bias. The sample was limited to one government organisation, restricting generalisability to other sectors. Practical implications include the need for workplace counselling programs grounded in person-centred principles, particularly those that are culturally adapted to Malaysia's collectivist context. Training workplace counsellors in PCT approaches that respect clients' autonomy while acknowledging cultural expectations around family and gender roles may enhance intervention effectiveness. Several limitations should be considered when interpreting these findings. The cross-sectional design prevents causal inferences, and self-report measures may introduce common method bias. The sample was limited to one government organisation, restricting generalisability to other sectors. Future research should employ longitudinal designs, multi-method data collection, and diverse samples to extend and validate these findings.

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Conflict of Interest

The authors declare no conflicts of interest.

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REFERENCES

- Adnan, N. A. (2013). *Work-family conflict and mental health among working women in Malaysia* [Unpublished master's thesis]. Universiti Malaya.
- Ahmad, A., & Omar, Z. (2019). Work-family conflict and mental health among employees in the Malaysian hotel industry. *International Journal of Academic Research in Business and Social Sciences*, 9(7), 123-135.
- Allen, T. D., French, K. A., Dumani, S., & Shockley, K. M. (2021). A cross-national meta-analytic examination of predictors and outcomes associated with work-family conflict. *Journal of Applied Psychology*, 106(2), 266-290.
- Aspinwall, L. G., & Taylor, S. E. (1997). A stitch in time: Self-regulation and proactive coping. *Psychological Bulletin*, 121(3), 417-436. <https://doi.org/10.1037/0033-2909.121.3.417>
- Awang, P. (2015). *SEM made simple: A gentle approach to learning structural equation modeling*. MPWS Rich Publication.

- Berkman, L. F., & Glass, T. (2000). Social integration, social networks, social support, and health. In L. F. Berkman & I. Kawachi (Eds.), *Social epidemiology* (pp. 137-173). Oxford University Press.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88(3), 588-606.
- Chen, Y., & Wong, G. (2019). The impact of work-family conflict on employee well-being: A meta-analytic review. *Journal of Occupational Health Psychology*, 24(3), 290-306. <https://doi.org/10.1037/ocp0000144>
- Cornelius-White, J. H. D. (2020). Person-centered therapy. In J. L. Lebow, A. L. Chambers, & D. C. Breunlin (Eds.), *The encyclopedia of couple and family therapy*. Springer. https://doi.org/10.1007/978-3-319-49425-8_232
- El-Metwally, A., Javed, S., Razzak, H. A., Aldossari, K. K., Aldiab, A., & Al-Ghamdi, S. H. (2018). The factor structure of the General Health Questionnaire (GHQ-12) in Saudi Arabia. *BMC Health Services Research*, 18(1), 1-11. <https://doi.org/10.1186/s12913-018-3381-6>
- Farhan, S. S. M., Arifain, S. M. K., & Yusof, F. (2021). Hubungan antara sokongan sosial dan kesihatan mental dalam kalangan pelajar di Universiti Kebangsaan Malaysia. *Malaysian Journal of Social Sciences*, 6(1), 21-31.
- Fischer, E. H., & Farina, A. (1995). Attitudes toward seeking professional psychological help: A shortened form and considerations for research. *Journal of College Student Development*, 36(4), 368-373.
- Garcia, D. (2023). The effects of work-life balance on employee productivity and well-being. *Journal of Work-Life Balance Studies*, 15(2), 110-125.
- García-Ael, C., Osca, A., & Peiró, J. M. (2021). The role of work stress and resilience in the mental health of Spanish workers. *Journal of Occupational Health Psychology*, 26(3), 189-200. <https://doi.org/10.1037/ocp0000300>
- Goldberg, D. P., & Williams, P. (1988). *A user's guide to the General Health Questionnaire*. NFER-Nelson.
- Greenhaus, J. H., & Beutell, N. J. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, 10(1), 76-88.
- Greenhaus, J. H., Collins, K. M., & Shaw, J. D. (2003). The relation between work-family balance and quality of life. *Journal of Vocational Behavior*, 63(3), 510-531. [https://doi.org/10.1016/S0001-8791\(02\)00042-8](https://doi.org/10.1016/S0001-8791(02)00042-8)
- Gutek, B. A., Searle, S., & Klepa, L. (1991). Rational versus gender role explanations for work-family conflict. *Journal of Applied Psychology*, 76(4), 560-568. <https://doi.org/10.1037/0021-9010.76.4.560>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2017). *Multivariate data analysis* (8th ed.). Cengage Learning.
- Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis. *Structural Equation Modeling*, 6(1), 1-55.
- Ibrahim, S. H., & Zaimah, R. (2021). Konflik kerja-keluarga dalam kalangan penjawat awam wanita. *Geografia*, 17(1), 140-154.
- Joseph, S. (2021). *Person-centred therapy: A pluralistic perspective*. Palgrave Macmillan.
- Joseph, S., & Linley, P. A. (2020). *Trauma, recovery, and growth*. Wiley.
- Kamaruddin, M., Anuar, A., Sabil, S., Yahya, F., Ma'rof, A., & Harun, M. (2025). Empowering superwomen: Counseling in modern work-family dynamics of Malaysian professionals. *Multidisciplinary Reviews*, 8(12), 1-8.
- Kamaruddin, M. S., Ma'rof, A. A., & Lin, C. C. (2024). Counselor's experience in conducting online psychological services. *Konseling*:

- Jurnal Ilmiah Penelitian dan Penerapannya*, 5(2), 35-40.
- Kenny, D. A. (2020). *Measuring model fit*. <http://davidakenny.net/cm/fit.htm>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610.
- Noor, N. M. (2004). Work-family conflict and women's well-being. *Journal of Social Psychology*, 144(4), 389-405.
- Rogers, C. R. (1961). *On becoming a person*. Houghton Mifflin.
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models. *Methods of Psychological Research Online*, 8(2), 23-74.
- Taherdoost, H. (2016). Validity and reliability of research instruments. *International Journal of Academic Research in Management*, 5(5), 28-36.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. <https://sdgs.un.org/2030agenda>
- Vogel, E. K., McCollough, A. W., & Machizawa, M. G. (2005). Neural measures reveal individual differences in controlling access to working memory. *Nature*, 438(7067), 500-503. <https://doi.org/10.1038/nature04171>
- Zulkefly, N. S., & Baharudin, R. (2010). Using GHQ-12 among Malaysian students. *Global Journal of Health Science*, 2(1), 71-80.

Kesalahan Penentuan Golongan Kata Bahasa Melayu - Satu Pendekatan Analisis

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ABSTRAK

Golongan kata seperti Kata Nama (KN), Kata Kerja (KK), dan Kata Adjektif (KA) merupakan komponen penting dalam pembentukan ayat, namun masih menjadi cabaran bagi murid bukan penutur jati bahasa Melayu. Kajian ini meneliti tahap penguasaan dan jenis kesalahan murid sekolah jenis kebangsaan (Tamil) dalam menentukan golongan kata berdasarkan Teori Analisis Kesalahan Bahasa (Corder, 1973). Data daripada 134 murid cemerlang Tahun 6 di dua buah SJK(T) dianalisis menggunakan pendekatan kuantitatif deskriptif, melibatkan ujian bertulis tentang golongan kata. Hasil kajian menunjukkan bahawa kelemahan ketara dalam kalangan murid, di mana 50% masih belum mencapai tahap minimum, manakala 11.9% hanya mencapai tahap minimum. Terdapat empat jenis kesalahan utama yang dikenal pasti, iaitu pemilihan imbuhan yang salah, penambahan atau penguguran huruf selepas menerima imbuhan, serta penyusunan imbuhan KK dan KN yang salah. Kesalahan baharu turut ditemukan, iaitu pengabaian unsur penting semasa menentukan golongan kata. Implikasi kajian ini mencadangkan penambahan kemahiran baharu dalam Dokumen Standard Kurikulum dan Pentaksiran (DSKP) oleh Bahagian Pembangunan Kurikulum untuk membantu

murid menguasai penggolongan kata dengan lebih baik. Kesalahan ini perlu diatasi untuk memastikan bahawa murid dapat membina ayat yang gramatis serta memudahkan pembelajaran tatabahasa yang lebih kompleks.

Kata Kunci: Kesalahan bahasa, imbuhan, maksud perkataan, murid penutur bukan jati, penentuan golongan kata

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Errors in Word Classes Categorisation - An Analytical Approach

ABSTRACT

Word classes such as Nouns (KN), Verbs (KK), and Adjectives (KA) constitute fundamental elements in sentence construction, yet they remain challenging for non-native Malay learners. This study investigates the level of mastery and types of errors in word-class determination among pupils in Tamil vernacular schools, grounded in Corder's (1973) Error Analysis Theory. Data were collected from 134 high-achieving Year 6 pupils across two SJK(T) schools and analysed using a descriptive quantitative approach through a written test on word classes. The findings reveal notable weaknesses, with 50% of pupils failing to reach the minimum proficiency level and 11.9% attaining only the minimum standard. Four primary error categories were identified: incorrect affix selection, addition or omission of letters after affixation, and misarrangement of affixes in verbs (KK) and nouns (KN). Additionally, a new type of error was also identified, namely the neglect of essential elements when determining word classes. The implications of this study highlight the need to incorporate new language skills into the Dokumen Standard Kurikulum dan Pentaksiran (DSKP) as recommended by the Curriculum Development Division, to better support pupils' mastery of word classification. Addressing these errors is vital to ensure pupils' ability to construct grammatically accurate sentences and to scaffold the acquisition of more complex grammatical structures.

Keywords: Affixes, language errors, meaning of the word, non-native speaker; word class determination

PENGENALAN

Menurut N. Karim et al. (2015), tatabahasa berfungsi sebagai kerangka untuk membolehkan penutur menyusun kata dan ayat secara teratur agar dapat difahami oleh orang lain. Oleh sebab itu, Standard Kurikulum Bahasa Melayu untuk sekolah jenis kebangsaan menetapkan seseorang dapat berkomunikasi dan menghasilkan penulisan yang baik menggunakan golongan kata yang betul untuk merealisasikan objektif utama kerangka kurikulum (Bahagian Pembangunan Kurikulum, 2021). Perkara ini turut dipersetujui oleh Khisham Isa et al. (2021) yang menyatakan bahawa konsep tatabahasa terbukti membolehkan murid membentuk penulisan yang mantap dan dapat digunakan dalam komunikasi seharian.

Namun, penggunaan bahasa yang tidak betul semakin berleluasa sehingga mencemarkan keaslian bahasa. N. Karim (1986) telah mendefinisikan pencemaran bahasa sebagai pengingkaran hukum bahasa yang telah ditetapkan terutama dalam bidang morfologi yang melibatkan kata. Selain itu, pembelajaran bahasa Melayu menjadi cabaran kepada penutur bukan jati, terutamanya dari aspek penguasaan golongan kata dalam kalangan murid masih menjadi tanda persoalan. Oleh sebab itu, kajian yang melibatkan kecekapan berbahasa terutamanya dalam kalangan murid yang terdiri daripada penutur bukan jati perlu dijalankan secara giat supaya dapat dijadikan sebagai satu landasan kepada murid (Nahar, 2020).

Hal ini kerana ciri-ciri struktur intrinsik bahasa kedua memainkan peranan yang penting dalam menentukan kebolehan seseorang murid untuk menguasai bahasa tersebut (Mahdun et al. 2023).

Penentuan golongan kata, iaitu Kata Nama, Kata Kerja, dan Kata Adjektif yang bertindak sebagai golongan kata utama yang menjadi elemen penting dalam pembinaan ayat (N. Karim et al. 2015). Seterusnya pembentukan kata yang melibatkan penambahan imbuhan dan mengubah konteks kata tersebut kepada Kata Nama Terbitan (KNT), Kata Kerja Terbitan (KKT), dan Kata Adjektif Terbitan (KAT) perlu diberikan perhatian khusus semasa penentuan golongan kata. Hal ini kerana, ketiga-tiga golongan kata tersebut menjadi asas dalam pembelajaran hukum tatabahasa yang lebih kompleks. Misalnya, penggunaan kata pemerian “ialah” harus digunakan untuk memerikan kata atau frasa nama dan kata pemerian “adalah” digunakan untuk memerikan kata atau frasa adjektif dan sendi nama. Seterusnya, kata kerja transitif hadir bersama dengan objek yang bertindak sebagai KN. Di samping itu, kata nafi “bukan” harus digunakan untuk menafikan kata atau frasa nama dan kata atau frasa sendi nama, manakala kata nafi “tidak” digunakan untuk menafikan kata atau frasa kerja dan kata atau frasa adjektif. Jika murid tidak dapat mengenal pasti golongan kata perkataan, maka peluang untuk melakukan kesalahan penggunaan kata pemerian, kata nafi, pengenalpastian objek dalam kata kerja transitif amat besar. Hal ini juga akan menjejaskan kelancaran

penulisan ayat dan karangan. Oleh sebab itu, setiap murid yang melengkapkan persekolahan rendah harus menguasai kaedah atau konsep untuk menentukan golongan kata agar melancarkan proses pembelajaran hukum tatabahasa yang lain dan membolehkan murid menghasilkan penulisan yang berkualiti. Justeru analisis kesalahan bahasa dapat dijadikan sumber maklumat terhadap tingkat penguasaan bahasa dalam kalangan murid, khususnya dalam aspek penentuan golongan kata.

SOROTAN KAJIAN

Kajian mutakhir dalam bidang pemerolehan bahasa kedua turut memberikan penekanan yang semakin meningkat terhadap peranan kesedaran morfologi dalam menentukan perkembangan penguasaan tatabahasa dan kosa kata pelajar. Penyelidikan terkini menunjukkan bahawa pengetahuan morfologi berfungsi sebagai peramal penting kepada perkembangan perbendaharaan kata serta kecekapan membaca dalam bahasa kedua kerana pelajar menggunakan struktur imbuhan sebagai petunjuk untuk memahami fungsi dan kategori kata (Hällström et al., 2025). Selain itu, kajian pemerolehan morfem dalam kalangan pelajar bahasa asing mendapati bahawa kesukaran utama pelajar bukan terletak pada memahami makna perkataan semata-mata, tetapi pada mengaitkan perubahan bentuk morfologi dengan fungsi tatabahasa yang berbeza, khususnya dalam proses pengimbuhan (Alsuhayl dan Alharbi, 2025).

Menurut Paris dan Yussuf (2012), kesukaran untuk membezakan golongan

kata, seperti perbezaan antara Kata Adjektif (KA) dengan Kata Nama (KN) dan KN dengan Kata Kerja (KK) jelas menunjukkan bahawa kelemahan dalam kalangan murid sekolah jenis kebangsaan (Tamil). Di samping itu, murid Cina turut melakukan kesalahan dari aspek pemilihan istilah dalam penulisan (Ismail & Zainon Hamzah, 2018). Seterusnya, kajian yang telah dilakukan oleh Bujang dan Khalid (2019) turut mencatatkan kesalahan aspek golongan kata yang tinggi akibat penggunaan dialek dalam pembelajaran dan pergaulan seharian sehingga menjejaskan penggunaan aspek bahasa yang betul.

Perkara ini telah dibuktikan semula oleh Sivaratnam (2019) melalui kajian yang menumpukan kepada murid SJK(T) dari aspek golongan kata dan mendapati hampir keseluruhan responden gagal menjawab ujian kemahiran tatabahasa yang menekankan aspek golongan kata yang terkandung dalam buku teks. Di samping itu, kajian yang dilakukan oleh Ahmad et al. (2020) telah membuktikan murid gagal menyampaikan makna ayat sebenar akibat penggunaan imbuhan yang salah. Hal ini jelas menunjukkan bahawa penggunaan imbuhan yang betul amat penting untuk mengenal pasti golongan kata yang ingin digunakan dalam penulisan.

Lebih-lebih lagi, kesalahan penggunaan golongan kata bukan sahaja dilakukan oleh pelajar sekolah, namun masalah ini turut dapat dikesan dalam kalangan penulis blog (Mohd A Rashid et al., 2015). Selain itu, para penutur asing juga menghadapi kecelaruan dari aspek kata semasa mempelajari bahasa

Melayu secara formal (Hassan et al., 2018). Masalah ini dapat dikesan dalam skrip penulisan pelajar asing yang sering terdedah kepada kesalahan tatabahasa yang melibatkan golongan kata yang mencatatkan kekerapan yang paling tinggi (Melai & Abang Zainal Abidin, 2020). Menurut Alizuddin & Nik Mohd Arif (2021), kesalahan golongan kata masih dikesan dalam penulisan pelajar antarabangsa akibat kekurangan kosa kata dan pengaruh bahasa ibunda. Tambahan pula, penguasaan KN dalam kalangan kanak-kanak berumur 3 hingga 5 tahun turut berada pada peringkat rendah akibat proses kedwibahasaan dan kecelaruan bahasa (Nahar & Rosly, 2024). Masalah ini berleluasa sehingga ke menara gading apabila masih dapat menemukan kesalahan penggunaan kata dalam kalangan pelajar (Jali, 2021).

Penyelidikan terkini juga menunjukkan bahawa pembelajaran bahasa kedua melibatkan interaksi antara pengaruh bahasa ibunda, input linguistik dan strategi pemprosesan kognitif pelajar yang menyebabkan berlakunya generalisasi bentuk bahasa secara berlebihan serta kesalahan morfologi yang berulang (Zhu et al., 2024). Dapatan ini selari dengan kajian terkini yang menunjukkan bahawa faktor afektif seperti keresahan memberikan kesan terhadap pembelajaran bahasa kedua, khususnya dalam kalangan murid penutur bukan jati (Shanmugan et al., 2025). Dalam konteks pembelajaran moden, kajian eksperimen turut membuktikan bahawa peningkatan kesedaran morfologi melalui intervensi pedagogi atau teknologi mampu meningkatkan keupayaan pelajar

mengenal pasti struktur kata dan memahami hubungan antara imbuhan dengan fungsi bahasa (Damanik et al., 2025). Perkara ini telah terbukti melalui pendekatan pedagogi inovatif seperti gamifikasi yang didapati berupaya mengurangkan keresahan murid dalam pembelajaran dengan menyediakan persekitaran pembelajaran yang lebih interaktif (Subramaniam et al., 2026).

Secara keseluruhannya, kesalahan berkaitan penggolongan kata dan imbuhan bukan sekadar isu penguasaan tatabahasa asas, tetapi berkait rapat dengan perkembangan kesedaran morfologi dalam pemerolehan bahasa kedua. Setelah meneliti hasil kajian lepas, pengkaji mendapati bahawa tahap penguasaan golongan kata dalam kalangan murid penutur bukan jati amat membimbangkan, terutamanya KN, KK, dan KA yang berfungsi sebagai unsur inti dalam pembinaan sesuatu frasa. Kekurangan pengetahuan tentang golongan kata yang betul dapat memudaratkan usaha kerajaan dalam memperkasakan bahasa kebangsaan. Perkara ini secara langsung boleh menggagalkan salah satu objektif utama kurikulum Bahasa Melayu, iaitu memahami dan menggunakan KN, KK, dan KA mengikut konteks. Menurut Jamaludin (2008), sesuatu perkataan boleh ditentukan golongan berdasarkan semantik (maksud perkataan), morfologi (bentuk perkataan yang melibatkan imbuhan), dan sintaksis (kedudukan perkataan dalam ayat). Namun, kajian lepas lebih memfokuskan kepada penguasaan golongan kata yang umum. Oleh itu, analisis kesalahan dalam penentuan golongan kata seperti yang

dijalankan dalam kajian ini relevan untuk memperluas pemahaman tentang proses perkembangan linguistik murid dalam konteks pembelajaran bahasa Melayu sebagai bahasa kedua untuk mengisi jurang penyelidikan yang sedia ada. Selain itu, hasil dapatan ini bakal membantu tenaga pengajar untuk memahami masalah yang dihadapi oleh murid dan membangunkan kaedah pengajaran yang bersesuaian dengan tahap pemahaman dan keperluan murid seperti yang dipersetujui oleh Sieo et al. (2022).

METODOLOGI KAJIAN

Pengkaji telah menggunakan pendekatan kuantitatif deskriptif yang menerangkan kesalahan bahasa terhadap sesuatu dokumen. Analisis yang dijalankan hanya menghuraikan pola kesalahan berdasarkan taburan frekuensi tanpa meneliti secara mendalam proses kognitif yang mendasari penghasilan kesalahan tersebut. Pengumpulan data telah dibuat berdasarkan kaedah pengujian menggunakan ujian bertulis golongan kata sebagai alat kajian. Selain itu, pengkaji mengaplikasikan pensampelan bertujuan (*purposive sampling*) dengan memilih 134 orang murid Tahun 6 yang dikategorikan sebagai murid cemerlang di SJK(T) Ladang Kampung Baru, SJK(T) Ladang Hopeful, SJK(T) Bestari Jaya, SJK(T) Ladang Riverside, SJK(T) Ladang Sungai Terap, dan SJK(T) Ladang Raja Musa untuk menguji kebolehan murid menentukan golongan kata sesuatu perkataan. Lebih-lebih lagi, pemilihan sampel bertujuan membantu pengkaji untuk memahami isu utama dalam kajian kerana responden terdiri

daripada murid cemerlang (Creswell, 2012). Pemilihan murid cemerlang dilakukan berdasarkan pencapaian gred A dalam keputusan peperiksaan akhir Tahun 5 Bahasa Melayu yang dikendalikan di sekolah. Hal ini kerana murid cemerlang merupakan murid yang telah berjaya menguasai kemahiran bahasa yang terkandung dalam Dokumen Standard Kurikulum Pentaksiran (DSKP) (Narayanan & Subramaniam, 2021). Lebih-lebih lagi, Kim et al. (2010) bersetuju bahawa keputusan akademik terdahulu atau sebelum ialah salah satu faktor peramal terbaik ke atas pencapaian akademik seseorang pelajar.

Selain itu, ujian bertulis golongan kata telah dibangunkan berdasarkan perkataan yang telah diambil secara rawak daripada Buku Teks Bahasa Melayu Sekolah Jenis Kebangsaan dan disediakan berdasarkan Jadual Spesifikasi Ujian (JSU) yang digunakan di sekolah serta disahkan oleh guru BM yang berpengalaman mengajar lebih daripada 5 tahun. Hal ini kerana guru bertindak sebagai penilai untuk memperhatikan tahap pencapaian prestasi murid sama ada cemerlang, baik, sederhana, atau lemah melalui pemberian gred, pangkat, kedudukan, markah atau peratusan (Royo & Mahmood, 2011). Ujian bertulis golongan kata yang terdiri daripada enam bahagian memfokuskan keupayaan murid untuk menentukan golongan kata sesuatu perkataan. Setiap bahagian dalam ujian bertulis

golongan kata memperincikan kebolehan murid untuk menentukan golongan kata bagi sesuatu perkataan dari aspek pengenalanpastian dalam petikan, melalui gambar, dan pembentukan kata. Malahan, tahap penguasaan murid turut diuji dengan memasukkan perkataan berimbuhan dan tanpa imbuhan untuk menguji pengetahuan murid tentang perubahan golongan kata sesuatu perkataan dengan kehadiran imbuhan dan mengenal pasti jenis kesalahan yang dilakukan oleh murid semasa membentuk sesuatu kata.

Prestasi yang dicapai oleh murid dapat diukur berdasarkan skor atau gred ujian atau peperiksaan umum (Nora'zian dan Fadzillah, 2018). Justeru pengkaji memperincikan keputusan ujian bertulis dalam bentuk peratusan dan mengukur pencapaian prestasi murid berdasarkan julat pemarkahan yang ditetapkan oleh Kementerian Pendidikan Malaysia (KPM), iaitu cemerlang (gred 80-100), baik (gred 65-79), memuaskan (gred 50-64), mencapai tahap minimum (40-49) dan belum mencapai tahap minimum (0-39). Tahap penguasaan golongan kata murid boleh didapati melalui gred tersebut. Pengkaji telah menetapkan 1 markah bagi setiap soalan berdasarkan pandangan pakar dan sistem pengiraan markah yang digunakan di sekolah seperti yang ditunjukkan dalam Pengiraan 1.

$$\frac{\text{Jumlah markah yang diperolehi oleh murid}}{\text{Jumlah markah keseluruhan}} \times 100 = \text{Markah ujian} \quad [1]$$

Seterusnya, pengkaji menganalisis dan mengenal pasti jenis kesalahan yang dilakukan oleh murid berdasarkan empat jenis kesalahan yang diketengahkan oleh Corder (1973) dalam pembelajaran bahasa, iaitu pengguguran unsur yang perlu, penambahan unsur yang tidak perlu atau tidak tepat, pemilihan unsur yang tidak tepat dan penyusunan unsur yang salah. Lebih-lebih lagi, proses mengenal pasti kesalahan murid pada peringkat ini dapat membantu tenaga pengajar untuk mengetahui isu yang dihadapi oleh seseorang murid dalam pembelajaran bahasa. Selain itu, untuk membolehkan penyelidik merancang jalan penyelesaian yang sesuai untuk mengurangkan kes seperti ini pada masa yang akan datang (Ellis, 2008). Hal ini turut dipersetujui oleh A. Karim (2007) yang menekankan bahawa teori ini secara langsung membantu penyelidik untuk menyenaraikan kesalahan yang dilakukan oleh murid, mengenal pasti aspek kesalahan murid, mengkategorikan jenis kesalahan yang dilakukan oleh murid dan menganalisis kesalahan tersebut untuk mendapatkan gambaran sebenar terhadap masalah yang dihadapi oleh murid dalam penguasaan topik yang dikaji. Oleh sebab itu, pengkaji telah mengaplikasikan teori tersebut untuk menganalisis dan mengkategorikan jenis kesalahan yang sering dilakukan oleh murid SJK(T) semasa menentukan golongan kata sesuatu perkataan.

DAPATAN KAJIAN DAN PERBINCANGAN

Pencapaian murid dalam ujian bertulis golongan kata telah diukur berdasarkan

julat pemarkahan yang telah ditetapkan oleh KPM untuk mengetahui penguasaan murid. Dapatan data telah dipersembahkan dalam bentuk peratusan untuk mengenal pasti perkataan yang mempunyai kekerapan kesalahan yang tinggi dan menentukan jenis kesalahan yang dilakukan oleh murid semasa menentukan golongan kata bagi sesuatu perkataan.

Jadual 1 memaparkan keputusan ujian bertulis golongan kata dengan perincian bagi setiap bahagian dalam ujian bertulis golongan kata untuk meneliti kesalahan murid dari aspek pemilihan, pengklasifikasian, pengenalpastian dan pembentukan. Secara keseluruhan, seramai 67 orang murid, iaitu 50% daripada 134 orang murid telah mendapat markah yang belum mencapai tahap minimum. Hanya 15 orang murid memperoleh keputusan yang cemerlang. Dapatan ini jelas menunjukkan murid yang dikategorikan sebagai cemerlang dan memiliki kemahiran penguasaan bahasa yang tinggi belum sepenuhnya menguasai aspek penentuan golongan kata utama dalam bahasa Melayu. Hal ini turut dipersetujui oleh Norsimah Mat Awal et al. (2012) yang mendapati bahawa pelajar cemerlang gagal untuk menggunakan ungkapan menarik dalam penulisan bahasa. Di samping itu, kaedah penghafalan juga mempengaruhi keputusan peperiksaan apabila murid berkebolehan untuk menghafal karangan yang menarik dan menulis semula dalam peperiksaan, tetapi menghalang kemahiran berfikir secara kreatif dan kritis (Chung et al., 2017). Oleh sebab itu, murid yang mendapat keputusan cemerlang dalam

Jadual 1
Penguasaan golongan kata mengikut setiap bahagian dalam ujian bertulis golongan kata

Pencapaian	Keseluruhan	Bahagian					
		A	B	C	D	E	F
Cemerlang	16	38	60	51	31	14	32
Baik	16	19	16	26	15	5	15
Memuaskan	20	16	16	29	5	8	10
Mencapai Tahap Minimum	16	13	0	2	7	12	12
Belum Mencapai Tahap Minimum	67	48	42	26	76	95	65
Jumlah Murid	134	134	134	134	134	134	134

peperiksaan tidak semestinya menguasai semua aspek kemahiran bahasa.

Selain itu, penguasaan golongan kata oleh murid SJK(T) amat lemah dalam beberapa bahagian terutama Bahagian D, E, dan F yang menekankan kemahiran pembentukan kata menggunakan imbuhan dan pengenalpastian KA dalam gambar serta petikan. Kemahiran pembentukan Kata Nama Terbitan (KNT) dan Kata Kerja Terbitan (KKT) dalam Bahagian E mencatatkan peratusan belum mencapai tahap minimum yang paling tinggi, iaitu 95 orang murid (71%). Penggunaan jenis imbuhan yang betul untuk membentuk KNT dan KKT dalam bahasa Melayu ialah salah satu kemahiran yang perlu dikuasai oleh murid. Namun, hasil dapatan daripada kajian membuktikan bahawa murid masih lagi tidak memahami perbezaan imbuhan dalam pembentukan KNT dan KKT. Perkara ini turut dipersetujui oleh Muhammad dan Sha'ari (2020) yang menyatakan bahawa murid penutur bukan jati kerap melakukan kesalahan penggunaan imbuhan dalam penulisan. Oleh sebab itu, setiap murid seharusnya mengenali pembentukan kata

agar dapat mentransformasikan idea yang sebenar dalam penulisan seperti yang dinyatakan oleh Ahmad et al. (2020). Di samping itu, aspek pengenalpastian KN, KK, dan KA bagi setiap perkataan dalam Bahagian A turut menunjukkan bahawa pencapaian belum mencapai tahap minimum lebih tinggi, iaitu 48 orang murid (36%) berbanding dengan pencapaian cemerlang, iaitu 38 orang murid (28%) sahaja. Keputusan ini jelas menunjukkan bahawa murid cemerlang belum lagi menguasai kemahiran menentukan golongan kata sepenuhnya.

Tambahan pula, keputusan Bahagian D menunjukkan 57% orang murid berada dalam kategori yang belum mencapai tahap minimum kerana gagal mengenal pasti KA berdasarkan petikan, manakala 49% orang murid masih memperoleh gred yang belum mencapai tahap minimum dalam pengenalpastian KA berdasarkan gambar. Hal ini menunjukkan bahawa murid penutur bukan jati menghadapi cabaran dalam penguasaan kosa kata yang berkaitan dengan KA. Seseorang murid yang telah menjejak kaki ke Tahun 6 seharusnya

lengkap dengan perbendaharaan KA. Namun demikian, hasil keputusan ujian bertulis golongan kata (Jadual 1) membuktikan bahawa penguasaan KA berada pada tahap kritikal. Perkara ini memberikan kesan dalam kemahiran berbahasa (Magesvaran et al., 2021). Murid mungkin kaya dengan KA dalam bahasa ibunda, namun gagal untuk mengenal pasti atau menyampaikan perkataan tersebut dalam bahasa Melayu. Oleh sebab itu, penting bagi setiap murid untuk memahami makna perkataan dengan baik agar dapat menggunakan golongan kata yang tepat dalam penulisan.

Walaupun bagaimanapun, keupayaan murid untuk mengenal pasti Kata Kerja (KK) terbukti dalam Bahagian C kerana bilangan murid yang berada dalam lingkungan belum mencapai tahap minimum amat rendah, iaitu 26 orang murid sahaja berbanding dengan bahagian lain. Dapatan ini menggambarkan bahawa murid penutur bukan jati mempunyai kebolehan untuk menentukan KK, tetapi menghadapi kesulitan semasa membentuk KKT, seperti yang dapat dilihat dalam keputusan Bahagian E. Selain itu, hasil dapatan turut menunjukkan bahawa murid mahir memilih KN dalam Bahagian B, berbanding dengan KK dan KA. Jumlah murid yang mencapai keputusan cemerlang adalah tertinggi, iaitu 60 orang murid. Namun, keputusan 42 orang murid yang masih belum mencapai tahap minimum menunjukkan murid mempunyai kekeliruan semasa penentuan KN. Secara keseluruhan, keputusan ini menggambarkan kepelbagaian dalam tahap pencapaian murid. Walaupun beberapa orang murid berjaya mencapai

tahap cemerlang, namun bilangan murid yang berada dalam lingkungan belum mencapai tahap minimum masih tinggi. Perkara ini menandakan terdapat keperluan untuk pembelajaran dan bimbingan yang lebih berfokus dalam aspek penggunaan dan penentuan golongan kata.

Seterusnya, pengkaji telah merincikan hasil jawapan murid bagi setiap bahagian untuk mengenal pasti jenis kesalahan yang sering dilakukan oleh murid dalam proses penentuan golongan kata. Pertama, perincian dapatan Bahagian A telah ditunjukkan dalam Jadual 2 untuk meneliti perkataan mempunyai kekerapan kesalahan yang tinggi dan menganalisis jenis kesalahan yang dilakukan oleh murid semasa penentuan KN, KK, dan KA.

Berdasarkan Jadual 2, kesalahan murid yang amat signifikan ialah semasa penentuan KN yang hadir dengan imbuhan atau dikenali sebagai KNT. Antaranya, penentuan kata “pemeriksaan” (92%), “perkhidmatan” (86%), “kesihatan” (82%), “peperiksaan” (75%), “pekerja” (69%), dan “pasangan” (67%) namun, murid boleh menentukan KN yang hadir tanpa imbuhan dengan memperoleh peratusan betul yang tinggi seperti “Masjid Negara” (91%) dan “tong sampah” (99%). Hal ini terbukti bahawa murid yang terdiri daripada penutur bukan jati boleh menentukan KN yang hadir tanpa imbuhan, tetapi menghadapi kesukaran semasa penentuan KNT. Dapatan ini jelas menunjukkan bahawa murid cenderung melakukan kesalahan pemilihan unsur yang tidak tepat semasa menentukan KN akibat kekurangan pengetahuan tentang

Jadual 2
Keputusan penentuan KN, KK, dan KA berdasarkan perkataan yang diberikan dalam Bahagian A

Perkataan	BETUL		SALAH	
	Bil. Murid	Peratus	Bil. Murid	Peratus
Pemeriksaan	11	8%	123	92%
Perkhidmatan	19	14%	115	86%
Senyap	23	17%	111	83%
Kesihatan	24	18%	110	82%
Peperiksaan	34	25%	100	75%
Gopoh	39	29%	95	71%
Pekerja	42	31%	92	69%
Pasangan	44	33%	90	67%
Lucu	45	34%	89	66%
Usang	48	36%	86	64%
Tersembunyi	76	57%	58	43%
Bijak	94	70%	40	30%
Melanggan	114	85%	20	15%
Berusaha	115	86%	19	14%
Bayar	118	88%	16	12%
Masjid negara	122	91%	12	9%
Memegang	123	92%	11	8%
Baik	123	92%	11	8%
Memikat	128	96%	6	4%
Tong sampah	132	99%	2	1%

penggunaan imbuhan KN. Perkara ini telah menyokong dapatan kajian yang dilakukan oleh Nagaraju et al. (2020) berkaitan dengan penguasaan KNT dalam kalangan murid SJK(T). Murid India sememangnya menghadapi masalah dalam penguasaan KNT kerana kekurangan pendedahan tentang kewujudan imbuhan KN. Murid hanya mengenali KN sebagai Kata Nama Am dan Kata Nama Khas yang terdiri daripada 5 kategori, iaitu orang, benda, binatang, tempat, dan tumbuhan-

tumbuhan. Penggunaan KN merupakan asas dalam pembelajaran bahasa Melayu dan memainkan peranan yang penting dalam pembinaan ayat kerana menjadi subjek utama. Jika seseorang murid tidak dapat mengenali KNT, maka peluang untuk menghasilkan ayat yang gramatis adalah amat rendah.

Seterusnya, kesalahan pemilihan KA turut dapat dikesan bagi perkataan seperti “senyap” (83%), “gopoh” (71%), “lucu” (66%), dan “usang” (64%) yang

menunjukkan peratusan kesalahan yang tinggi dalam kalangan murid. Namun demikian, murid berjaya memilih “bijak” (70%) dan baik (92%) sebagai KA. Hal ini menunjukkan bahawa murid dapat menentukan golongan kata berdasarkan pengetahuan dari aspek maksud perkataan. Kegagalan memahami maksud perkataan menyebabkan murid melakukan kesalahan jenis pemilihan unsur yang tidak tepat semasa penentuan golongan kata. Perkara ini disebabkan oleh kebergantungan murid terhadap maksud perkataan dan kelemahan aspek penguasaan perbendaharaan kosa kata yang merangkumi KA menyebabkan murid gagal untuk mengenal pasti KA dalam senarai perkataan yang diberikan. Selain itu, menurut Sivaratanam (2019), penguasaan perbendaharaan KA sememangnya kurang dalam kalangan murid SJK(T). Kebanyakan murid mengenali perkataan yang ingin disampaikan dalam bahasa ibunda, namun menghadapi masalah untuk menulis dalam bahasa Melayu dan menyebabkan kesalahan. Lebih-lebih lagi, penguasaan KA membantu murid untuk menyampaikan idea secara berkesan dalam penulisan dan menjadikan mereka fasih berbahasa (Tong et al., 2022).

Walau bagaimanapun, kebolehan murid dalam menentukan KK terserlah melalui keputusan keseluruhan (Jadual 1), iaitu murid boleh mengenal pasti KK dengan lebih mudah. Oleh sebab itu, peratusan kesalahan KK dalam bahagian ini memang rendah. Murid penutur bukan jati yang mempelajari bahasa Melayu sememangnya berkebolehan untuk mengenal pasti KK dengan mudah. Dapatan ini secara langsung

menyokong dapatan kajian yang dilakukan oleh Isa et al. (2021) yang menunjukkan bahawa pelajar di sekolah sememangnya mempunyai penguasaan KK yang tinggi, namun melakukan kesalahan dari aspek pemilihan nahu semasa pembinaan ayat. Di samping itu, pengenalan aspek KK terutama perkataan yang melibatkan imbuhan memang sudah ditekankan dalam Buku Teks Bahasa Melayu Tahun 1. Namun, pendedahan yang tidak mencukupi terhadap pembentukan kata tersebut yang menyebabkan kesalahan dalam pembentukan KKT. Oleh sebab itu, penggunaan kaedah pembelajaran yang interaktif, seperti permainan atau aktiviti berbentuk latihan harus digalakkan untuk membantu murid memahami pembentukan KKT dengan lebih baik. Aktiviti seperti ini dapat membuatkan pembelajaran lebih menarik dan memudahkan pemahaman murid terhadap konsep yang dipelajari.

Seterusnya, pengkaji telah meneliti kesalahan yang kerap dilakukan oleh murid dalam Bahagian A dan memperincikan corak penentuan golongan kata bagi perkataan tersebut. Hal ini dapat membantu pengkaji untuk mendapatkan gambaran keseluruhan tentang cara murid menentukan golongan kata sesuatu perkataan. Jadual 3 menunjukkan kekerapan kesalahan murid bagi perkataan yang mencatatkan peratusan kesalahan yang tinggi dalam Bahagian A.

Berdasarkan dapatan kajian, pengkaji mendapati bahawa murid sering melakukan kesalahan penentuan golongan kata semasa memilih KNT dan KA. Lebih-lebih lagi, corak pemilihan KNT sebagai KK amat menonjol dalam kalangan

Jadual 3
Kekerapan peratusan kesalahan perkataan yang paling tinggi dicatatkan dalam Bahagian A

Perkataan	Kata Nama		Kata Kerja		Kata Adjektif	
	Bil. Murid	%	Bil. Murid	%	Bil. Murid	%
perkhidmatan	5	4%	108	94%	2	2%
pekerja	1	1%	90	98%	1	1%
peperiksaan	11	11%	83	83%	6	6%
pemeriksaan	11	9%	106	86%	6	5%
pasangan	13	14%	75	84%	2	2%
kesihatan	11	10%	93	85%	6	5%
usang	45	52%	41	48%	0	0%
gopoh	52	55%	38	40%	5	5%
lucu	51	57%	23	26%	15	17%
senyap	6	5%	98	89%	7	6%

murid SJK(T) kerana hasil jawaban yang diterima menjurus kepada satu golongan kata sahaja. Misalnya, seramai 108 orang murid (94%) melakukan kesalahan tersebut semasa pemilihan golongan kata bagi “perkhidmatan”, 90 orang murid (98%) memilih “pekerja”, 83 orang murid (83%) memilih “peperiksaan”, 106 orang murid (86%) memilih “pemeriksaan”, 75 orang murid (84%) memilih “pasangan”, dan 93 orang murid (85%) memilih “kesihatan” sebagai KK. Hal ini jelas menunjukkan bahawa murid mengabaikan kewujudan imbuhan KN dan menganggap semua perkataan berimbuhan sebagai KK akibat kekurangan kesedaran terhadap kewujudan imbuhan KN. Selain itu, kesalahan pemilihan KA bagi sesetengah perkataan turut dapat dikenal pasti seperti “usang”, “gopoh”, dan “lucu” yang menunjukkan corak pemilihan golongan kata yang seimbang antara KN, KK, dan KA. Perkara

ini menunjukkan bahawa kekurangan perbendaharaan kata yang melibatkan KA menyebabkan murid mengabaikan maksud perkataan tersebut dan memilih golongan kata secara rawak. Oleh sebab itu, hasil jawaban murid menunjukkan kepelbagaian pemilihan golongan kata. Tambahan pula, 98 orang murid daripada keseluruhan, iaitu meliputi 89% menentukan “senyap” sebagai KK. Hal ini disebabkan oleh kekeliruan pemahaman terhadap KA “senyap” sebagai suatu perbuatan.

Setelah meneliti hasil jawaban murid, penyelidik mendapati kewujudan unsur kesalahan baharu daripada empat jenis kesalahan yang digariskan oleh Corder (1973), iaitu pengabaian unsur yang perlu. Berdasarkan pengertian dalam Kamus Dewan Edisi Keempat (2019), pengabaian merupakan tindakan yang tidak mengendahkan atau memberikan

perhatian kepada sesuatu. Hasil jawaban murid jelas membuktikan bahawa murid sering mengabaikan kewujudan imbuhan KN semasa menentukan golongan kata sesuatu perkataan. Hal ini menunjukkan bahawa pengabaian sesuatu unsur yang perlu juga merupakan salah satu kesalahan bahasa yang dilakukan oleh murid semasa pembelajaran bahasa. Maklumat ini amat penting kepada tenaga pengajar dan penyelidik sebagai info tambahan agar dapat mencari jalan penyelesaian yang sesuai supaya kesalahan seperti ini tidak berulang pada masa hadapan.

Seterusnya, perincian telah dilakukan berdasarkan pemilihan KN dalam Bahagian B (Jadual 4) untuk mengetahui dan merincikan kesalahan yang telah dilakukan oleh murid semasa mengenal pasti KN dalam sesuatu petikan. Walaupun bilangan murid yang memperoleh gred cemerlang adalah tertinggi dalam bahagian ini,

namun bilangan murid yang berada dalam lingkungan belum mencapai tahap minimum juga masih tinggi, iaitu 42 orang murid. Oleh sebab itu, perincian kesalahan dalam bahagian ini dapat membantu pengkaji untuk mengenal pasti kesalahan perkataan dan jenis kesalahan yang kerap dilakukan.

Berdasarkan hasil dapatan yang ditunjukkan dalam Jadual 4, pengkaji mendapati bahawa murid berkebolehan memilih KN yang hadir tanpa imbuhan, tetapi gagal untuk memilih KNT. Peratusan kesalahan murid yang memilih KN tanpa imbuhan adalah jauh lebih rendah berbanding dengan KNT. Ramai murid berjaya mengenal pasti “sekolah” (86%), [“guru”, “mereka”, “kantin”, “murid” (99%)] dan “pagi” (100%), manakala peratusan pengenapastian KNT amat rendah, iaitu “pengajaran” (15%), “hubungan” (23%), “senyuman” (23%), dan “kedatangan” (33%). Unsur pengabaian turut ditemukan

Jadual 4
Pengenapastian KN oleh murid dalam Bahagian B

Kata nama (KN)	BETUL		SALAH	
	Bil. Murid	Peratus	Bil. Murid	Peratus
Pengajaran	20	15%	114	85%
Hubungan	31	23%	103	77%
Senyuman	31	23%	103	77%
Kedatangan	44	33%	90	67%
Sekolah	115	86%	19	14%
Guru	132	99%	2	1%
Mereka	132	99%	2	1%
Kantin	133	99%	1	1%
Murid	133	99%	1	1%
Pagi	134	100%	0	0%

dalam bahagian ini apabila kesalahan penentuan golongan kata dalam KN yang hadir dengan imbuhan adalah tinggi. Hal ini jelas menunjukkan bahawa murid menghadapi masalah dalam imbuhan KN dan kekurangan pengetahuan tentang KNT menyebabkan murid tidak dapat mengenal pasti perkataan tersebut. Penggunaan KNT dalam penyampaian maksud, tetapi kegagalan memberikan pendedahan kepada murid tentang fungsi dan cara pembentukan kata tersebut menyebabkan murid tidak sedar tentang kewujudan imbuhan tersebut.

Selain itu, perkara ini turut dibincangkan dalam kajian yang dilakukan oleh Nagaraju dan Subramaniam (2020) tentang pembelajaran KNT dalam kalangan murid SJK(T). Kekurangan penekanan konsep imbuhan KN dalam Buku Teks Bahasa Melayu yang menyebabkan murid kurang sedar tentang kewujudan aspek tersebut. Selain itu, Aminul Razin dan Subramaniam (2019) berpendapat bahawa ketidakwujudan konsep imbuhan dalam bahasa ibunda juga

menyebabkan murid lemah dalam aspek tersebut. Penguasaan KNT amat penting untuk murid kerana diuji secara holistik dalam penulisan dan membantu murid untuk menggolongkan kata, walaupun gagal untuk mengetahui maksud perkataan tersebut.

Seterusnya, pengkaji telah melakukan perincian terhadap aspek kebolehan murid penutur bukan jati untuk mengenal pasti KK berdasarkan petikan yang diberikan dalam Bahagian C (Jadual 5).

Peratusan kesalahan murid yang rendah dalam Bahagian C menunjukkan murid penutur bukan jati mampu mengenal pasti KK yang terdapat dalam petikan. Kebanyakan KK yang menerima imbuhan awalan “meN-” dan imbuhan apitan “meN..i” serta “meN...kan” memperoleh peratusan yang tinggi, iaitu lebih daripada 90%. Hal ini kerana pembelajaran imbuhan KK atau dikenali sebagai Kata Kerja Terbitan (KKT) dalam Buku Teks Bahasa Melayu SJK memang diberikan penekanan. Maka, penguasaan KK turut dapat dilihat melalui

Jadual 5
Pengenalpastian KK oleh murid dalam Bahagian C

Kata Kerja (KK)	BETUL		SALAH	
	Bil. Murid	Peratus	Bil. Murid	Peratus
Mengadakan	131	98%	3	2%
Meletak	132	99%	2	1%
Membenarkan	133	99%	1	1%
Dijadikan	83	62%	51	38%
Mendapat	129	96%	5	4%
Mendirikan	126	94%	8	6%
Menghiaskan	125	93%	9	7%
Terletak	94	70%	40	30%

hasil jawaban murid. Namun, perkataan “dijadikan” menerima peratusan kesalahan yang paling tinggi dalam bahagian ini, iaitu 38% daripada 134 orang murid. Perkara ini selaras dengan kajian yang dilakukan oleh Ismail dan Zainon Hamzah (2018) tentang analisis kesalahan dalam penulisan pelajar bahasa kedua. Hasil dapatan kajian tersebut menunjukkan bahawa murid sememangnya amat lemah dalam penggunaan imbuhan awalan dan apitan KK, iaitu “di-”. Sehubungan dengan itu, dapatan kajian ini membuktikan bahawa murid yang melalui pembelajaran bahasa kedua mempunyai keupayaan untuk mengenal pasti KK dengan lebih mudah berbanding dengan golongan kata yang lain.

Kemudian, penelitian telah dilakukan terhadap keupayaan murid untuk mengenal pasti KA melalui petikan yang diberikan dalam Bahagian D (Jadual 6).

Hasil keputusan menunjukkan bahawa murid menghadapi masalah dalam mengenal pasti KA. Dapatan jawaban murid dalam bahagian A dan D agak sama, iaitu murid tidak dapat menentukan KA dan gagal untuk menyenaraikan KA yang terdapat dalam petikan. Kegagalan dalam memilih perkataan seperti “tenang” (85%), “lembik” (81%), “kagum” (71%) dan “damai” (69%) sebagai KA amat tinggi. Kesalahan jenis pemilihan unsur yang tidak tepat berlaku akibat kekurangan perbendaharaan kata. Dalam hal ini, kesalahan pengabaian unsur turut dijumpai semasa memilih KA daripada teks petikan yang diberikan kerana murid mengabaikan sesetengah KA yang wujud dalam teks tersebut akibat

kekeliruan maksud perkataan tersebut dan kekurangan perbendaharaan kosa kata yang melibatkan KA.

Manakala, jurang kesalahan dalam KA yang terdiri daripada “tajam” (14%), “halus” (13%), “putih” (11%), “keras” (7%), “gembira” (7%), “nipis” (4%), dan “manis” (1%) amat rendah. Perkara ini berlaku kerana senarai KA tersebut telah diperkenalkan sejak Tahun 1 dan merupakan asas dalam pembelajaran KA. Oleh sebab itu, murid dapat mengenal pasti golongan kata bagi perkataan tersebut dengan mudahnya, berbanding dengan KA yang lain. Dapatan ini jelas menunjukkan bahawa murid mempunyai penguasaan kosa kata yang melibatkan KA amat rendah. Hasil kajian ini selari dengan penemuan Abdul Hamid (2025) yang melaporkan bahawa murid kerap memilih golongan kata seperti KN atau KK semasa menentukan golongan kata bagi perkataan yang sebenarnya terdiri daripada KA. Kesalahan sebegini secara langsung memberikan kesan terhadap penulisan murid, khususnya melalui penggunaan kosa kata terhad yang boleh menjejaskan kualiti penulisan. Penyataan ini dikuatkan melalui hasil kajian Chelliah dan Hj Othman (2022) yang mengesahkan bahawa kelemahan dalam penguasaan kosa kata menyumbang kegagalan dalam penghasilan penulisan yang baik. Selain itu, penggunaan bahasa ibunda yang meluas menyebabkan komunikasi dalam bahasa Melayu juga terhad yang menjurus kepada kelemahan dari aspek penguasaan kosa kata.

Di samping itu, Dokumen Standard Kurikulum Pentaksiran (DSKP) yang

Jadual 6
Pengenalpastian KA oleh murid dalam Bahagian D

Kata Adjektif (KA)	BETUL		SALAH	
	Bil. Murid	Peratus	Bil. Murid	Peratus
Tenang	20	15%	114	85%
Lembik	25	19%	109	81%
Kagum	39	29%	95	71%
Damai	41	31%	93	69%
Seronok	76	57%	58	43%
Sunyi	87	65%	47	35%
Kecil	99	74%	35	26%
Tajam	115	86%	19	14%
Halus	116	87%	18	13%
Putih	119	89%	15	11%
Keras	124	93%	10	7%
Gembira	125	93%	9	7%
Nipis	128	96%	6	4%
Manis	132	99%	2	1%

dijadikan sebagai panduan dalam pelaksanaan pengajaran dan pembelajaran bahasa Melayu di sekolah menggariskan kepentingan aspek tatabahasa terutamanya aspek pembentukan kata. Selain itu, seseorang murid harus memahami dan menguasai golongan kata mengikut konteks secara lisan mahupun tulisan sebelum melangkah kaki ke alam persekolahan menengah. Justeru, Bahagian E telah dibangunkan untuk menguji keupayaan murid membentuk KNT dan KKT berdasarkan kata dasar yang diberikan. Pencapaian murid telah diteliti dalam Jadual 7.

Berdasarkan keputusan dalam Jadual 7, jurang kesalahan murid semasa pembentukan KNT dan KKT amat

menonjol. Peratusan kegagalan murid untuk membentuk KNT lebih tinggi, iaitu lebih daripada 50% berbanding dengan peratusan kesalahan murid semasa pembentukan KKT. Perkataan seperti “daki” (72%), “ukur” (69%), “ikat” (66%), “arah” (64%), “bakar” (60%) dan “curi” (53.0%) mencatatkan peratusan kesalahan yang tinggi semasa pembentukan KNT. Manakala, murid berjaya membentuk KKT bagi setiap kata dasar yang diberikan dengan pencapaian peratusan yang tinggi. Namun, murid melakukan kesalahan dari aspek pemilihan imbuhan dan ejaan seperti yang dipersetujui oleh Aminul Razin dan Subramaniam (2019). Justeru, isu tersebut harus dipandang serius dalam pembelajaran bahasa Melayu di alam persekolahan rendah agar dapat

Jadual 7
Kesalahan murid semasa pembentukan KNT dan KKT

Perkataan	BETUL				SALAH			
	Kata Nama Terbitan (KNT)		Kata Kerja Terbitan (KKT)		Kata Nama Terbitan (KNT)		Kata Kerja Terbitan (KKT)	
	Bil. Murid	Peratus	Bil. Murid	Peratus	Bil. Murid	Peratus	Bil. Murid	Peratus
Daki	37	28%	119	89%	97	72%	15	11%
Ukur	42	31%	115	86%	92	69%	19	14%
Ikat	45	34%	97	72%	89	66%	37	28%
Arah	48	36%	93	69%	86	64%	41	31%
Bakar	53	40%	110	82%	81	60%	24	18%
Curi	63	47%	124	93%	71	53%	10	7%
Nyanyi	76	57%	113	84%	58	43%	21	16%
Buru	79	59%	118	88%	55	41%	16	12%
Nasihat	81	60%	102	76%	53	40%	32	24%
Culik	96	72%	122	91%	38	28%	12	9%

membuat penambahbaikan supaya murid lebih bersedia untuk mempelajari hukum tatabahasa yang lebih mencabar minda. Oleh sebab itu, pengkaji telah membuat perincian terhadap jenis kesalahan yang dilakukan oleh murid semasa pembentukan KNT dan KKT untuk mengenal pasti aspek kelemahan murid berdasarkan Teori Analisis Kesalahan Bahasa Corder (1973) (Jadual 8).

Hasil jawapan murid jelas menunjukkan bahawa keempat-empat jenis kesalahan bahasa yang digariskan oleh Corder (1973) dapat ditemukan semasa pembentukan KNT. Murid sering memilih imbuhan yang salah dan menggunakan imbuhan KK semasa membentuk KNT (Jadual 8). Penambahan unsur yang tidak tepat amat jelas semasa penggantian huruf “s”, “f”, “p”, “t”, dan “k” selepas menerima imbuhan. Seterusnya, murid sering menggugurkan huruf yang perlu selepas menerima imbuhan dan

melakukan kesalahan penyusunan imbuhan awalan KN dengan imbuhan akhiran KK untuk membentuk KNT. Dapatan ini jelas menunjukkan bahawa penguasaan murid terhadap pembentukan KNT amat lemah dan memberikan impak negatif dari aspek kualiti penulisan. Perkara ini menguatkan pencapaian murid dalam Bahagian B apabila kebanyakan murid gagal mengenal pasti KNT dalam petikan. Ketandusan ilmu tentang kewujudan imbuhan KN dan tanggapan semua imbuhan akan membentuk KK merupakan penyumbang utama kepada masalah tersebut.

Selepas itu, pengkaji meneliti jenis kesalahan yang dilakukan oleh murid semasa pembentukan KKT (Jadual 9).

Empat jenis kesalahan yang sama turut ditemukan semasa pembentukan KKT. Kesalahan pemilihan imbuhan yang salah dapat dikesan dan kekeliruan dalam

Jadual 8
Senarai kesalahan murid semasa pembentukan KNT berdasarkan teori analisis kesalahan bahasa Corder (1973)

Kesalahan Pembentukan Kata Nama Terbitan		
Jenis kesalahan 1: Pemilihan unsur yang tidak tepat		
Kesalahan	Perincian Kesalahan	Pembetulan
pebantu	Pemilihan imbuhan yang salah	pembantu
peedar		pengedar
perlawat		pelawat
peredar		pengedar
membantu	Pemilihan imbuhan KK untuk membentuk KN	pembantu
edarkan		edaran
mengecat		pengecat
membantu		pembantu
Jenis kesalahan 2: Penambahan unsur yang tidak tepat		
pekarang	Penambahan huruf yang perlu digugurkan selepas menerima imbuhan	pengarang
pesapu		penyapu
pepadam		pemadam
petunggang		penunggang
Jenis kesalahan 3: Pengguguran unsur yang perlu		
penarang	Pengguguran huruf semasa menggantikan huruf selepas menerima imbuhan	pengarang
penungang		penunggang
penedar		pengedar
pemantu		pembantu
Jenis kesalahan 4: Penyusunan unsur yang salah		
pesapukkan	Penyusunan imbuhan awalan KN dengan imbuhan akhiran KK	penyapuan
penternakkan		penternakan

penggunaan imbuhan awalan meN- amat jelas. Kekurangan pengetahuan terhadap kewujudan alomorf imbuhan yang memperincikan penggunaan setiap imbuhan menyebabkan murid melakukan kesalahan semasa pembentukan kata. Hal ini yang menyebabkan murid menggunakan imbuhan yang salah, menambah dan menggugurkan huruf selepas penerimaan imbuhan. Selepas itu, penyusunan imbuhan awalan KK dengan imbuhan akhiran KN turut dapat ditemukan apabila murid menghasilkan apitan baharu, iaitu imbuhan awalan KK “meN-” berpasangan dengan imbuhan

Jadual 9
Senarai kesalahan murid semasa pembentukan KKT

Kesalahan Pembentukan Kata Kerja Terbitan		
Jenis kesalahan 1: Pemilihan unsur yang tidak tepat		
Kesalahan	Perincian Kesalahan	Pembetulan
mecat	Pemilihan imbuhan yang salah	mengecat
medar		mengedar
menlukis		melukis
Jenis kesalahan 2: Penambahan unsur yang tidak tepat		
mekunjung	Penambahan huruf yang perlu digugurkan selepas menerima imbuhan	mengunjung
mesapu		menyapu
metanam		menanam
mekarang		mengarang
mentunggang		menunggang
Jenis kesalahan 3: Pengguguran unsur yang perlu		
mernak	Pengguguran huruf semasa menggantikan huruf selepas menerima imbuhan	menternak
memantu		membantu
Jenis kesalahan 4: Penyusunan unsur yang salah		
memasakan	Penyusunan imbuhan awalan KK dengan imbuhan akhiran KN	memasakan
melukisan		melukiskan

akhiran KN “-an”. Ketandusan ilmu tentang penggunaan imbuhan yang betul dalam pembentukan KNT dan KKT menyebabkan murid melakukan kesalahan ejaan dalam penulisan. Perkara ini juga menyebabkan murid gagal dalam menentukan golongan kata sesuatu perkataan, menjejaskan penguasaan hukum tatabahasa yang asas, dan banyak melakukan kesalahan tatabahasa yang tinggi dalam penulisan, walaupun murid mempunyai idea.

Tambahan pula, kajian tentang kecelaruan morfologi dalam penulisan

bahasa Melayu oleh penutur asing membuktikan bahawa pengimbuhan merupakan salah satu aspek yang membantu murid dalam pengenalpastian golongan kata, tetapi menimbulkan kesulitan apabila setiap imbuhan tersebut membawa makna nahu yang berbeza (Hassan et al., 2018). Selain itu, kajian yang melibatkan kesalahan ejaan dalam penulisan terutama murid penutur bukan jati memberikan dapatan yang sama, iaitu bilangan kesalahan ejaan dalam penulisan pelajar sangat banyak (Alizuddin & Nik Mohd Arif, 2021;

Magesvaran et al., 2021; Tengku Din dan Abd Wahab, 2021). Hal ini menunjukkan bahawa kesalahan pembentukan perkataan berimbuhan masih mendapat perhatian yang serius dalam kalangan pengkaji, namun jalan penyelesaian masih tinggal sebagai tanda soal. Perkara ini boleh dielakkan jika murid diberi pendedahan lebih awal tentang cara pembentukan sesuatu kata yang melibatkan imbuhan.

Justeru, murid jelas melakukan kesalahan pemilihan unsur yang tidak tepat apabila memilih KN yang hadir dengan imbuhan sebagai KK dan melakukan kesalahan baharu, iaitu pengabaian unsur yang perlu semasa menentukan golongan kata. Unsur pengabaian ini jelas menggambarkan situasi kekurangan perhatian yang diberikan terhadap maksud perkataan dan jenis imbuhan yang membentuk kata menyebabkan murid sering melakukan kesalahan semasa menentukan golongan kata sesuatu perkataan. Selain itu, murid sering melakukan kesalahan yang terdiri daripada menggugurkan unsur yang perlu, menambahkan unsur yang tidak perlu atau tidak tepat, memilih unsur yang tidak tepat, dan menyusun unsur yang salah semasa pembentukan KNT serta KKT. Hasil kesalahan murid yang ditemukan menerusi pembentukan kata menjelaskan kelemahan murid Tahun 6 yang dikategorikan sebagai cemerlang dalam aspek pemilihan imbuhan yang betul berdasarkan golongan kata.

Dari sudut teoretis, dapatan kajian ini memberikan implikasi penting terhadap proses penentuan golongan kata dalam pembelajaran bahasa kedua. Penemuan

kesalahan baharu, iaitu pengabaian unsur yang perlu menunjukkan bahawa penentuan golongan kata tidak berlaku secara linear melalui penguasaan makna semantik semata-mata, tetapi melibatkan interaksi kompleks antara kesedaran morfologi, fungsi sintaksis dan proses pembentukan kata. Murid didapati lebih bergantung pada petunjuk makna leksikal berbanding ciri morfologi imbuhan semasa menentukan golongan kata. Oleh itu, dapatan ini memperluas kerangka Teori Analisis Kesalahan Bahasa (Corder, 1973) dengan menunjukkan bahawa proses pemerolehan bahasa kedua terjejas bukan sahaja berpunca daripada kesalahan dari aspek aplikasi peraturan bahasa, tetapi kegagalan memberikan perhatian terhadap petunjuk linguistik yang relevan dalam proses penentuan kata juga turut memberikan sumbangan dalam masalah ini.

IMPLIKASI KAJIAN

Kurikulum Standard Sekolah Rendah Bahasa Melayu Sekolah Jenis Kebangsaan yang didokumentasikan sebagai Dokumen Standard Kurikulum dan Pentaksiran, DSKP (2021) telah menetapkan standard kandungan dan standard pembelajaran dalam penguasaan bahasa di sekolah rendah dan dijadikan sebagai panduan oleh warga pendidik untuk mengendalikan pembelajaran dan pemudaharaan (PdPc) di sekolah. Terdapat 5 kemahiran asas yang telah ditekankan dalam dokumen tersebut, iaitu kemahiran mendengar dan bertutur, kemahiran membaca, kemahiran menulis,

aspek seni bahasa, dan aspek tatabahasa. Dalam pada itu, penguasaan golongan kata dan pembentukan kata turut menjadi satu kemahiran yang telah diberikan perhatian yang khusus dalam aspek tatabahasa. Lebih-lebih lagi, guru sentiasa menjadikan DSKP sebagai panduan dalam perancangan dan pengendalian pengajaran dalam kelas. (Sulaiman, 2019).

Di samping itu, menurut Hajmi dan Jamaludin (2022), murid-murid perlu diberikan perincian terhadap standard kandungan yang terkandung dalam DSKP dan objektif pembelajaran yang hendak dicapai sebelum memulakan PdP agar murid mengetahui tanggungjawab mereka sepanjang perjalanan PdP. Perkara ini jelas menunjukkan bahawa setiap standard kandungan dan standard pembelajaran memainkan peranan yang penting dalam penguasaan bahasa seseorang murid terutamanya murid SJK(T). Lebih-lebih lagi, dapatan kajian ini jelas membuktikan kebergantungan murid terhadap maksud perkataan dan ketandusan ilmu tentang kewujudan jenis imbuhan yang membentuk KN, KK, dan KA. Oleh sebab itu, implikasi kajian ini membolehkan pihak Bahagian Pembangunan Kurikulum untuk memperincikan standard pembelajaran

aspek tatabahasa dalam DSKP dengan memahami dan menggunakan pelbagai kata berimbuhan mengikut konteks dengan menambahkan imbuhan KN, imbuhan KK, dan imbuhan KA seperti yang ditunjukkan dalam Jadual 10.

Perincian standard pembelajaran dalam aspek tatabahasa membantu warga pendidik untuk mengendalikan PdP berkaitan jenis imbuhan yang terlibat dalam pembentukan KN, KK, dan KA agar dapat memudahkan murid untuk mengenal pasti golongan sesuatu perkataan berimbuhan dengan lebih mudah dan dapat menghasilkan penulisan tanpa kesalahan tatabahasa. Selain itu, perkara ini juga memudahkan proses mengenal pasti dan penggunaan kata kerja transitif, kata pemeris, dan kata nafi yang mempunyai hukum tertentu dengan kehadiran sesuatu golongan kata tertentu.

KESIMPULAN

Murid sering melakukan kesalahan jenis pemilihan unsur yang tidak tepat semasa menentukan golongan kata sesuatu perkataan. Hal ini jelas bahawa menunjukkan murid SJK(T) yang dikategorikan cemerlang belum mahir dalam aspek penentuan golongan kata. Perkara ini telah mengubah

Jadual 10
Standard kandungan dan standard pembelajaran aspek tatabahasa dalam DSKP

Standard Kandungan	Standard Pembelajaran
5.2 Memahami dan menggunakan bentuk kata mengikut konteks	5.2.1 Memahami dan menggunakan pelbagai kata berimbuhan mengikut konteks: Imbuhan Kata Nama Imbuhan Kata Kerja Imbuhan Kata Adjektif

persepsi bahawa gred peperiksaan tidak dapat mengukur pencapaian kemahiran bahasa seseorang murid. Pembelajaran bahasa Melayu semata-mata untuk lulus dalam peperiksaan awam serta untuk mendapat tempat di universiti tempatan sahaja akan menyebabkan penguasaan kemahiran bahasa sentiasa berada pada tahap rendah. Murid didapati mahir dalam penentuan KN, tetapi menghadapi kekeliruan semasa memilih KNT, manakala penguasaan kosa kata yang terhad menyebabkan murid tidak dapat memilih dan menentukan kebanyakan KA.

Lebih-lebih lagi, penemuan jenis kesalahan baharu yang dilakukan oleh murid penutur bukan jati semasa pembelajaran bahasa Melayu, iaitu pengabaian unsur yang perlu merupakan maklumat yang penting dalam analisis kesalahan bahasa. Penemuan ini bukan sahaja menambah kepada senarai kesalahan yang digariskan oleh Corder (1973), malah meluaskan skop penyelidikan bahasa. Selain itu, pengubahan aliran pendidikan yang lebih berteraskan kepada teknologi dan corak pemikiran murid generasi kini yang suka kepada cabaran dan berkeinginan menjadi agen perubahan pada abad ke-21 melakukan kesalahan baharu dalam aspek pembelajaran bahasa kedua. Pengenalpastian kesalahan baharu ini membuka ruang kepada pendekatan pedagogi yang lebih inovatif untuk meningkatkan penguasaan bahasa Melayu. Unsur pengabaian ini jelas menggambarkan situasi kekurangan perhatian terhadap maksud perkataan dan jenis imbuhan yang membentuk kata menyebabkan murid gagal menentukan golongan kata sesuatu

perkataan. Oleh sebab itu, pendedahan yang betul tentang langkah penentuan golongan kata yang betul pada peringkat sekolah rendah membolehkan mereka bersedia untuk mempelajari hukum tatabahasa yang lebih kompleks. Dari sudut praktikal, dapatan kajian menegaskan bahawa keperluan pendekatan pengajaran yang lebih eksplisit terhadap hubungan antara imbuhan dan penentuan golongan kata dalam kurikulum bahasa Melayu sekolah rendah. Penambahbaikan dalam pelaksanaan DSKP berpotensi membantu murid membina kefahaman sistematik tentang struktur bahasa. Kajian ini membuka ruang kepada penyelidikan masa hadapan yang meneliti intervensi pedagogi berfokus dan perbandingan antara murid pelbagai tahap pencapaian bagi memperkukuh teori dan amalan pengajaran bahasa Melayu sebagai bahasa kedua.

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RUJUKAN

Abdul Hamid, M. H. (2025). Penggunaan aplikasi 'Cekap BM' bagi meningkatkan pemahaman

- kata adjektif pancaindera dalam kalangan murid tahun tiga. *International Journal of Islamic Theology & Civilization*, 3(2), 82-88. <https://doi.org/10.5281/zenodo.14997195>
- Ahmad, N. A., Farakhanna, N., & Norfaizah. (2020). Analisis kesalahan imbuhan dalam penulisan karangan pelajar dan hubungan kait dari segi makna gramatikal. *Jurnal Pendidikan Bahasa Melayu*, 10(1), 77-90.
- Alizuddin, N. A., & Nik Mohd Arif, N. N. A. (2021). Analisis kesalahan bahasa dalam penulisan bahasa Melayu pelajar antarabangsa [Error analysis in international students' Malay language written compositions]. *AL-QIYAM International Social Science and Humanities Journal*, 4(1), 113-127.
- Alsuhayl, E., & Alharbi, A. S. (2025). English grammatical morphemes acquisition by young EFL learners. *International Journal of Instruction*, 18(2), 557-576. <https://doi.org/10.29333/iji.2025.18230a>
- Aminul Razin, A. S., & Subramaniam, V. (2019). Kesalahan penggunaan imbuhan awalan dan akhiran dalam kalangan murid sekolah jenis kebangsaan Tamil berdasarkan teori analisis kesalahan Corder (1973). *International Journal of the Malay World and Civilisation*, 7(1), 3-13.
- Bahagian Pembangunan Kurikulum. (2021). *Kurikulum standard sekolah rendah bahasa Melayu sekolah jenis kebangsaan: Dokumen standard kurikulum dan pentaksiran tahun 6*. Kementerian Pendidikan Malaysia.
- Bujang, J., & Khalid, F. (2019). Penguasaan morfologi bahasa Melayu sebagai bahasa kedua dalam kalangan murid Melayu Sarawak. In *Linguistik bahasa dan pendidikan* (pp. 172-184). Pusat Pengajian Ilmu Kemanusiaan.
- Chelliah, S., & Hj Othman, N. (2022). Tahap penguasaan bahasa Melayu dengan pencapaian prestasi mata pelajaran perniagaan murid bukan Melayu. *Malaysian Journal of Social Sciences and Humanities*, 7(5), Article e001509. <https://doi.org/10.47405/mjssh.v7i5.1509>
- Chung, L. L., Leng, C. H., & Peng, C. P. (2017). Amalan pengajaran guru bahasa Melayu tingkatan empat dalam penulisan karangan dari aspek kemahiran berfikir secara kritis dan kreatif serta pembelajaran kolaboratif. *Jurnal Kepimpinan Pendidikan*, 4(1), 1-12.
- Corder, S. P. (1973). *Introducing applied linguistics*. Penguin Books.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson.
- Damanik, L. A., Pratiwi, R., & Rosada, B. (2025). Enhancing morphological awareness and reading fluency in EFL learners through AI tools. *Premise: Journal of English Education and Applied Linguistics*, 14(2), 443-461. <https://doi.org/10.24127/pj.v14i2.12079>
- Ellis, N. C. (2008). The dynamics of second language emergence: Cycles of language use, language change, and language acquisition. *The Modern Language Journal*, 92(2), 232-249.
- Hajmi, H., & Jamaludin, K. (2022). Kesediaan guru dalam pelaksanaan pentaksiran bilik darjah di sekolah rendah. *Jurnal Dunia Pendidikan*, 4(4), 119-125.
- Hällström, E., Sahlén, B., von Koss Torkildsen, J., Hallenbrant, K., Tamakloe, A., Lyxell, B., & Wass, M. (2025). Morphological knowledge as a predictor of receptive vocabulary for Swedish L1 and L2 school-aged children. *Language Awareness*, 1-20. <https://doi.org/10.1080/09658416.2025.2565316>
- Hassan, H., Omar, M. S., & Abdul Wahid, P. R. (2018). Kecelaruhan morfologi dalam penulisan bahasa Melayu oleh penutur asing. *Jurnal Linguistik*, 22(2), 20-36.

- Isa, A. K., Zainon Hamzah, Z. A., & Sha'ri, S. N. (2021). Tahap penguasaan penggunaan kata kerja dalam kalangan pelajar di tingkatan empat sekolah berasrama penuh. *PENDETA: Journal of Malay Language, Education and Literature*, 12(1), 90-104. <https://doi.org/10.37134/pendeta.vol12.1.7.2021>
- Ismail, A., & Zainon Hamzah, Z. A. (2018). Analisis kesalahan dalam penulisan pelajar bahasa kedua dari aspek morfologi. *Jurnal Linguistik*, 22(1), 24-31.
- Jali, I. (2021). Analysing grammar errors in Malay language learning. *Journal of Cognitive Sciences and Human Development*, 7(1), 72-85. <https://doi.org/10.33736/jcshd.3050.2021>
- Jamaluddin, N. (2008). Kriteria penggolongan kata: Bahasa Yunani, Inggeris & Melayu. *MALIM: Jurnal Pengajian Umum Asia Tenggara*, 9, 139-162.
- Kamus Dewan. (2007). *Kamus Dewan* (4th ed.). Dewan Bahasa dan Pustaka.
- Karim, A. H. (2007). Analisis kontrastif dan analisis kesalahan bahasa: Antara hipotesis dan realiti. In *Prosiding seminar tahunan Jabatan Bahasa Melayu dan Linguistik II (SETALING)* (Vol. 2, pp. 212-225).
- Karim, N. S. (1986). *Bahasa dan sastera: Ke arah mempertingkatkan karya-karya kreatif bahasa*. Dewan Bahasa dan Pustaka.
- Karim, N. S., Onn, F. M., Musa, H., & Mahmood, A. H. (2015). *Tatabahasa Dewan* (3rd ed.). Dewan Bahasa dan Pustaka.
- Kim, E., Newton, F. B., Downey, R. G., & Benton, S. L. (2010). Personal factors impacting college student success: Constructing college learning effectiveness inventory (CLEI). *College Student Journal*, 44(1), 112-125.
- Magesvaran, U., Mahamod, Z., Mahad, I., & Nur Syuhada, I. (2021). Analisis kesalahan bahasa dalam penulisan karangan bahasa Melayu pelajar tingkatan tiga di Sekolah Menengah San Min (SUWA) Teluk Intan (sekolah persendirian Cina). In *4th International Conference on Business Studies and Education (ICBE)*. ICBE Publication.
- Mahdun, M., Chan, M. Y., Yap, N. T., Wong, B. E., & Mohd Kasim, Z. (2023). Overpassivisation in L2 acquisition: An examination of L1 Malay ESL tertiary students' passivisation of intransitive verbs in English. *Pertanika Journal of Social Sciences & Humanities*, 31(3), 995-1013. <https://doi.org/10.47836/pjssh.31.3.05>
- Melai, Z., & Abang Zainal Abidin, D. N. (2020). Pengajaran bahasa Melayu dalam kalangan pelajar asing: Analisis pola kesalahan tatabahasa dalam penulisan. *Issues in Language Studies*, 9(1), 86-106. <https://doi.org/10.33736/ils.2351.2020>
- Mohd A Rashid, S. N., Yaakob, N. A., & Salleh, C. I. (2015). Penggunaan bahasa dalam laman blog dari aspek morfologi. *Journal of Business and Social Development*, 3(2), 34-50.
- Muhammad, S. R., & Sha'ari, S. N. (2020). Kesalahan tatabahasa bahasa Melayu dari aspek morfologi dalam penulisan karangan murid sekolah rendah. *AL-QIYAM International Social Science and Humanities Journal*, 3(2), 77-89.
- Nagaraju, P., & Subramaniam, V. (2020a). Pembelajaran kata nama terbitan dalam kalangan murid. In N. F. Habidin et al. (Eds.), *Isu dan cabaran dalam pendidikan: Strategi dan inovasi* (pp. 268-286). Penerbit Kaizenrenovation Sdn Bhd.
- Nagaraju, P., Subramaniam, V., & Sha'ari, S. N. (2020b). Tahap penguasaan kata nama terbitan dalam kalangan murid SJK(T). In Z. A. Zainon Hamzah et al. (Eds.), *Eksplorasi idea dan pemikiran melalui bahasa & sastera* (pp. 79-97). Penerbit Universiti Putra Malaysia.
- Nahar, N., & Abd. Rahman, F. (2018). Tahap profisiensi kemahiran bertutur bahasa Melayu

- dalam Nahar, N. (2020). Hubungan profisiensi bahasa Melayu dengan pencapaian akademik murid bukan penutur natif di sekolah jenis kebangsaan. *Jurnal Bahasa*, 20(2), 287-316. [https://doi.org/10.37052/jb20\(2\)no5](https://doi.org/10.37052/jb20(2)no5)
- Nahar, N., & Rosly, N. J. (2024). Penguasaan kata nama kanak-kanak berumur 3 hingga 5 tahun semasa pandemik COVID-19. *Jurnal Pengajian Melayu*, 35(1), 55-73. <https://doi.org/10.22452/jomas.vol35no1.4>
- Narayanan, S. P., & Subramaniam, V. (2021). Pembangunan kit inovasi kata berimbuhan bagi murid sekolah rendah. *Jurnal Melayu*, SI, 394-410.
- Norsimah Mat Awal, N., Abu Bakar, N., & Jalaluddin, N. H. (2012). *Pembelajaran bahasa Melayu sebagai bahasa kedua: Pengungkapan idea dalam penulisan pelajar sekolah menengah di Malaysia*. Fakulti Sains Sosial dan Kemanusiaan, Universiti Kebangsaan Malaysia.
- Nor Zaiton Hanafi, N. Z., Nor Azura Mohd Salleh, N. A., & Zamri Mahamod, Z. (2008). Analisis kesalahan bahasa dalam penulisan karangan pelajar Cina ketika belajar bahasa Melayu. In Z. Mahamod (Ed.), *Psikolinguistik dalam pengajaran & pembelajaran bahasa Melayu* (pp. 117-145). Karisma Publication Sdn. Bhd.
- Royo, M. A., & Mahmood, H. (2011). Faktor-faktor kelemahan yang mempengaruhi pencapaian cemerlang dalam mata pelajaran reka cipta. *Journal of Educational Psychology and Counseling*, 2(6), 145-174.
- Shanmugan, G., Subramaniam, V., & Sultan, M. T. H. (2025). English speaking anxiety among primary students: Evidence from Tamil vernacular schools in Selangor, Malaysia. *Pertanika Journal of Social Sciences & Humanities*, 33(6), 2707-2721. <https://doi.org/10.47836/pjssh.33.6.25>
- Sieo, W. M., Amini, M., Lee, K. F., Eng Lin, S., Tee, J. N., & Siau, C. S. (2022). Reading strategies in teaching and learning English as a foreign language: A mixed-method study. *Pertanika Journal of Social Sciences & Humanities*, 30(2), 475-499. <https://doi.org/10.47836/pjssh.30.2.04>
- Sivaratanam, S. (2019). Penguasaan golongan kata dalam kalangan murid SJK(T). *Rumpun Jurnal Persuratan Melayu*, 7(1), 1-24.
- Subramaniam, V., Gokilavani, & Sultan, M. T. H. (2026). Gamification as pedagogical innovation: Evaluating the Story Cube approach to reduce English-speaking anxiety. *Pertanika Journal of Social Sciences & Humanities*, 34(1), 401-413. <https://doi.org/10.47836/pjssh.34.1.20>
- Sulaiman, A. R. (2019). Tahap kesediaan guru pendidikan Islam dalam pentaksiran dokumen standard kurikulum dan pentaksiran sekolah rendah. *International Journal of Humanities Technology and Civilization*, 6(1), 1-7.
- Tengku Din, T. N. S., & Abd Wahab, K. (2022). Kesalahan penggunaan imbuhan bahasa Melayu dalam Instagram. *Jurnal Wacana Sarjana*, 5(5), 1-14.
- Tengku Pari, T. N. S., & Yussof, R. L. (2012). Enhancing grammar using board game. *Procedia – Social and Behavioral Sciences*, 68, 213-221. <https://doi.org/10.1016/j.sbspro.2012.12.221>
- Tong, Y., Hasim, Z., & Abdul Halim, H. (2022). The impact of L2 vocabulary knowledge on language fluency. *Pertanika Journal of Social Sciences & Humanities*, 30(4), 1723-1751. <https://doi.org/10.47836/pjssh.30.4.14>
- Zhu, L., Rebuschat, P., Nixon, J. S., & Monaghan, P. (2025). Learning morphology from cross-situational statistics. *Studies in Second Language Acquisition*, 47(5), 1250-1276. <https://doi.org/10.1017/S027226312510106X>

Techno-Invasion and Contextual Performance Among Malaysian Telecommuters: Moderating and Mediating Effects

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ABSTRACT

The rapid expansion of telecommuting has intensified employees' reliance on digital technologies, increasing the risk of techno-invasion that blurs boundaries between work and personal life. The research seeks to offer an understanding of how telecommuters cope with and reduce the problems brought by techno-invasion. In this quantitative-based research, the theories and hypotheses were rigorously designed based on a literature review, which encompassed some detected knowledge gaps, on the framework of the Job Demands-Resources Theory and Contextual Performance Model. A survey-based data collection method was employed in this study to obtain responses from 153 telecommuters based in Kuala Lumpur. The data were analysed using the SPSS and SMART-PLS4 package. Results indicated no significant relationship between techno invasion and telecommuters' performance. Furthermore, emotional intelligence did not show a significant moderate effect on the relationship between techno invasion and work exhaustion. These results suggest practical steps for leaders to address work fatigue and burnout caused by technological intrusion by fostering a

supportive work culture. This study contributes to the technostress literature by integrating the Job Demands-Resources (JD-R) framework with Contextual Performance Theory and empirically testing a moderated mediation model among Malaysian telecommuters.

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INTRODUCTION

Remote work or telecommuting has recently been growing due to rapid advancements in technological tools. This change towards telecommuting emanates from widespread and easy accessibility of several technologies that facilitate telecommuting, such as high-speed internet, better online interaction tools, and highly secured digital tools and systems for working together from afar, such as telecommuting (Hurst, 2020). It is often praised and accepted for its flexibility, reduces stress from commuting, and lowers costs for both employees and companies (Hopwood, 2019). Nevertheless, there are also negative consequences emanating from remote working. A survey conducted by McKinsey found that more than 60% of participants reported a decrease in productivity while working from home during the COVID-19 pandemic (Lund et al., 2020). Despite extensive research on technostress, existing studies have predominantly focussed on task performance outcomes in Western contexts, leaving contextual performance, and emerging economy settings underexplored. According to a Forbes report, nearly half of the U.S. workforce, specifically 49%, would consider resigning if they became frustrated with the available technology (Abbot, 2023). This study refers to these disagreements by focusing on contextual performance rather than task performance, suggesting that techno invasion may indirectly affect performance through work exhaustion. This approach aligns with Li and Wang (2021), who noted contextual performance remains underexplored in technostress literature.

This research investigates the impact of techno-invasion on the work performance of remote workers. Research has thoroughly examined the impact of technostress on employee performance (Tarafdar et al., 2014). Previous research has demonstrated that techno invasions have a negative impact on the mental well-being and work-related burnout of employees (Dragano & Lanau, 2020). Findings from research on the connection between techno-invasion and stress, or work-related exhaustion, revealed a significant and positive correlation. (Borle et al., 2021; Satpathy et al., 2021). Wang et al. (2023) investigated the roles of work exhaustion in explaining technostress. It was proposed that a further examination of this phenomenon be undertaken.

Research conducted by Warriar et al. (2024) found that EI functions as a positive mediator in the connection between communication effectiveness in virtual environments and decision-making undertaken by professional workers. The relationship between technostress and burnout, from the perspective of emotional intelligence, remains an area that has been somewhat ignored in research. Emotional intelligence is critical for managing involved workplace relationships and coping with stress, with Goleman (1998) emphasising it as the primary factor contributing to job success. The study was conducted in the Malaysian context and cultural norms change significantly from the Western context. Previous research has predominantly examined technostress in developed nations (e.g., the U.S., Europe), often

observing the rare faces faced by workers in emerging economies. However, by analysing the moderating role of emotional intelligence and the mediating effect of work exhaustion in Malaysian institutions, this study proposals traditionally contextualised insights that enhance a universal kind of technostress and its impact on performance. This study addresses both an empirical and a theoretical gap by examining the indirect and conditional mechanisms through which techno-invasion affects contextual performance via work exhaustion.

LITERATURE REVIEW

Theoretical Support

Tarafdar et al. (2020) and Ayyagari et al. (2011), technostress is an issue that affects employees who fight or have problems with new technology management and deployment. Corresponding to research, technological overload, invasion, complexity, insecurity, and uncertainty are the five stressor categories characterised by the technostress model. In addition, not all technological stressors cause negative effects for employees. Corresponding to Pansini et al. (2023), technological complexity and uncertainty are two stressors that can be benefited by employers to foster output and commitment at work of employees.

Contextual performance of employees is strengthened by Borman and Motowidlo's Contextual Performance Theory (Borman & Motowidlo, 1997). This perspective accepts the idea that employee performance is a complex concept. Contrasting task

performance, contextual performance involves non-task-related behaviours as voluntary and extraneous actions. The Job Demands-Resources model (JD-R model), which is linked to work tiredness and burnout, was projected by Bakker et al. (2004). The concept indicates that work-related demands lead to burnout and health challenges. The leading source of emotional intelligence is the ability-based paradigm of emotional intelligence generated by Mayer and Salovey (1989). They identified emotional intelligence (EI) as the ability to monitor one's own and other people's feelings and emotions, differentiate between them, and use this information to guide one's thoughts and actions (Mayer & Salovey, 1989). The JD-R model explains how job demands (techno invasion) lead to strain (work exhaustion), while Contextual Performance Theory frames performance outcomes. Concurrently, they form a sequential logic, demands → strain → discretionary behaviours.

Techno Innovation

Referring to Tarafdar (2020), five stressors included in technostress are techno overload, techno invasion, techno complexity, techno insecurity, and techno uncertainty. Techno invasion refers to the intrusion of technology into personal life, creating expectations of constant connectivity, where technostress is a broader construct incorporating numerous stressors. Techno invasion explains in what manner technology infringes on people's privacy and puts pressure on them to be continuously connected. One form of

technostress is this phenomenon, which is referred to as techno-invasion (Tarafdar et al. 2014). Referring to Büchler et al. (2020), it is typified by a lack of clear boundaries between work and personal life, which causes stress and anxiety and drastically reduces employee job satisfaction. A major source of stress for people is techno invasion, such as for remote workers who must cope with the constant availability of work due to ICTs, which interferes with their privacy and personal time (Rosado et al., 2023). Although not all technological stressors are damaging, techno-invasion is classified as an unsafe stressor. The negative effects go beyond the office, decline general well-being and lead to burnout (Talib et al. 2022). While techno invasion intersects with work-life imbalance, it is technology-driven, unlike the general imbalance caused by other factors.

Contextual Performance

In the early 1990s, scholars advocated for a more comprehensive and broad definition of performance, broadening the scope of the term to include various facets such as task, contextual, and counterproductive performance (Koopmans et al. 2014). Both task and contextual performance encompass the multidimensional performance construct. Contextual performance encompasses prosocial organisational behaviours and organisational citizenship behaviours, including adhering to rules, displaying initiative, putting in extra effort, assisting colleagues, and minimising the frequency of disruptions (Borman and

Motowidlo, 1997). The concept of contextual performance encompasses various voluntary and interpersonal actions that foster a supportive social and motivational atmosphere within an organisation by establishing a positive workplace environment (Scotter & Motowidlo, 1996). Contextual performance that is relevant to one's actual work responsibilities goes beyond what is explicitly mentioned in job descriptions and is often overlooked or unrewarded, different to the task-oriented performance that aligns with an employee's defined duties and is usually considered during performance assessments (Motowidlo & Scotter, 1994). Contextual performance is theoretically marked from task performance as it implies discretionary behaviours that support organisational functioning (Borman & Motowidlo, 1997). This study measures contextual performance using validated scales to ensure objectivity.

Work Exhaustion

Demerouti et al. (2003) explained that work exhaustion is a critical state of stress faced by employees that is caused by long exposure to certain workplace restrictions or stressors that harm physical, emotional, and mental well-being. Work exhaustion refers to short-term reduction of energy, whereas burnout is a prolonged state relating to emotional exhaustion, suspicion, and decreased efficiency (Maslach & Leiter, 2008). This study operates exhaustion as a precursor to burnout. Tired employees often feel that their emotional and physical energy is depleted because of the great load

of their work (Maslach & Leiter, 2008). A study on work-related tiredness exhibits that it reduces job satisfaction, output, and the probability of employees aiming to exit the company (Wang, 2023). Bakker et al. (2024) explained that the job-demand-resources model 2004 highlights a robust linkage between job demands and available resources in relation to stress. Sources like social assistance and self-efficacy help keep employees protected against the damage of job demands and mitigate burnout. Emotional exhaustion increases because of high workloads and rigid deadlines experienced by employees (Zhang et al. 2022).

Emotional Intelligence

A set of skills analogous to general intelligence is identified as emotional intelligence. Consisted of four key elements: emotional perception, emotional utilisation for cognitive enhancement, emotional understanding, and emotional regulation, define from Salovey and Mayer's (1990) theory. Referring to Mayer et al. (2008), emotional intelligence (EI) is characterised by the ability to make precise emotional reasoning and to utilise emotions and emotional knowledge to upgrade thought processes. EI was conceptualised as a moderator because it protects stress outcomes rather than transmitting them. Individuals with high EI can weaken the connection between techno invasion and exhaustion, side with stress coping theory. This is reliable with conclusions that EI relieves stress effects (Rezvani & Khosravi, 2019).

Techno Invasion and Contextual Performance Relationship

Yener et al. (2021) establish a sharp connection in Turkish civil servant unions between contextual performance and technostress in research. Wu et al. (2022) exposed that technological stressors were harmful to work performance in China's hospitality industry, with a focus on the effect of techno invasion. A link between techno invasion and its influences on employee unconventional behaviour and efficiency levels (Chen et al., 2022). Saleem et al. (2021) and Fern'andez Fernandez et al. (2023) highlighted contradictory outcomes, proposing that technostress might have a positive or small impact on the job performance of university instructors in Pakistan and remote workers in Madrid. Further research is urgently required to enhance our comprehension of the impact of technostress on contextual performance. The hypothesis in question was formulated as follows:

H1: There is an inverse relationship between techno invasion and contextual performance

Techno Invasion and Work Exhaustion Relationship

Recent studies have highlighted the adverse consequences of technostress and techno invasion on the working population (Harris et al. 2022). Research conducted by Harris et al. (2022) found that telecommuters experience technostress, which negatively affects their overall well-being. According to the study, techno invasion and work

overload can lead to an impact on work-life balance and may cause employee job burnout. Yener et al. (2021) discovered a considerable negative impact on burnout levels among Turkish personnel. Bauwens et al. (2021) discovered that among Dutch childcare staff, job-related burnout was the primary reason for work exhaustion. Studies of the impact of techno invasion have shown that it hurts well-being and causes job-related anxiety as well as emotional exhaustion (Weinert, 2019; Wu et al. 2020). Constant connectivity can lead to decreased employee happiness (Büchler et al., 2020). Based on the literature, the hypothesis was developed and tested:

H2: There is a direct relationship between techno invasion and work exhaustion

Work Exhaustion and Contextual Performance Relationship

Major linkage between reduced contextual performance and emotional exhaustion among university supervisors in Taiwan (Chuang et al., 2022). Australian software developers' performance was extensively impacted by work-related exhaustion, as indicated in a 2019 study by Rezvani & Khosravi. Studies by Camacho and Barrios (2022) attained a correlation between stress levels among teleworkers and their reduced job performance. Emotional fatigue and burnout regularly result in a loss in the engagement of behaviours that increase the efficiency of an organisation (Palenzuela et al. 2019).

These results emphasise exactly how critical it is to treat work-related tiredness to preserve happiness and dynamic organisational forces. The following hypothesis was established:

H3: There is an inverse relationship between work exhaustion and contextual performance

Mediating Role of Work Exhaustion

Aprilia and Riani's (2023) research indicates that burnout mediated the relationship between job performance and technological stressors in a sample of 181 public workers. Yener et al. (2021) discovered that burnout mediated the relationship between technostress and contextual performance, Wang et al. (2023) observed that in a Chinese manufacturing company, work fatigue moderated the relationship between technostress and employee well-being, indicating the impact of technological stressors on workers' general health and productivity, and Tu et al. (2021) observed the complicated connections between stressors, burnout, and psychological well-being. The outcomes showed the significant effect of burnout on the employees' ability to handle the pressures of technology-driven work and yield the finest results across different duties and commitments in their workplace. The following hypothesis was proposed:

H4: Work Exhaustion mediates the relationship between Techno invasion and contextual performance

Moderating Role of Emotional Intelligence (EI)

In the employee workplace, EI acts as a significant buffer or moderator against various work stressors that have a harmful result on personal health, increase intentions to leave the organisation, and result in counterproductive work behaviour (Huang et al., 2019; Rezvani and Khosravi, 2019). Empirical study in what way EI buffers or moderates the relationship between technological invasion or violation and work burnout or performance are quite limited. Before, research has examined the same moderate roles of emotional intelligence (Badawy, 2022; Mishra et al., 2022). Research by Mishra et al. (2022) discovered the mediating role of emotional intelligence between employee performance and different styles of leadership, focussing on micromanagement. The research carried out by Badawy (2022) explored the moderating role of emotional intelligence in the association of employees' counterproductive work behaviours and job fairness perceptions. These findings advance the knowledge of emotional intelligence's consequences for organisational outcomes by highlighting the significance of researching it as a basic coping mechanism and its possible moderating effects in technologically stressful conditions. Drawing on the JD-R model and stress-buffering theory, emotional intelligence is conceptualised as a personal resource that may attenuate the strain-inducing effects of techno-invasion on work exhaustion.

Extending this logic, emotional intelligence is expected to condition the indirect effect of techno-invasion on contextual performance through work exhaustion, forming a moderated mediation relationship. The following hypotheses were put forth. Figure 1 illustrates the research framework for H1 to H6.

H5: The relationship between work burnout and techno-invasion is moderated by EI, indicating that telecommuters with high EI have a weaker relationship

H6: EI moderates the indirect relationship between techno-invasion and contextual performance through work exhaustion, where the mediating effect of work exhaustion is sounder when emotional intelligence is soft for the telecommuters

METHODOLOGY

Research Design

This study utilised the research onion model as proposed by Saunders et al. (2019). The data was gathered using a mono-method quantitative survey strategy that adhered to the principles of positivist philosophy and employed a deductive approach over a fixed, cross-sectional time. A mono-method survey was selected for productivity and equivalence with earlier technostress research. Validated scales and privacy were confirmed to ease bias.

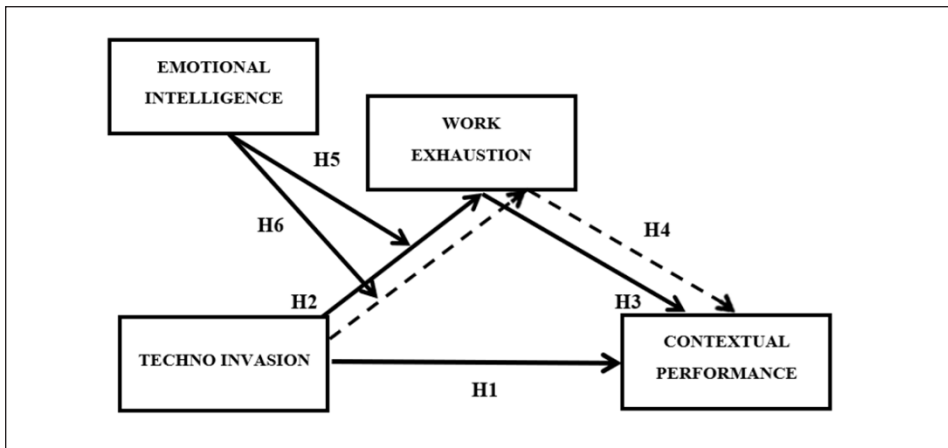


Figure 1. Research framework

With the availability of facts and measurements, positivism was an appropriate philosophy (Saunders et al., 2019). Primary data were collected from a questionnaire in a cross-sectional design. The target population involved people working remotely in Kuala Lumpur's services industry. Before conducting descriptive and inferential statistics using SPSS and SmartPLS, the quality of the data was verified and corrected. SmartPLS was opted for its appropriateness in conducting complex moderated mediation models and small-to-medium sample sizes.

Sample Size and Sampling Technique

Referring to Saunders et al. (2019), collecting data from an entire population is not practical, thus requiring sampling methods as a necessity in the study. In this research, convenience sampling was chosen as it accommodated the time limitations, in line with the suggested recommendations. Though convenience sampling controls

generalisability, the sample size outstrips minimum SEM requirements (Kline, 2016) and incorporates diverse service sectors, boosting representativeness. Green (1991) explained that the target sample size was initially set at 82. To bolster statistical reliability and broaden the scope of generalisability, the sample size was then increased to 150, in that way granting a more representative sample of the population being investigated. In addition, according to Kline (2005), a sample size of 100 is considered minimal for analysing structural equation models, while a sample size of 100 to 200 is classified as moderate. A sample of 153 participants was considered enough for this research. The sample was drawn from diverse service sectors in Kuala Lumpur to mirror the approximate telecommuting workforce.

Instrumentation

A self-administered questionnaire was established and handed to qualified

participants to gather initial data. Participants were guaranteed confidentiality and anonymity to reduce social interest unfairness. The survey comprised explanatory questions, and the participants' permission was secured. The questionnaire was split into two separate sections. Section A contains data about age and gender demographics. The section on study variables was assessed using a 5-point Likert scale to gauge responses. The questions were adapted based on existing scales: 4 items from Tarafdar et al. (2007) for techno invasion, 16 items from Koopmans et al. (2012) for contextual performance, 5 items from Moore (2000) for work exhaustion, and 16 items from Wong & Law (2002) for emotional intelligence.

Data Collection, Data Preparation, and Analysis

Data were gathered from Malaysian telecommuters via the electronic distribution of questionnaires. Sekaran and Bougie (2016) highlighted three main goals targeted in the data analysis: deriving a feel of the data, assessing its goodness or accuracy, and testing the research hypotheses as stated. Primarily, to create a visual picture of the data, descriptive statistics were processed using the IBM SPSS statistical software, version 26. The subsequent step in the analytical process involves verifying the data's integrity by valuing its reliability, multicollinearity, and validity. For this analysis, the Smart PLS4 was utilised. Items with low factor loading were eliminated

to ensure the reliability and validity of the measure. According to Hair et al. (2021), the reliability of the indicator should exceed 0.70. Items below 0.70 were eliminated to maintain construct validity. The average variance extracted (AVE) was computed for convergent validity, and it must be 0.5 or greater, as stated by Hair et al. (2021). The HTMT correlation ratio was calculated to determine discriminant validity. The HTMT value should be below 0.90 (Hair et al., 2021). Multicollinearity was checked to ensure the variance inflation factor (VIF) value was less than 5. Separating predictor and criterion items with statistical checks ($VIF < 3.3$) indicated no common-method bias. Subsequently, hypothesis testing was carried out after adjusting the data for 5000 sub-samples through bootstrapping in Smart PLS4. Bootstrapping with 5000 subsamples served as a robustness check.

RESULTS

Participants' Demographics

Out of the 162 responses received, 9 respondents were not telecommuters; therefore, their responses had to be removed. Thus, 153 responses were considered for the data analysis. Of those respondents, 60.2% were male, while 39.8% were female. Moreover, 67% of the respondents are married, while 33% are single. Regarding the age of respondents, most belong to the age group of 36-40, about 45 respondents. This is followed by 35 belonging to the age group 26-30, 28 from the age group 31-35, 20 from the age group 41-49,

16 from the age group 20-25, and lastly, only 9 respondents were from the age group 50 or older.

Internal Consistency Reliability

The internal consistency of a measurement tool is determined by how much its individual components correlate with each other and are related to the same fundamental concept (Hair et al., 2021). Hair et al. (2019) suggest that reliability values should exceed 0.7. Table 1 presents the reliability analysis for the research. In contrast, the composite reliability rho_a provides a more accurate assessment of reliability, with acceptable values typically falling between 0.7 and 0.95 (Hair et al., 2019). The composite reliability (rho_a) coefficients for contextual performance, emotional intelligence, techno-invasion, and

work exhaustion in this investigation were found to be 0.852, 0.857, 0.883, and 0.949, respectively, all of which met the expected benchmarks. Reliability can be confirmed.

Convergent Validity

Convergent validity is evaluated by analysing the degree to which a construct converges to explain the variation in its items, with a minimum acceptable Average Variance Extracted (AVE) of 0.50 or higher signifying that the construct accounts for at least 50% of the observed variation in its items (Hair et al., 2019). Table 2 shows the AVE values were recorded for techno invasion at 0.685, work exhaustion at 0.690, contextual performance at 0.737, and emotional intelligence at 0.859. All values exceed the 0.5 threshold and are considered acceptable.

Table 1
Reliability

Variable	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)
Contextual Performance	0.856	0.852	0.862
Emotional Intelligence	0.865	0.857	0.869
Techno Invasion	0.881	0.883	0.918
Work Exhaustion	0.946	0.949	0.961

Table 2
Convergent validity

Variable	Average Variance Extracted (AVE)
Techno Invasion	0.685
Work Exhaustion	0.690
Contextual Performance	0.737
Emotional Intelligence	0.859

Discriminate Validity

Henseler et al. (2015) have shown in a study that an HTMT of above 0.90 may indicate that discriminant validity does not exist or is violated, while a cut-off value of 0.85 (Henseler et al., 2015) is generally recommended where constructs are more strongly divergent. Discriminant validity was confirmed based on the values obtained in Table 3, where all the values were less than 0.90.

Multicollinearity

It is crucial to investigate collinearity before assessing structural relationships to prevent it from skewing the regression results. Hair et al. (2019) recommend that the ideal

Variance Inflation Factor for the Inner Model should be around 3 or less to indicate no multicollinearity. The values of VIF in Table 4 are all below 3, so multicollinearity is not present in the structural model. A VIF value below 3.3, as stated in Kock (2017), is indicative of no collinearity problem in this model. The absence of this issue also suggests that the model does not have a common method bias problem (Kock, 2017).

R-square and Adjusted R-square

The correlation between exogenous variables and work exhaustion is substantial, indicating that 43.7% of the variation in work exhaustion can be attributed to external

Table 3
HTMT

	Contextual Performance	Emotional Intelligence	Techno Invasion	Work Exhaustion	EI* Techno Invasion
Contextual Performance					
Emotional Intelligence	0.742				
Techno Invasion	0.179	0.286			
Work Exhaustion	0.606	0.657	0.363		
EI*Techno Invasion	0.064	0.049	0.394	0.054	

Table 4
VIF-Inner model multicollinearity

Path	VIF
Emotional Intelligence > Work Exhaustion	1.103
Techno Invasion > Contextual Performance	1.125
Techno Invasion > Work Exhaustion	1.273
Work Exhaustion > Contextual Performance	1.123
Emotional Intelligence X Techno invasion > Work Exhaustion	1.184

factors, as evidenced by a coefficient of determination (R2) of 0.437. According to a guideline established by Chin (1998), coefficients of R2 at 0.67, 0.33, and below 0.19 are classified as strong, moderate, and weak. According to the values listed in Table 5, the coefficient of determination for contextual performance, denoted as R2, is 0.336, indicating that 33.6 percent of the variation in the dependent variable can be attributed to the independent variables. Work Exhaustion has an R2 of 0.437, which explains that 43.7% of the variation in work exhaustion is influenced by exogenous variables. The R-square values for this study are in a moderate range. R² values (0.336, 0.437) are moderate, consistent with behavioural research norms.

Predictive Q-square

An approach for evaluating the predictive accuracy of the PLS path model involves calculating the Q2 value, for which any value above 0 is satisfactory (Hanafiah, 2020).

In general, Q2 values exceeding 0, 0.25, and 0.50 indicate minor, moderate, and substantial predictive relevance of the PLS-path model, respectively. Table 6 shows the Q2 for contextual performance and work exhaustion is 0.356 and 0.394, falling in the moderate range.

Path Coefficients and Hypothesis Testing

Table 7 shows path coefficient results. For a significant relationship to be evident, the T-value must exceed 1.960. Meanwhile, the P-value signifies significance when it is below 0.05 (Hair et al., 2021). According to Table 7, no statistically significant effect of techno invasion was found on contextual performance (p-value >0.05), so. Hypothesis H1 lacks supporting evidence. The significant positive correlation between techno invasion and work-related exhaustion suggests that hypothesis two has been supported at a significant level of p < 0.005. The inverse relationship between work exhaustion and contextual performance is

Table 5
Coefficient of determination R2

Endogenous Variable	R-square	Adjusted
R-square		
Contextual Performance	0.336	0.326

Table 6
Predictive relevance Q²

Variable	Q ² Predict
Contextual Performance	0.356
Work Exhaustion	0.394

Table 7
Path coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P values
Emotional Intelligence -> Work Exhaustion	-0.567	-0.571	0.065	8.653	0.00
Techno Invasion -> Contextual Performance	0.036	0.037	0.071	0.509	0.306
Techno Invasion -> Work Exhaustion	0.222	0.22	0.083	2.684	0.004
Work Exhaustion -> Contextual Performance	-0.591	-0.595	0.058	10.263	0.00
Emotional Intelligence x Techno Invasion -> Work Exhaustion	-0.115	-0.106	0.077	1.486	0.069

statistically significant ($p\text{-value} < 0.00$), which confirms support for hypothesis three.

Mediator testing is based on the formula by Zhao et al (2010). Based on the formula by Zhao et al. (2010), the indirect path is significant. However, the direct path is not significant. Therefore, there is full mediation (indirect only). The indirect effect was statistically significant ($\beta = -0.131$, $p < 0.01$), indicating practical relevance. Full mediation happens when the mediating variable, that is, EI, completely explains the relationship between techno invasion and contextual performance. Therefore, hypothesis 4 is supported.

Emotional intelligence, acting as the moderator of this study, fails to significantly influence the connection between techno invasion and work-related exhaustion. According to Table 7, the $p\text{-value}$ for the moderation effect linking EI (Emotional Intelligence) and Techno Invasion to Work Exhaustion is 0.069, which is greater than 0.05. Techno invasion has a lesser effect on work exhaustion when employees utilise EI (B, -0.115), but the moderating influence is not statistically significant. Hence,

hypothesis 5 is not supported. This study also investigates the way emotional intelligence influences the relationship between techno invasion in the workplace and contextual job performance while considering the impact of work-related burnout (Table 8). The specific indirect test results, following 5000 sub-sampling iterations, indicate that the moderated mediation effect is not statistically significant, with a $p\text{-value}$ of 0.141, thereby failing to support the hypothesis on the moderated mediation.

A simple slope analysis was conducted to examine the interaction between techno-invasion and emotional intelligence on work exhaustion. Although the interaction term was not statistically significant, the slope patterns indicate that the relationship between techno-invasion and work exhaustion is weaker for individuals with higher emotional intelligence, suggesting a buffering trend consistent with theoretical expectations. Table 9 summarises the hypothesis testing results. The findings indicate that techno-invasion significantly increases work exhaustion (H2), which in turn negatively

affects contextual performance (H3). Moreover, work exhaustion mediates the relationship between techno-invasion and contextual performance (H4). However, the hypothesized direct effect of techno-invasion on contextual performance (H1), as well as the moderating roles of emotional intelligence (H5 and H6), were not supported.

DISCUSSION

Research aimed to examine the impact of techno invasion on contextual performance among Malaysian remote workers and to investigate the potential mediating effect of emotional intelligence. Unexpectedly, the findings demonstrated that techno invasion had no substantial effect on

Table 8
Specific indirect results

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values
Emotional Intelligence -> Work Exhaustion -> Contextual Performance	0.08	0.087	0.197	0.407	0.687
Techno Invasion -> Work Exhaustion -> Contextual Performance	-0.352	-0.345	0.164	2.14	0.032
Emotional Intelligence X Techno Invasion -> Work Exhaustion -> Contextual Performance	0.067	0.065	0.045	1.472	1.141

Table 9
Results summary of the hypothesis

Hypothesis	Beta	P-value	Decision
H1: There is an inverse relationship between techno invasion and contextual performance.	0.036	0.306	Not supported
H2: There is a direct relationship between techno invasion and work exhaustion.	0.222	0.004	Accepted
H3: There is an inverse relationship between work exhaustion and contextual performance.	-0.591	0.00	Accepted
H4: Work exhaustion mediates the relationship between techno invasion and contextual performance.	-0.352	0.032	Accepted
H5: The relationship between work burnout and techno-invasion is moderated by EI, indicating that telecommuters with high EI have a weaker relationship.	-0.115	0.069	Not supported
H6: EI moderates the indirect relationship between techno-invasion and contextual performance through work exhaustion, where the mediating effect of work exhaustion is stronger when emotional intelligence is low for the telecommuters.	0.067	0.141	Not supported

contextual performance. Absence of a direct effect could reflect suppression effects or measurement independence, as suggested by Zhao et al. (2010). The study found that work exhaustion fully mediates this relationship. Furthermore, the findings indicated that emotional intelligence did not moderate either the direct or indirect relationship between techno invasion and contextual performance.

The first hypothesis aimed to investigate the effects of techno invasion on contextual performance. The results revealed that the connection was not statistically significant. The findings differed from former research, which directed a substantial effect of techno invasion on contextual performance, aligned with Yener et al. (2021) and Chen et al. (2022). Techno invasion does not disrupt the personal lives of remote workers, which are carried about by technology that gives rise to stresses or conditions of lasting connectivity. The techno invasion does not have a substantial effect on the contextual performance of remote workers. Earlier research has also shown an insignificant correlation between techno invasion or incursion and contextual performance levels (Fernández Fernandez et al., 2023; Saleem et al., 2021). Earlier research granted conflicting outcomes, proposing that technostress may either positively affect or have an insignificant impact on performance.

The second hypothesis was to determine whether techno invasion was related to work-related burnout, and the results exposed a direct and statistically significant

relationship. The result of the study is in agreement with previous research carried out on the effect of techno invasion by Harris et al. (2022) and Bauwens et al. (2021). The findings of this research are consistent with Harris et al. (2022), who exposed a significant role of techno-invasion on burnout and work-family difference among remote workers. It was emphasised that raised levels of techno-invasion led to higher stress levels, burnout, and telecommuting-related work fatigue among telecommuters. Based on the findings, the development of new technology creates significant pressure on telecommuters to stay connected all the time, eventually leading to work-related fatigue among home-based workers or telecommuters.

The third hypothesis was to examine the relationship between work exhaustion and contextual performance. The findings indicated a substantial and statistically significant inverse correlation. The results show an inverse and significant relationship. Prior studies have shown that their results support outcomes from research on the effects of work exhaustion on job performance, as seen in the work of Chuang et al. (2022) and Camacho and Barrios (2022). Research by Chuang et al. in 2022 found equal outcomes, which are associated with their findings that emotional exhaustion has a significant effect on job performance. Remote workers understand enhanced levels of burnout resulting from poor work-life balance, technostress, and other contributing factors, which in turn lead to work exhaustion and weaken their job performance.

The fourth hypothesis explored the role of work exhaustion as a mediator in the connection between techno invasion and contextual performance, with outcomes indicating that work exhaustion fully mediated this relationship. Research has demonstrated that exhaustion acts as a mediator in the connection between technological stressors and work-related consequences. Yener et al. (2021) discovered that burnout acts as a mediator between techno-stressors and contextual performance. Aprilia and Riani (2023) found that burnout acts as a mediator in the relationship between technostress and work performance. Tu et al. (2021) discovered that exhaustion acted as a mediator in the relationship between commute stress and psychological distress among Chinese workers.

This fifth hypothesis examines exactly how emotional intelligence influences the techno-invasion and work-related burnout relationship. The outcome indicates that emotional intelligence was not observed to be a factor that influences the relationship, and hence, the hypothesis was not accepted. Emotional intelligence as a moderator did not affect the direction or magnitude of the techno-invasion and work-related burnout relationship. Earlier studies have recognised that emotional intelligence was a moderating factor between job stressors and burnout, with higher emotional intelligence affecting or correlating with improved stress handling and lower levels of exhaustion related to the job (Huang et al., 2019). A high level of moderating effect was exhibited by

previous work, as established in Laulie et al. (2023). This study discovered that emotional intelligence, not functioning as a moderator, was correlated with work burnout. Hence, greater emotional intelligence led to fewer employee burnouts.

Through employee burnout or exhaustion of telecommuters, the sixth or final hypothesis sought to evaluate the effect of emotional intelligence in the indirect relationship between technological invasion and contextual performance.

The results of this study did not favour or support the hypothesised moderated mediation model. While it was anticipated that techno-invasion would affect contextual performance through work exhaustion, with emotional intelligence (EI) as a moderator, the test results did not provide any significant interaction effect between the constructs. These results indicate that EI did not affect the indirect link between techno-invasion and contextual performance through work exhaustion. The mediating role was consistent regardless of EI levels. Muller et al. (2005) stated that moderated mediation happens when the levels of a moderating variable (EI) affect how an independent variable (techno invasion) affects a dependent variable (contextual performance) through a mediator variable (employee work burnout). The results showed that there was no discernible moderated-mediation effect in the results. This was a new insight, as the moderated mediation impact of emotional intelligence on the relationship between technological stressors and work-related outcomes through

exhaustion of telecommuters has not been examined in any other research.

CONCLUSION

The results found that techno invasion does not affect the contextual performance of telecommuters. Organisations should leverage technostress and techno invasion to improve the productivity and performance of employees. The results also found that work exhaustion significantly affects the contextual performance of telecommuters. Therefore, organisations need to provide support to employees to improve their well-being and health. Policies and programs should be implemented to support employees' burnout and work exhaustion. The study also revealed the role of work exhaustion as a mediator and EI as a moderator. A better understanding can be provided of organisations' matters about techno invasion, contextual performance, and work exhaustion of telecommuters. Based on the results of this study, organisations should focus their recruitment, selection, and development of employees on managing techno invasion, work burnout, and contextual performance. Organisations should create an environment that supports the work exhaustion of telecommuters that is caused by the techno invasion. Findings suggest integrating technology-specific demand into the JD-R model for remote work contexts.

Theoretical and Practical Implications

The findings of the research are of theoretical and practical importance and implications.

Theoretically, new insights were obtained in this study. For one, the techno invasion did not have a significant effect on telecommuters' contextual performance, as expected. This study tested the hypothesis that techno invasion may not always have negative effects on employee performance. This suggests that the intrusion of technology into the personal lives of telecommuters does not always place pressures or expectations based on constant connectivity. Secondly, the research set the central position that emotional intelligence (EI) occupies in moderating techno invasion and contextual performance. Organisations should implement structured interventions such as digital detox policies and EI training programmes. EI development programmes can include stress management workshops and role-playing exercises to enhance coping skills. Thirdly, this research was one of the pioneering pieces of research, to the researcher's best knowledge, to scrutinise the moderated mediation relationship between techno invasion, work exhaustion, and contextual performance. Finally, the research found a large and negative relationship between work exhaustion and telecommuters' contextual performance.

Limitations and Recommendations for Future Research

The other dimensions of technostress, namely, techno overload, techno complexity, techno insecurity, and techno uncertainty, were not examined. Future studies should examine the effects of the remaining four technostress factors on burnout and

contextual performance of employees. Besides that, future research should examine alternative models and cross-cultural comparisons. The cross-sectional design limits capturing dynamic changes in technology exposure and emotional regulation. Future longitudinal studies are recommended. The target population of this study was telecommuters. This limits the generalisability of the results. Future studies should consider a comparative study between telecommuters and employees in the workplace. Only emotional intelligence (EI) was taken into account as a moderating factor in this investigation. There can be other categorical moderators that affect the results. Future research should consider including variables like mindfulness, gender, and age.

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REFERENCES

- Aprilia, N., & Riani, A. L. (2023). The effect of techno-stressor and psychological capital on task performance. *International Journal of Economics, Business and Management Research*, 7(6), 100-115. <https://doi.org/10.51505/ijebmr.2023.7608>
- Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: Technological antecedents and implications. *MIS Quarterly*, 35(4), 831-858. <https://doi.org/10.2307/41409963>
- Badawy, S. M. (2022). How emotional intelligence moderate the relation between perceived justice and counterproductive behaviours? *International Journal of Business and Management*, 17(11), 12-21. <https://doi.org/10.5539/ijbm.v17n11p11>
- Bakker, A. B., Demerouti, E., & Verbeke, W. (2004). Using the job demands-resources model to predict burnout and performance. *Human Resource Management*, 43(1), 83-104. <https://doi.org/10.1002/hrm.20004>
- Bauwens, R., Denissen, M., Beurden, J. V., & Coun, M. (2021). Can leaders prevent technology from backfiring? Empowering leadership as a double-edged sword for technostress in care. *Frontiers in Psychology*, 12, 1-13. <https://doi.org/10.3389/fpsyg.2021.702648>
- Borle, P., Reichel, K., Niebuhr, F., & Voelter-Mahlknecht, S. (2021). How are technostressors associated with mental health and work outcomes? A systematic review of occupational exposure to information and communication technologies within the technostress model. *International Journal of Environmental Research and Public Health*, 18(16), Article 8673. <https://doi.org/10.3390/ijerph18168673>
- Borman, W. C., & Motowidlo, S. J. (1997). Task performance and contextual performance: The meaning for personnel selection research. *Human Performance*, 10(2), 99-109. https://doi.org/10.1207/s15327043hup1002_3
- Büchler, N., Hoeven, C. L., & Zoonen, W. van. (2020). Understanding constant connectivity to work: How and for whom is constant connectivity related to employee well-being? *Information and Organisation*, 30(3), Article 100302. <https://doi.org/10.1016/j.infoandorg.2020.100302>
- Camacho, S., & Barrios, A. (2022). Teleworking and technostress: Early consequences of a COVID-19 lockdown. *Cognition, Technology*

- & *Work*, 24, 441-457. <https://doi.org/10.1007/s10111-022-00693-4>
- Chen, Y., Wang, X., Benitez, J., Luo, X., & Li, D. (2022). Does techno-invasion lead to employees' deviant behaviours? *Journal of Management Information Systems*, 39(2), 454-482. <https://doi.org/10.1080/07421222.2022.2063557>
- Chin, W. W. (1998). The partial least squares approach to structural equation modelling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295-336). Lawrence Erlbaum Associates.
- Chuang, Y. T., Chiang, H. L., Lin, A. P., & Lien, Y. C. (2022). Dual crossover mechanisms of benevolent supervision on followers' contextual performance and emotional exhaustion alleviation. *Leadership & Organisation Development Journal*, 43(1), 111-132. <https://doi.org/10.1108/LODJ-10-2020-0431>
- Demerouti, E., Bakker, A. B., Ioanna, V., & Aristotelis, K. (2003). The convergent validity of two burnout instruments: A multitrait-multimethod analysis. *European Journal of Psychological Assessment*, 19(1), 12-23. <https://doi.org/10.1027/1015-5759.19.1.12>
- Dragano, N., & Lunau, T. (2020). Technostress at work and mental health: Concepts and research results. *Current Opinion in Psychiatry*, 33(4), 407-413. <https://doi.org/10.1097/YCO.0000000000000613>
- Fernández Fernández, M., Martínez-Navalón, J. G., Gelashvili, V., & Román, C. P. (2023). The impact of teleworking technostress on satisfaction, anxiety and performance. *Heliyon*, 9(6), Article e17201. <https://doi.org/10.1016/j.heliyon.2023.e17201>
- Goleman, D. (1998). *Working with emotional intelligence*. Bantam.
- Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research*, 26(3), 499-510. https://doi.org/10.1207/s15327906mbr2603_7
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modelling (PLS-SEM) using R* (3rd ed.). Springer. <https://doi.org/10.1007/978-3-030-80519-7>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hanafiah, M. H. (2020). Formative vs. reflective measurement model: Guidelines for structural equation modeling research. *International Journal of Academic Research in Business and Social Sciences*, 10(5), 876-889. <https://doi.org/10.28924/2291-8639-18-2020-876>
- Harris, K. J., Harris, R. B., Valle, M., Carlson, J., Carlson, D. S., Zivnuska, S., & Wiley, B. (2022). Technostress and the entitled employee: Impact on work and family. *Information Technology & People*, 35(3), 1073-1095. <https://doi.org/10.1108/ITP-07-2019-0348>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science*, 43(1), 1-21. <https://doi.org/10.1007/s11747-014-0403-8>
- Hopwood, S. (2019, June 25). The benefits and challenges of working with remote employees. *Forbes*. <https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2019/06/25/the-benefits-and-challenges-of-working-with-remote-employees/>
- Huang, H., Liu, L., Yang, S., Cui, X., Zhang, J., & Wu, H. (2019). Effects of job conditions, occupational stress, and emotional intelligence on chronic fatigue among Chinese nurses: A cross-sectional study. *Psychology Research and*

- Behaviour Management*, 12, 351-360. <https://doi.org/10.2147/PRBM.S207283>
- Hurst, E. J. (2020). Web conferencing and collaboration tools. *Journal of Hospital Librarianship*, 20(3), 266-279. <https://doi.org/10.1080/15323269.2020.1780079>
- Kline, R. B. (2016). *Principles and practice of structural equation modelling* (4th ed.). The Guilford Press.
- Kock, N. (2017). Common method bias: A full collinearity assessment method for PLS-SEM. In H. Latan & R. Noonan (Eds.), *Partial least squares path modelling: Basic concepts, methodological issues, and applications* (pp. 245-257). Springer. https://doi.org/10.1007/978-3-319-64069-3_11
- Koopmans, L., Bernaards, C., Hildebrandt, V., van Buuren, S., van der Beek, A. J., & de Vet, H. C. (2012). Development of an individual work performance questionnaire. *International Journal of Productivity and Performance Management*, 62(1), 6-28. <https://doi.org/10.1108/17410401311285273>
- Koopmans, L., Hildebrandt, V., Bernaards, C., & de Vet, H. D. (2014). Construct validity of the individual work performance questionnaire. *Journal of Occupational and Environmental Medicine*, 56(3), 331-337.
- Laulie, L., Jiménez, G. B., & Gómez, G. H. (2023). Exploring self-regulation theory as a mechanism of the effects of psychological contract fulfilment: The role of emotional intelligence. *Frontiers in Psychology*, 14, 1-9. <https://doi.org/10.3389/fpsyg.2023.1090094>
- Li, L., & Wang, X. (2021). Technostress inhibitors and creators and their impacts on university teachers' work performance in higher education. *Cognition, Technology & Work*, 23, 315-330. <https://doi.org/10.1007/s10111-020-00625-0>
- Lund, S., Madgavkar, A., Manyika, J., & Smit, S. (2020, November 23). What's next for remote work: An analysis of 2,000 tasks, 800 jobs, and nine countries. *McKinsey & Company*. <https://www.mckinsey.com/featured-insights/future-of-work/whats-next-for-remote-work-an-analysis-of-2000-tasks-800-jobs-and-nine-countries>
- Maslach, C., & Leiter, M. P. (2008). Early predictors of job burnout and engagement. *Journal of Applied Psychology*, 93(3), 498-512. <https://doi.org/10.1037/0021-9010.93.3.498>
- Mayer, J. D., & Salovey, P. (1989). Emotional intelligence. *Imagination, Cognition and Personality*, 9(3), 185-211. <https://doi.org/10.2190/DUGG-P24E-52WK-6CDG>
- Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, 59, 507-536. <https://doi.org/10.1146/annurev.psych.59.103006.093646>
- Mishra, N., Rajkumar, M., & Mishra, R. (2022). Emotional intelligence as a moderator between micromanagement leadership and employee performance. *Prabandhan: Indian Journal of Management*, 15(10), 63-70. <https://doi.org/10.17010/pijom/2022/v15i10/172409>
- Moore, J. E. (2000). One road to turnover: An examination of work exhaustion in technology professionals. *MIS Quarterly*, 24(1), 141-168. <https://doi.org/10.2307/3250982>
- Motowidlo, S. J., & Scotter, J. R. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology*, 79(4), 475-480. <https://doi.org/10.1037/0021-9010.79.4.475>
- Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, 89(6), 852-863. <https://doi.org/10.1037/0022-3514.89.6.852>

- O'Connor, P. J., Hill, A., Kaya, M., & Martin, B. (2019). The measurement of emotional intelligence: A critical review of the literature and recommendations for researchers and practitioners. *Frontiers in Psychology, 10*, Article 1116. <https://doi.org/10.3389/fpsyg.2019.01116>
- Palenzuela, P., Delgado, N., & Rodríguez, J. A. (2019). Exploring the relationship between contextual performance and burnout in healthcare professionals. *Revista de Psicología del Trabajo y de las Organizaciones, 35*(2), 115-121. <https://doi.org/10.5093/jwop2019a13>
- Pansini, M., Buonomo, I., Vincenzi, C. D., Ferrara, B., & Benevene, P. (2023). Positioning technostress in the JD-R model perspective: A systematic literature review. *Healthcare, 11*, Article 446. <https://doi.org/10.3390/healthcare11030446>
- Rezvani, A., & Khosravi, P. (2019). Emotional intelligence: The key to mitigating stress and fostering trust among software developers working on information system projects. *International Journal of Information Management, 48*, 139-150. <https://doi.org/10.1016/j.ijinfomgt.2019.02.007>
- Rosado, M. E., Cerdá-Suárez, L. M., Zevallos, G. F., & Espinosa-Cristia, J. F. (2023). Technostress at work during the COVID-19 lockdown phase (2020-2021): A systematic review of the literature. *Frontiers in Psychology, 14*, Article 1173425. <https://doi.org/10.3389/fpsyg.2023.1173425>
- Saleem, F., Malik, M. I., Qureshi, S. S., Farid, M. F., & Qamar, S. (2021). Technostress and employee performance nexus during COVID-19: Training and creative self-efficacy as moderators. *Frontiers in Psychology, 12*, Article 595119. <https://doi.org/10.3389/fpsyg.2021.595119>
- Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*(3), 185-211. <https://doi.org/10.2190/DUGG-P24E-52WK-6CDG>
- Satpathy, S., Patel, G., & Kumar, K. (2021). Identifying and ranking techno-stressors among IT employees due to work from home arrangement during COVID-19 pandemic. *Decision, 48*(4), 391-402. <https://doi.org/10.1007/s40622-021-00295-5>
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.
- Scotter, J. R. V., & Motowidlo, S. J. (1996). Interpersonal facilitation and job dedication as separate facets of contextual performance. *Journal of Applied Psychology, 81*(5), 525-531. <https://doi.org/10.1037/0021-9010.81.5.525>
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Talib, S. L. A., Jusoh, M. A., Razali, F. A., & Awang, N. B. (2022). Technostress creators in the workplace: A literature review and future research needs in accounting education. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 7*(7), Article e001625. <https://doi.org/10.47405/mjssh.v7i7.1625>
- Tarafdar, M., Cooper, C. L., & Stich, J. F. (2017). The technostress trifecta: Techno eustress, techno distress and design: Theoretical directions and an agenda for research. *Information Systems Journal, 29*(1), 6-42. <https://doi.org/10.1111/isj.12169>
- Tarafdar, M., Maier, C., Laumer, S., & Weitzel, T. (2020). Explaining the link between technostress and technology addiction for social networking sites: A study of distraction as a coping behaviour. *Information Systems Journal, 30*(1), 96-124. <https://doi.org/10.1111/isj.12253>
- Tarafdar, M., Pullins, E. B., & Ragu-Nathan, T. S. (2014). Technostress: Negative effect on performance and possible mitigations. *Information Systems Journal, 25*(2), 103-132. <https://doi.org/10.1111/isj.12042>

- Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, 24(1), 301-328. <https://doi.org/10.2753/MIS0742-1222240109>
- Tu, Z., He, J., Zhou, N., & Shen, X. (2021). Driver-passenger communicative stress and psychological distress among Chinese bus drivers: The mediating effect of job burnout. *BMC Public Health*, 21, 1-9. <https://doi.org/10.1186/s12889-021-10618-x>
- Wang, H., Ding, H., & Kong, X. (2023). Understanding technostress and employee well-being in digital work: The roles of work exhaustion and workplace knowledge diversity. *International Journal of Manpower*, 44(2), 334-353. <https://doi.org/10.1108/IJM-08-2021-0480>
- Warrier, U., Shankar, A., & Belal, H. M. (2021). Examining the role of emotional intelligence as a moderator for virtual communication and decision-making effectiveness during the COVID-19 crisis: Revisiting task technology fit theory. *Annals of Operations Research*. <https://doi.org/10.1007/s10479-021-04216-8>
- Weinert, C., Christian, M., Laumer, S., & Weitzel, T. (2019). How do users respond to technostress? An empirical analysis of proactive and reactive coping. In *Proceedings of the 52nd Hawaii International Conference on System Sciences* (pp. 5103-5112). <https://hdl.handle.net/10125/59947>
- Wong, C. S., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *The Leadership Quarterly*, 13(3), 243-274. [https://doi.org/10.1016/S1048-9843\(02\)00099-1](https://doi.org/10.1016/S1048-9843(02)00099-1)
- Wu, J., Wang, N., & Mei, W. (2020). Technology-induced job anxiety during non-work time: Examining conditional effect of techno-invasion on job anxiety. *International Journal of Networking and Virtual Organisations*, 22(2), 162-182. <https://doi.org/10.1504/IJNVO.2020.105520>
- Wu, W., Chin, W., & Liu, Y. (2022). Technostress and the smart hospitality employee. *Journal of Hospitality and Tourism Technology*, 13(3), 404-426. <https://doi.org/10.1108/JHTT-01-2021-0032>
- Yener, S., Arslan, A., & Kiliç, S. (2021). The moderating roles of technological self-efficacy and time management in the technostress and employee performance relationship through burnout. *Information Technology & People*, 34(7), 1890-1919. <https://doi.org/10.1108/ITP-09-2019-0462>
- Zhang, Z., Ye, B., Qiu, Z., Zhang, H., & Yu, C. (2022). Does technostress increase R&D employees' knowledge hiding in the digital era? *Frontiers in Psychology*, 13, Article 873846. <https://doi.org/10.3389/fpsyg.2022.873846>
- Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197-206. <https://doi.org/10.1086/651257>

Examining the Role of Creative Problem-Solving in Supporting Academic Achievement and Reducing Study-life Conflict among Thai Undergraduate Students

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ABSTRACT

Creative problem-solving (CPS) is increasingly important in higher education because it may help students respond effectively to academic demands and competing life responsibilities. This study examined the role of CPS in academic achievement and study-life conflict among Thai undergraduate students from a behavioural science perspective grounded in Social Cognitive Theory. The participants were 620 undergraduate students from four universities in Thailand. Cross-sectional data were collected using six self-report questionnaires and analysed using partial least squares structural equation modelling. The results showed that CPS was positively associated with academic achievement and negatively associated with study-life conflict. Proactive personality emerged as the strongest predictor of CPS, followed by social and emotional learning (SEL). Multi-group analysis also indicated that the associations involving CPS varied across demographic groups. Students with part-time jobs showed a stronger positive association between CPS and academic achievement, whereas female students and students with higher GPAs showed a stronger negative association between CPS and study-life conflict. These findings extend the literature by positioning CPS as a behavioural pathway linking psychosocial resources with both academic and life-related

outcomes. The results suggest that universities should support CPS through learning activities and student development systems that strengthen academic adaptation, study-life balance, and career readiness.

Keywords: Academic achievement, creative problem-solving, study-life conflict, Thai undergraduate students, quality education

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INTRODUCTION

Thailand's skilled workforce is shrinking, while challenges in higher education are becoming increasingly severe. University enrollment is experiencing a persistent decline, with projections indicating a reduction of at least 20.75% in undergraduate enrollment by 2026 (Kamsawas, 2019). Concurrently, student attrition rates have increased, with roughly 23%-26% of students discontinuing their studies prior to degree completion (Scott & Asavisanu, 2023). These developments necessitate a critical examination of students' academic adaptation and their capacity to navigate the demands of university life. Consequently, higher education institutions are compelled to not only broaden access and maintain enrollment figures, but also to furnish students with the requisite skills to effectively manage both academic and personal challenges (Thornhill-Miller et al., 2023). From a behavioural science perspective, identifying competencies that promote student success is essential because such competencies support degree completion and help align graduates with workforce expectations. Beyond academic performance, students' ability to balance academic responsibilities with other aspects of life has become increasingly important. As students face pressures related to coursework, relationships, finances, and well-being, the competencies that support adaptation remain a central concern in higher education research.

Among these competencies, creative problem-solving (CPS) is particularly important because it enables students

to respond constructively to complex academic and personal challenges. CPS refers to a cognitive and behavioural process that integrates creativity and critical thinking to generate effective solutions to complex problems (Treffinger et al., 2006). Unlike reactive problem-solving, which relies on familiar strategies (Jonassen, 2000), CPS involves problem analysis, idea generation, evaluation of alternatives, and implementation of innovative strategies (Isaksen et al., 2011). In higher education, CPS may help students cope with academic uncertainty, adjust learning strategies, and respond more effectively to competing demands.

Creativity is a key component of CPS and can be understood as both a cognitive process and an individual capability expressed through ideas, behaviours, or tangible outcomes. Creative outcomes are typically characterised by their originality, usefulness, and practical value (Guilford, 1967; Runco & Jaeger, 2012). Previous research has identified several factors that influence creative problem-solving, including divergent thinking and coping flexibility (Peterson et al., 2013; Scott et al., 2004). These abilities, when combined, reflect students' capacity to adapt to complex and uncertain situations.

Empirical studies indicate that creative problem-solving (CPS) fosters enhanced performance and adaptability in various settings. Those exhibiting more robust CPS capabilities often achieve superior performance outcomes (Suryanto et al., 2021; Wang & Horng, 2002), exhibit greater innovative potential within fluctuating

environments (Kim et al., 2018), and attain higher academic success (Gajda et al., 2017). Furthermore, CPS has been linked to an augmented capacity to navigate multifaceted responsibilities and adjust to intricate circumstances (Ong & Jeyaraj, 2014). For undergraduate students, CPS may enhance academic achievement while reducing tensions between academic and personal responsibilities, thereby lowering study-life conflict and promoting academic well-being (Karwowski & Beghetto, 2019; Salmela-Aro & Upadyaya, 2014).

Bandura's (1986) Social Cognitive Theory posits that competencies, including CPS, emerge through the interplay of personal attributes, actions, and environmental factors. Within educational contexts, students' psychological assets and learning environments cultivate adaptive behaviours, thereby equipping them to navigate academic obstacles effectively. Consequently, CPS can be conceptualised as a behavioural process that connects psychological resources and learning experiences to academic results (Chotratanakamol et al., 2023). Despite the increasing body of research on creativity and innovation, CPS remains relatively unexplored as a mechanism that links psychosocial resources, learning environments, and educational outcomes. Furthermore, studies that concurrently investigate academic achievement and study-life conflict are scarce.

Moreover, most existing research on CPS has been conducted in Western contexts, with relatively little evidence from Thai higher education. This study

addresses this gap by examining the role of CPS in academic achievement and study-life conflict among Thai undergraduate students, while also considering subgroup differences and exploring how individual and contextual factors contribute to its development. By conceptualising CPS as a mediating behavioural mechanism linking psychosocial resources, learning environments, and educational outcomes, this study helps explain how adaptive cognitive and behavioural competencies support students' academic adjustment and life balance in higher education.

LITERATURE REVIEW

Academic Achievement and Creative Problem-Solving

Academic achievement (AA) refers to students' success in meeting educational goals, often reflected in examination scores and GPA. Higher academic achievement is associated with better educational and career outcomes (Sideridis & Alamri, 2023). Although cognitive ability remains an important predictor, recent studies suggest that adaptive competencies also contribute to academic success. CPS may enhance achievement by helping students analyse problems, generate alternative solutions, and respond flexibly to academic demands (Gajda et al., 2017; Wang & Horng, 2002). Students with stronger CPS are therefore more likely to manage academic tasks effectively and achieve better outcomes. Thus,

H1 : CPS positively influences academic achievement.

Study-life Conflict and Creative Problem-Solving

Study-life conflict (SLC) refers to the tension that occurs when academic responsibilities interfere with personal, social, or family roles (Richardson et al., 2012; Salmela-Aro & Read, 2017). Drawing from the idea of work-family conflict, it occurs when academic demands compete with personal or work-related obligations (Greenhaus & Beutell, 1985). High conflict levels reduce academic engagement, learning performance, and student well-being (Chotratanakamol et al., 2023; Häfner et al., 2015; Robotham & Julian, 2006). Therefore, maintaining balance between academic responsibilities and personal life is crucial for student well-being (Mohd Sham et al., 2025). Academic pressures can disrupt students' personal, family, or leisure time, increasing stress, and affecting mental health (Zainal Badri et al., 2021).

CPS may help lessen study-life conflict, as strong problem-solving skills support better stress management, task prioritisation, and handling competing role demands (Ong & Jeyaraj, 2014). It also promotes coping flexibility and cognitive control, which can help students manage multiple responsibilities without slipping into burnout or disengagement (Wang & Horng, 2002). As a result, students with stronger CPS abilities are generally better at managing academic pressures while maintaining their life balance. Thus,

H2 : CPS negatively influences the study-life conflict.

Causal Factors Related to Creative Problem-Solving in Higher Education

This study adopts Social Cognitive Theory (Bandura, 1986) to explain how CPS develops and influences student outcomes. The theory proposes that behaviour is shaped by reciprocal interactions among personal factors and environmental influences. In this study, SEL and proactive personality are treated as personal resources, whereas study workload represents an environmental demand. CPS is treated as a behavioural mechanism through which these personal and contextual factors are associated with adaptive outcomes, namely academic achievement and study-life conflict.

The Influence of Social and Emotional Learning on Creative Problem-Solving, Academic Achievement, and Study-life Conflict

Social and emotional learning (SEL) refers to a set of competencies that support students' cognitive and emotional development, including emotional regulation, self-awareness, social understanding, and responsible decision-making. From the perspective of Social Cognitive Theory, SEL is a personal resource that shapes how students interpret and respond to academic challenges. Strong SEL helps students manage emotions, stay engaged, and work well with others, which in turn supports creative problem solving. Previous studies show that SEL enhances CPS by improving emotional regulation, cognitive flexibility, and interpersonal collaboration (Brackett et al., 2011; Isen, 2009).

Some evidence suggests that stronger social-emotional competence may, under certain conditions, be associated with greater pressure to perform. For example, Chou and Sun (2026) found that pressure to perform was positively related to interpersonal dimensions of social and emotional competence and argued that socially competent students may be more sensitive to peer expectations and social comparison. In this sense, students with higher SEL may become more actively involved in academic, social, or extracurricular roles, which can increase role complexity and, under demanding conditions, heighten study-life conflict.

- H3a : SEL positively influences CPS.
- H3b : SEL positively influences academic achievement.
- H3c : SEL positively influences study-life conflict.

Proactive Personality and Its Effects on CPS, Academic Achievement, and Study-life Conflict

Proactive personality (PP) refers to a tendency to take initiative, anticipate challenges, and actively shape one’s environment rather than respond passively (Bateman & Crant, 1993). In terms of Social Cognitive Theory, it reflects a personal tendency toward taking action. Proactive students often anticipate problems, seek opportunities, and, before problems escalate, make this trait pertinent to CPS (Fuller & Marler, 2009).

People with a proactive personality typically show greater resilience when

confronting obstacles and are more likely to engage in problem-based learning, entrepreneurial activity, and innovative thinking (Crant, 2000; Parker et al., 2010). They also succeed in their education because they set clear goals, manage their learning strategies, and reflect on their progress (Zimmerman, 2011). A proactive personality further supports behaviours linked to academic and career success, such as building networks, speaking up, preventing problems, and taking initiative (Parker et al., 2010). However, proactive people may experience negative consequences. When students take on too many roles or responsibilities, they may experience stress, overload, role conflict, and difficulty stepping away from tasks (Grant & Ashford, 2008; Sonnentag & Fritz, 2007).

- H4a : Proactive personality positively influences CPS.
- H4b : Proactive personality positively influences academic achievement.
- H4c : Proactive personality negatively influences study-life conflict.

Study Workload and Its Effects on Creative Problem-Solving, Academic Achievement, and Study-life Conflict

Study workload (SW) refers to the time, effort, and mental resources students invest in academic tasks. Within Social Cognitive Theory, it is considered an environmental factor that shapes behaviour. Perceived workload reflects not only task quantity but also students’ interpretations of academic demands, which are influenced by factors

such as goals, self-confidence, task value, and personal interest (Pintrich, 2004). It is also shaped by contextual conditions, including teaching style, task difficulty, assessment methods, and relationships with instructors and peers (Kember, 2004).

Previous studies have reported mixed effects of study workload on CPS. Early models suggested that low workload combined with limited autonomy may constrain opportunities for problem-solving (Karasek, 1979), whereas later research showed that excessive workload can impair creativity by increasing stress and reducing cognitive flexibility (Amabile et al., 1996). These findings suggest that the workload does not have a simple linear relationship with CPS. When demands become excessive, students may rely more on routine coping than on creative strategies. Heavy workload is also associated with surface-level learning and greater study-life conflict, particularly when academic demands interfere with personal roles (Baik et al., 2015; Kember & Leung, 2006).

- H5a : Study workload negatively influences CPS.
- H5b : Study workload negatively influences academic achievement.
- H5c : Study workload positively influences study-life conflict.

Using Social Cognitive Theory as a guideline, proactive personality and SEL can be seen as personal strengths, while studying workload represents the pressures in a student's environment. Within this framework, CPS is the process that connects

these factors to outcomes like academic achievement and study-life conflict. Students with stronger personal resources are more likely to develop and employ CPS when they face academic challenges. Effective use of CPS can improve their academic performance and reduce the disruption of personal life from academic responsibilities. Therefore, the mediating role of CPS was hypothesised as follows:

- H6a : CPS mediates the relationship between SEL and academic achievement.
- H6b : CPS mediates the relationship between proactive personality and academic achievement.
- H6c : CPS mediates the relationship between SEL and study-life conflict.
- H6d : CPS mediates the relationship between proactive personality and study-life conflict.

METHODS

Research Design

This study employed a quantitative cross-sectional design to examine the role of CPS in academic achievement and study-life conflict among Thai university students. The proposed model also included SEL, proactive personality, and study workload as antecedent variables. Data were analysed using partial least squares structural equation modelling (PLS-SEM).

Sample and Sampling Procedures

Sample size was determined using SEM criteria and power analysis. In line with Hair

et al. (2022), sample size in PLS-SEM should reflect model complexity and the maximum number of structural paths directed at an endogenous construct. G*Power analysis (Faul et al., 2009) indicated a minimum of 420 participants (effect size = 0.05, $\alpha = 0.05$, power = 0.90). Using multistage sampling, data was collected from second- and third-year undergraduates in four universities across four academic fields. A total of 620 valid responses were obtained, exceeding the required minimum. The study received ethical approval from the Human Research Ethics Committee of Thammasat University, Social Sciences (SSTU-EC 151/2567; No. 111/2567).

Instruments

Data were collected using a self-report questionnaire with a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The instruments were adapted from established scales for the Thai context. Harman's single-factor test indicated that the first unrotated factor accounted for 27.05% of the variance, below the 50% threshold, suggesting that common method bias was not a serious concern (Fuller et al., 2016; Podsakoff et al., 2003). All scales were previously validated through exploration and confirmatory factor analyses and showed satisfactory internal consistency, with Cronbach's alpha coefficients ranging from 0.833 to 0.964.

Data Analysis

Data were analysed using SmartPLS 4.1.0.3 in two stages: measurement model

assessment and structural model assessment. The measurement model was evaluated for convergent validity, discriminant validity, and internal consistency reliability using indicator loadings, average variance extracted (AVE), composite reliability (CR), rho-A, Cronbach's alpha, the Fornell-Larcker criterion, and the HTMT ratio (Fornell & Larcker, 1981; Hair et al., 2021; Henseler et al., 2015). The structural model was assessed using path coefficients, t-values, *p*-values, and R^2 . Bootstrapping with 5,000 resamples was used to test the hypothesised relationships (Hair et al., 2022). Mediation effects were also examined. Before comparing subgroups by gender, GPA, and part-time employment, measurement invariance of composite models (MICOM) was assessed to establish group comparability, followed by multi-group analysis (Henseler et al., 2016).

RESULTS

Respondent Characteristics

The final dataset comprised 620 university students, most of whom were female (73.4%). The GPA distribution was relatively balanced, with 47.6% reporting a GPA of 3.10 or below and the remainder reporting a GPA of 3.11 or above. Most students (76.0%) were enrolled in social sciences and humanities programmes, while the rest were in science and business fields. In addition, 66.3% were 20.60 years old or younger, and 23.4% reported having a part-time job. Table 1 summarises the personal and demographic characteristics of the study sample.

Table 1
Respondent demographic data (n=620)

Criterion	Category	Frequency	Percentage
Gender	Female	455	73.40%
	Male	165	26.60%
GPA	≤3.10	295	47.60%
	≥3.11	325	52.40%
Faculties	Science/Business	149	24.00%
	Social Sciences/ Humanities	471	76.00%
Age in years	≤20.60	411	66.30%
	≥20.61	209	33.70%
Part-time employment	Yes	145	23.40%
	No	475	76.60%

Measurement Model Assessment

Convergent Validity

Convergent validity and construct reliability were assessed using Cronbach’s Alpha (CA), Dijkstra-Henseler’s rho-A (ρA), Composite Reliability (CR), and average variance extracted (AVE), following Hair et al. (2021). The results indicated satisfactory construct reliability across all constructs, with factor loadings ranging from 0.659 to 0.902, CA values from 0.848 to 0.964, CR values from 0.872 to 0.969, and ρA values from 0.834 to 0.964. Convergent validity was supported for academic achievement, creative problem-solving, proactive personality, social and emotional learning, and study-life conflict. Although the AVE for study workload was slightly below the recommended threshold (AVE = 0.461), its CR and ρA values remained acceptable, and the construct was therefore retained with caution (Fornell & Larcker, 1981; Hair et al., 2021).

Discriminant Validity

Discriminant validity was supported by both the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT). The square root of the AVE for each construct exceeded its inter-construct correlations, and all HTMT values were below 0.85, confirming adequate discriminant validity and empirical distinctiveness among the constructs (Fornell & Larcker, 1981; Henseler et al., 2015). Although the highest HTMT value was found between academic achievement and social and emotional learning, it remained within the acceptable range.

Model Fit

Model fit was assessed using the standardised root mean square residual (SRMR), geodesic discrepancy (d_G), unweighted least squares discrepancy (d_ULS), chi-square, and the normed fit index (NFI). As shown in Table 2, the

SRMR values for both the saturated model (0.030) and the estimated model (0.034) were below the recommended cutoff of 0.08, while the corresponding NFI values (0.939 and 0.938) exceeded the recommended threshold of 0.90, indicating acceptable model fit.

According to Table 2, the data demonstrated acceptable model fit, as indicated by the NFI and SRMR values. Although chi-square was relatively high, this is common in large-sample SEM models (Hair et al., 2016). Furthermore, d_G and d_ULS values suggested that the saturated model fit better than the estimated model, while both remained within an acceptable range (Henseler et al., 2016). These findings confirmed that the PLS-SEM model met the required goodness-of-fit criteria.

Structural Model Results and Hypothesis Testing

After validating the measurement model, the structural model was assessed by examining the relationships between latent variables and the model’s predictive capability. The results enable estimation of path coefficients and the coefficient of determination (R²). As illustrated in Figure 1, the structural equation model explained 36.90% of the variance in study-life conflict, 44.70% in CPS, and 45.80% in academic achievement. The path coefficients, t-values, and p-values for each hypothesis are presented in Figure 1 and Table 3, indicating that most hypotheses were supported.

Table 3
Structural model results in PLS-SEM

Hypothesis	Relationship	Path Coefficient	T-value	p-values	Result
H1	CPS → AA	0.282	6.772	< .001	Supported
H2	CPS → SLC	-0.226	5.889	< .001	Supported
H3a	SEL → CPS	0.319	8.258	< .001	Supported
H3b	SEL → AA	0.352	9.053	< .001	Supported
H3c	SEL → SLC	0.147	4.158	< .001	Supported
H4a	PP → CPS	0.421	11.948	< .001	Supported
H4b	PP → AA	0.106	2.843	0.004	Supported
H4c	PP → SLC	-0.185	5.242	< .001	Supported
H5a	SW → CPS	0.009	0.266	0.791	Not supported
H5b	SW → AA	-0.171	5.246	< .001	Supported
H5c	SW → SLC	0.556	20.498	< .001	Supported
H6a	SEL → CPS → AA	0.102	5.950	< .001	Supported
H6b	PP → CPS → AA	0.135	6.260	< .001	Supported
H6c	SEL → CPS → SLC	-0.072	4.749	< .001	Supported
H6d	PP → CPS → SLC	-0.095	5.004	< .001	Supported

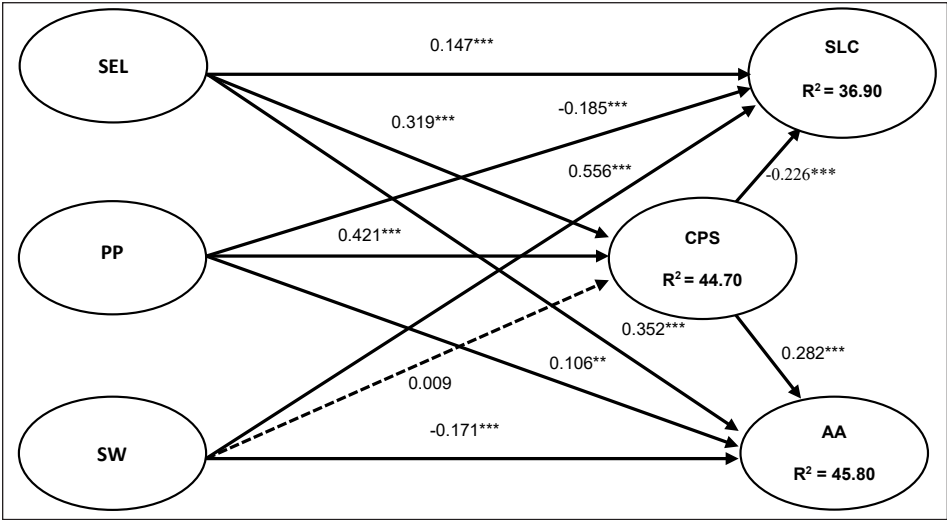


Figure 1. Hypothesis testing results

Note. ** $p < 0.01$, *** $p < 0.001$

Table 2
Model fit results

Model Fit Indicators	Saturated Model	Estimated Model
SRMR	0.030	0.034
d_ULS	1.259	1.619
d_G	0.465	0.472
Chi-square	1614.548	1633.213
NFI	0.939	0.938

Based on the data analysis, CPS had a significant negative effect on study-life conflict ($\beta = -0.226, p < 0.001$) and a significant positive effect on academic achievement ($\beta = 0.282, p < 0.001$), supporting H1 and H2. H3a and H4a were also supported, whereas H5a was not. SEL and PP significantly affected CPS ($\beta = 0.319, p < 0.001$ and $\beta = 0.421, p < 0.001$, respectively), whereas study workload had no statistically significant effect on CPS

($\beta = 0.009, p > 0.05$). In addition, H3b, H4b, and H5b were supported, as SEL, proactive personality, and study workload significantly affected academic achievement ($\beta = 0.352, p < 0.001$; $\beta = 0.106, p < 0.01$; and $\beta = -0.171, p < 0.001$, respectively). These variables also significantly affected study-life conflict ($\beta = 0.147, p < 0.001$; $\beta = -0.185, p < 0.001$; and $\beta = 0.556, p < 0.001$, respectively), supporting H3c, H4c, and H5c.

Mediating Effects

The mediating role of CPS was tested under Hypothesis 6. The results showed that CPS partially mediated the relationships between SEL and academic achievement (H6a; indirect effect = 0.102, $p < 0.001$), proactive personality and academic achievement (H6b; indirect effect = 0.135, $p < 0.001$), SEL and study-life conflict (H6c; indirect effect = -0.072, $p < 0.001$), and proactive personality and study-life conflict (H6d; indirect effect = -0.095, $p < 0.001$). These findings support H6a-H6d and confirm CPS as a behavioural mechanism through which psychosocial resources influence both academic achievement and study-life conflict.

Multi-group Analysis

A multi-group analysis was conducted by gender, GPA, and part-time employment status to examine whether the effects of CPS varied across demographic groups. As shown in Table 4, for the relationship between CPS and academic achievement, a significant group difference was observed only by part-time employment status (difference = 0.254, $p < 0.05$), indicating

that the positive effect of CPS was stronger among students with part-time jobs. No significant group differences were found for this relationship by gender or GPA.

For the relationship between CPS and study-life conflict, significant group differences were observed across gender (difference = 0.249, $p < 0.05$) and GPA (difference = 0.365, $p < 0.05$). Specifically, the negative association between CPS and study-life conflict was stronger among female students and students with higher GPAs. No significant group difference was found by employment status.

DISCUSSION

This study examined the effects of creative problem-solving (CPS) on academic achievement and study-life conflict among Thai undergraduates using PLS-SEM. It also investigated whether SEL, proactive personality, and study workload function as antecedents of CPS and related student outcomes, as well as whether the effects of CPS vary across demographic groups. Overall, the findings identify CPS as an important adaptive skill in higher education that supports academic performance while reducing study-life conflict.

Table 4
Multi-group analysis results

Path Effects	Demographics		
	Difference (Gender)	Difference (GPA)	Difference (Part-time employment)
CPS → AA	-0.136	0.118	0.254*
CPS → SLC	0.249*	0.365*	0.107

Note: * $p < 0.05$

The Role of Creative Problem-Solving in Academic Achievement and Study-life Conflict

The positive association between CPS and academic achievement suggests that students who can analyse problems, generate alternatives, and adjust strategies are better able to manage complex academic demands. This finding is consistent with prior studies showing that problem-solving and creativity-related skills contribute to stronger performance outcomes (Suryanto et al., 2021; Wang & Horng, 2002). It indicates that adaptive problem-solving may help students translate effort and flexibility into stronger academic performance. The negative relationship between CPS and study-life conflict further suggests that its value extends beyond academic tasks. Students with stronger CPS skills may be better able to prioritise responsibilities, adapt strategies, and respond constructively to competing demands, thereby reducing tensions between academic and personal roles. This interpretation is consistent with evidence that problem-solving supports adaptive functioning and effective role management under pressure (Ong & Jeyaraj, 2014). Together, these findings position CPS as a competency that supports both academic performance and adaptation in university life.

Antecedents of Creative Problem-Solving

Among the predictors, proactive personality was the strongest predictor of CPS, followed by SEL. This suggests that CPS is shaped

not only by cognitive ability but also by dispositional and psychosocial resources. Students with proactive tendencies may be more likely to take initiative, anticipate challenges, and engage actively in problem-solving, consistent with prior research linking proactivity to innovation, problem-solving confidence, and adaptive action (Fuller & Marler, 2009; Şener, 2019). SEL also positively predicted CPS, indicating that effective problem-solving is supported not only by initiative and goal-directed behaviour but also by emotional regulation, interpersonal understanding, and responsible decision-making. This aligns with previous research showing that social and emotional competencies enhance adaptive coping, collaboration, and creative thinking (Brackett et al., 2011; Domitrovich et al., 2017). In contrast, study workload did not significantly predict CPS, suggesting that academic demands alone may not explain differences in adaptive problem-solving. Instead, students' responses may depend more on how they interpret and manage those demands, consistent with mixed findings in prior research (Bergman et al., 2012; Derakhshanrad et al., 2019; Karasek, 1979).

Effects of the Antecedent Variables on Academic Achievement and Study-life Conflict

Proactive personality and SEL positively predicted academic achievement, whereas study workload negatively predicted it. These findings suggest that psychosocial competencies may support academic

success beyond CPS, while excessive workload may undermine performance. For study-life conflict, study workload showed the strongest positive effect, reinforcing the view that high academic demands intensify tension between academic and non-academic roles (Karasek, 1979; Kember, 2004). SEL also positively predicted study-life conflict, suggesting that stronger social and emotional competencies do not always reduce strain and may, under demanding conditions, be associated with greater role complexity. (Chou & Sun, 2026). In contrast, proactive personality negatively predicted study-life conflict, indicating that proactive students may be better able to anticipate demands, organise responsibilities, and manage multiple roles effectively (Grant & Ashford, 2008).

Mediating Role of Creative Problem-Solving

The mediation analyses showed that CPS partially mediated the relationships of SEL and proactive personality with academic achievement and study-life conflict. This suggests that CPS is one mechanism through which these psychosocial resources are associated with student outcomes. Students with higher SEL and proactive personality may achieve better academic and life-related outcomes partly because these characteristics support more effective creative problem-solving. At the same time, the direct effects remained significant, indicating that CPS explains only part of these relationships. These findings are consistent with Social

Cognitive Theory. Personal characteristics and psychosocial competencies may shape students' behaviour, and that behaviour, represented here by CPS, is related to academic achievement and study-life conflict (Bandura, 1986). However, the partial mediation results also suggest that other processes may be involved. Factors such as self-regulation, motivation, and social support may provide additional pathways linking student resources to these outcomes and should be examined in future research.

Demographic Differences in the Effects of Creative Problem-Solving

The multi-group analysis showed that CPS effects varied across demographic groups. Students with part-time jobs benefited more from CPS in academic achievement, suggesting that CPS is especially valuable for managing multiple responsibilities. Students who combine study and work often face greater demands in time management and role coordination, making adaptive problem-solving particularly advantageous under these conditions (Baik et al., 2015; Puccio et al., 2011; Scott et al., 2004). The analysis also showed that female students and students with higher GPAs benefited more from CPS in reducing study-life conflict, indicating that these groups may apply CPS more effectively to manage competing demands. The stronger effect among high-GPA students suggests that academically successful students are better able to translate problem-solving skills into

practical strategies for balancing academic and personal responsibilities, consistent with evidence linking creative thinking to academic performance (Gajda et al., 2017; Yang & Zhao, 2021). The gender difference may reflect variation in how students mobilise cognitive and emotional resources under pressure, although this interpretation should be made cautiously given that findings on gender differences in creative thinking remain context-dependent (Mariani et al., 2025).

Contribution to the Literature

This study extends prior to CPS research in three ways. First, it conceptualises CPS as a behavioural mechanism linking psychosocial resources to educational outcomes. Second, it integrates academic achievement and study-life conflict within a single framework, addressing outcomes that are often examined separately. Third, it shows that students' adaptive functioning is shaped not only by cognitive processes but also by proactive personality and SEL, which foster CPS. Together, these contributions provide a more integrated understanding of how psychosocial resources and adaptive competencies influence student adjustment in higher education.

CONCLUSION

This study indicates that CPS is an important adaptive resource for Thai undergraduate students. CPS was positively associated with academic achievement and negatively associated with study-life conflict, suggesting that students with stronger CPS skills tend

to show better academic performance and more effective management of academic and personal demands. Proactive personality and SEL were significant positive predictors of CPS, whereas study workload was not. In addition, CPS partially mediated the effects of proactive personality and SEL on both academic achievement and study-life conflict, supporting its role as a behavioural mechanism linking psychosocial resources to student outcomes. The benefits of CPS were stronger among students with part-time jobs, females, and high-GPA students.

Implications of the Study

These findings provide practical guidance for higher education. CPS should be recognised as a key undergraduate skill because it is associated with academic performance and study-life conflict. Universities can foster CPS through problem-based learning, collaborative projects, and reflective activities. Because CPS is linked to proactive personality and social-emotional competencies, its development should also be supported through mentoring, co-curricular programmes, and student services. The subgroup differences further suggest the need for more targeted support for students facing different academic and personal demands. At the policy level, the findings support integrating soft skills and adaptive competencies into higher education reform. Theoretically, they suggest that, within Social Cognitive Theory, CPS functions as a behavioural pathway through which psychosocial strengths influence student outcomes.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study has several limitations. Although the sample included four Thai universities, uneven gender distribution may have affected representativeness. Only three predictors were examined, which may not capture all factors shaping CPS, performance, or study-life conflict. Given CPS's dynamic nature, its underlying causes require further study. Although subgroup differences were identified, the mechanisms behind them were not explored. Future research should examine these mechanisms and assess whether different student groups would benefit from more targeted support or intervention.

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REFERENCES

- Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal*, 39(5), 1154-1184. <https://doi.org/10.2307/256995>
- Baik, C., Naylor, R., & Arkoudis, S. (2015). *The first-year experience in Australian universities: Findings from two decades of research*. Melbourne Centre for the Study of Higher Education.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bateman, T. S., & Crant, J. M. (1993). The proactive component of organisational behaviour: A measure and correlates. *Journal of Organisational Behavior*, 14(2), 103-118. <https://doi.org/10.1002/job.4030140202>
- Bergman, P. N., Ahlberg, G., Johansson, G., Stoetzer, U., Åborg, C., Hallsten, L., & Lundberg, I. (2012). Do job demands and job control affect problem-solving? *Work*, 42(2), 195-203. <https://doi.org/10.3233/WOR-2012-1340>
- Brackett, M. A., Rivers, S. E., & Salovey, P. (2011). Emotional intelligence: Implications for personal, social, academic, and workplace success. *Social and Personality Psychology Compass*, 5(1), 88-103. <https://doi.org/10.1111/j.1751-9004.2010.00334.x>
- Chotratanakamol, K., Bhanthumnavin, D. L., Bhanthumnavin, D. E., Meekun, K., Pimthong, S., & Kleebua, C. (2023). The nomological model of study-life balance in Thai university students. *The Journal of Behavioural Science*, 18(2), 116-135. <https://so06.tci-thaijo.org/index.php/IJBS/article/view/262987>
- Chou, M. H., & Sun, Y. F. (2026). Pressure to perform as a mediator between social and emotional competence, academic buoyancy, and emotional well-being. *International Journal of Adolescence and Youth*, 31(1). <https://doi.org/10.1080/02673843.2025.2607246>
- Crant, J. M. (2000). Proactive behaviour in organisations. *Journal of Management*, 26(3), 435-462. <https://doi.org/10.1177/014920630002600304>
- Derakhshanrad, S. A., Piven, E., & Zeinalzadeh Ghoochani, B. (2019). The relationships between problem-solving, creativity, and job burnout in Iranian occupational therapists. *Occupational Therapy in Health Care*, 33(4), 365-380. <https://doi.org/10.1080/07380577.2019.1639098>
- Domitrovich, C. E., Durlak, J. A., Staley, K. C., & Weissberg, R. P. (2017). Social-emotional competence: An essential factor for promoting positive adjustment and reducing risk in school

- children. *Child Development*, 88(2), 408-416. <https://doi.org/10.1111/cdev.12739>
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, 82(1), 405-432. <https://doi.org/10.1111/j.1467-8624.2010.01564.x>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behaviour Research Methods*, 41(4), 1149-1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 18(3), 382-388. <https://doi.org/10.2307/3150980>
- Fuller, B., & Marler, L. E. (2009). Change driven by nature: A meta-analytic review of the proactive personality literature. *Journal of Vocational Behaviour*, 75(3), 329-345. <https://doi.org/10.1016/j.jvb.2009.05.008>
- Fuller, C. M., Simmering, M. J., Atinc, G., Atinc, Y., & Babin, B. J. (2016). Common methods variance detection in business research. *Journal of Business Research*, 69(8), 3192-3198.
- Gajda, A., Karwowski, M., & Beghetto, R. A. (2017). Creativity and academic achievement: A meta-analysis. *Journal of Educational Psychology*, 109(2), 269-299. <https://doi.org/10.1037/edu0000133>
- Grant, A. M., & Ashford, S. J. (2008). The dynamics of proactivity at work. *Research in Organisational Behaviour*, 28, 3-34. <https://doi.org/10.1016/j.riob.2008.04.002>
- Greenhaus, J. H., & Beutell, N. J. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, 10(1), 76-88. <https://doi.org/10.2307/258214>
- Guilford, J. P. (1967). Creativity: Yesterday, today, and tomorrow. *The Journal of Creative Behaviour*, 1(1), 3-14. <https://doi.org/10.1002/j.2162-6057.1967.tb00002.x>
- Häfner, A., Stock, A., & Oberst, V. (2015). Decreasing students' stress through time management training: An intervention study. *European Journal of Psychology of Education*, 30, 81-94. <https://doi.org/10.1007/s10212-014-0229-2>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2022). *Partial least squares structural equation modelling (PLS-SEM) using R: A workbook*. Springer.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modelling (PLS-SEM)*. Sage.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Evaluation of reflective measurement models. In J. F. Hair et al., *Partial least squares structural equation modelling (PLS-SEM) using R* (pp. 75-90). Springer. https://doi.org/10.1007/978-3-030-80519-7_4
- Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modelling in new technology research: Updated guidelines. *Industrial Management & Data Systems*, 116(1), 2-20. <https://doi.org/10.1108/IMDS-09-2015-0382>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2016). Testing measurement invariance of composites using partial least squares. *International Marketing Review*, 33(3), 405-431. <https://doi.org/10.1108/IMR-09-2014-0304>
- Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2011). *Creative approaches to problem solving: A framework for innovation and change* (3rd ed.). Sage Publications.
- Isen, A. M. (2009). A role for neuropsychology in understanding the facilitating influence of

- positive affect on social behaviour and cognitive processes. In S. J. Lopez & C. R. Snyder (Eds.), *Oxford handbook of positive psychology* (pp. 503-518). Oxford University Press.
- Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development*, 48(4), 63-85. <https://doi.org/10.1007/BF02300500>
- Kamsawas, P. (2019). *The impact of decreasing in school-age population on university enrollment* (Publication no. dc:169111) [Master's thesis, Thammasat University]. Thammasat University Digital Collections. https://digital.library.tu.ac.th/tu_dc/frontend/Info/item/dc:169111
- Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, 24(2), 285-308. <https://doi.org/10.2307/2392498>
- Karwowski, M., & Beghetto, R. A. (2019). Creative behaviour as agentic action. *Psychology of Aesthetics, Creativity, and the Arts*, 13(4), 402-415. <https://doi.org/10.1037/aca0000190>
- Kember, D. (2004). Interpreting student workload and the factors that shape it. *Studies in Higher Education*, 29(2), 165-184. <https://doi.org/10.1080/0307507042000190779>
- Kember, D., & Leung, D. Y. P. (2006). Characterising a teaching and learning environment conducive to making demands on students while not making their workload excessive. *Studies in Higher Education*, 31(2), 185-198. <https://doi.org/10.1080/03075070600572074>
- Kim, K. H., Cramond, B., & Bandalos, D. (2018). The relationship between creativity and intelligence: An updated meta-analysis. *Journal of Educational Psychology*, 110(4), 609-627. <https://doi.org/10.1037/edu0000234>
- Mariani, S., Faizah, S., & Mashfufah, A. (2025). An exploration of gender differences in students' creative thinking ability in solving problems based on higher order thinking skill. *Paedagoria: Jurnal Kajian, Penelitian dan Pengembangan Kependidikan*, 16(2), 155-164. <https://doi.org/10.31764/paedagoria.v16i2.28795>
- Mohd Sham, M. A. S., Yulita, & Idris, M. A. (2025). The mediating and moderating roles of study-life balance in predicting student well-being: A quantitative diary study. *Psychology in the Schools*. Advance online publication. <https://doi.org/10.1002/pits.23544>
- Ong, H. L. C., & Jeyaraj, S. (2014). Work-life interventions: Differences between work-life balance and work-life harmony and its impact on creativity at work. *SAGE Open*, 4(3), 1-11. <https://doi.org/10.1177/2158244014544289>
- Parker, S. K., Bindl, U. K., & Strauss, K. (2010). Making things happen: A model of proactive motivation. *Journal of Management*, 36(4), 827-856. <https://doi.org/10.1177/0149206309360940>
- Peterson, D. R., Barrett, J. D., Hester, K. S., Robledo, I. C., Hougen, D. F., Day, E. A., & Mumford, M. D. (2013). Teaching people to manage constraints: Effects on creative problem-solving. *Creativity Research Journal*, 25(3), 335-347. <https://doi.org/10.1080/10400419.2013.813809>
- Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*, 16, 385-407. <https://doi.org/10.1007/s10648-004-0006-x>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioural research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Puccio, G. J., Mance, M., & Murdock, M. C. (2011). *Creative leadership: Skills that drive change*. Sage.
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 353-387. <https://doi.org/10.1037/a0026838>
- Robotham, D., & Julian, C. (2006). Stress and the higher education student: A critical review of the literature. *Journal of Further and Higher Education*, 30(2), 107-117. <https://doi.org/10.1080/03098770600617513>

- Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, 24(1), 92-96. <https://doi.org/10.1080/10400419.2012.650092>
- Salmela-Aro, K., & Read, S. (2017). Study engagement and burnout profiles among Finnish higher education students. *Burnout Research*, 7, 21-28. <https://doi.org/10.1016/j.burn.2017.11.001>
- Salmela-Aro, K., & Upadaya, K. (2014). School burnout and engagement in the context of the demands-resources model. *British Journal of Educational Psychology*, 84(1), 137-151. <https://doi.org/10.1111/bjep.12018>
- Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal*, 16(4), 361-388. https://doi.org/10.1207/s15326934crj1604_1
- Scott, T., & Asavisanu, P. (2023). Synthesis and model development of Thai undergraduate dropout risk factors. *Higher Education Studies*, 13(4), 94-104. <https://doi.org/10.5539/hes.v13n4p94>
- Şener, G. (2019). The predictive power of teachers' proactive personality traits on their problem-solving skills. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, 45, 175-189. <https://doi.org/10.9779/PUJE.2018.228>
- Sideridis, G., & Alamri, A. A. (2023). Predicting academic achievement and student absences in high school: The roles of student and school attributes. *Frontiers in Psychology*, 14, Article 987127. <https://doi.org/10.3389/fpsyg.2023.987127>
- Sonnentag, S., & Fritz, C. (2007). The recovery experience questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, 12(3), 204-221.
- Suryanto, H., Degeng, I. N. S., Djatmika, E. T., & Kuswandi, D. (2021). The effect of creative problem solving with the intervention of social skills on the performance of creative tasks. *Creativity Studies*, 14(2), 323-335.
- Thornhill-Miller, B., Camarda, A., Mercier, M., Burkhardt, J.-M., Morisseau, T., Bourgeois-Bougrine, S., Vinchon, F., El Hayek, S., Augereau-Landais, M., Mourey, F., & Lubart, T. (2023). Creativity, critical thinking, communication, and collaboration: Assessment, certification, and promotion of 21st century skills for the future of work and education. *Journal of Intelligence*, 11(3), Article 54. <https://doi.org/10.3390/jintelligence11030054>
- Treffinger, D. J., Isaksen, S. G., & Stead-Dorval, K. B. (2006). *Creative problem solving: An introduction*. Prufrock Press.
- Wang, C. H., & Horng, R. Y. (2002). The effects of creative problem-solving on academic achievement. *The Journal of Educational Research*, 95(5), 315-322. <https://doi.org/10.1080/00220670209596607>
- Yang, J., & Zhao, X. (2021). The effect of creative thinking on academic performance: Mechanisms, heterogeneity, and implication. *Thinking Skills and Creativity*, 40, Article 100831. <https://doi.org/10.1016/j.tsc.2021.100831>
- Zainal Badri, S. K., Wan Mohd Yunus, W. M. A., Ramos, H. M., & Mahmud, N. (2021). Remote learning and its implications toward study-life conflicts and the mental health of university students: Does studying at home or campus matter? *Higher Education Research & Development*, 41(7), 2523-2537. <https://doi.org/10.1080/07294360.2021.2014407>
- Zimmerman, B. J., & Schunk, D. H. (2011). Self-regulated learning and performance: An introduction and an overview. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 15-26). Routledge.

Standing, Sitting, Suffering: Prevalence and Predictors of Musculoskeletal Disorders (MSDs) Among School Teachers in Terengganu, Malaysia

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ABSTRACT

Every successful classroom has a committed teacher at its core, but many teachers suffer in silence from the physical strain of their work. Despite their detrimental effects on performance and well-being, musculoskeletal disorders (MSDs) have appeared as a hidden epidemic among school teachers. The prevalence and predictors of MSDs among 200 primary and secondary school teachers in Terengganu, Malaysia, were examined in this study. A validated questionnaire was used to gather demographic, occupational, and MSD-related data from the standardised Nordic Questionnaire in this cross-sectional survey. There was a high prevalence of MSD (35.6%, n=71), with the most affected areas being the neck (40.5%, n=81), knees (36.0%, n=72), and shoulders (36.0%, n=72). Pain in the neck (OR=4.17, p<0.001), shoulders (OR=4.72, p<0.001), and upper back (OR=2.59, p<0.001) was substantially more common in female teachers. On the other hand, men were more likely to experience knee pain (OR=2.28, p<0.05) and hand pain (OR=2.90, p<0.05). Significantly, overweight status and age between 30-39 years were paradoxically associated with pain and discomfort in the upper back (OR=5.10, p<0.05) and arm (OR=5.36, p<0.05). This study draws attention to

MSDs, a serious but little-known occupational health issue that affects educators. Educational institutions urgently need to implement more focused ergonomic interventions and enhance workplace design in schools. Resolving these problems supports sustainability goals by advocating for healthier working conditions for school teachers in school settings.

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INTRODUCTION

Work-related musculoskeletal disorders (WMSDs) continue to be a major and costly issue for occupational health, affecting both developing and developed nations. Around the world, WMSDs are a major issue, resulting in significant costs for employees, employers, and governments alike (Fahmy et al., 2022). These disorders often arise when muscles, ligaments, and tendons are overworked, typically due to repetitive movements, awkward postures, or prolonged periods of immobility (Jeffree et al., 2024). In fact, related research has identified various risk factors associated with musculoskeletal disorders (MSDs), which can generally be categorised into four main groups: individual and personality traits, biodynamic or physical risk factors, psychological or mental stressors and those less obvious or hidden risks (Darvishi et al., 2024). In addition to their primary role in teaching students in the classroom, teachers need to complete the work related to teaching assessment, such as marking paper examinations and evaluating students' homework on a daily basis. Without being aware of it, and as long as they do not experience discomfort or pain, they tend to maintain these prolonged postures to complete their tasks (Rahim et al., 2022).

Apart from packed teaching schedules, teachers always carry the heavy load of books and their teaching materials from one period of subject to the teachers' hall and this routine would be carried out repeatedly until the end of school hours. The heavy load is also due to having to bring their

personal laptop to fulfil their task and other administrative task that are not related to teaching sessions. The nature of their work can push them to adapt with various uncomfortable posture, and they need to bear with this body discomfort due to having limited time to complete their tasks (Gholami et al., 2023). By doing that, they are likely not to get enough rest and the pain could be getting worse especially when it comes to body parts that are directly affected by their awkward posture, prolonged standing and sitting. The pain eventually leads to stress and can affect their job performance as educators (Souza et al., 2023). Personal factors such age and gender as well as psychological factors may influence the symptoms of musculoskeletal illness and it is very important to look at various factors to maintain the good health of school teachers and by doing that giving a positive impact towards educational settings and school environment (Tahernejad et al., 2024).

The research study establishes multiple unique elements which add value to existing academic knowledge about musculoskeletal disorders (MSDs) that occur in school teachers. Teachers now experience extended periods of computer usage because of their work with online administrative reporting systems and screen-based classroom activities, which results in different ergonomic stressors when compared to their pre-pandemic working environment (Bahaman et al., 2025). The research study in Terengganu, which is located on the East Coast of Peninsular Malaysia, examines ergonomic risk factors that arise from

different school resource levels and various socioeconomic backgrounds, in contrast to existing Malaysian studies, which focus their research on urban teachers in Klang Valley and their research areas. The research study examines a specific geographical area, which delivers evidence about local conditions that existing studies have not documented sufficiently. The research study investigates task-specific occupational factors through their examination of administrative workload burden and computer use during classroom teaching and school sports activities (Abas et al., 2023).

To reduce their impact, this study intends to provide more comprehensive and significant findings on the prevalence of MSDs among teachers and what factors contribute to them across different areas of the body. The findings can be a useful starting point for occupational health specialists creating focused ergonomic plans and training courses to prevent MSDs and encourage safer, healthier working environments for teachers. The purpose of this cross-sectional study was to examine the prevalence of musculoskeletal disorders (MSDs) and the contributing factors among Terengganu school teachers.

MATERIALS AND METHODS

Selection of Participants

The list of schools was obtained by the respective Terengganu State Education Department with permission from the Ministry of Education. The schools were selected randomly based on the list provided, and a total of six schools were included in

this study. A total of 200 school teachers from primary and secondary schools were chosen to participate in the study. The sample size was finalised based on Lemeshow et al. (1990) formula, with the mean value of MSDs taken from the study conducted by Ng et al. (2020). The sample size calculation was based on the Z-score (1.96 for a 95% confident interval), prevalence of 80.1% of school teachers reported in musculoskeletal complaints, and a margin error of $\pm 5\%$ (0.05). Participants had to have taught for at least a year in order to meet the inclusion requirements. From a sampling frame that included a comprehensive list of teaching staff members acquired from the administrative offices of the chosen schools, teachers were chosen by simple random sampling. Prior to data collection, each participant provided written informed consent to ensure voluntary participation and ethical standards. The data collection was conducted in supervised sessions during allocated hours to ensure that the school teachers received a full explanation regarding any questions.

Questionnaire Survey

Data from school teachers was gathered using a self-administered questionnaire. All qualified school teachers who satisfied the inclusion and exclusion criteria of the study participated fully, therefore the distribution produced a 100% response rate with no missing data. A pilot study was conducted beforehand with a total of 20 respondents, representing 10% of the total sample size. A researcher-adapted questionnaire with three

primary sections meant to collect thorough data on socio-demographic traits (11 items), work-related variables (11 items), and musculoskeletal health concerns (11 items) served as the survey tool. The standardised Nordic Musculoskeletal Questionnaire was adapted in this section. The neck, shoulder, upper and lower back, elbow, hand, wrist, knee, thigh, calf, and feet are among the 11 anatomical regions highlighted in the human body diagram. During the previous 7 days and 12 months, respondents were asked if they had ever felt pain or discomfort in any of these areas, and if so, whether it affected their ability to go about their daily lives normally. The predictors and overall prevalence of MSDs among school teachers were identified through cross-analysis of these variables with 11 anatomical body regions (Jeffree et al., 2024).

Validity of Content

Five experts with a background of occupational health and ergonomics have reviewed the research instrument for content validity, using the Item-Content Validity Index (I-CVI) to independently assess the appropriateness and relevance of each questionnaire item. This process ensures alignment with the study's objectives and applicability to school teachers and their work environment. The overall I-CVI score of 0.83 confirmed strong content validity for assessing the prevalence of MSDs and related risk factors. The Nordic Musculoskeletal Questionnaire widely used to measure discomfort and pain across 11 body regions, was employed to update MSD

prevalence data, with its focus adapted to body regions most affected by teaching activities. In fact, studies have demonstrated its high inter-rater reliability, ranging from 0.60 to 1.00 and its consistent application across various occupational groups supports its effectiveness in producing valid prevalence findings (Vega-Fernandez et al., 2024).

Analysis of Statistics

Data were analysed using IBM SPSS Statistics version 30.0 (SPSS Inc., Chicago, USA). Descriptive statistics were applied to summarise the sociodemographic, occupational characteristics of respondents, and MSD prevalence based on reported pain or discomfort in specific body regions. Multiple logistic regression models with the Hosmer–Lemeshow test were applied to assess model fit for MSD predictors (Jeffree et al., 2024).

Approval and Ethical Consideration

The Ministry of Education Malaysia (MOE) granted permission to conduct this study, requiring submission of a complete research proposal before approaching school teachers. Ethical clearance was also obtained from the Ethics Committee of Universiti Putra Malaysia (JKEUPM-2024-876), confirming that the study adhered to established ethical standards.

RESULTS AND DISCUSSION

The study was conducted on 200 school teachers with an average age of 44.90 years (SD = 7.76) (Table 1).

Table 1

Socio-demographic characteristics of school teachers

Variables	Total (%) (n=200)	Mean (SD)
Age		44.90 (7.76)
20-29	10 (5%)	
30-39	33 (16.5%)	
40-49	98 (49%)	
50-59	59 (29.5%)	
Gender		
Male	47 (23.4%)	
Female	153 (76.1)	
Education Level		
Diploma	15 (7.5%)	
Degree	165 (82.5%)	
Master's Degree	20 (10.0%)	
BMI		
<18.5 underweight	3 (1.5%)	
18.5–22.9 normal	88 (43.8%)	
23.0–24.9 overweight	62 (30.8%)	
> 25.0 obesity	47 (23.4%)	
Household Income		
> RM3,000	3 (1.5%)	
RM 3,000 – RM 6,000	53 (25.9%)	
>RM 6,000	145 (72.6%)	
Regular Sleeping Pattern		
Yes	95 (47.5%)	
No	105 (52.5%)	
History of Injury		
Yes	36 (18.0%)	
No	164 (82.0%)	
Marital Status		
Married	182 (91.0%)	
Unmarried	18 (9.0%)	
Have Children		
Yes	171 (85.5%)	
No	29 (14.5%)	

Source: Authors' own work

Most of them were aged from 40 to 49 years (49.0%). Additionally, 76.1% of them were females and 23.4% were male school teachers. The highest education attainment of teachers was a degree (82.5%), followed by a master's degree (10.0%), and

a diploma (7.5%) respectively. Regarding BMI, 43.8% (18.5–22.9) were normal, 30.8% were overweight (23.0–24.9) and 23.4% were obese (≥ 25.0). For the analysis of household income, most respondents are earning at least more than RM 6,000 which

comprises 72.6% of the total respondents. More than 50% of the study population was reported to have irregular sleep (47.5% regular vs approximately 52.5% irregular sleep). Teachers (18.0%) also reported a history of injury in any body's parts. Most of the teachers were married (91.0%) and had children (85.5%).

Table 2 shows that teaching experience varied, with 39.0% having 11 to 20 years and 43.0% having 21 to 30 years. Most were permanent employees (97.0%) and primary school teachers (67.0%). The teaching hours per day were mostly from 1 to 4 hours (80.5%), and 84.5% of the sitting hours were from 1 to 4 hours. A proportion of teachers stood for 5 to 8 hours (36.5%), while mostly 63.5% stood for 1 to 4 hours. Less than 200 students were taught by the majority of teachers (77.0%) each week. Teachers spent 1 to 4 hours a day writing on the whiteboard in their classrooms (94.5%), and administrative work was prevalent among school teachers, which contributed to 91.0% of across schools. In addition, teachers actively participated in school sports (71.5%), and they mostly utilised the computer in class for learning and teaching activities (92.0%). Teachers deal with a variety of daily tasks that can negatively impact their physical health in addition to juggling numerous responsibilities. Research indicates that compared to other occupational groups, school teachers are more likely to suffer from MSDs. The literature continuously emphasises that teachers are at a significant risk of developing MSDs, despite the fact

that schools are typically seen as positive work environments (Alias et al., 2020).

The study discovered that school teachers had a high prevalence of MSDs, as shown in Table 3, with 35.6% reporting having MSDs throughout their teaching career and continuing symptoms in vital body areas. The most affected areas within 12 months were the neck (40.5%, $n=81$) and shoulder (36.0%, $n=72$), with the knee (36.0%, $n=72$) and lower back (34.5%, $n=69$) coming in second and third, respectively. This suggests that poor ergonomic postures and repetitive motions, such as writing on whiteboards, are major contributors to these conditions. Due to prolonged standing during lessons, the feet (34.5% $n=69$) also displayed a high prevalence. However, compared to larger muscle groups, the elbow (12.5%, $n=25$) and hand (20.0%, $n=40$) for the past 7 days had lower but still noticeable rates, which may be related to less frequent strain. The prevalence was still high in the neck (39.0%, $n=78$), shoulder (36.0%, $n=72$), and knee (34.0%, $n=68$) when looking at recent symptoms (within the last seven days), confirming the chronic nature of these work-related musculoskeletal problems. According to the analysis of the current study and earlier research, a considerable proportion of teachers are susceptible to MSDs as a result of long-term exposure to ergonomic risk factors, such as prolonged standing and awkward postures during school hours (Tahernejad et al., 2024). In Malaysia, a recent study by Jeffree et al. (2024) in Sabah found that there is a high prevalence of MSDs with

Table 2

Work-related characteristics of school teachers

Variables	Total (%) (n=200)
Teaching Experience (Years)	
1-10 years	25 (12.5%)
11-20 years	78 (39.0%)
21-30 years	86 (43.0%)
31-40 years	11 (5.5%)
Type of School	
Primary	134 (67.0%)
Secondary	66 (33.0%)
Employment	
Permanent	194 (97.0%)
Contract	6 (3.0%)
Teaching Hours (daily)	
1-4 hours	161 (80.5%)
5-8 hours	39 (19.5%)
Sitting Hours (daily)	
1-4 hours	169 (84.5%)
5-8 hours	31 (15.5%)
Standing Hours (daily)	
1-4 hours	127 (63.5%)
5-8 hours	73 (36.5%)
Number of Students (weekly)	
<200 students	154 (77.0%)
>200 students	46 (23.0%)
Write on Whiteboard (daily)	
1-4 hours	189 (94.5%)
5-8 hours	11 (5.5%)
Administrative Work	
Yes	182 (91.0%)
No	18 (9.0%)
Sports Activity in School	
Yes	143 (71.5%)
No	57 (28.5%)
Use Computer in Classroom	
Yes	184 (92.0%)
No	16 (8.0%)

Source: Authors' own work

a rate of 77.9% among school teachers in special education, followed by studies in Terengganu and Klang Valley within the range between 40.4% and 80.1% (Alias et al., 2020; Ng et al., 2019).

The findings in Table 4 show a number of noteworthy correlations between school teachers' musculoskeletal pain and sociodemographic characteristics. With the exception of the elbow, female teachers

Table 3
Prevalence of MSDs among school teachers

Body Region	Prevalence (%) (Past 12 months)	Prevalence (%) (Past 7 days)
All regions	35.6%	
Neck	40.5	39.0
Shoulder	36.0	36.0
Upper Back	29.5	31.0
Lower Back	34.5	32.0
Elbow	13.0	12.5
Hand	18.0	20.0
Arm	21.0	19.0
Knee	36.0	34.0
Thigh	21.5	20.5
Calf	26.0	25.0
Feet	34.5	34.0

Source: Authors’ own work

reported significantly higher percentages of pain in most body parts. Gender emerged as a highly influential factor. Other than gender, arm pain was significantly correlated with age ($p=0.04$), BMI ($p=0.04$), and sleeping pattern ($p=0.01$), whereas upper back was also significantly correlated with BMI ($p=0.03$) and sleeping pattern ($p=0.001$). In most body areas, teachers with irregular sleeping patterns reported higher pain prevalence ($p<0.05$), and household income was linked to hand pain ($p=0.04$). A history of injuries showed a significant link to elbow pain ($p=0.04$), and interestingly, having children was also associated with elbow pain ($p=0.01$). These findings suggest that female teachers, those with a higher BMI, irregular sleep patterns, and lower income may be at a greater risk for musculoskeletal issues (Souza et al., 2023).

Jeffree et al. (2024) reported that body mass index (BMI) and marital status were significantly associated with musculoskeletal pain. For married teachers, particularly women, additional household responsibilities such as caring for spouses and children may prolong physical strain from the school day into the evening, contributing to discomfort and pain (Souza et al., 2021). BMI has consistently shown a strong association with MSDs, with overweight and obese individuals more prone to lower back and knee pain. In addition, female teachers are more prone to being affected by musculoskeletal discomfort compared to male teachers. The reason for the low prevalence of MSDs among men is due to their active and regular involvement with physical activities.

Table 4
Risk factors based on socio-demographic characteristics of school teachers

Variables	Neck (%)	Shoulder (%)	Upper Back(%)	Lower Back(%)	Elbow (%)	Hand (%)	Arm (%)	Knee (%)	Thigh (%)	Calf (%)	Feet (%)
Age											
20-29	4.0	5.0	2.7	6.3	0.0	10.2	8.5	5.6	5.6	4.2	3.5
30-39	18.6	16.0	23.4	20.3	9.1	16.3	8.5	13.5	14.8	15.3	17.6
40-49	48.0	48.0	47.9	46.8	48.5	38.8	40.4	49.4	40.7	48.6	47.1
50-59	29.4	31.0	26.0	26.6	42.4	34.7	42.6	31.5	38.9	31.9	31.8
p-value	0.78	0.97	0.18	0.56	0.14	0.14	0.04*	0.75	0.33	0.92	0.77
Gender											
Male	11.8	10.0	5.5	10.1	21.2	10.2	6.4	13.5	9.3	8.3	10.6
Female	88.2	90.0	94.5	89.9	78.8	89.8	93.6	86.5	90.7	91.7	89.4
p-value	<0.001**	<0.001**	<0.001**	<0.001**	0.73	0.01*	0.002*	0.003*	0.004*	<0.001**	<0.001**
Education Level											
Diploma	9.8	5.0	4.1	5.1	9.1	10.2	8.5	6.7	9.3	8.4	5.8
Degree	82.4	81.0	84.9	82.2	78.8	77.6	87.2	86.6	87.0	81.9	82.4
Master	7.8	14.0	11.0	12.7	12.1	12.2	4.3	6.7	3.7	9.7	11.8
p-value	0.29	0.09	0.38	0.38	0.83	0.56	0.32	0.34	0.18	0.94	0.61
BMI											
<18.5 underweight	2.0	3.0	4.1	2.5	0.0	2.0	4.3	1.1	3.7	2.8	2.4
18.5–22.9 normal	49.0	48.0	50.7	46.8	39.4	44.9	40.4	39.3	42.6	45.8	48.2
23.0–24.9 overweight	27.5	26.0	23.3	24.1	24.2	22.5	21.3	32.6	25.9	26.4	25.9
> 25.0 obesity	21.5	23.0	21.9	26.6	36.4	30.6	34.0	27.0	27.8	25.0	23.5
p-value	0.45	0.15	0.03*	0.29	0.25	0.38	0.04*	0.59	0.31	0.53	0.46
Household Income											
> RM3,000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RM 3,000 – RM 6,000	30.4	28.0	34.2	31.6	39.4	38.8	31.9	32.6	29.6	30.6	28.2
>RM 6,000	69.6	72.0	65.8	68.4	60.6	61.2	68.1	67.4	70.4	69.4	71.8
p-value	0.09	0.19	0.07	0.15	0.13	0.04*	0.38	0.06	0.47	0.26	0.29

Table 4 (continued)

Variables	Neck (%)	Shoulder (%)	Upper Back(%)	Lower Back(%)	Elbow (%)	Hand (%)	Arm (%)	Knee (%)	Thigh (%)	Calf (%)	Feet (%)
Regular Sleeping Pattern											
Yes	60.8	57.0	63.0	54.4	60.6	67.3	63.8	58.4	61.1	65.3	58.8
No	39.2	43.0	37.0	45.6	39.4	32.7	36.2	41.6	38.9	34.7	41.2
p-value	<0.001**	0.007*	0.001*	0.11	0.10	0.001*	0.01*	0.006*	0.02*	<0.001**	0.006*
History of Injury											
Yes	20.6	20.0	16.4	24.1	30.3	16.3	17.0	23.6	16.7	16.7	23.5
No	79.4	80.0	83.6	75.9	69.7	83.7	83.0	76.4	83.3	83.3	76.5
p-value	0.33	0.46	0.66	0.07	0.04*	0.73	0.84	0.07	0.77	0.71	0.08
Marital Status											
Married	94.1	90.0	93.2	89.9	97.0	87.8	89.4	92.1	96.3	91.7	91.8
Unmarried	5.9	10.0	6.8	10.1	3.0	12.2	10.6	7.9	3.7	8.3	8.2
p-value	0.12	0.62	0.42	0.65	0.19	0.36	0.65	0.62	0.11	0.81	0.75
Have Children											
Yes	88.2	81.0	87.7	84.8	100.0	79.6	83.0	84.3	87.0	86.1	83.5
No	11.8	19.0	12.3	15.2	0.0	20.4	17.0	15.7	13.0	13.9	16.5
p-value	0.26	0.07	0.51	0.82	0.01*	0.18	0.58	0.66	0.71	0.85	0.50

*Significant at p<0.05
**Significant at p<0.001
Source: Authors' own work

High musculoskeletal complaint also was received from women compared to men due to women being more likely to report and more sensitive to their discomfort and pain of any body part. Compared to men, they are more likely to endure the pain and discomfort of any body parts and receive late treatment (Amit & Gerald, 2020; Fahmy et al., 2022).

A number of important work-related factors that contribute to teachers' MSDs are highlighted in Table 5. In several body regions, such as the neck, shoulder, upper back, lower back, elbow, hand, arm, knee, calf, and feet, longer teaching hours (5-8 hours per day) were significantly linked to higher MSD prevalence (all $p < 0.05$), indicating that long-term occupational strain exacerbates musculoskeletal stress. Prolonged sitting (5-8 hours daily) was associated with thigh, hand and arm pain ($p < 0.05$), possibly from repetitive administrative tasks, while prolonged standing (5-8 hours daily) significantly affected the upper back, knee, calf, and feet ($p < 0.05$), probably due to sustained postural load. While involvement in school sports seemed to contribute to musculoskeletal discomfort in the neck ($p = 0.02$), upper back ($p = 0.01$), and feet ($p = 0.03$), perhaps as a result of impaired physical conditioning. Besides, administrative work was linked highly to neck ($p = 0.002$) and shoulder pain ($p = 0.01$), most likely as a result of extended desk work. The need for improved workstation ergonomics was highlighted by the correlation ($p < 0.05$) between computer use in the classroom and MSDs in the neck,

shoulder, lower back, calf, and feet. All of these findings point to the significance of poor ergonomics, teaching-related physical demands, and inadequate movement breaks in causing MSDs (Tahernejad et al., 2024).

School teachers around the world continue to face musculoskeletal disorders (MSDs) as their most common workplace health issue. A study conducted in the United Arab Emirates discovered that school teachers experienced high rates of work-related MSDs, which resulted from their lack of physical activity and their continuous work responsibilities. The research demonstrated that contemporary teaching positions require educators to spend extended periods either sitting or standing while they conduct lessons and handle administrative responsibilities, which heightens their risk of developing musculoskeletal disorders (Abu Zohair et al., 2024). A study on school teachers in Tanzania has discovered that teachers experience MSDs as a major work-related health issue, which occur when they perform repetitive tasks while maintaining fixed body positions during their teaching duties. The research results showed that workplace ergonomic standards and workplace organisation and workload distribution systems played a crucial role in determining the risk of MSDs, which educators experienced (Gikaro et al., 2025).

After adjusting for confounding variables, the final logistic regression model identifying important predictors of MSDs is shown in Table 6. Because there are no multicollinearity problems or inter-

Table 5
Risk factors related to the work characteristics of school teachers

Variables	Neck (%)	Shoulder (%)	Upper Back(%)	Lower Back(%)	Elbow (%)	Hand (%)	Arm (%)	Knee (%)	Thigh (%)	Calf (%)	Feet (%)
Teaching Experience (Years)											
1-10 years	14.7	15.0	16.4	19.0	3.0	16.3	10.6	15.7	13.0	15.1	15.3
11-20 years	38.2	39.0	45.2	39.2	33.3	32.7	34.0	32.6	35.2	37.5	37.6
21-30 years	44.2	44.0	37.0	40.5	57.6	49.0	55.4	46.1	46.2	43.1	42.4
31-40 years	2.9	2.0	1.4	1.3	6.1	2.0	0.0	5.6	5.6	4.2	4.7
p-value	0.34	0.14	0.07	0.03*	0.16	0.34	0.12	0.34	0.92	0.77	0.76
Type of School											
Primary	68.6	63.0	69.9	69.6	75.8	65.3	68.1	59.6	70.4	68.1	69.4
Secondary	31.4	37.0	30.1	30.4	24.2	34.7	31.9	40.4	29.6	31.9	30.6
p-value	0.62	0.23	0.51	0.52	0.24	0.77	0.86	0.04*	0.54	0.81	0.53
Employment											
Permanent	96.1	95.0	98.6	94.9	100.0	89.8	91.5	95.5	94.4	97.2	96.5
Contract	3.9	5.0	1.4	5.1	0.0	10.2	8.5	4.5	5.6	2.8	3.5
p-value	0.44	0.09	0.31	0.17	0.27	0.001*	0.01*	0.27	0.20	0.89	0.71
Teaching Hours (daily)											
1-4 hours	74.5	74.0	69.9	73.4	63.6	69.4	70.2	74.2	74.1	70.8	70.6
5-8 hours	25.5	26.0	30.1	26.6	36.4	30.6	29.8	25.8	25.9	29.2	29.4
p-value	0.02*	0.02*	0.002*	0.03*	0.01*	0.02*	0.03*	0.03*	0.13	0.01*	0.001*
Sitting Hours (daily)											
1-4 hours	84.3	83.0	82.2	83.5	75.8	75.5	72.3	79.8	75.9	79.2	82.4
5-8 hours	15.7	17.0	17.8	16.5	24.2	24.5	27.7	20.2	24.1	20.8	17.6
p-value	0.94	0.56	0.49	0.76	0.13	0.04*	0.01*	0.09	0.04*	0.12	0.47
Standing Hours (daily)											
1-4 hours	61.8	58.0	50.7	59.5	57.6	55.1	61.7	55.1	61.1	52.8	54.1
5-8 hours	38.2	42.0	49.3	40.5	42.4	44.9	38.3	44.9	38.9	47.2	45.9
p-value	0.71	0.14	0.01*	0.41	0.48	0.19	0.83	0.04*	0.74	0.03*	0.03*

Table 5 (continued)

Variables	Neck (%)	Shoulder (%)	Upper Back(%)	Lower Back(%)	Elbow (%)	Hand (%)	Arm (%)	Knee (%)	Thigh (%)	Calf (%)	Feet (%)
Number of Students (weekly)											
<200 students	81.4	80.0	78.1	78.5	81.8	69.4	74.5	77.5	79.6	77.8	76.5
>200 students	18.6	20.0	21.9	21.5	18.2	30.6	25.5	22.5	20.4	22.2	23.5
p-value	0.13	0.31	0.78	0.69	0.47	0.15	0.64	0.87	0.59	0.85	0.88
Write on Whiteboard (daily)											
1-4 hours	90.2	90.0	86.3	87.3	87.9	89.8	89.4	89.9	90.7	86.1	88.2
5-8 hours	9.8	10.0	13.7	12.7	12.1	10.2	10.6	10.1	9.3	13.9	11.8
p-value	0.01 *	0.01 *	<0.001 **	<0.001 **	0.07	0.10	0.08	0.01 *	0.16	<0.001 **	0.001 *
Administrative Work											
Yes	97.1	96.0	95.9	94.9	97.0	93.9	91.5	91.0	94.4	94.4	95.3
No	2.9	4.0	4.1	5.1	3.0	6.1	8.5	9.0	5.6	5.6	4.7
p-value	0.002 *	0.01 *	0.06	0.12	0.19	0.42	0.89	0.99	0.30	0.20	0.07
Sports Activity in School											
Yes	79.2	74.0	83.6	77.2	84.8	77.6	78.7	91.0	81.5	79.2	80.0
No	20.8	26.0	16.4	22.8	15.2	22.4	21.3	9.0	18.5	20.8	20.0
p-value	0.02 *	0.50	0.01 *	0.17	0.07	0.31	0.23	0.99	0.07	0.08	0.03 *
Use Computer in Classroom											
Yes	96.1	96.0	95.9	98.7	100.0	98.0	97.9	98.1	94.4	97.2	97.6
No	3.9	4.0	4.1	1.3	0.0	2.0	2.1	1.9	5.6	2.8	2.4
p-value	0.03 *	0.04 *	0.12	0.01 *	0.06	0.07	0.09	0.05	0.27	0.04 *	0.01 *

*Significant at p<0.05
**Significant at p<0.001
Source: Authors' own work

teaching hours has increased the likelihood of arm pain (OR=2.42, $p=0.01$), elbow (OR=2.55, $p=0.03$) and neck (OR=2.77, $p<0.001$). Shorter periods of time (1–4 hours) spent writing on the whiteboard increased the likelihood of calf (OR=4.02, $p=0.01$) and neck (OR=2.45, $p=0.03$) pain. Administrative work was a significant risk factor for shoulder pain (OR=0.22, $p=0.02$) and neck pain (OR=0.17, $p=0.01$).

Permanent employment was strongly linked to hand pain (OR=2.60, $p=0.005$), while longer teaching experience may be a risk factor for lower back, as evidenced by the significantly lower incidence of lower back MSDs among school teachers with 1 to 10 years of experience (OR=0.09, $p=0.04$). Arm pain was significantly correlated with age, especially for those between the ages of 30 and 39 (OR=5.36, $p=0.01$), 40 and 49 (OR=2.49, $p=0.04$), and 50 and 59 (OR=2.51, $p=0.03$). The odds of upper back pain increased with overweight BMI (OR=5.10, $p=0.03$). Significant predictors for the knee included teaching in a primary school (OR=2.01, $p=0.03$), being male (OR=2.28, $p=0.04$), and standing for 1 to 4 hours (OR=4.53, $p=0.04$). Thigh pain was significantly related to sitting period by 1 to 4 hours (OR=3.67, $p=0.01$). Lower back discomfort was found to be more common among teachers who used computers during lessons (OR=4.02, $p=0.002$). Foot pain was also reported more frequently by those who spent only 1 to 4 hours standing in a day (OR=3.76, $p=0.003$). Employment status as part of the predictors of this study reflected the duration of exposure of school

teachers towards continuing teaching workload, teaching duration and exposure intensity during school hours throughout their entire career. These patterns point to the need for educational institutions to prioritise ergonomic adjustments, ensuring that classroom furniture and workstation layouts encourage healthier posture and reduce strain. Since musculoskeletal disorders (MSDs) often develop through a combination of work demands and personal factors, effective prevention and management efforts, particularly for teachers, should address both elements in tandem (Souza et al., 2021).

In their daily routines, teachers often remain bent forward for long stretches while marking papers, preparing teaching materials, or entering grades. Many also carry out repeated physical movements such as lifting and bending, which can accumulate physical stress over time. Teaching spaces themselves can add to the problem, with prolonged standing being common in classrooms that lack adequate ergonomic support (Alias et al., 2020). Over time, these conditions raise the likelihood of MSDs, which can adversely affect both work performance and quality of life. Previous studies have shown that MSDs are a persistent concern in the profession, with the back, neck, and upper limbs most often affected (Prieto-González et al., 2021).

However, the development of these disorders is influenced by multiple factors, including being female, having sleep issues and poor posture. Despite the rising concern, there aren't many studies that have

investigated the prevalence and risk factors of MSDs among teachers. Some studies have only looked at one gender (Alharbi et al., 2020), overlooked a thorough examination of certain body areas (Alqahtani, 2020), or did not even distinguish between genders at all (Aldukhayel et al., 2021). So far, no study has thoroughly examined the long-term prevalence of MSDs in both male and female teachers while considering a wide range of risk factors (Althomali, 2022).

Professional groups exposed to various ergonomic risk factors include teachers. They perform monotonous work, hold still positions, and occasionally put in long hours. Aside from delivering lessons, teachers are also responsible for reviewing and grading students' homework and in-class assignments (Coledam et al., 2019). Their work often involves moving or carrying heavy materials such as books, laptops, and other teaching supplies. Long periods spent in fixed positions can cause physical strain, a problem compounded by the mental demands of the job. Awkward body positions are common. For example, tilting the head upward while writing on the board, leaning forward during computer work, or bending over when grading and handling administrative duties. Repetitive motions, including writing on boards with arms raised above shoulder height, standing for extended periods without proper posture, sitting in unsupported positions, and frequently twisting or bending to interact with students, can further increase musculoskeletal stress. Such physical demands may place teachers at higher risk of developing MSDs (Rahim et al., 2022).

To address this concern, the present study examines the occurrence of MSDs in teachers while considering sociodemographic, occupational, and ergonomic factors.

The study needs to acknowledge its existing limitations, which exist despite its valuable contributions. First, the study used self-reported data to assess musculoskeletal disorders and work-related factors, which created reporting bias because participants tended to answer based on their personal views and social expectations. Second, the study required participants to remember their previous activities, which included standing, sitting and doing office work, thus creating recall bias, which decreased correct exposure assessment. Lastly, while this data has been collected in a certain district of Terengganu due to the availability of schools to participate and time constraints, this finding may not be fully generalisable to school teachers in other states of Malaysia and other countries.

CONCLUSION

This study sheds light on the high prevalence of MSDs among primary and secondary school teachers in Terengganu, Malaysia, revealing that 35.6% of those surveyed reported experiencing MSD symptoms. The neck, knees, and shoulders were the most commonly affected areas, with noticeable differences in pain distribution between genders. It turns out that female teachers often experience more pain in their necks, shoulders, and upper backs, while male teachers tend to feel more discomfort in their knees and hands. Additionally, certain

factors like teaching for 1 to 4 hours a day, being overweight, having a permanent job, and being between the ages of 30 and 39 are strongly associated with higher rates of MSDs, particularly in the neck, upper back, hands, and arms.

Tackling the significant prevalence of MSDs among teachers requires a structured and evidence-based strategy within a longitudinal study. This begins with identifying and addressing task-related and posture-related risk factors through classroom-specific ergonomic assessments. Once these risks are identified, tailored ergonomic training programmes should be introduced to equip teachers for preventing severe injuries. Improving classroom ergonomics as part of an intervention approach can be further achieved by providing height-adjustable furniture and supportive teaching aids that promote healthy posture and reduce biomechanical stress. This research provides a valuable foundation for future studies and policy initiatives aimed at improving occupational health standards for teachers and fostering supportive and sustainable learning environments. By doing so, SDG 3 (Good Health and Well-Being) and SDG 8 (Decent Work and Economic Growth) are supported, highlighting the importance of inclusive and sustainable workplace practices in education.

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REFERENCES

- Abas, A. H., Daud, A., Mohd Hairon, S., & Shafei, M. N. (2023). Prevalence and risk factors of low back pain in Malaysia: A scoping review. *Malaysian Journal of Medical Sciences*, 30(3), 32-41. <https://doi.org/10.21315/mjms2023.30.3.3>
- Abu Zohair, H. M., Girish, S., & Hazari, A. (2024). Work-related musculoskeletal disorders among United Arab Emirates schoolteachers: An examination of physical activity. *BMC Musculoskeletal Disorders*, 25, 134. <https://doi.org/10.1186/s12891-024-07256-w>
- Aldukhayel, A., Almeathem, F. K., Aldughayyim, A. A., Almeshal, R. A., Almeshal, E. A., Alsaud, J. S., & Albaltan, R. I. (2021). Musculoskeletal pain among school teachers in Qassim, Saudi Arabia: Prevalence, pattern, and its risk factors. *Cureus*, 13(8), e17510. <https://doi.org/10.7759/cureus.17510>
- Alharbi, T. A., Abadi, S., & Awadallah, N. J. (2020). Prevalence and risk factors of musculoskeletal pain among governmental male secondary school teachers. *Middle East Journal of Family Medicine*, 18(2), 77-85. <https://doi.org/10.5742/MEWFM.2020.93752>
- Alias, A. N., Karuppiyah, K., How, V., & Perumal, V. (2020). Prevalence of musculoskeletal disorders among primary school female teachers in

- Terengganu, Malaysia. *International Journal of Industrial Ergonomics*, 77, Article 102957. <https://doi.org/10.1016/j.ergon.2020.102957>.
- Alqahtani, T. (2020). The prevalence of foot pain and its associated factors among Saudi school teachers in Abha sector, Saudi Arabia. *Journal of Family Medicine and Primary Care*, 9(9), 4641-4647. https://doi.org/10.4103/jfmpc.jfmpc_898_20
- Althomali, O. W. (2022). Long-term prevalence and risk factors of musculoskeletal disorders among schoolteachers in Hail, Saudi Arabia: A cross-sectional study. *BioMed Research International*, 2022, Article 3610196. <https://doi.org/10.1155/2022/3610196>
- Amit, L. M., & Gerald, T. M. (2020). Prevalence and risk factors of musculoskeletal disorders among provincial high school teachers in the Philippines. *Journal of UOEH*, 42(2), 151–160. <https://doi.org/10.7888/juoeh.42.151>
- Bahaman, N. I., Feisal, N. A. S., Tengku Ibrahim, T. N. B., Cheah, W. Y., & Kamaludin, N. H. (2025). Prevalence of musculoskeletal disorders and associated ergonomic risks among Pahang school teachers. *Malaysian Journal of Medicine and Health Sciences*, 21(Suppl. 5), 336-346.
- Coledam, D. H. C., Júnior, R. P., Ribeiro, E. A. G., & de Oliveira, A. R. (2019). Factors associated with musculoskeletal disorders and disability in elementary teachers: A cross-sectional study. *Journal of Bodywork and Movement Therapies*, 23, 658-665. <https://doi.org/10.1016/j.jbmt.2018.05.009>
- Darvishi, E., Osmani, H., Aghaei, A., & Moloud, E. A. (2024). Hidden risk factors and the mediating role of sleep in work-related musculoskeletal discomforts. *BMC Musculoskeletal Disorders*, 25, 256. <https://doi.org/10.1186/s12891-024-07387-0>
- Fahmy, V. F., Momen, M. A. M. T., Mostafa, N. S., & Elawady, M. Y. (2022). Prevalence, risk factors and quality of life impact of work-related musculoskeletal disorders among school teachers in Cairo, Egypt. *BMC Public Health*, 22, 2257. <https://doi.org/10.1186/s12889-022-14712-6>
- Gholami, M., Choobineh, A., Karimi, M. T., Dehghan, A., & Abdoli-Eramaki, M. (2023). Investigating glenohumeral joint contact forces and kinematics in different keyboard and monitor setups using OpenSim. *Journal of Biomedical Physics and Engineering*, 13, 281. <https://doi.org/10.31661/jbpe.v0i0.2210-1450>
- Gikaro, J. M., Goi, G. C., Taamala, F. H., Hamadi, H. H., Welema, J. C., Minduva, Z. M., & Swai, E. A. (2025). Prevalence and factors associated with musculoskeletal disorders among primary and secondary school teachers. *Frontiers in Public Health*, 13, Article 1654131. <https://doi.org/10.3389/fpubh.2025.1654131>
- Jeffree, M. S., Abdul Rahim, A. A., Ag Daud, D. M., Pang, N., Sazali, M. F., Sudi, S., et al. (2024). Predictors of musculoskeletal disorders among special education teachers in Sabah, Malaysia. *Heliyon*, 10, e30873. <https://doi.org/10.1016/j.heliyon.2024.e30873>
- Lemeshow, S., Hosmer, D. W., Klar, J., & Lwanga, S. K. (1990). *Adequacy of sample size in health studies*. John Wiley & Sons.
- Ng, Y. M., Voo, P., & Maakip, I. (2019). Psychosocial factors, depression, and musculoskeletal disorders among teachers. *BMC Public Health*, 19, 234. <https://doi.org/10.1186/s12889-019-6553-3>
- Prieto-González, P., Šutvajová, M., Lesňáková, A., Bartík, P., Buřáková, K., & Friediger, T. (2021). Back pain prevalence, intensity, and associated risk factors among female teachers in Slovakia during the COVID-19 pandemic. *Healthcare*, 9(7), 860. <https://doi.org/10.3390/healthcare9070860>

- Rahim, A. A. A., Jeffree, M. S., Ag Daud, D. M., Pang, N., & Sazali, M. F. (2022). Factors associated with musculoskeletal disorders among regular and special education teachers: A narrative review. *International Journal of Environmental Research and Public Health*, 19, Article 11704. <https://doi.org/10.3390/ijerph191811704>
- Souza, C. S., Cardoso, J. P., Aguiar, A. P., Macedo, M. M. S. R., & Oliveira, J. D. S. (2021). Work-related musculoskeletal disorders among schoolteachers. *Revista Brasileira de Medicina do Trabalho*, 19(1), 140-150. <https://doi.org/10.47626/1679-4435-2020-545>.
- Souza, J. M. D., Tebar, W. R., Delfino, L. D., Tebar, F. S. G., Gobbo, L. A., Franco, M., et al. (2023). Association of musculoskeletal pain with sedentary behavior in public school teachers. *Pain Management Nursing*, 24, 196-200. <https://doi.org/10.1016/j.pmn.2022.08.005>
- Tahernejad, S., Hejazi, A., Rezaei, E., Makki, F., Sahebi, A., & Zangiabadi, Z. (2024). Musculoskeletal disorders among teachers: A systematic review and meta-analysis. *Frontiers in Public Health*, 12, Article 1399552. <https://doi.org/10.3389/fpubh.2024.1399552>
- Vega-Fernandez, G., Gonzalez-Torres, C., Solis-Soto, M., & Lizana, P. A. (2024). Musculoskeletal disorders and quality of life for Chilean teachers during the COVID-19 pandemic. *Frontiers in Public Health*, 12, Article 1277578. <https://doi.org/10.3389/fpubh.2024.1277578>

Sustainable STEM Education for Disadvantaged Communities

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ABSTRACT

Disadvantaged local communities frequently face significant barriers to recognising the value of STEM education and are hesitant to engage in partnerships with external organisations due to mistrust or unfamiliarity. As a result, students from these communities miss opportunities to enhance their learning and career prospects, thereby creating a gap compared to urban students who have better access to innovative programmes, mentorships, and STEM career pathways. This study aims to bridge the gap by exploring the perceptions of disadvantaged communities regarding factors influencing students' performance in STEM education. It also examines their level of involvement in STEM programmes and explores the issues they faced in accessing and engaging with such education. The study involved 11,827 respondents, who were the local communities of 1,224 primary and secondary schools. Using a mixed-methods approach, quantitative data were collected through surveys, and qualitative data were gathered through in-depth interviews. The findings indicate that these communities tend to leave the responsibility for STEM education to teachers, schools, and students. Key obstacles to their partnership include gaps in STEM knowledge, a mindset toward STEM education, and cultural factors that hinder progress in STEM education within disadvantaged

communities. Consequently, a local community STEM education model is proposed as a holistic approach to sustaining STEM education by strengthening community support in these communities.

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INTRODUCTION

The rapid adoption of new technologies in the twenty-first-century information age has compelled individuals to acquire the skills necessary for success in a competitive world. STEM education is a gateway to cultivating students' twenty-first-century skills (Huang et al., 2022; Widya et al., 2019). Specifically, STEM education endows learners with essential problem-solving skills, empowering them to contribute meaningfully to society (Pahnke et al., 2019). Furthermore, it equips individuals to navigate and thrive in a dynamic and constantly evolving global landscape. In addition to educational institutions, local communities play a crucial role in STEM education (Hite et al., 2020; Yuenyong, 2019). STEM education has influenced people's daily lives, including the creation of new ideas and solving problems (Vijayatheepan, 2023). Previous studies have demonstrated that community involvement through various programmes positively influences STEM education. The roles of these communities primarily include providing STEM learning environments or acting as collaborators or partners (Hite et al., 2020; So & Guo, 2023).

Rural and interior communities are often disadvantaged compared to urban areas. In lower-middle-income and low-income countries, the rural population constitutes approximately sixty and sixty-seven per cent, respectively (United Nations Department of Economic and Social Affairs [UNDESA], 2021). Therefore, rural development is a critical issue for

these countries. The 19th session of the United Nations Commission on Sustainable Development (CSD) emphasised that economic, social, and environmental factors are crucial for achieving sustainable rural development. Since urban poverty is largely rooted in rural areas, eradicating poverty is essential. The report also underscores the need for approaches tailored to rural settings, considering their remoteness and unique potential (UN General Assembly, 2015). Sustainable Development Goals (SDGs) such as Quality Education, Industry, Innovation, and Infrastructure, Reduced Inequalities, and Partnerships for the Goals are particularly relevant for disadvantaged communities. STEM thinking and science literacy help individuals develop logical, systematic, and critical solutions to problems identified in their communities (Timko et al., 2022).

Community partnerships have bolstered STEM education (Davis & Veenstra, 2014; Lopez et al., 2016), and community-based STEM activities have enhanced students' learning outcomes in STEM subjects (Delaine, 2021). Moreover, STEM community networks and activities make science more appealing and accessible, particularly to students from economically disadvantaged families and underrepresented groups (Davis & Veenstra, 2014). These efforts contribute to the sustainability of STEM education, empower disadvantaged communities to tackle local challenges, and support global sustainability efforts toward achieving several Sustainable Development Goals (SDGs). However, the

quality of STEM education in economically disadvantaged communities, especially in rural and remote areas, still lags that of their urban counterparts (Jones & Cleaver, 2020; Kavanagh et al., 2022; Ling et al., 2021). Beyond being collaborators or partners, communities should take a more active role in STEM education. Key questions include how disadvantaged communities contribute to STEM education and how they can sustain their contributions. Carroll et al. (2019) identified six key factors for the sustainability of STEM education projects: “continuation of activities, sustaining impact, community engagement and collaboration, leadership, planning and evaluation, and finances” (p. 1).

Del Arco et al. (2021) propose that empowering rural populations enables local administrations to formulate community policies that align with institutional objectives, fostering synergies for sustainable development and improving the quality of life. Empowering rural communities allows them to participate, make decisions, negotiate, influence, and exert control, and strengthens their families and productive environments amidst the challenges posed by current socio-economic dynamics (del Arco et al., 2021). Additionally, they assert that quality, inclusive, and equitable education, along with lifelong learning, are integral components of sustainable development that contribute to the growth of sustainable societies (del Arco et al., 2021). Literature also reports that community education models have been proven to benefit disadvantaged communities (SOLAS, 2024). Sustainable STEM education for

disadvantaged communities is crucial for advancing the Sustainable Development Goals (SDGs) and promoting inclusive development. This highlights the importance of community education in effectively contributing to STEM education.

This study aims to explore the perceptions of disadvantaged local communities regarding the factors influencing students' performance in STEM subjects, as provided in the survey instrument; while also investigating the current status of their involvement in STEM education and the issues they face in this field. Based on the literature and the findings, a tailored community education model is proposed to meet the needs of these communities and ensure the sustainability of STEM education.

The significance of this study lies in two main aspects. First, it provides insights into the factors influencing students' performance in STEM subjects, the current level of engagement of disadvantaged local communities in STEM education, and the issues they face. Second, based on these findings and existing community education models, it proposes an innovative education model tailored for disadvantaged communities. This model offers a comprehensive approach to sustaining STEM education within these communities.

LITERATURE REVIEW

Sustainable STEM Education

STEM is an acronym for science (S), technology (T), engineering (E), and mathematics (M). STEM education was

started when engineering and technology were included in science and mathematics for undergraduates and K-12 school education in the 1990s in the United States (Li et al., 2020). There are multiple perspectives on STEM education in the literature. Li et al. (2020) classified it into two perspectives: a broad and inclusive view encompassing education in each STEM discipline, or a focus solely on the interdisciplinary or cross-disciplinary integration of the STEM fields.

In the context of this study, the definition of STEM education is adapted from English (2016), Soo (2019), Sujarwanto et al. (2021), and Liu and Wang (2023). English (2016) suggested STEM education as a context to connect the four disciplines. This approach also aims to blur the barriers between the four disciplines and integrate them into students' daily life to solve daily problems (Soo, 2019). STEM education is an interdisciplinary approach that incorporates the four disciplines, emphasising their interconnections, to prepare students for the advancement of science and technology and equip them with the skills to solve problems (Sujarwanto et al., 2021).

Sustainability refers to the ability to maintain or continue something toward a long-term goal (Timko et al., 2022). "Quality, inclusive, and equitable education", along with lifelong learning, are integral elements of sustainable development that foster the creation of sustainable societies (del Arco et al., 2021, p. 3). STEM education can equip learners with problem-solving skills and enable them to act meaningfully in society (Pahnke et al., 2019). In this study,

sustainable STEM education refers to the ability to continue and maintain STEM education with a focus on sustainability principles, aiming to equip learners with the knowledge and skills necessary to address quality, inclusive, and equitable education, as well as lifelong learning for the sustainable development of disadvantaged communities.

Disadvantaged Local Community

Technically, there is a lack of formal definition of the scope of local community in the education system. Education researchers generally use the term community interchangeably with the stakeholders of the education system, which is generally referring to those who have a stake in the success of the education of the students. Community in most studies on STEM education (Alexandre et al., 2022; Gaias et al., 2022; Jackson et al., 2019; Lim et al., 2022; Newman et al., 2015; Salvetti et al., 2022; Steiner et al., 2019; Sujarwanto et al., 2021) generally includes the schools (students, teachers, administrative staff), families (parents, siblings, and extended families) of the students enrolled in a school, education authorities and policymakers, school alumni, both the education (e.g., parents teacher associations) and non-education related associations, the professional bodies, universities (the undergraduate and graduate students, administrator, and the faculty members), researchers, the non-governmental organisation (NGO), the businesses, and the general residents.

Davis and Veenstra (2014) define the local community as corporations, community groups, and educational institutions supporting STEM education. Great Schools Partnership (2019) refers to the local community as the members of the community who are socially and emotionally attached to a school. The attachments include those that are familial (parents and relatives of students), experiential (the schools' alumni), professional (an individual who works in and whose stipend comes from the school), civic (the caretakers, policymakers, and volunteers of schools), and socioeconomic (the general public who are also the taxpayers, the local businesses whose employees are the schools' alumni and those who share a burden for quality education and betterment of education in the schools). This study resorts to refer community as the local community who are legally, socially, and emotionally attached to the schools. Both terms are used interchangeably in this paper.

Studies show that the local community contributes to the informal STEM education and assists in the enhanced STEM experience (Alexandre et al., 2022; Gaia et al., 2022; Jackson et al., 2019; Lim et al., 2022; Newman et al., 2015; Salvetti et al., 2022; Steiner et al., 2019; Sujarwanto et al., 2021). It plays an important role in enriching the STEM interest and thus the STEM learning of the students. Reed et al. (2022) emphasise that experiences outside the classroom are crucial for fostering and enhancing students' attitudes toward science, regardless of age group. It is thus imperative to build STEM experiences out of the classroom, and this is

the part where the role of community comes in. Alexandre et al. (2022) and Jackson et al. (2019) also reiterate this. According to them, the attitudes, and interests of students in sciences specifically and STEM generally, are collectively influenced by both their formal and informal experiences related to the fields.

The intertwined effect resulting from the students' formal and informal learning of STEM, which took place inside and outside the classroom, is promising. The pertinent role of the community, particularly in fostering informal STEM learning, is well accepted by the STEM education community (Alexandre et al., 2022; Gaia et al., 2022; Jackson et al., 2019; Lim et al., 2022; Newman et al., 2015; Salvetti et al., 2022; Steiner et al., 2019). These studies on the involvement of the community in STEM education have reported a positive impact on student STEM learning (Steiner et al., 2019) and support STEM learning fields (M. Ainley & J. Ainley, 2011).

Nevertheless, the quality and achievement of STEM education among disadvantaged local communities is of particular concern (Jones & Cleaver, 2020; Kavanagh et al., 2022; Ling et al., 2021). The disadvantaged individuals in education generally refer to those who benefit less from the education system than their peers (Organisation for Economic Cooperation and Development [OECD], 2018). In addition to those typically from rural and remote areas, this group of individuals deprived of equal STEM education also includes marginalised individuals

(Galligan, 2008; Ludwig et al., 2024). The marginalised community comprises those discriminated against or isolated from fair access to the education system. This can include individuals suffering from poor health, limited facilities, physical or mental disabilities, financial hardship, social exclusion, and those who are minorities in a community (Galligan, 2008; Ludwig et al., 2024). Studies on informal STEM education with support from the community report encouraging results with improved STEM learning and outcomes among marginalised communities (Ludwig et al., 2024). Consequently, the disadvantaged local community in this study refers to those in rural and remote areas, including the marginalised individuals.

How important is STEM for disadvantaged local communities, particularly in their daily lives and problem-solving? Timko et al. (2022) examine rural communities in the United States on this topic. They report that the communities often relate their daily activities to STEM fields. STEM is perceived as potentially valuable for addressing community challenges, building local partnerships and networks, implementing both formal and informal STEM learning opportunities, and establishing goals to develop a STEM learning ecosystem in rural areas. Their practical applications highlight the significance of STEM thinking and promote a collective understanding of what STEM represents. Timko et al. (2022) highlight that building awareness of STEM and developing related knowledge and skills can benefit individuals in various ways

to address local community challenges, such as improving critical thinking and problem-solving abilities. They also reveal that STEM positively impacts the next generation of learners. They further stress that each community culture is unique, therefore defining local manifestations of STEM that meet the unique needs and identity of individual communities is also important to the sustainable development of STEM learning ecosystems in rural areas.

The studies discussed above imply the importance of sustainable STEM education for disadvantaged local communities. Involvement of the communities in STEM education requires further exploration to gain deeper insights and develop a tailored educational model.

Community Education Model

Community education plays a crucial role in disadvantaged communities, benefiting both individual learners and the broader community (SOLAS, 2024). It is especially efficient in addressing sustainable development challenges such as “Climate Justice Education, Education for Sustainable Development and building Climate Literacy” (p. 18). Due to its inclusive nature, community education unites individuals from diverse backgrounds and experiences, making it especially appealing to those underserved by the traditional “one size fits all” education model, including older learners, people in rural areas, and individuals with disabilities. Moreover, it fosters inclusion by engaging a wide and diverse range of learners (SOLAS,

2024) and significantly impacts equality by providing educational opportunities to disadvantaged learners. Therefore, community education should actively involve disadvantaged learners (AONTAS, 2006).

The concept of community education has evolved differently across contexts due to diverse historical and cultural influences (Zhang & Perkins, 2023). There are various definitions of community education in the literature. According to SOLAS (2004), community education encompasses various meanings, making it difficult to define precisely. Engelbrecht (2005) defines community education as the acquisition of knowledge, values, and skills by people in the community, which has always been the foundation of all human development. Community education is at the heart of human development and has played a vital role throughout the history of social work.

Galligan (2008) characterises community education as a driving force for community development, highlighting its crucial role in tackling social and cultural inequalities, including poverty, discrimination, neglect, and other disadvantages. They point out the challenge of incorporating relevant indigenous paradigms into modern community education practices. Additionally, they emphasise that community education should embody a deep understanding of the intrinsic connection between education and culture (Galligan, 2008). Apart from that, Rubenson (2010) emphasises that community education should be considered

in relation to the different contexts and locations. The researcher suggests viewing community education as an extension of pragmatic educational services aimed at reaching hard-to-access individuals and integrating them into mainstream society through “employment, further education, or rehabilitation” (p. 6).

Ardiwinata and Mulyono (2018) reveal that the concept of community education, which has long been a part of people's lives, is well-established in the realm of science. However, the use of various terms and names poses challenges in creating a cohesive system for community education. As a result, ongoing efforts are being made to define the “basic concepts, evaluations, methods, approaches, and conclusions” (Ardiwinata & Mulyono, 2018, p. 25) associated with community education. The core concept of community education is to offer more educational opportunities for the community. It involves continuous learning processes tailored to the community's needs, designed to prepare and enhance their ability to progress. It also provides community members with the opportunity to actively engage in broader development efforts, benefiting both themselves and the wider community (Ardiwinata & Mulyono, 2018). On the other hand, Zhang and Perkins (2023) define community education as structured lifelong learning for adults aimed at addressing both personal and community needs. The most recent definition by SOLAS (2024) defines community education as both formal and non-formal learning, led by communities for their benefit, to

support “personal, social, educational, environmental, economic, and community development” (p. 12).

Studies on the community education model are very limited. Botari (1996) introduces the Enhanced Community-Centred Education (ECCE) model, which is developed based on previous outreach education models, community needs, and principles such as social and cultural values. The author summarises the relevant literature and concludes with five key principles. First, Values and Goals that emphasises each community has its social and cultural values to sustain while aiming to achieve economic and social goals. Second, Priorities and Plans that emphasise translating the first principle into priorities and plans to establish the educational programme. Third, Administrative Establishment that reiterates the role of communicating and negotiating with educational institutions about suitable programmes. Fourth, Programmes and Support that underscores the need for a support system at both academic and personal levels to optimise the likelihood of community members completing the programme. Lastly, Results and Benefits that reflects the positive outcomes achieved by community members will not only benefit themselves but also contribute to the wellbeing of the community. An additional loop ties the relationships between institutions and education programmes to accommodate the five principles. These relationships involve the community’s contribution, and the benefits gained from the educational programmes (Botari, 1996).

On the other hand, Vijayatheepan (2023) discusses the successful implementation of STEM education involves equipping educators, fostering collaboration with industries, embracing inclusivity, and maintaining adaptability to evolving needs. This suggestion is closely related to the Botari (1996) ECCE model.

The White Paper on Adult Education lists 10 key characteristics of community education (Department of Education and Science, 2000). First, a community education has a non-statutory nature. Second, its rootedness in the community is not just in terms of physical location, but also in that its activists have lived and worked for many years within the community, possessing a deep knowledge and respect for its values, culture, and circumstances, as well as an understanding of community needs and capacity. Third, community education is a problem-solving task with flexible focus based on trust. Fourth, it is a process-oriented rather than syllabus-oriented approach, implying that participants are engaged from the outset as equal partners in identifying needs, designing and implementing programmes, and adapting them on an ongoing basis. Fifth, community education respects the participants and their reflection of their lived experiences. Sixth, it emphasises the concerns with communal values and is committed to aligning curriculum and pedagogy with the needs and interests of students. Seventh, it promotes personalised learning and flexibility within the environment of a learning group, with goals that include not just individual

development but also collective community advancement, especially in marginalised communities. Eighth, it emphasises on providing the necessary supports for successful access and learning, particularly guidance, mentoring, continuous feedback and dialogue, childcare, and other related aspects. Ninth, a community education's collective social purpose and inherently political agenda is to promote critical reflection, challenge existing structures, and empower participants to influence the social contexts in which they live. Lastly, it ensures the promotion of participative democracy, recognising a key role for adult education in transforming society.

Galligan (2008) lists four characteristics of the community education model, naming lived experience as the starting point, community education responds to disadvantage and social exclusion, community education works at an individual, community, and political level, and the community group being the deliverer of community education. In addition, Galligan (2008) also identifies four factors influencing the type of programmes for community education, naming accreditation not being a priority for most community groups, requests by the target group, popularity of programmes, and response to an identified need. They share that community education enhances individual self-esteem, confidence, knowledge, and skills. Besides this, it also fosters interaction among community members, enabling them to collaborate on community issues relevant to their specific context. They

observe that community education has successfully engaged marginalised groups and established connections with individuals who are frequently excluded from society.

Community education aims to “create awareness of issues, enhance people’s knowledge, understanding, and skills, influence people’s values and attitudes, and encourage more responsible behaviour” (Department of Irrigation and Drainage [DID], 2012, p. 37-1). DID (2012) also suggests nine characteristics for practical community education projects and concludes that collaboration is the key to successful community education. The nine characteristics include engaging stakeholders and learners, providing a supportive environment, enhancing and reinforcing existing community networks, motivation, offering opportunities to explore beliefs and values, recognising and encouraging positive actions, being pertinent, accessible, and cost-effective, utilising two-way communication, and addressing the community needs. In addition, DID (2012) also highlights eight steps in developing an education programme. The steps are analysing the issue, identifying stakeholders, knowing the target group, determining objectives and outcomes, designing the methods, identifying funding sources, designing and implementing an action plan, and monitoring and evaluating.

A community education charter was established in 2021 based on three key stakeholder pillars - academics, practitioners, and advocacy. It outlines nine core values central to community education

(SOLAS, 2024). These include community education is rooted in equality, justice, and empowerment; it creates a voice for those who are furthest from the education system; it promotes social inclusion in its broadest sense; it is needs-based, driven by the community, and reflective of lived experiences; it recognises the value of both accredited and non-accredited learning; it nurtures critical thinking; it is learner-centred, flexible, supportive, and developmental; it is facilitative, group-focused, and open to new things; and it centres on relationship building.

In this study, community education is viewed as a step-by-step, continuous learning process tailored to the needs and values of disadvantaged local communities. It emphasises community development, particularly in STEM education, to promote sustainable growth within these communities. Each community has unique needs shaped by its specific values. According to Zhang and Perkins (2023), the concept of community education has evolved differently across contexts due to diverse historical and cultural influences. The evidence gathered in this study will be aligned with community education approaches tailored to the specific context of local disadvantaged communities.

METHODOLOGY

Research Design

This study used an exploratory mixed-method design. The quantitative approach was employed to survey local communities' perceptions of the factors influencing

students' performance in STEM subjects. Interviews were conducted to further explore and validate the findings from the quantitative data (Creswell et al., 2003). The qualitative approach aimed to assess the status of disadvantaged local communities' involvement in STEM education and examine the issues related to their participation.

Population and Sampling

The study population consisted of disadvantaged local communities of all 1,224 primary and secondary schools located in rural and interior areas of Sarawak, Malaysia. The sample was selected using a multistage sampling method. First, the population was clustered based on the twelve divisions and thirty education districts. Next, the population was further stratified based on the levels of schools (primary and secondary), and finally, clustered into two categories: urban and rural-interior. The Rural-Interior cluster was selected and further stratified into four strata based on the school location: rural, interior one (P1), interior two (P2), and interior three (P3). The distribution of schools based on location was 11.74% from urban, 59.23% from rural, and 12.34%, 6.94%, and 6.94% from P1, P2, and P3, respectively. The classification of interior areas was based on criteria that included the number and cost of transportation modes, journey risks, water supply, electrical power supply, accommodation, sanitation, telecommunication, healthcare and safety services, and other amenities such as banking

and post offices (Ministry of Education, 2014). The P3 schools were classified as the most challenging.

Samples from the disadvantaged local communities were randomly selected from each division to ensure representative data. The inclusion criteria were individuals residing within the divisions of the selected primary and secondary schools, who were related to the schools in one or another way, aged 18 years and above, and who provided consent to participate in the survey, in-depth interview, or both. Conversely, the exclusion criteria were defined as individuals not meeting the inclusion criteria. All eligible members of these communities were encouraged to participate in the study, and selected survey participants were interviewed. In total, 11,827 respondents from disadvantaged local communities completed the survey, while 957 respondents participated in the in-depth interviews.

Measures

A total of 13 items in the survey instrument were adapted from Schmidt et al. (2009) to measure the extent of factors influencing STEM education. Participants were asked to rate the extent to which these factors influenced STEM education in their community using a 6-point Likert scale (1—no influence, 2—very low influence, 3—low influence, 4—moderate influence, 5—high influence, and 6—very high influence). The instrument had a Cronbach's alpha reliability of 0.93. A structured interview protocol was developed based on the four phases of the Interview Protocol

Refinement (IPR) framework to guide interviewers in collecting high-quality information. This framework improves the reliability of interview protocols (Castillo-Montoya, 2016). The four phases of the IPR framework include ensuring that interview questions align with the study's research questions, organising the interview protocol to facilitate an inquiry-based conversation, having the protocol reviewed by others, and piloting it (Castillo-Montoya, 2016). The interview protocol was further reviewed and validated by a panel of experts in the field. To accommodate community members with different academic backgrounds, particularly those with lower academic levels, the data collection process was assisted by the trained enumerators, who explained the survey items and, where necessary, used the local language.

Data Collection Method

The questionnaire for collecting quantitative data was digitised using Google Forms, which enabled wide dissemination of the survey instrument and made it accessible to respondents across all locations. The survey link was shared with local community representatives in each division, who then distributed it to respondents. For communities in interior areas with limited internet access, printed survey forms were distributed. To collect qualitative data, the researchers visited the selected disadvantaged local communities in the four areas (rural, P1, P2, and P3) to conduct face-to-face interviews. The purpose of the interviews was to confirm

the findings from the quantitative data, explore the current status of disadvantaged local communities' involvement in STEM education, and examine the issues related to their involvement in STEM education.

Data Analysis

Descriptive statistics, such as mean and standard deviation, were used to analyse the quantitative data. The qualitative data were transcribed, coded, and analysed using thematic analysis to identify patterns or themes (Maguire & Delahunt, 2017). Thematic analysis was guided by the factors in the survey instrument, as the qualitative findings were intended to support and complement the quantitative results. A data team was established to conduct the analysis, with the team leader training members in coding. The coded data were first reviewed by the team leader and subsequently discussed and refined together with the research team members.

RESULTS AND DISCUSSION

This section explains the results and discussions, which are further divided into the factors influencing the performance of STEM subjects, current status, issues of disadvantaged local communities' involvement in STEM education, and the Community Education Model. The quantitative data were collected from 11,827 respondents from disadvantaged local communities, including 9,001 (76.11%) respondents from rural communities, 1,128 (9.54%) from P1 communities, 969 (8.19%) from P2 communities, and 729 (6.16%)

from P3 communities. The percentage of respondents decreased in more remote areas with smaller populations. The respondents were from low-income groups, and many had low levels of education or were uneducated. To accommodate community members with lower academic levels, the data collection process was assisted by the trained enumerators, who explained the survey items and, where necessary, used the local language.

In-depth interviews were conducted with 85 local communities, including 41 rural communities, 17 P1 communities, 14 P2 communities, and 13 P3 communities. This selection ensured representation from different locations in each education district. A total of 957 respondents were involved in the in-depth interviews, including 614 interviewees from rural communities, 114 from P1 communities, 83 from P2 communities, and 146 from P3 communities.

Perception of Disadvantaged Local Communities on Factors Influencing STEM Subjects' Performance

The local communities from rural and interior areas perceive all thirteen factors as having a moderate to high level of influence on students' performance in STEM subjects. The factor perceived as most influential is 'Teaching skills' (mean = 5.03, SD = 1.05). This is followed by 'Teachers' enthusiasm' (mean = 4.97, SD = 1.16), 'Teachers' efficacy' (mean = 4.94, SD = 1.06), 'Teachers' knowledge' (mean = 4.96, SD = 1.15), and 'Teachers' attitude towards teaching'

(mean = 4.91, SD = 1.10). The results indicate that teacher-related factors are the top five influences affecting students' performance in STEM subjects. It also indicates that external stakeholders view teacher-related factors as playing a significant role in students' academic performance in STEM subjects.

Disadvantaged local communities also believe that students themselves play a role in their performance in STEM subjects. They perceive the three student-related factors as having a moderate to high influence on students' performance in STEM subjects. These factors are 'Students' interest' (mean = 4.68, SD = 1.21), 'Students' attitude' (mean = 4.66, SD = 1.25), and 'Students' motivation' (mean = 4.66, SD = 1.18). Similar results were found for the three school-related factors, which disadvantaged local communities perceive as having a moderate to high influence on students' performance in STEM subjects. These factors are 'School facilities' (mean = 4.68, SD = 1.21), 'School environment' (mean = 4.66, SD = 1.25), and 'School culture' (mean = 4.66, SD = 1.18). The factors perceived to have less influence compared to others were 'Parental involvement' (mean = 4.20, SD = 1.32) and 'Community involvement' (mean = 4.01, SD = 1.41). The results also show that local communities tend to delegate the responsibility for STEM education to teachers, students, and schools.

The qualitative data provides further explanation for the quantitative findings. Thematic analysis of the qualitative data was organised into three main themes:

perceptions of disadvantaged local communities on factors influencing students' performance in STEM subjects, their current involvement in STEM education, and issues related to community involvement in STEM education. The findings regarding perceptions on factors influencing students' performance in STEM subjects are presented below.

The respondents from the disadvantaged local community delegate their children's STEM education to others. They express that STEM education should be the responsibility of teachers and that students are accountable for their learning. Additionally, they emphasise that schools should have adequate facilities and a conducive environment for STEM learning. One respondent commented:

STEM education should be the teachers' job. Teachers are supposed to teach, and students are supposed to learn. After all, we do not know what STEM education is.

Some communities from rural and interior areas entrust their children's STEM education to schools due to their limited knowledge of STEM. As one parent revealed:

I am not educated. So, I leave it to the school to educate my children. I hope my children will excel in STEM.

These findings are consistent with the study by Allen et al. (2019), which identified similar challenges with the public or communities presuming that the

responsibility for providing STEM education lies entirely with teachers or parents. The researchers also share encouraging findings from their survey, which involved hiring and training local community members who met specific criteria in rural areas to serve as catalysts for students' STEM learning by connecting them with available STEM resources. The opportunities and challenges they highlighted imply the need for a comprehensive and sustainable system to educate disadvantaged local communities and advance students' STEM learning. The studies reviewed indicate that community involvement in STEM education is crucial for enhancing students' STEM learning. These informal STEM learning experiences contribute positively to students' attitudes toward learning STEM concepts (Reed et al., 2022), which in turn positively impacts their interest in STEM (Alexandre et al., 2022; Jackson et al., 2019). Next, the findings about the current involvement of disadvantaged local communities in STEM education are described.

Current Status of Disadvantaged Local Communities' Involvement in STEM Education

Most of the rural and interior communities perceive that STEM is not important in their daily lives, and they cannot relate STEM to their everyday activities. Therefore, they seldom emphasise the importance of STEM to their children. Additionally, they believe they can live without STEM knowledge. In this environment, children in these communities are raised with a mindset and values that indirectly influence their interest

and motivation to learn STEM subjects. As one respondent pointed out:

I cannot relate to STEM in my daily life. We are farmers and go to the farm daily to earn a living. For me, as long as my children can help me work on our farm and earn a living, that is enough for us.

Another respondent disclosed:

The current mindset of the rural community shapes the culture of their community. The younger generation is influenced by this culture, which affects their interest in STEM.

The local communities share that they lack knowledge related to STEM education. They perceive STEM subjects as challenging to learn and worry that their children would struggle to keep up with their studies. They are also unaware of the importance of STEM education. One community member shared:

I felt that STEM subjects were difficult to learn. That is why I couldn't cope with it when I was in school. I hope my child learns these subjects well, but I can't guide him because I have limited knowledge of STEM.

Another respondent noted:

There is not much exposure or awareness among parents, especially those from rural areas. The parents think that if their children can get a job and earn a living in the future, that is good enough.

Although the local community appears to play a passive role in STEM education, the study shows that they indirectly support it. They send their children to STEM activities organised by schools. Some participants provide financial support, while others contribute manpower for STEM activities. They shared:

Since I do not know much about STEM education, I will support the activities by sending my children to participate.

We cannot contribute much to STEM activities, but we can help the schools by preparing food for the children who attend these activities.

The local community does show support for STEM education, as the following comments reveal:

The *ketua kampung* arranges night study sessions for students from 7-9 pm, using the materials provided by teachers.

Parents in our village take turns supervising children with their homework at night, ensuring they complete their assignments, especially in Mathematics and Science.

A parent revealed:

The community is very supportive and cooperative. The School Management Board, especially the priest and PTA, are very supportive, and the Church Board members are very helpful in promoting STEM education.

Some local companies support STEM education through financial contributions for equipment and expenses related to STEM activities. A parent revealed:

Private companies in our area provide support by purchasing furniture and prizes for STEM events organised by the school.

However, Morris et al. (2021) reveal that the live experience of rural students provides them with a rich environment naturally accessible in rural areas for STEM learning. The researchers propose the local rural knowledge model within the rural context to escalate STEM education and uncover more STEM learning opportunities for students in rural areas. Therefore, the responses of the local community members in this study reveal that they are oblivious to the STEM-filled environment readily obtainable within the rural and interior areas. It also indicates the need for the local communities to be educated accordingly and mindfully. Lastly, the findings on issues related to community involvement in STEM education are detailed below.

Issues of Disadvantaged Local Communities' Involvement in STEM Education

The study identifies several issues faced by the disadvantaged local community regarding STEM education. The first issue is that the community does not value the contribution of STEM to their daily lives. There is a negative mindset towards STEM subjects and a local culture that emphasises

art over STEM education. The following excerpts from the qualitative data illustrate these issues:

We are content with our existing culture. I have heard about the importance of STEM education, but changing the local culture is difficult. People prefer to stay in their comfort zone, where they do not believe STEM will influence their lives.

We need significant efforts to change the mindset of people here. We may need intervention programmes from the government, local institutions, or industry. The problem with our community is the lack of industries, and learning institutions are limited to schools.

STEM subjects are difficult. When I was young, my parents and grandparents told me the subjects were challenging. That is why we prefer to pursue fields in the arts and humanities.

Limited knowledge of STEM education is another challenge faced by the disadvantaged local community. The respondents reveal that most people in their community are either illiterate or have low levels of education. Those who are highly educated often move to big cities due to limited job opportunities within the local community. One respondent recalled:

Since most people in our community dislike STEM subjects, our knowledge

of STEM is very limited. We do not know much about it, which is why we are rarely involved in STEM activities, and our community does not organise such events.

Limited experience and a lack of local role models are additional challenges for the disadvantaged local community. The respondents share that their exposure to STEM is limited because most STEM activities are conducted in cities. They also mention the absence of local role models to inspire the younger generation to pursue STEM.

We do not have many opportunities to experience STEM activities. Attending STEM activities in the city is very costly due to the distance. The cost of boat fuel is high, and we cannot afford it.

Since not many people here are successful in the STEM field, we have limited role models in STEM who could motivate our local population.

Due to the geographical context and the limited physical infrastructure available in rural and interior communities for STEM activities, combined with the fact that better-educated individuals have relocated to urban areas for better economic opportunities, there is a pressing need for more community leaders to promote STEM education within these areas. Respondents disclosed:

Most of our educated people are staying in the big city. Therefore, we do not

have educated leaders with STEM knowledge.

Our community is very far from the larger town. Young people who pursue higher education do not return here, which is why we have very few leaders with STEM knowledge.

The responses reported align with the findings of Vuong et al. (2020), which show that STEM academic performance is correlated with family income and the parents' academic qualifications. This correlation helps explain the issues faced by the disadvantaged local communities in supporting their community STEM education, as expressed by the local community members in this study. These communities face a shortage of high-quality STEM education and require STEM enrichment and professional development (Kavanagh et al., 2022). A well-planned STEM initiative by policymakers is needed to address the issues.

A Local Community Education Model

The roles and contributions of the disadvantaged local community in STEM education should be taken into serious consideration in planning STEM education, as their contributions in the literature have significant contributions to STEM education. Their perspectives and life experiences have made valuable contributions to STEM education. However, various issues hinder their full participation, including limited STEM knowledge, mindset, and cultural factors.

The findings indicate that disadvantaged communities in rural and remote areas urgently require an education model tailored to their local context, which aligns with national policymakers' objectives for STEM education. There is a clear need for continuous STEM knowledge development within these communities, which is a turning point for shifting attitudes and improving STEM knowledge.

The proposed model (Figure 1), termed the Local Community STEM Education Model, integrates the five key principles of the ECCE model, the community education characteristics (Department of Education and Science, 2000; Galligan, 2008), the Community Education Charter (SOLAS, 2024), and strategies for successful STEM education implementation (Vijayatheepan, 2023). It also incorporates the findings of this study. The model consists of two main components: the local community and the supporting stakeholders. The community's local government, industrials and private agencies, and local learning institutions are the three key supporting stakeholders in the model, as identified in the studies on which the model is based. The local community component comprises eight steps, which represent the processes required to conduct effective community education. The four steps on the left (blue-coloured rectangles) highlight the main concerns to be decided collaboratively between the local community and the supporting stakeholders, while the four steps on the right (orange-coloured rectangles) encompass the Plan-Do-Check-Act (PDCA)

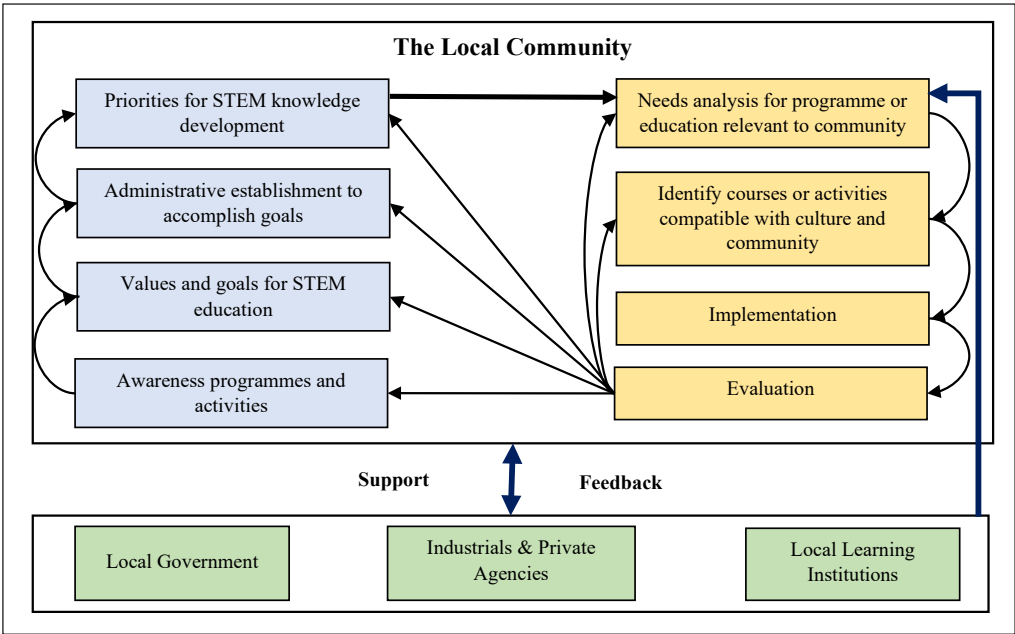


Figure 1. A local community STEM education model

framework, ensuring holistic execution of community education that is contextualised to the local setting and aligned with its goal. The arrows connecting the steps imply that the processes are cyclical rather than linear and may start at any step. Ultimately, the model aims to enhance community support for STEM education by raising awareness of its importance for their children’s future.

To achieve this, the first step (Step 1: Awareness programmes and activities, shown in Figure 1) in the model involves implementing awareness programmes and activities supported by local government, industries, private agencies, and institutions. This step aims to create awareness, as recommended by DID (2012), to change the community’s perception of the value of STEM education.

The findings, particularly those related to perceptions of factors influencing STEM performance, indicate that disadvantaged community is currently unaware of the importance of STEM education.

To initiate the awareness programme, a basic introduction to how STEM contributes to the local community’s daily life will be meaningful (Step 2: Values & goals for stem education, shown in Figure 1). This link is shown by the arrow connecting Step 1 and Step 2. Through activities such as exhibitions and talks, the community can gain a better understanding of the role STEM education plays in their sustainable development. A successful awareness programme can shift community values and goals toward STEM education.

As depicted by the arrow from Step 2 to Step 3, when the community recognises the value of STEM, they are more likely to set clear goals for STEM education and prioritise activities that foster STEM knowledge development among their members (Step 3: Administrative establishment to accomplish goals, shown in Figure 1). The findings on the current involvement of disadvantaged local communities in STEM education suggest that participation increases when communities appreciate the importance of STEM education.

Next, the administrative team should conduct a needs analysis of the community regarding STEM education to identify their priorities for STEM knowledge development (Step 4: Priorities for STEM knowledge development, shown in Figure 1). This process is illustrated by the arrow connecting Step 3 and Step 4. The team may also establish representatives to negotiate with local educational institutions about relevant education programmes and activities.

As depicted by the arrow from Step 4 to Step 5, to help the community prioritise its goals, educational institutions will conduct a needs analysis to identify programmes that will most benefit the community (Step 5: Needs analysis for programme or education relevant to community, shown in Figure 1). Once the analysis is complete, shown by the arrow linking Step 5 and Step 6 (identify courses or activities compatible with culture and community, shown in Figure 1), the community's administrative team will collaborate with institutions, industries, and private agencies to plan,

design, and develop courses or activities tailored to the community's needs and values, emphasising STEM education. The need to work closely with the supporting stakeholders in Step 6 is stressed by the arrow connecting them. The double-headed arrow at the bottom of Figure 1, connecting both components of the model, represents the strong bilateral collaboration required between these stakeholders, communities, and schools to ensure continuous support and feedback for effective community education. The Plan-Do-Check-Act (PDCA) framework, shown by the four processes coloured orange on the right of Figure 1, will be adopted in this model. Ongoing collaboration between the administrative team and educational institutions will facilitate information exchange and address challenges.

The next step is to arrange the delivery of the programme, including selecting the venue (Step 7: Implementation, shown in Figure 1). This process is represented by the arrow joining Step 6 and Step 7. During this implementation stage, schools and learning institutions in the community may support the programme by sharing available resources and facilities, such as providing school spaces for conducting courses. The local government, industries, and private agencies may offer financial support, venues, resources, and facilities necessary for running the courses. Additionally, institutions, schools, and experts from the industrial and private sectors may serve as active partners in delivering the courses.

This collaboration is again depicted by the double-headed arrow connecting the two main components of Figure 1.

As indicated by the double-headed arrow, feedback from the local community to the support group is essential for improving the services and support provided. The success of individual participants will contribute to the overall benefit of the community. At the end of each programme, evaluations should be conducted to assess whether the programme's outcomes align with the community's goals (Step 8: Evaluation, shown in Figure 1), as represented by the arrow connecting Step 7 and Step 8. This evaluation helps identify what is working well and what needs improvement, fostering a cycle of continuous improvement. In the next cycle, awareness programmes can be made more in-depth. The arrows extending from Step 8 to each of the other steps emphasise that the cycle may begin at any relevant step, as shown in Figure 1, and follows a step-by-step approach to building STEM knowledge. With each new cycle, the community's appreciation for STEM education will grow, enabling better-planned activities.

The knowledge gained from this model aims to address and mitigate the issues faced by disadvantaged communities in STEM education. The local community model offers a tailored approach to meet the specific needs and issues of these communities, aligning with global calls for sustainable development, particularly for disadvantaged communities.

CONCLUSION

Numerous studies have affirmed the vital roles and significant contributions of local communities in STEM education. However, many disadvantaged communities still lack sufficient STEM knowledge, and their attitudes toward STEM education need to be improved for full engagement in STEM initiatives. To address the issues, a local community education model is proposed for communities with generally low education levels.

This model aims to enhance STEM education by raising awareness, shifting values towards STEM, and increasing knowledge through activities tailored to the community's needs, as identified in a needs analysis. The Plan-Do-Check-Act (PDCA) framework is adopted to guide the implementation and continuous improvement of the model. The community is encouraged to collaborate with local governments, stakeholders, and educational institutions to strengthen their contributions to STEM education. The model also aligns with the United Nations' Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities).

Implications of the Study

The findings reveal that disadvantaged local communities do not recognise the importance of their involvement in supporting students' STEM learning and fail to see the relevance of STEM to their daily lives and culture. This disconnect contributes to their reluctance to engage in partnerships that advance STEM

education. It has negatively impacted students' interests and performance. If left unaddressed, this creates a vicious cycle: students remain disengaged from STEM, while communities miss out on its benefits, leading to underachievement and lost opportunities. To break this cycle, communities must be educated on the significance of STEM. The proposed local community STEM education model offers a sustainable approach by implementing tailored interventions designed to disrupt the cycle of underachievement and promote long-term success in STEM education for disadvantaged communities.

Limitations and Recommendations for Future Research

This study is exploratory in nature, with data collected from disadvantaged local communities in Sarawak. The findings are limited to the socio-cultural and educational context from which the data were obtained. Future studies could apply the proposed model to other local communities facing similar STEM education issues, and to validate its effectiveness in comparable environments. Additionally, the community education model could be explored across disadvantaged communities in different regions, with adaptations tailored to the various demographic groups.

Ethics Approval and Consent to Participate

The study involved internal (students, teachers, schools' administrators) and external stakeholders of schools (parents,

alumni, industrial, education experts from schools, universities, and the Ministry of Education). Approval to collect data was obtained from the Ministry of Education Malaysia [KPM.600-3/2/3-eras(7024)] dated 16th March 2020 and Sarawak Education Department [JPNSW.SKPP. LAT.600-1/1/1 Jld.7(47)] dated 23rd June 2020. Consent was also obtained from each participant before they participated in the study.

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REFERENCES

- Ainley, M., & Ainley, J. (2011). Student engagement with science in early adolescence: The contribution of enjoyment to students' continuing interest in learning about science. *Contemporary Educational Psychology*, 36(1), 4-12. <https://doi.org/10.1016/j.cedpsych.2010.08.001>
- Alexandre, S., Xu, Y., Washington-Nortey, M., & Chen, C. (2022). Informal STEM learning for young children: A systematic literature review.

- International Journal of Environmental Research and Public Health*, 19(14), 8299. <https://doi.org/10.3390/ijerph19148299>
- Allen, S., Kastelein, K., Mokros, J., Atkinson, J., & Byrd, S. (2019). STEM guides: Professional brokers in rural STEM ecosystems. *International Journal of Science Education, Part B: Communication and Public Engagement*, 10(1), 17-35. <https://doi.org/10.1080/21548455.2019.1700317>
- AONTAS. (2006). *AONTAS strategic plan 2007-2010: Policy, promotion, practice, partnership*. National Adult Learning Organisation.
- Ardiwinata, J. S., & Mulyono, D. (2018). Community education in the development of the community. *Jurnal Empowerment*, 7(1), 25-35. <https://doi.org/10.22460/empowerment.v7i1p25-35.661>
- Botari, V. A. (1996). *A model of community-centred education: The evolution of post-secondary education programming on the Stoney Indian Reserve* (Doctoral dissertation, University of Calgary).
- Carroll, S., Grenon, M., Nistor, A., James, V., McGuinness, S., Ben Shitrit Haimi, L., Cahill, G., Caner, F., Curtin, S., Dean, K., Fleming, J. V., Garcia Cabellos, G., Garcia Terceño, E. M., Germaine, K., Gilleran Stephens, C., Hayes, M., Kirmaci, H., Mangina, E., Moline, F. M., Moujdi-Menaugue, F., O'Grady, A., Pastor Pina, F., Peleg, R., Prior, S., Santos Antunes, I. M., & Siotou, E. (2019). *The sustainability of STEM education projects*. Scientix: The Community for Science Education in Europe.
- Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *The Qualitative Report*, 21(5), 811-831. <https://doi.org/10.46743/2160-3715/2016.2337>
- Creswell, J. W., Plano Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209-240). Sage Publications. <https://doi.org/10.4135/9781506335193>
- Davis, D., & Veenstra, C. (2014). Community involvement in STEM learning. *Journal for Quality and Participation*, 37(1), 30-33.
- del Arco, I., Ramos-Pla, A., Zsembinszki, G., de Gracia, A., & Cabeza, L. F. (2021). Implementing SDGs to a sustainable rural village development from community empowerment: Linking energy, education, innovation, and research. *Sustainability*, 13(23), 12946. <https://doi.org/10.3390/su132312946>
- Delaine, D. A. (2021). Characterising STEM community-based learning through the inter-stakeholder dynamics within a three-tiered model. *Journal of Higher Education Outreach and Engagement*, 25(2), 35-58.
- Department of Education and Science. (2000). *Learning for life: White paper on adult education*. Government of Ireland. <https://assets.gov.ie/24723/8eaa8222690f43279dd017f686427e9b.pdf>
- Department of Irrigation and Drainage (DID). (2012). *Urban storm water management manual for Malaysia* (2nd ed.). Malaysian Government.
- Engelbrecht, L. K. (2005). Perspectives on the community education model of social work: Implications for education and practice. *Social Work/Maatskaplike Werk*, 41(2), 143-154.
- English, L. D. (2016). STEM education K-12: Perspectives on integration. *International Journal of STEM Education*, 3, Article 3. <https://doi.org/10.1186/s40594-016-0036-1>
- Gaias, L., Taylor, M., Pratt, M. E., & Whelan, M. (2022). Promoting caregiver involvement at the public library: An evaluation of a math and science story time program for young children.

- Frontiers in Psychology*, 13, 1049694. <https://doi.org/10.3389/fpsyg.2022.1049694>
- Galligan, C. (2008). *Community education and social change: Qualitative research exploring the current nature of community education in Donegal*. Donegal Community Education Forum and County Donegal Vocational Education Committee.
- Garibay, C., & Teasdale, R. (2019). Equity and evaluation in informal STEM education. In A. C. Fu, A. Kannan, & R. J. Shavelson (Eds.), *Evaluation in informal science, technology, engineering, and mathematics education* (New Directions for Evaluation, No. 161, pp. 87-106). John Wiley & Sons. <https://doi.org/10.1002/ev.20352>
- Great Schools Partnership. (2019, January 29). *Glossary of education reform: School community*.
- Hite, R., Spott, J., Johnson, L., & Sobehrad, L. (2020). STEM challenge: Two years of community-engaged engineering. *Journal of Research in Innovative Teaching and Learning*, 13(1), 57-82. <https://doi.org/10.1108/JRIT-12-2019-0080>
- Huang, B., Jong, M. S.-Y., King, R. B., Chai, C.-S., & Jiang, M. Y.-C. (2022). Promoting secondary students' twenty-first century skills and STEM career interests through a crossover program of STEM and community service education. *Frontiers in Psychology*, 13, 903252. <https://doi.org/10.3389/fpsyg.2022.903252>
- Jackson, M. C., Leal, C. C., Zambrano, J., & Thoman, D. B. (2019). Talking about science interests: The importance of social recognition when students talk about their interests in STEM. *Social Psychology of Education*, 22(1), 149-167. <https://doi.org/10.1007/s11218-018-9469-3>
- Jones, R. M., & Cleaver, R. (2020). Recruiting and enrolling rural students: A model for increasing diversity in STEM. *Innovative Higher Education*, 45(3), 253-263. <https://doi.org/10.1007/s10755-020-09499-6>
- Kavanagh, K., DeWaters, J., Rivera, S., Richards, M., Ramsdell, M., & Galluzzo, B. (2022). A university-community partnership model to support rural STEM teaching and student engagement. *Theory and Practice in Rural Education*, 12(2), 229-248. <https://doi.org/10.3776/tpre.2022.v12n2p229-248>
- Li, Y., Wang, K., Xiao, Y., & Froyd, J. E. (2020). Research and trends in STEM education: A systematic review of journal publications. *International Journal of STEM Education*, 7, Article 11, 1-16. <https://doi.org/10.1186/s40594-020-00207-6>
- Lim, T. C., Wilson, B., Grohs, J. R., & Pingel, T. J. (2022). Community-engaged heat resilience planning: Lessons from a youth smart city STEM program. *Landscape and Urban Planning*, 226, 104497. <https://doi.org/10.1016/j.landurbplan.2022.104497>
- Ling, S. E., Mohamad, M. I., Lau, S. H., Tang, H. E., Delwis, C., Liew, C. Y., Julaihi, N. H., & Lai, K. L. (2021). *Baseline research for STEM and English language in Sarawak* [Unpublished research report]. Sarawak Ministry of Education, Science and Technological Research.
- Liu, X., & Wang, L. (2023). Volume 11: The rise of STEM education. In R. J. Tierney, F. Rizvi, & K. Erkican (Eds.), *International encyclopedia of education* (4th ed., pp. xix-xxi). Elsevier. <https://doi.org/10.1016/B978-0-12-818630-5.02011-X>
- Lopez, C. A., Rocha, J., Chapman, M., Rocha, K., Wallace, S., Baum, S., Lawler, B. R., & Mothé, B. R. (2016). Strengthening STEM education through community partnerships. *Science Education and Civic Engagement: An International Journal*, 8(2), 20-33.
- Ludwig, C. M., Howsmon, R. A., Stromholt, S., Valenzuela, J. J., Calder, R., & Baliga, N. S. (2024). Consequential insights for advancing informal STEM learning and outcomes for students from historically marginalised

- communities. *Humanities and Social Sciences Communications*, 11, Article 351. <https://doi.org/10.1057/s41599-024-02797-w>
- Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. *All Ireland Journal of Higher Education*, 9(3), 33501-33514.
- Ministry of Education. (2014). *Malaysian Ministry of Education service: Special allowance according to location and level of difficulty* (Circular No. 5). Malaysian Government.
- Morris, J., Slater, E., Fitzgerald, M. T., Lummis, G. W., & van Etten, E. (2021). Using local rural knowledge to enhance STEM learning for gifted and talented students in Australia. *Research in Science Education*, 51(1), 61-79. <https://doi.org/10.1007/s11165-019-9823-2>
- Newman, J. L., Dantzler, J., & Coleman, A. N. (2015). Science in action: How middle school students are changing their world through STEM service-learning projects. *Theory into Practice*, 54(1), 47-54. <https://doi.org/10.1080/00405841.2015.977661>
- Organisation for Economic Co-operation and Development (OECD). (2018). *Equity in education: Breaking down barriers to social mobility*. OECD Publishing. <https://doi.org/10.1787/9789264073234-en>
- Pahnke, J., O'Donnell, C., & Bascopé, M. (2019). Using science to do social good: STEM education for sustainable development. In *Proceedings of the Second International Dialogue on STEM Education (IDoS)* (pp. 5-6). IDoS. <http://www.innovec.org.mx/home/images/positionpaper-idos2019-usingsciencetodosocialgood.pdf>
- Reed, D. E., Kaplita, E. C., McKenzie, D. A., & Jones, R. A. (2022). Student experiences and changing science interest when transitioning from K-12 to college. *Education Sciences*, 12(7), 496. <https://doi.org/10.3390/educsci12070496>
- Rubenson, K. (2010). Barriers to participation in adult education. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (3rd ed., pp. 234-239). Elsevier. <https://doi.org/10.1016/B978-0-08-044894-7.00036-1>
- Salvetti, F., Capshaw, T. L., Zanin, L., O'Connor, K. C., Zeng, Q., & Bertagni, B. (2022). The GW Community Medi-Corps Program: A mobile mixed-reality immersive learning centre. In D. Guralnick, M. E. Auer, & A. Poce (Eds.), *Innovative approaches to technology-enhanced learning for the workplace and higher education* (Vol. 581, pp. 335-350). Springer. https://doi.org/10.1007/978-3-031-21569-8_32
- Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, 42(2), 123-149. <https://doi.org/10.1080/15391523.2009.10782544>
- So, W. M., & Guo, C. J. (2023). Community engagement in STEM education. In R. J. Tierney, F. Rizvi, & K. Ercikan (Eds.), *International encyclopedia of education* (4th ed., pp. 234-243). Elsevier. <https://doi.org/10.1016/B978-0-12-818630-5.13006-4>
- SOLAS. (2024). *Community education framework*. Further Education and Training Authority.
- Soo, B. N. (2019). Exploring STEM competencies for the 21st century. In *Current and critical issues in curriculum, learning and assessment*. UNESCO International Bureau of Education.
- Steiner, A., Lemke, J., Nero, D., & McGlamery, S. (2019). STEM and community engagement: Providing preservice teachers authentic experiences beyond the classroom. *Science and Children*, 56(8), 76-79.

- Sujarwanto, E., Madlazim, & Sanjaya, I. G. M. (2021). A conceptual framework of STEM education based on the Indonesian curriculum. *Journal of Physics: Conference Series*, 1760, 012022. <https://doi.org/10.1088/1742-6596/1760/1/012022>
- Timko, G., Harris, M., Hayde, D., & Peterman, K. (2022). Sustainable development of community-supported STEM-learning ecosystems in rural areas of the United States. *Community Development Journal*, 58(3), 492-511. <https://doi.org/10.1093/cdj/bsac016>
- UN General Assembly. (2015). *Transforming our world: The 2030 agenda for sustainable development* (A/RES/70/1).
- United Nations Department of Economic and Social Affairs (UNDESA). (2021). *World social report 2021: Reconsidering rural development*.
- Vijayatheepan, R. (2023). *The transformative role of STEM education on society*.
- Vuong, Q. H., Pham, T. H., Tran, T., Vuong, T. T., Cuong, N. M., Linh, N. P. K., La, V. P., & Ho, M. H. (2020). STEM education and outcomes in Vietnam: Views from the social gap and gender issues. *Social Science Research Network Electronic Journal*. <https://doi.org/10.2139/ssrn.3543346>
- Widya, Rifandi, R., & Rahmi, Y. L. (2019). STEM education to fulfil the 21st century demand: A literature review. *Journal of Physics: Conference Series*, 1317, 012208. <https://doi.org/10.1088/1742-6596/1317/1/012208>
- Yuenyong, C. (2019). Lesson learned of building up community of practice for STEM education in Thailand. In *Proceedings of the 6th International Conference for Science Educators and Teachers (ISET 2018), Bangkok, Thailand* (Vol. 2081, Issue 1, 020002). AIP Publishing. <https://doi.org/10.1063/1.5093997>
- Zhang, Y., & Perkins, D. D. (2023). Toward an empowerment model of community education in China. *Adult Education Quarterly*, 73(1), 21-39. <https://doi.org/10.1177/07417136211062252>

Motivational Factors Influencing Educational Development in Lifelong Learning Among Late Bloomers in Malaysia

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ABSTRACT

In Malaysia, the phenomenon of adults returning to higher education later in life, commonly referred to as late bloomers, remains underexplored, despite its growing significance within the discourse of lifelong learning. This study investigates the motivational factors that drive late-bloomer youth in Malaysia to pursue higher education as part of their lifelong learning journey. Adopting a qualitative phenomenological approach, the research involved in-depth interviews with twelve participants aged between 25 and 40, all of whom were enrolled in higher education institutions at the time of the study. Participants were selected based on specific criteria: Malaysian citizenship, urban residency within Kuala Lumpur, and a household income of RM 4,000.00 or below. Thematic analysis was conducted within the framework of Self-Determination Theory (SDT), allowing for the identification of both intrinsic and extrinsic motivational dimensions. Three primary themes emerged: career advancement, intrinsic motivation, and family support. Career-related goals,

such as obtaining qualifications for job stability and salary progression, were key extrinsic motivators. Intrinsically, participants were driven by desires for personal growth, cognitive enrichment, and the achievement of individual aspirations. Additionally, emotional and moral support from family, particularly parents and siblings, proved vital in sustaining motivation. The study concludes that understanding and addressing these motivational drivers is essential for developing educational policies and support systems tailored to the needs of late bloomers. By doing so, institutions can better facilitate

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lifelong learning and enhance both personal and professional outcomes for this demographic. This research offers valuable insights into adult education and learner engagement strategies.

Keywords: Adult learner, late bloomer, lifelong learning, motivational factors

INTRODUCTION

Lifelong learning encompasses continuous learning activities individuals engage in throughout their lives to enhance knowledge, skills, and competencies for personal, societal, or employment-related reasons (Billett, 2022; Jamil et al., 2022; Kamrozzaman et al., 2020; Mohd et al., 2024; Yucedal, 2022). It involves personal learning experiences and institutional education, emphasising the importance of learning beyond formal educational settings (Bárány et al., 2023 ; Kuan et al., 2014). Lifelong learning is crucial for individual development, self-fulfilment, and adapting to the evolving demands of the globalised world. Various international organisations and institutions promote strategies and initiatives to facilitate lifelong learning, recognising its significance in personal growth, societal progress, and sustainable development (International Labour Organisation, 2022; UNESCO, 2023). The concept of lifelong learning is intertwined with continuous skill development, knowledge enhancement, and adaptability to navigate the complexities of modern life.

However, despite the global momentum around lifelong learning, less attention has been given to understanding how this concept unfolds in specific regional

contexts, such as Malaysia, where unique socio-cultural and economic factors shape learning behaviours. Late bloomers represent a unique group within this context, with distinct motivations and barriers that merit focused attention (Ministry of Higher Education Malaysia, 2011). Understanding these factors is critical for educational policymaking aimed at encouraging broader participation in lifelong learning among late bloomers. The complexities of returning to education after a long hiatus, often driven by personal, familial, or professional reasons, make late bloomers an important yet under-researched demographic.

In addition, adult learners' involvement in lifelong education heavily depends on motivational factors (Alexandrova, 2023). Multiple studies highlight the importance of motivation in adult education (Ilie, 2019; Lukianova, 2016). Adults are motivated to engage in continuous learning activities by the aspiration for career progression, personal fulfilment, and overall life contentment. Furthermore, adult learners are motivated by the need for social connection, influence, and information acquisition. Components such as emotional considerations, goal setting, and learning capacity are recognised as internal factors that influence the motivation of adult learners (Lukianova, 2016). Comprehending these many motivational

factors is crucial for creating efficient educational programmes customised to the requirements and ambitions of adult learners (Min et al., 2021).

This study aims to explore the motivational variables that lead young individuals to pursue higher education at a later age in life. Late-bloomer youths, typically characterised as individuals who postpone their academic aspirations beyond the conventional age range, are an increasingly prominent group in higher education (Kasworm, 2009; Schuetze & Slowey, 2002). Although this phenomenon is becoming more common, there remains a gap in the understanding of the unique motivational dynamics that drive these individuals to re-enter education (Hasif et al., 2024; Othman et al., 2023). Specifically, there is limited research that situates this phenomenon within the Malaysian context, where socio-economic, cultural, and institutional factors may differ from those in Western countries (Ministry of Higher Education Malaysia, 2011). A deeper understanding of how these factors interact in Malaysia is critical for designing more inclusive educational frameworks that accommodate late bloomers.

This study debate aims to analyse the motivational variables that impact the decisions of late-bloomer teenagers to pursue higher education at a later age. The goal is to enhance the current knowledge of lifelong learning groups. This study aspires to provide significant insights by comprehensively analysing these aspects. In doing so, the study seeks

to inform the development of educational strategies and policies that could better support late bloomers in their pursuit of academic qualifications, thereby addressing a critical demographic in the lifelong learning ecosystem. The findings will inform educational policies and practices, enabling the development of successful strategies to support and engage late-bloomer youths in their higher education journeys. Furthermore, by addressing the needs of this demographic, educational institutions can foster a more equitable learning environment that promotes both personal and professional growth for all learners.

LITERATURE REVIEW

Late bloomers in education play a significant role in lifelong learning for adult learners (Zin et al., 2020). While American norms emphasise academic achievement "on schedule", there is also a tolerance for educational late blooming, providing unique opportunities not found in other societies (Levin & Levin, 1991). Late bloomers, who often return to education after overcoming significant personal or professional challenges, engage with learning through a complex interplay of personal resilience, external support, and shifting life circumstances (Pascua et al., 2024). This unique context highlights the importance of studying the diverse factors that influence their re-engagement with education. Learning in later life is distinct from adult learning, exhibiting characteristics aligned with the benefits of

later life (Kassim et al., 2019). European societies, however, tend to focus on older adult learning within the framework of lifelong learning policies, often driven by economic motives rather than social values (Brink, 2017). To enhance late-life learning, it is crucial to address barriers to participation, ensure quality, improve guidance and re-skilling, rethink higher education opportunities, bring learning closer to communities, and establish opportunities for housebound elders (Laal, 2011). However, while these international models provide useful frameworks, they may not fully capture the specific socio-economic and cultural factors influencing late bloomers in non-Western contexts, such as Malaysia (Salleh, 2019). This study seeks to fill that gap by exploring the Malaysian perspective on lifelong learning and late bloomers.

According to a model of late blooming in higher education by Levin and Levin (1991), late bloomers in higher education are individuals who re-enter the educational system at a later age, often after facing personal or economic challenges, and achieve academic success that was not apparent in their earlier educational careers. In the same discussion, J. Levin and W. Levin (1991) also mentioned that these individuals may include former juvenile delinquents, drug addicts, alcoholics, educational 'burnouts,' and members of the urban underclass who, despite leaving the educational system voluntarily, return to experience their first academic success in college. This model illustrates how

late bloomers differentiate themselves from those who remain in education without genuine engagement, driven more by societal expectations than personal motivation. In contrast, late bloomers often exhibit renewed purpose, fuelled by personal growth, career aspirations, and a desire for social integration.

The phenomenon of continuing study at a later age among adult learners is driven by a complex interplay of motivational factors, which can be broadly categorised into intrinsic and extrinsic motivations and the influence of personal, socio-relational, and environmental factors. Intrinsic motivations, such as a desire for self-improvement, play a crucial role in late bloomers' decisions to return to education, particularly as they seek to overcome earlier perceived failures or missed opportunities (Lockhart et al., 2013). Intrinsic motivations are pivotal, with many youths and adults pursuing education for personal development, a desire for cognitive stimulation, and a sense of purpose and motivation contributing to successful ageing and prolonged health (Subramanyam et al., 2024). This internal drive is often fuelled by a desire for self-fulfilment, the joy of learning, and the aspiration for professional advancement and improving the quality of lifestyle (Verasingam et al., 2020). Additionally, the quest for ontological security and the influence of habits highlight the complex interplay between individual agency and social structures in motivating older adults to learn (Heinz et al., 2022).

Extrinsic motivations, such as pursuing career advancement, monetary gains

(Yasuzato & Katagiri, 2019), and social pressures (Hachem, 2022), also play a significant role. These external factors often stem from the need to remain competitive in a job market that increasingly values higher educational qualifications (Evans et al., 2013). In this context, late bloomers may feel compelled to return to education to secure job stability or career progression (Evans et al., 2013). This is particularly relevant in Malaysia, where government policies and corporate structures increasingly prioritise formal qualifications, even for those who have substantial work experience.

Moreover, learning programmes' educational and cultural benefits are attributed to external motivations by providing opportunities for social interaction and community engagement (Lukianova, 2016). Personal factors, such as past learning experiences and access to learning opportunities, significantly influence the continuation of learning in older age (Ilie, 2019). Socio-relational factors, including support from family and peers and the role of instructors, create a conducive learning environment that encourages continued participation (Tavares et al., 2017). Family support plays a crucial role in Malaysia, where familial expectations and responsibilities are often deeply intertwined with individual aspirations. This support, both moral and financial, is key to the success of many late bloomers (Nicholas et al., 2008). Environmental and societal changes, including integrating digital technologies in education, have made learning more accessible and appealing to

older adults, motivating them to engage in lifelong learning (Devanesan, 2020; Ilie, 2019). In Malaysia, studies on adult learners' readiness for MOOCs further highlight how digital competencies, self-regulation, and motivation shape late bloomers' capacity to benefit from flexible online learning opportunities (Ghazali et al., 2021). The availability of distance learning programmes and flexible learning schedules helps overcome barriers such as financial constraints and time limitations. These technological advancements have gained even more importance in the post-pandemic world, where online and hybrid learning models provide flexibility for individuals balancing work, family, and education. For Malaysian late bloomers, the rise of online learning platforms has been particularly beneficial, offering them the opportunity to pursue higher education while fulfilling work and family responsibilities (Muniandy et al., 2022).

Therefore, the motivation behind continuing study at a later age among adult learners is multifaceted, encompassing intrinsic desires for personal growth and cognitive engagement, extrinsic factors related to career and social pressures, and the supportive role of personal, socio-relational, and environmental factors. Understanding these factors is crucial for designing educational programmes that cater to the unique needs of late bloomers and promote lifelong learning as a pathway to both personal fulfilment and professional success. By tailoring educational programmes to the unique motivations and challenges of

late bloomers in Malaysia, educators and policymakers can foster a more inclusive and supportive learning environment that encourages continued participation in higher education.

Motivational Theories and Lifelong Learning: A Framework for Late Bloomers

Understanding the motivations that drive adults to re-engage in formal education requires a comprehensive lens that considers both psychological and contextual factors. Two key theoretical perspectives, Self-Determination Theory (SDT) and frameworks from the lifelong learning literature, offer valuable insights into how motivation operates across different life stages, particularly among individuals returning to education after a significant hiatus.

Self-Determination Theory (SDT), developed by Ryan and Deci (2000), provides a foundational psychological framework for analysing human motivation. It distinguishes between intrinsic motivation, which arises from genuine interest or enjoyment, and extrinsic motivation, which is driven by external rewards or social pressures. Crucially, SDT posits that optimal motivation and sustained engagement are achieved when three basic psychological needs are fulfilled: autonomy (a sense of volition and self-direction), competence (a feeling of capability and effectiveness), and relatedness (a sense of belonging and social connection). These elements are particularly salient for individuals who

return to education later in life, as they often face the challenge of overcoming previous academic setbacks, limited support systems, or socio-economic constraints. SDT offers a nuanced lens to understand how such learners rebuild self-confidence, reconnect with educational environments, and develop a renewed sense of purpose.

Complementing this psychological perspective, theories within the lifelong learning domain underscore the significance of agency, experience, and adaptability in adult learning. Loeng (2020) highlights self-directed learning as a hallmark of adult education, emphasising the learner's capacity to take initiative, set personal goals, and actively manage the learning process. Wahl and Gerstorf (2020) further stress that adult learning is inherently contextual, shaped by the learner's life stage, accumulated experiences, and social environment. For late bloomers, these theories shed light on how motivation is not only internally driven but also closely linked to life transitions, career aspirations, or the desire for personal fulfilment. Their pathways are often complex, requiring flexible and empathetic educational structures that acknowledge their distinct needs and trajectories.

Together, these theoretical approaches offer a multidimensional understanding of motivation in the context of lifelong learning. SDT explains the internal mechanisms that sustain engagement, while lifelong learning theories situate these mechanisms within broader life circumstances. Integrating these perspectives provides a robust conceptual

foundation for exploring how late bloomers navigate educational opportunities, particularly within the evolving landscape of adult and continuing education in Malaysia.

METHODOLOGY

This study employed a qualitative research design grounded in a phenomenological approach, aiming to explore the lived experiences of individuals within a defined social context. Phenomenology, as mentioned by Creswell (2014), emphasises the in-depth understanding of participants' subjective experiences and the meanings they ascribe to those experiences. In alignment with this tradition, the current study sought to investigate participants' perceptions, emotions, challenges, and adaptive strategies in navigating the social phenomenon under examination. The selection of phenomenology as the research typology was deliberate and justified by the study's overarching objective to uncover and interpret the essence of shared human experiences within a specific demographic and situational context. This design provided the researchers with a powerful lens through which to engage deeply with participants' perspectives, facilitating rich, contextually nuanced insights into their thought processes and lived realities. Data collection was executed through semi-structured interviews, which enabled a balance between guiding the conversation and allowing for emergent themes. This flexible interview format also empowered participants to articulate their views freely while ensuring the core areas of inquiry were systematically explored.

A total of twelve informants were recruited for this study through a combination of purposive sampling and snowball sampling techniques. These sampling strategies were implemented sequentially to ensure both targeted representation and access to participants who met specific inclusion criteria. The purposive sampling phase involved the selection of participants using data retrieved from the university's student information system, accessed with formal institutional approval prior to the data collection phase. Participants in this study were selected based on specific inclusion criteria to maintain the focus and relevance of the research. They were: (1) Malaysian citizens aged between 25 and 40 years; (2) residing in urban areas within Kuala Lumpur; (3) currently pursuing a bachelor's degree at a higher education institution; and (4) from households with a monthly income level of RM 4,000.00 or below. In Table 1, the study's demographic profile is shown:

Following the purposive phase, snowball sampling was employed to identify additional participants who fit the study's strict inclusion parameters. Existing participants were invited to refer peers or acquaintances who met the specified criteria. This approach enhanced the efficiency of participant recruitment and addressed the challenge of identifying suitable individuals within a constrained demographic niche, thus ensuring the selection of high-quality, information-rich cases. Data were collected through in-depth, semi-structured interviews, guided

Table 1
Demographic

Informant	Age (year)	Gender	Monthly income (RM)
A	27	Male	2,700.00
B	26	Male	1,500.00
C	27	Female	900.00
D	31	Male	2,700.00
E	26	Female	No income
F	27	Female	No income
G	37	Male	3,000.00
H	29	Male	3,000.00
I	39	Female	3,800.00
J	29	Male	3,500.00
K	28	Female	3,000.00
L	28	Male	2,700.00

by a set of open-ended questions developed through an extensive review of relevant literature. These questions were further subjected to expert validation by academic professionals specialising in the field, to ensure content relevance and construct validity. The interview protocol explored three main domains: career advancement, intrinsic motivation, and family support. Each interview was conducted individually and lasted approximately two to two and a half hours, allowing sufficient time for detailed exploration.

In addition, participant recruitment continued until thematic saturation was reached, with no new codes or themes emerging from subsequent interviews. All sessions were audio-recorded with participants' informed consent and later transcribed verbatim within 48 hours of completion to preserve the integrity and

accuracy of the data. To enhance credibility and trustworthiness, the transcribed texts were shared with the respective participants for member checking, a process through which participants could confirm, clarify, or amend their statements to ensure authentic representation.

Following transcription and participant validation, the data underwent a systematic thematic analysis. This analytic approach involved coding the data, which is known as a multi-phase coding process: open, axial, and selective coding to identify patterns, categories, and overarching themes that emerged from participants' narratives. The analysis was iterative and interpretative, consistent with phenomenological research principles, allowing the researchers to distil meaning structures and generate grounded insights into the social phenomenon under investigation.

Analysis

Theme 1: Career Advancement

The study explores career motivation as a significant factor driving individuals to pursue higher education. It highlights how investing in education for career development is viewed as securing prospects. Notably, the research emphasises the correlation between educational attainment and improved social status within careers. Findings reveal that informants prioritise career fields that offer job security, leading them to seek higher education for better qualifications. This is supported by Barroso-Hurtado and Chan (2019) and Kamrozzaman et al. (2019), who underscore the role of education in enhancing career prospects.

In 2014, there was a turning point for me. I told my mother I wanted to quit and find a job. However, even if I wanted to work with just a diploma, the scope of work was very limited because it was in the religious field. So, the main factor was to obtain a good job. That was the main factor that drove me to continue studying. (Informant F)

This narrative reflects a decision-making process shaped by structural limitations in the job market. Informant F demonstrates how career limitations in specific sectors (such as religious services) motivated a return to education, where the goal was not abstract improvement but concrete upward mobility.

At that time, I was working in the accounting department. So, to obtain

the ACCA certificate, a basic degree is required. That is why I pursued a degree. For the enhancement of my career status. (Informant D)

Informant D's quote reveals how institutional requirements (e.g., ACCA prerequisites) create a pathway that necessitates educational advancement, suggesting a systemic push towards lifelong learning for career continuity.

In addition, this study highlights that salary increment is a contributing factor driving informants to pursue higher education. The rising cost of living compels people to recognise the enhanced benefits that come with higher education levels. This aspect also receives attention from several researchers who explain that salary increment is a primary motivator for individuals already in the workforce to continue their education (Nordlund et al., 2013; Blossfeld et al., 2014; Boeren & Holford, 2016; Midtsundstad, 2019). This also provides a solution to addressing the escalating cost-of-living issue. Therefore, salary increment and promotion emerged as intertwined motivations:

It is also because of the salary factor. Since promotions are time-based, I need ten years of work experience to reach grade 32. Earning around RM4k-RM5k per month is okay to support a better life. However, it's not like I am studying just for the money. One of the factors that makes me want to continue studying is the salary. (Informant A)

Secondly, it's about the salary. Typically, there's a considerable gap between diploma and degree holders' salaries, possibly hundreds. However, at the time, the organisation didn't value diplomas much, especially in terms of pay—it was low. Higher pay would have been preferable, especially considering the cost of living in the city. (Informant B)

These insights showcase how the perceived economic returns of a degree, such as greater job security, salary, and promotion, act as compelling extrinsic motivators.

The researcher found that promotion is one element contributing to the need for informants to pursue higher education. This aligns with the discussion on salary increments previously mentioned. Therefore, informants must choose to further their education to ensure their chances of being promoted to the next level are more accessible with the academic qualifications required in their job scopes. The study also explains that most of the working population will choose opportunities to continue their education as a platform to build their careers and elevate their status to a better level (Blossfeld et al., 2014; Midtsundstad & Nielsen, 2019; Talib et al., 2024).

I'm fine spending money on commuting for studies now because it'll pay off with a promotion later. Our organisation lacks U41 positions despite many having degrees. Completing this programme could fast-track me to U41,

with a higher salary and rank quickly. There's a position for a psychology and counselling officer in our department, so my degree could place me there to work with patients. Whenever there's a vacancy, they'll call to fill it. (Informant A)

Informant A conceptualises his educational pursuit as a long-term investment with clear institutional outcomes, tying motivation to real-world benefits such as access to specific job grades and positions.

Oh, for sure. When there's demand from the organisation to tackle work challenges, it's a plus point for me. Whether it's applying for a higher position or annual increments, it adds value. Otherwise, there's no reason for promotion if there's no effort to advance. So, at least there, there's added value. (Informant I)

Theme 2: Self-motivation

In this study, the element of self-motivation (Elekwa, 2021) within each informant greatly contributes to their strong drive toward education. This makes the informants clear about their goals and purposes for pursuing further education at higher levels. The study found that this element of self-need encompasses several values that give meaning to each informant in instilling motivation to pursue higher education. According to Maslow's Theory (1943), self-need is a level that individuals strive to achieve to realise their potential (McLeod, 2018).

Therefore, these self-needs translate into the desires an individual aims to achieve to ensure their aspirations and dreams become a reality.

For informant F, her desire to achieve her aspirations as a public speaker in the mental health field is profound. This makes her always enthusiastic and highly motivated in the studies she pursues.

I aspire to be a public motivational speaker, and my passion for writing, especially poetry, aligns well with my counselling journey. Discovering my illness ignited a desire to understand it better, driving my motivation to continue studying. I want to delve deeper into the subject, feeling that my past struggles shouldn't go to waste. (Informant F)

Informant F views education not just as a tool for employment but as part of a larger identity transformation. Her motivation stems from turning personal adversity into purpose, which resonates with Maslow's concept of self-actualisation.

In addition, referring to the element of self-belief, this study found that several informants exhibited a profound belief in their ability to pursue education even at a later age. The psychological strength within them makes them more transparent about their personal goals to achieve success through educational attainment (Solberg et al., 2012).

First, it's because of myself. I'm a former MRSM student. When I think

back, having only a diploma made my self-esteem very low. So, I had to do something. Then, I was determined to continue studying because I wanted to be as successful as my other friends. (Informant D)

Informant D connects his educational motivation to personal esteem and a desire to match peer success. The quote illustrates how intrinsic motivation can arise from internalised comparisons and a restored self-image.

Seriously. We need to recognise our strengths. For me, life is not just about what we achieve. It's about falling and how strong you are to get up every time you fall. In other words, it's about knowing ourselves. If you want to hold onto something that isn't yours, it will hurt. Honestly, there's worry, but I've never felt like I won't finish learning. Because I'm determined to finish this degree. (Informant E)

Here, education is framed as a personal journey of resilience and perseverance. Informant E's statement exemplifies a growth mindset and the deep psychological strength required for late bloomers to persist.

Theme 3: Family Support

The family institution plays a crucial role in providing its members with physical and spiritual support. Additionally, it serves as the most profound connection in everyone's life, fostering feelings of love and mutual dependence among its members. This is

also supported by several previous studies, stating that family support is highly essential and necessary for individuals to provide confidence and support as motivators for them to continue their studies until successful completion (Boeren & Holford, 2016; Hamzah et al., 2022; Mello & Braga, 2018).

In this study, on average, informants consider parental support as their primary motivation to pursue higher education. This support makes them more enthusiastic and motivated, even when facing challenges. This is supported by research emphasising parental prioritisation of their children's educational success (Fischer et al., 2017; Kilpatrick et al., 2020).

They said it's fine. Once you start, make sure you finish. Don't quit halfway. So, I'm okay. They encourage me to continue studying. My dad has a master's and always pushes me to get a degree. My parents are overseas graduates, strong motivators for me to aim higher in education. (Informant D)

If I feel like giving up, my mom pushes me to finish my studies. She always encourages and supports me, along with my dad. (Informant A)

These narratives reveal that emotional reinforcement from parents functions as a critical support mechanism. It reinforces motivation during periods of doubt and acts as a psychological buffer against burnout or dropout.

My family says, 'You can do it, just keep going. Finish it first, whether you like it or not, you must finish that journey. (Informant J)

My parents provide moral support for me to continue studying. (Informant K)

The shared sentiment reflects how familial validation and encouragement serve as persistent motivators. This aligns with collectivist values in Malaysian culture, where family often plays a central role in individual goal setting.

On the other hand, it is undeniable that sibling relationships are not merely blood ties but also have an impact on an individual's life within the family (Burke et al., 2017). Similarly, as reported in a study conducted by Hamzah et al. (2022), one of the elements contributing to success among youth in pursuing education is their family members. The researcher clearly observes this through study findings, where sibling relationships also influence motivational drive and enthusiasm among informants to succeed in education.

According to informant A, the academic success achieved by both his older and younger siblings motivates him to pursue higher education. They serve as close role models for him in achieving success in life. He said:

My sister has a degree in Electrical Engineering and is now pursuing a master's. My younger sibling is also in the final semester of their degree. So, I am the only one who has just

a diploma. I am the only male with only a diploma. So, I feel challenged. Therefore, I decided to keep going until I succeed like my sister and brother. (Informant A)

Informant A's motivation is rooted in sibling comparison and a desire for parity. This reveals how educational ambition is often cultivated within family environments that set collective benchmarks for success.

In addition, this sentiment is echoed by informants C and D, where the achievements of their siblings serve as motivation for them to pursue higher education:

Alhamdulillah, all of us have quite impressive academic qualifications. Some have completed their degrees, while others are still pursuing them. There are five siblings, and I am the second child. (Informant C)

Another reason is when I look at my siblings, my sister has a degree. So, it's not enjoyable if I am the only one without a degree. (Informant D)

These reflections highlight how educational achievement can be a source of familial pride and belonging, motivating individuals to align themselves with familial expectations.

RESULTS AND DISCUSSION

Demographic and socio-economic factors emerged as critical influences on participants' motivation to pursue higher education. Their economic positioning

intensified the perceived value of education as a strategic means of social and economic mobility. Financial constraints, rather than discouraging participation, often reinforced the urgency of acquiring qualifications to secure stable employment and upward mobility. Gender also played a notable role in shaping motivational drivers. Male participants frequently cited a sense of familial responsibility as a motivating force, whereas female participants expressed motivations grounded in personal growth and emotional resilience. Age differences further influenced learning goals: younger participants were typically focused on future career development, while older learners, often referred to as "late bloomers", sought to regain educational momentum or achieve parity with peers and siblings.

Career motivation is one of the factors arising from the work environment faced by informants. Those already employed are driven to pursue further education due to various career aspects such as field of work, salary increments, promotions, and understanding and maturity in job matters. The field of work is driven by the informants' desire to enhance their career status while assuring a more secure job. In addition, improvement in socio-economic status motivates individuals to continue their education. With the promise of salary increments offered by employers, it is expected that this group chooses to pursue education. It ensures better career status and higher salary returns. This aligns with the promotion aspect employers offer when having an education level equivalent to the

position offered. It indirectly guarantees a better career and future.

On the other hand, this study also acknowledges the importance of setting clear goals, which helps them stay motivated in their studies, overcome obstacles to success, and contribute positively to society through their achievements. The desire for self-advancement inspires each participant to succeed in life. They believe that failure is temporary as long as they strive for improvement toward success. This aspiration is also driven by the desire to recognise their potential and never give up. Moreover, self-confidence plays a significant role in motivating participants to succeed, supported by psychological strength, observing and emulating peers' success, and feeling inspired by their spouse's achievements. All these elements significantly motivate the participants to strive for more tremendous success.

Furthermore, parental support is the closest and most significant factor influencing late bloomers' motivation to pursue higher education. This is because parental attempts to counsel and offer their kids consistent support to achieve in school have a significant impact. Furthermore, communicating with parents about problems helps them stay motivated to finish their education since it gives them confidence-boosting advice that encourages them to work hard in their studies. Moreover, parents who help with home concerns and are generally understanding also considerably lessen the burden on these late bloomers, enabling them to concentrate more on their education.

Interestingly, several unexpected insights surfaced from the participants' stories. While most informants shared that their motivation to pursue higher education stemmed from practical needs such as career advancement, job security, or salary improvement, a few offered deeply personal perspectives that went beyond professional goals. Informant F spoke about using education as a path to recover from mental health struggles and to fulfil a long-held passion for public speaking. These accounts remind us that learning is not always about climbing the career ladder; sometimes, it's about healing, rediscovering oneself, and embracing personal growth.

There were also moments where participants' experiences of family support revealed emotional complexity. Although many described their families as a steady source of encouragement, others, like Informant C, felt a quiet pressure to live up to the achievements of their siblings. In these cases, support was tinged with a sense of obligation, showing that what motivates us can sometimes be a mix of love, expectation, and comparison. It highlights how family encouragement can be both empowering and emotionally demanding at the same time.

Family, Career, and Self in the Educational Pathways of Adult Learners

While the three primary motivational themes were generally consistent across participants, some nuanced contradictions and unexpected insights emerged. For instance, although family support was

predominantly positive, a few participants shared the emotional pressure from high family expectations. This suggests that while support systems bolster motivation, they can simultaneously introduce stress, particularly when participants balance work, education, and personal life. Moreover, although career advancement was frequently cited as the initial motivator for returning to education, it did not always sustain motivation over time. Participants noted that their goals evolved throughout their academic journey in several cases. As one informant described, while salary increments were initially appealing, the intrinsic joy of learning and fulfilment became more central as they progressed. This shift from extrinsic to intrinsic motivation was unanticipated and reflects the dynamic nature of adult learners' motivations.

A significant insight is the interconnectedness of the three themes. Career aspirations often acted as the entry point into education, while intrinsic motivation and family support played critical roles in maintaining momentum. For example, participants who started their degree to meet career goals frequently drew on family encouragement during challenging moments and experienced increased intrinsic satisfaction. In this way, the three themes operated less as isolated factors and more as interdependent elements in a holistic motivational system. Their synergy contributed to sustained participation in higher education among late bloomers.

Participants' narratives reflect a rich interplay between external career-driven

motivations, internal psychological resilience, and familial encouragement. The manifestation of these themes in lived experiences underscores the complex, layered nature of motivation among late bloomers in Malaysia. By presenting not only what participants said but also how these motivations shaped their educational journeys, this study provides a more credible and nuanced understanding.

Theoretical Contributions

Reinforcing and Recontextualising Self-Determination Theory (SDT)

SDT posits that human motivation is shaped by fulfilling three fundamental psychological needs: autonomy, competence, and relatedness. This study affirms the applicability of SDT among adult learners, showing that although many participants initially pursued higher education due to extrinsic motivations such as promotions or salary increments, as highlighted by Informants A, B, and D, their motivation evolved into more intrinsic forms as they progressed through their studies. Participants described a growing sense of self-worth, personal success, and fulfilment, aligning with the developmental trajectory posited by SDT (Ryan & Deci, 2000; Solberg et al., 2012).

I want to be a motivational speaker...
I do not want my life journey to go to waste. (Informant F)

I have fallen before, but now I know my potential... I must prove that I can succeed. (Informant E)

Notably, the element of relatedness, often considered a secondary motivator in SDT, emerged in this study as a primary and enduring force. Several participants cited familial expectations, sibling achievements, and parental support as central to their educational persistence:

I am the only male in the family with just a diploma... All my siblings have degrees. (Informant A)

My parents always remind me to finish my studies. They constantly support me. (Informant D)

In the collectivist Malaysian context, relatedness operates as emotional support and normative pressure, forming an internalised social obligation. This expands the understanding of SDT by demonstrating that in collectivist cultures, relatedness may function as a core motivational axis, rather than a peripheral one (Cockburn et al., 2022).

International Comparison of Late Bloomer Motivation

This study's findings are compared with those of similar research conducted internationally to provide a broader perspective. In the United States, Levin and Levin (1991) found that late bloomers often return to education driven by personal transformation, resilience, and self-directed growth characteristics echoed in the Malaysian context.

I almost quit school before... but now I know why I must continue for my future and my family. (Informant C)

I am not studying just for money. I want to prove that I'm capable too. (Informant E)

However, unlike Western studies, where motivations tend to be individualistic, Malaysian participants strongly relied on familial support systems, underscoring the influence of collectivist cultural values. In contrast, European research (Bélanger, 2015) often frames lifelong learning through economic reintegration policies, emphasising workforce productivity over psychosocial development. In Japan, structural challenges such as credentialism and job market rigidity have been identified as significant motivators (Billett et al., 2022), which parallels the Malaysian late bloomers' emphasis on educational qualifications as gateways to promotion. These comparisons highlight universal and context-specific dimensions of adult motivation, suggesting that policy frameworks must be sensitive to national and cultural differences when addressing the needs of late bloomers.

Practical Contribution

This study extends existing research on adult learning motivation by examining how motivational themes, namely career advancement, intrinsic motivation, and family support, manifest within the distinct socio-cultural and economic context of urban low-income late bloomers in Malaysia.

In addition, these findings highlight the centrality of family expectations and evolving motivations, where extrinsic career goals often shift toward intrinsic self-fulfilment. These insights contribute to a more dynamic and context-sensitive understanding of adult learner motivation, calling for policies that reflect the lived realities of late bloomers in developing nations.

Policy Recommendations for Supporting the Educational Development of Late Bloomers

Drawing on this study's findings, this section outlines four key policy recommendations targeting multiple stakeholders: individual learners, families, universities, and government policymakers. These integrated strategies aim to address motivational challenges and foster equitable participation in lifelong learning among urban low-income late bloomers.

An important contextual factor in shaping these recommendations is Malaysia's national commitment to lifelong learning. Notably, the Blueprint on Enculturation of Lifelong Learning for Malaysia (2011–2020) emphasised inclusive access through flexible learning pathways, modular programmes, online education, and the Recognition of Prior Learning (RPL). These frameworks aim to widen participation and theoretically support late bloomers. However, this study's findings reveal that implementation gaps persist. Despite the policy architecture in place, many late bloomers from low-income

urban areas continue to face financial barriers, limited psychosocial support, and inflexible work-study arrangements. The current policy focus does not fully address the emotional, structural, and cultural challenges unique to adults returning to higher education later in life. Therefore, a more targeted and inclusive policy approach is needed, one that bridges these gaps and aligns national objectives with the lived experiences of late bloomers.

Individual-level Interventions

At the individual level, targeted interventions are essential to support late bloomers in their educational and professional development journeys. A primary focus should be on building self-confidence and enhancing self-efficacy, which can be achieved through structured mentoring systems and goal-setting initiatives embedded within lifelong learning frameworks. These interventions help mitigate the fear of failure and foster a growth-oriented mindset. Additionally, policies must promote reflective learning practices and provide robust career guidance services. Such measures enable individuals to explore their potential more effectively by identifying their unique strengths, clarifying career aspirations, and designing personalised learning pathways that align with long-term goals.

Family Engagement Policies

Family engagement plays a pivotal role in sustaining the motivation and perseverance of adult learners, particularly those who return to education later in life.

To harness this potential, national family education initiatives should incorporate dedicated modules that emphasise emotional support, shared responsibility in educational pursuits, and the promotion of mental wellness within the household context. Such efforts help create a nurturing and stable learning environment. Furthermore, policy measures should actively encourage parental and spousal involvement through targeted awareness campaigns and university-led family engagement programmes. These strategies not only strengthen the learner's support network but also foster a culture of collective educational commitment within families.

Institutional Support from Higher Education Providers

Higher education institutions must adopt inclusive and adaptive designs to effectively support part-time, distance, and non-traditional learners who are late bloomers navigating complex life circumstances. A critical step in this direction is expanding flexible academic advising systems, integrating blended learning platforms, and establishing adult-focused learning centres that cater specifically to diverse learner profiles. Moreover, university counselling units should evolve into proactive support systems, with trained professionals capable of identifying at-risk learners early in their academic journey. By providing continuous psychosocial and academic assistance, these units can play a transformative role in enhancing student retention and fostering long-term success for late bloomers.

Government Policy and Systemic Reform

Policymakers must significantly expand financial aid schemes to foster equitable access to lifelong learning, particularly for adult learners from low-income urban communities. This includes the provision of scholarships, living allowances, and targeted subsidies for digital learning resources, which collectively reduce the economic barriers that often hinder educational advancement. In parallel, governments should enact work-study balance policies that recognise the dual responsibilities of working learners. Legislative measures such as educational leave entitlements and employer incentives are essential in promoting a sustainable integration of work, life, and study. Together, these initiatives can empower adult learners to pursue higher education without compromising their economic or personal well-being.

Cross-cultural Applicability and Global Relevance

Although the findings are situated within the Malaysian context, they are relevant to other multicultural and developing country settings. The motivational themes of economic necessity, familial responsibility, and personal redemption identified in this study are consistent with challenges faced by adult learners in many regions across Southeast Asia, the Middle East, and other countries.

These insights support the argument that international adult learning models should be adaptable to local cultural realities,

particularly in societies where education remains strongly interwoven with familial expectations and community norms. As Salleh (2019) and Kassim et al. (2019) suggest, the future of adult learning lies in its ability to integrate global frameworks with local values and needs. Thus, this study contributes to regional policy and practice and provides a culturally grounded perspective that can enrich comparative research and international education development efforts.

These recommendations align with Sustainable Development Goal 4 (SDG 4), which advocates inclusive and equitable quality education and lifelong learning opportunities for all. Implementation of these measures will contribute to a more resilient, adaptable, and inclusive higher education ecosystem in Malaysia.

CONCLUSION

In conclusion, belief in oneself is crucial for late bloomers to succeed despite challenges in continuing education. Clear goals help reduce the risk of failure and instil self-confidence. Continuous motivation is essential to stay focused on goals. Late bloomers should explore their potential and maintain a positive mindset to overcome limitations and seize opportunities for self-improvement. Family support is vital in promoting education among late bloomers, instilling positive values, and providing moral support. Support from parents, encompassing communication and social support, is significant for late-bloomer students facing learning challenges.

Studies show that parental and family support fuels late bloomers' success and motivates them to make their parents proud. Therefore, late bloomers should receive moral support from family members to build motivational, solid spirits for success.

However, this study is not without limitations. The relatively small sample size and the focus on urban Malaysian late bloomers aged 25 to 40 limit the generalizability of the findings. Participants were selected through purposive sampling, which may introduce selection bias and overlook perspectives from rural areas, those not currently enrolled, or individuals facing more severe socio-economic barriers. Additionally, cultural factors such as family expectations and social norms about adult learners in Malaysian society may have shaped both participants' experiences and their willingness to share openly. These limitations suggest caution when applying the findings to other cultural or demographic contexts.

Future research should investigate how lifelong learning affects late bloomers and identify other elements that support their achievement. It is crucial to get deeper into the strategies and interventions to assist them in their educational journey and improve their general development. Research should also concentrate on comprehending the long-term effects and implications of lifelong learning for late bloomers, including their potential for professional success and personal development.

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REFERENCES

- Bárány, Z., Buchinsky, M., & Corblet, P. (2023). *Late bloomers: The aggregate implications of getting education later in life*. National Bureau of Economic Research. <https://doi.org/10.3386/w31874>
- Barroso-Hurtado, D., & Chan, R. (2019). Why enrol in a lifelong learning programme? A comparative study of Austrian and Spanish young adults. *Social Inclusion*, 7(3), 110-121. <https://doi.org/10.17645/si.v7i3.2088>
- Bélanger, P. (2015). Adult learning in modern societies: An international comparison from a life-course perspective. *International Review of Education*, 61(4), 563-565. <https://doi.org/10.1007/s11159-015-9488-7>
- Billett, S. (2022). Lifelong learning. *Oxford Research Encyclopedia of Education*. <https://doi.org/10.1093/acrefore/9780190264093.013.1787>
- Blossfeld, H.-P., Kilpi-Jakonen, E., Vono de Vilhena, D., & Buchholz, S. (Eds.). (2014). *Adult learning in modern societies*. <https://doi.org/10.4337/9781783475186>
- Boeren, E., & Holford, J. (2016). Vocationalism varies (a lot). *Adult Education Quarterly*, 66(2), 120-142. <https://doi.org/10.1177/0741713615624207>
- Brink, S. (2017). Learning in later years in the lifelong learning trajectory. *Journal of Intergenerational Relationships*, 15(1), 14-25. <https://doi.org/10.1080/15350770.2017.1260391>
- Burke, M. M., Lee, C. E., Chung, M. Y., Rios, K., Arnold, C. K., & Owen, A. (2017). Individual and family correlates of community living options among adults with intellectual and developmental disabilities. *Inclusion*, 5(4), 279-292. <https://doi.org/10.1352/2326-6988-5.4.279>
- Cockburn, J. G., Tan, C. Y., Poh, D. C. S. C., Tan, D. J., Foong, C. C., & Hong, W. (2022). Mental health and self-determination profiles of the diverse population of medical students in Malaysia during the COVID-19 pandemic. *BMC Psychology*, 10(1), Article 59. <https://doi.org/10.1186/s40359-022-00759-y>
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). SAGE Publications.
- Devanesan, J. (2020, October). Microsoft Malaysia – every student has a chance with the right tech. *Tech Wire Asia*. <https://techwireasia.com/10/2020/microsoft-malaysia-every-student-has-a-chance-with-the-right-tech/>
- Elekwa. (2021). Motivation as an enhancement strategy for adult learning in a learning process. *Worldwide Journal of Multidisciplinary Research and Development*, 7(3), 50-53.
- Evans, K., Schoon, I., & Weale, M. (2013). Can lifelong learning reshape life chances? *British Journal of Educational Studies*, 61(1), 25-47.
- Fischer, S., Barnes, R. K., & Kilpatrick, S. (2017). Equipping parents to support their children's higher education aspirations: A design and evaluation tool. *Educational Review*, 71(2), 198-217. <https://doi.org/10.1080/00131911.2017.1379472>
- Ghazali, N., Mustakim, S. S., Nordin, M. S., & Hashim, S. (2021). Assessing the psychometric properties of students' MOOC-efficacy measurement model. *Pertanika Journal of Science & Technology*, 29(S1). <https://doi.org/10.47836/pjssh.29.s1.12>

- Hachem, M., Daignault, K., & Wilcox, G. (2022). Impact of educational neuroscience teacher professional development: Perceptions of school personnel. *Frontiers in Education*, 7, Article 912827. <https://doi.org/10.3389/feduc.2022.912827>
- Heinz, M., Benton, N., & Gleissner, L. (2022). Sources of intrinsic motivation in later adulthood: A qualitative analysis. *Innovation in Aging*, 6(Supplement_1), 576-577. <https://doi.org/10.1093/geroni/igac059.2169>
- Hamzah, A., Sueb, R., Alias, N., Syed Mustafa, S., & Mohd Yusof, N. (2022). Motivation in learning: A case study of young adult learners in Kuala Selangor, Malaysia. *Asian Journal of University Education*, 18(2), 469-476. <https://doi.org/10.24191/ajue.v18i2.17999>
- Hasif, N., Rahman, M. A. A., Hasan, M. R., Othman, N., Khaled, N., & Talib, A. (2024). Analysing dominant returns: Skill development and fulfilment in SDG solution projects in eastern Malaysia. *Journal of Technical Education and Training*, 16(2), Article 023. <https://doi.org/10.30880/jtet.2024.16.02.023>
- Ilie, V. (2019). Study on adult learning motivation. *International Journal of Human and Behavioral Science*, 5(1), 11-28. <https://doi.org/10.19148/ijhbs.543980>
- International Labour Organisation. (2022). *The ILO strategy on skills and lifelong learning 2030*. <https://www.ilo.org/publications/ilo-strategy-skills-and-lifelong-learning-2030>
- Jamil, M. R. M., Idris, N., Zalli, M. M. M., Rakami, N. M. H. N., & Putra, Z. H. (2024). Transforming inclusive digital pedagogy in Malaysian tertiary TVET: Adapting to a new educational landscape. *Journal of Technical Education and Training*, 16(2), Article 014. <https://doi.org/10.30880/jtet.2024.16.02.014>
- Kamrozzaman, N. A., Badusah, J., & Ruzanna, W. M. (2019). Coggle: SWOT analysis in lifelong learning education using online collaborative mind-mapping. *International Journal of Asian Social Science*, 9(1), 139-147. <https://doi.org/10.18488/journal.1.2019.91.139.147>
- Kamrozzaman, N. A., Badusah, J., & Ruzanna, W. M. (2020). Development of heutagogy approach in m-learning for sustainability education. *Education and Information Technologies*, 25(4), 3035-3047. <https://doi.org/10.1007/s10639-020-10101-x>
- Kassim, Z., Buang, N. A., & Halim, L. (2019). Needs of lifelong learning for professionalisation of industrial workers: Opportunities and challenges. *Journal of Adult and Continuing Education*, 25(1), 65-73. <https://doi.org/10.1177/1477971418809443>
- Kilpatrick, S., Burns, G., Katersky Barnes, R., Kerrison, M., & Fischer, S. (2020). Parents matter: Empowering parents to inform other parents of post-year 10 pathway options in disadvantaged communities. *Australian and International Journal of Rural Education*, 30(3), 21-35. <https://doi.org/10.47381/aijre.v30i3.275>
- Kuan, J., Kok, J., Tunku, U., & Rahman, A. (2014). Lifelong learning: The experiences of Malaysian school teachers. *Pertanika Journal of Social Sciences & Humanities*, 22(1), 147-163.
- Kasworm, C. E. (2009). Adult learners in a research university: Negotiating undergraduate student identity. *Adult Education Quarterly*, 60(2), 143-160. <https://doi.org/10.1177/0741713609336110>
- Laal, M. (2011). Barriers to lifelong learning. *Procedia – Social and Behavioral Sciences*, 28, 612-615. <https://doi.org/10.1016/j.sbspro.2011.11.116>
- Levin, J., & Levin, W. (1991). Sociology of educational late blooming. *Sociological Forum*, 6(4), 661-679.
- Lockhart, K. L., Keil, F. C., & Aw, J. (2013). A bias for the natural? Children's beliefs about traits acquired through effort, bribes, or medicine. *Developmental Psychology*, 49(9), 1669-1682. <https://doi.org/10.1037/a0030769>

- Loeng, S. (2020). Self-directed learning: A core concept in adult education. *Education Research International*, 2020, 1-12. <https://doi.org/10.1155/2020/3816132>
- Lukianova, L. (2016). Motivation factors of adult learning. *The New Educational Review*, 44(2), 223-229. <https://doi.org/10.15804/tner.2016.44.2.18>
- McLeod, S. (2018). *Maslow's hierarchy of needs*. HCC Certificate in Counselling Skills.
- Mello, R. R., & Braga, F. M. (2018). School as learning communities: An effective alternative for adult education and literacy in Brazil. *Frontiers in Education*, 3, Article 114. <https://doi.org/10.3389/feduc.2018.00114>
- Midtsundstad, T. (2019). A review of the research literature on adult learning and employability. *European Journal of Education*, 54(1), 13-29. <https://doi.org/10.1111/ejed.12321>
- Midtsundstad, T., & Nielsen, R. A. (2019). Lifelong learning and the continued participation of older Norwegian adults in employment. *European Journal of Education*, 54(1), 48-59. <https://doi.org/10.1111/ejed.12322>
- Ministry of Higher Education Malaysia. (2011). *Blueprint on enculturation of lifelong learning for Malaysia (2011-2020)*. <https://uil.unesco.org/i/doc/lifelong-learning/policies/malaysia-strategy-blueprint-on-enculturation-of-lifelong-learning-for-malaysia-2011-2020.pdf>
- Mohd, R. F., Zulkifli, H., & Hamzah, M. I. (2024). Lifelong learning practices of primary school teachers: A systematic literature review. *International Journal of Evaluation and Research in Education*, 13(6), Article 3872. <https://doi.org/10.11591/ijere.v13i6.29597>
- Muniandy, R., Mutty, B., & Kandasamy, S. (2022). The Malaysian educational landscape since COVID-19. In *Handbook of research on Asian perspectives of the educational impact of COVID-19* (pp. 81-116). <https://doi.org/10.4018/978-1-7998-8402-6.ch007>
- Nicholas, T., Stepick, A., & Dutton Stepick, C. (2008). "Here's your diploma, mom!" Family obligation and multiple pathways to success. *The Annals of the American Academy of Political and Social Science*, 620(1), 237-252. <https://doi.org/10.1177/0002716208322781>
- Nordlund, M., Stehlik, T., & Strandh, M. (2013). Investment in second-chance education for adults and income development in Sweden. *Journal of Education and Work*, 26(5), 514-538. <https://doi.org/10.1080/13639080.2012.664633>
- Othman, I. W., Mokhtar, S., Lebai Ahmad, M. K., Diming, R., Ag Bakar, K., & Yusoff, M. S. (2023). Decision dilemmas: Higher education pursuits or workforce entry among SPM graduates. *International Journal of Entrepreneurship and Management Practices*, 6(23), 190-223. <https://doi.org/10.35631/ijemp.623014>
- Pascua, C. M. R., Tanilon, A., Cariaga, J. M., Rivera, K. C., Lopez, M. L., Sena, S. M. N., & Oscar, O. A., Jr. (2024). From beginners to achievers: Unlocking the late bloomers academic journey. *Diversitas Journal*, 9(3). <https://doi.org/10.48017/dj.v9i3.3082>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Salleh, N. B. M. (2019). *Understanding policy and practice in lifelong learning in Malaysia: A case study of rural and urban community colleges* (Doctoral dissertation, University of Warwick).
- Schuetze, H. G., & Slowey, M. (2002). Participation and exclusion: A comparative analysis of non-traditional students and lifelong learners in higher education. *Higher Education*, 44(3-4), 309-327. <https://doi.org/10.1023/A:1019898114335>

- Solberg, V. S., Howard, K., Gresham, S., & Carter, E. (2012). Quality learning experiences, self-determination, and academic success. *Career Development and Transition for Exceptional Individuals*, 35(2), 85-96. <https://doi.org/10.1177/0885728812439887>
- Subramanyam, A. A., Somaiya, M., & De Sousa, A. (2024). Mental health and well-being in children and adolescents. *Indian Journal of Psychiatry*, 66(Suppl. 2), S304-S319. https://doi.org/10.4103/indianjpsychiatry.indianjpsychiatry_624_23
- Talib, S. A., Nasri, N. M., & Mahmud, M. S. (2024). Expert teachers' point of view on mathematics teachers' readiness in becoming professional teachers. *Journal of Education and Learning*, 19(2), 634-644. <https://doi.org/10.11591/edulearn.v19i2.21857>
- Tavares, O., Sin, C., Cardoso, S., & Videira, P. (2017). Barriers to adults' continuing education. *ICERI Proceedings*, 1, 2938-2944. <https://doi.org/10.21125/iceri.2017.0830>
- UNESCO. (2023). *Collection of lifelong learning policies and strategies*. <https://www.uil.unesco.org/en/collection-lifelong-learning-policies-and-strategies>
- Verasingam, K., Supramaniam, K., Arumugam, N., & Sathyiasenan, S. D. (2020). A study on factors influencing young and matured adult learners to continue their education. *International Journal of Modern Languages and Applied Linguistics*, 4(2). <https://ir.uitm.edu.my/id/eprint/42790/1/42790.pdf>
- Wahl, H., & Gerstorf, D. (2020). Person–environment resources for aging well: Environmental docility and life space as conceptual pillars for future contextual gerontology. *The Gerontologist*, 60(3), 368-375. <https://doi.org/10.1093/geront/gnaa006>
- Yasuzato, C., & Katagiri, K. (2019). Factors promoting continued lifelong learning: Focus on the person–environment fit in Japan. *Innovation in Aging*, 3(Suppl. 1), S661-S662. <https://doi.org/10.1093/geroni/igz038.2450>
- Yucedal, H. M. (2022). Learning strategies in lifelong learning. *International Journal of Social Science Research and Review*, 5(9), 559-565. <https://doi.org/10.47814/ijssrr.v5i9.445>
- Zin, N. A. M., Tambi, N., & Manap, J. (2020). Impak kemiskinan bandar terhadap faktor kewujudan golongan belia lewat kembang di institusi pengajian tinggi (IPT) (Impact of urban poverty towards the existence factors of late bloomers among youth in higher education institutions). *Akademika*, 90(1). <https://doi.org/10.17576/akad-2020-90IK1-02>

Shedding Light on Healing: IPLT as a Brief Intervention for Psychological Recovery from Bullying. A Single-subject ABA Study Using DASS-21 Indicators

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ABSTRACT

Bullying among students has been identified as a source of major educational and psychological issues, which most of the time result in depression, anxiety, and stress. Despite increasing concern about bullying-related trauma, empirical evidence on brief and perceptual-based counselling interventions for psychological recovery remains limited. This research focused on determining the effectiveness of the Ifdil Perceptual Light Technique (IPLT), a trauma-informed counselling

method used to alleviate the psychological impact of bullying. Through a single-subject A-B-A design, five students who scored highly on DASS-21 were monitored during baseline, intervention, and follow-up stages. The IPLT intervention consisted of five brief sessions lasting approximately 10-15 minutes each. Both visual and quantitative analyses showed substantial reductions in depression, anxiety, and stress, which were corroborated by effect size, Percentage of Non-Overlapping Data (PND), and Reliable Change Index (RCI) results.

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Social validation observed changes in emotional well-being, sleep quality, confidence, and social interaction. These findings suggest that IPLT may provide a promising approach for facilitating emotional recovery from bullying-related trauma. Due to its short and organised sessions, IPLT may offer a viable brief intervention for school counselling contexts. Additional research with a bigger sample size and longer follow-up periods is needed to ascertain the duration of the effects.

Keywords: Bullying, counselling, DASS-21, IPLT, psychological well-being

INTRODUCTION

Bullying has become a significant problem in educational settings worldwide and has been consistently associated with negative psychological outcomes among students (Bhatia, 2023; Han et al., 2025). UNESCO reports that approximately one in three students has experienced bullying at school, highlighting the widespread nature of this issue. In Indonesia, bullying remains a serious concern, with numerous cases reported each year and increasing exposure through both direct and digital forms of interaction (Borualogo, 2025; Ding et al., 2024).

Alongside its impact on education, bullying can cause severe psychological and emotional trauma. It is also capable of changing the brain's structure and function of adolescent victims in the long term as they grow up. A growing number of studies have shown that areas of the brain involved in emotion regulation, stress, and decision-making can be affected by being bullied (Menken et al., 2023; Paillere-Martinot et al., 2023; Palamarchuk & Vaillancourt, 2022). Neurologically, the limbic system of bullying victims tends to be hyperactive, which upsets the prefrontal cortex, thus affecting cognitive abilities as well as

overall emotional regulation (H. Wang et al., 2024; Kenwood et al., 2022; Menken et al., 2023). The prolonged imbalance between these systems will increase the chances of cognitive impairment and difficulties in dealing with emotions such as anxiety, clinical depression, and even deviant behaviour (Bariyyah, Soejanto, et al., 2025; Gao et al., 2022; Suddell et al., 2023).

Students who are bullied often experience several types of emotional or psychological problems. These may include depression, anxiety, helplessness, anger, sleep problems, low self-esteem, and a feeling of being worthless. In extreme cases, these symptoms may resemble post-traumatic stress symptoms (Bhatia, 2023; Ifdil, Fadli, et al., 2019; Snodgrass et al., 2024). Studies consistently indicate that the trauma caused by bullying can have immediate and long-term effects. It not only hampers students' academic performance but also damages the quality of their social interactions and affects their overall mental health. Besides being bullied, victims of such behaviour may also become socially withdrawn, feel lonely, and may even lose interest in their surroundings (Franzen et al., 2021; Halliday et al., 2024; Kiing et al., 2025). Although school counselling is a

good initiative designed to support students who suffer from emotional problems, these services are mostly basic in nature and can take time before students really get help (Ifdil et al., 2024a; Ime, 2025; Manrique et al., 2020). In addition, such support may not be sufficient to heal the emotional damage caused by bullying trauma (Hikmat et al., 2024; Noret et al., 2025). Such drawbacks demonstrate the urgent need for more adaptive and focused counselling programmes to help bullying victims emotionally recover.

Different counselling methods have been introduced to reduce the psychological effects of bullying. CBT is one of the most popular methods, and it helps not only to lessen the signs of depression, anxiety, and thoughts of suicide but also to enhance students' empathy and coping skills (Ferraz De Camargo et al., 2023; Ime, 2025). Besides CBT, school-based interventions such as social support programmes, social skills training, and collaborative prevention initiatives involving teachers, parents, and students have shown potential in dealing with the trauma caused by bullying (Gaffney et al., 2021; Rizka et al., 2026). However, there are still some drawbacks that need to be addressed. A lot of these programmes demand several organised sessions and continued therapeutic interaction, which might pose significant challenges to schools with shortages of time and counsellor availability. Besides, students who have been subjected to severe or long-lasting bullying may still show traumatic symptoms after completing these programmes (Laninga-

Wijnen et al., 2025; Salmivalli, 2023). Such drawbacks emphasise the necessity for quick and potent counselling techniques that can be more easily accommodated in school environments.

The Ifdil Perceptual Light Technique (IPLT) is an innovative, brief counselling method that has been researched for its therapeutic role in trauma-related distress and other psychological issues. IPLT is a perceptual light method that uses structured visual stimuli along with verbal suggestions to change one's sensory perceptual processing and emotional responses (Ifdil, Zola, et al., 2019). By altering perception, this method aims to help the brain reprocess traumatic memory and is a means of support for emotional regulation. In contrast to traditional counselling methods, IPLT is a short-term intervention model that is feasible to be carried out in a very short time, often within a single brief session (Ifdil et al., 2020a, 2022). Research has shown that it has been used to successfully treat different psychological issues, including specific phobias, social anxiety, nomophobia tendencies, and trauma-related symptoms (Arrahman et al., 2024; Ifdil et al., 2021). This evidence indicates that perceptual-based therapy, such as IPLT, can promote change in the way individuals view traumatic events and control their emotional reactions. It also offers a logical framework for the investigation of its possible use in the treatment of bullying-related trauma.

Multiple trauma-focused interventions, including Cognitive behavioural Therapy (CBT), Eye Movement Desensitisation

and Reprocessing (EMDR), and imagery-based exposure techniques, have been the primary treatment choice for trauma-related symptoms; however, these methods normally involve multiple structured sessions and intensive therapeutic settings (Gielkens et al., 2024; Simpson et al., 2025). With the Ifdil Perceptual Light Technique (IPLT), on the other hand, a completely new perceptual-based mechanism that uses controlled light stimulation together with guided suggestion to change emotional processing through sensory, perceptual pathways is presented. EMDR is a method for bilateral stimulation to encourage adaptive information processing, whereas IPLT is a method of perceptual light modulation aimed at neutralising emotionally disturbing memories through rapid sensory integration and suggestion-based reframing (de Jongh et al., 2024; Spicer, 2024). It works through perceptual modification of the light. It also helps towards the generation of new learning and the development of new perceptual frames of reference (e.g., through the provision of guided suggestions). This mechanism enables IPLT to be used as a brief and effective counselling intervention that can be carried out with minimal disruption in school counselling settings where time and resources are typically inadequate.

Considering the fact that bullying is widespread and psychological services in many schools have limited resources, the demand for short and well-researched methods to help students emotionally is increasing (Ifdil et al., 2024b; Pedrini et al., 2022). One of the approaches that previous

research highlighted is that the IPLT may help in lowering psychological distress and be helpful in emotional regulation (Miftahhuddin et al., 2024; Zatrachadi et al., 2023). Nevertheless, there is very little direct evidence of its effectiveness for trauma related to bullying and especially a lack of those studies that are scientifically rigorous and use standard psychological measurements. This paper presents a single-subject A-B-A experimental design method to monitor psychological symptoms before, during and after intervention. This paper will use DASS-21 to measure results and present data that will give an insight into the potential application of IPLT as a brief counselling intervention that meets the psychosocial needs of school students in school settings.

In light of the widespread bullying issue and the limitation of psychological services in schools, brief, effective, and evidence-based interventions to support students' emotional recovery comprehensively are desperately needed. By lessening bullying victims' psychological symptoms and aiding them in building emotional resilience, IPLT is a viable option (Ifdil, Zola, et al., 2019; Miftahhuddin et al., 2024; Zatrachadi et al., 2023). However, the amount of scientific data that supports the use of IPLT for the recovery of post-bullying trauma is quite scarce, especially when considering rigid experimental studies that use objective and standardised psychological indicators. This research is aimed at filling this gap by conducting a single-subject ABA (A-B-A) experimental design that allows

for the detailed examination of changes in individuals' psychological symptoms before, during, and after the intervention. By employing DASS-21 as a legitimate and reliable measuring tool, this study seeks to make a pioneering contribution towards the development of evidence-based counselling that is adaptive, time-efficient, and responsive to the psychosocial needs of students in the school.

LITERATURE REVIEW

Ifdil Perceptual Light Technique (IPLT)

The Ifdil Perceptual Light Technique (IPLT) is a therapy method that was designed to help with various types of psychological problems, such as trauma, phobias, anxiety, and other stress-related issues (Ifdil, Zola, et al., 2019). This method is based on changing people's sensory-perceptual experiences by using controlled light stimulation along with therapeutic suggestions. In these therapy sessions, the clients are asked to shut their eyes, and the counsellor gives them certain visual stimuli and also structured suggestions that are aimed at changing emotional responses and cognitive perceptions. By using this method to modulate perception, IPLT hopes to assist people in reprocessing the emotional experiences that cause them distress and to develop perceptual frameworks that are more adaptive (Arrahman et al., 2024; Ifdil et al., 2022). From the standpoint of trauma-informed counselling, one can think of IPLT as a sensory perception-based intervention that works through the sensory perceptual pathways to help with emotional regulation

and cognitive reframing. Being a brief intervention, the goal of IPLT is to bring about significant emotional change in a relatively short period of counselling, which is the main reason why it might be a good option in settings where time and resources for counselling are often limited.

Ifdil Perceptual Light Technique (IPLT) is an instrumental technique that allows students to come out of depression, anxiety, and stress that results from bullying. IPLT seamlessly integrates various approaches, namely perceptual, relational, and spiritual, through its systematic stages that encompass emotional discovery, strengthening the therapeutic bond, sensory stimulation involving light, and suggestion processes to alleviate psychological burdens (Ifdil et al., 2020a). This method is practised through five major sequential stages, namely:

The first encounter is the introduction stage, whereby the main objective is to create a safe environment and set up the structure of the counselling process. Besides putting client confidentiality into practice, the counsellor also elaborates on the goals, the principles, and the phases of counselling. This step serves to build trust and create an environment conducive to honest exploration that is indispensable for the next stages.

The second session is the exploration stage, where the counsellor delves into the emotional condition of the student and his/her experiences of bullying. The counsellor, through open-ended questions and client-exploration techniques, tries to get the client to be more communicative.

The third session is the interpretation stage. The counsellor organises and interprets the information provided by the student to identify the core issues and design an appropriate and personalised intervention strategy.

The fourth session is the intervention stage, which is carried out by applying the IPLTC procedure (Insight, Processing of Building Rapport, Lighting Techniques, Tools and Techniques, Closing and Follow-Up), consisting of:

1. Insight

The counsellor introduces IPLT to the student, explaining its benefits and how it works. Next, an assessment is conducted using scaling (0-10) to determine the level of anxiety and expectations for change. This stage also emphasises the client's sincerity as a form of spiritual readiness to undergo the recovery process.

2. Processing of Building Rapport

The counsellor builds psychological closeness and a good relationship with the client so that the client feels comfortable and trusting. When the client feels comfortable and trusts, other factors will not disrupt their focus. At this stage, the counsellor practices pacing, imitating the client's style, including body language, intonation, breathing patterns, and so on. The counsellor also needs to identify the client's dominant sensory modality (visual, auditory, kinesthetic, olfactory, gustatory) to facilitate the modification

of the client's problems and then apply leading techniques to guide the client to reflect on traumatic experiences in a structured way.

3. Lighting Techniques

The client is asked to close their eyes and receive light stimulation from the IP Light. The client focuses on the visible colours and connects them to emotional experiences. The counsellor asks the client to mention the colours they see. This is done at least three times or until the client is focused on one colour.

4. Tools and Techniques

The counsellor provides direct suggestions such as: "Now the problem is gone. If it disappears, it becomes neutral. If it is neutral, it means the problem has already vanished" to neutralise negative perceptions of past trauma. The client is asked to recall disturbing events and then given direct suggestions to gradually neutralise their impact.

5. Closing and Follow-Up

The client is once again challenged to rate the severity of their issue on a 0-10 scale at this point in time. The counsellor keeps on offering support through positive affirmations and strengthening the change commitment by follow-up suggestions that bring about the newly changed psychological state.

The IPLT intervention is separated into three sessions, each happening on a different day within a week. The recovery

from trauma is the main theme of each session, the work is done step by step and deeply, and the ultimate goal is the students' psychological resilience reconstruction in the face of stress resulting from .

From a broader trauma-informed counselling perspective, IPLT can be conceptually situated alongside several established therapeutic approaches designed to process traumatic memories and regulate emotional responses. Trauma-focused CBT, for example, emphasises cognitive restructuring and emotional regulation to reduce trauma symptoms, while EMDR facilitates adaptive information processing through bilateral stimulation (Birkeland et al., 2025; Daniëls et al., 2025; Thielemann et al., 2022; Vanderschoot & Dessel, 2022). Sensory-based approaches and somatic interventions similarly aim to regulate emotional responses through perceptual and bodily experiences. In comparison, IPLT combines perceptual light stimulation with guided suggestion to facilitate rapid emotional reframing and sensory-perceptual integration. Positioning IPLT within this broader therapeutic landscape helps to clarify its role as a brief counselling approach that emphasises perceptual modulation within trauma recovery processes.

METHODS

Procedure

As an experimental paradigm, this study aims to explore the various effects of a treatment administered at a different time point on the research sample (Kinugasa et al., 2004). The research utilises a single-subject

design, which highlights the monitoring and analysis of an individual's behaviour within a specified time frame to gauge the degree to which the intervention has contributed to the change of the individual's behavioural outcomes (Creswell & Creswell, 2017). The single-subject design in question was the A-B-A design, which involves a repeat of the baseline phase for the purpose of checking the condition of the experimental subject before as well as after the treatment. Thus, this facilitates the establishment of causal relations between independent and dependent variables (Riley-Tillman et al., 2020).

Nonprobability purposive sampling was the sampling method chosen, whereby the participants were picked based on the preset criteria (Stratton, 2023). The selection of respondents for the IPLT intervention was preceded by the initial assessment of 123 students conducted to have an overall idea of their levels of depression, anxiety, and stress. The assessment results of five students (N=5) who met the criteria for inclusion were used to select the students. These young people showed middle to high-grade depression, anxiety, and stress caused by bullying.

The single-case A-B-A experimental design comprising three principal stages: the first baseline (A1), the intervention (B), and the last baseline (A2) was what the intervention had. Through this design, the systematic observation of each subject's psychological changes, especially anxiety, depression, and stress brought about by bullying, was made possible.

Initial Baseline Phase (A1)

During this phase, individuals were evaluated through the DASS-21 tool to comprehend their mental state before the treatment. The outcomes were utilised to confirm score consistency and to check that the participants were in the divisions of anxiety, depression, or stress, which required additional intervention. In order to confirm the stability of scoring patterns, records were taken on three occasions.

Baseline stability was evaluated based on consistency of scores across three consecutive measurements without strong upward or downward trends prior to the intervention phase.

Intervention Phase (B)

This stage was the essence of the trauma recovery from bullying, and it was based on the Ifdil Perceptual Light Technique (IPLT). IPLT is a method under the guided relaxation technique that aims at emotional detoxification through perceptual stimulation and direct suggestion. The intervention was spread over five sessions. After each session, self-monitoring was done by the respondents to evaluate the intensity of their problems again. To follow up on the intervention, the changes that took place were recorded.

In this study, the term guided relaxation technique refers to a guided relaxation and focused attention process used to facilitate emotional processing, rather than formal clinical hypnotherapy.

Final Baseline Phase (A2)

The last baseline phase was carried out in order to assess the continuation of the psychological changes after the completion of all intervention sessions. Anxiety, depression, and stress levels were measured again by the DASS-21. Data from the A2 phase were compared with A1 and B data in order to determine the effectiveness of the intervention both visually and quantitatively.

Participants

The research respondents were five high school students aged between 15 and 17 years who had been victims of bullying and exhibited symptoms of depression, anxiety, and stress as assessed using the DASS-21. Participants were purposively selected based on baseline observational results. All respondents voluntarily agreed to participate in the intervention and had obtained parental or guardian consent. Pseudonyms were used to protect participants' identities. Brief profiles of each participant are presented below to offer a more detailed context of the individual characteristics and psychological states of the respondents before the intervention. This disclosure aims to deepen the analysis of the intervention effectiveness and to strengthen methodological transparency (Krisnanda et al., 2024; Palantza et al., 2025).

Raka (17 years old, male)

After Raka was verbally bullied, he experienced a lack of motivation to study; his sleep quality was impaired, and he

withdrew from the social community. The bullying included acts of calling Raka "fat and lazy" and pushing him into the classroom. His DASS-21 scores showed that he was experiencing moderate depression, anxiety, and stress.

Dina (15 years old, female)

Dina, a tenth-grade student, felt that her mother and brother were putting a lot of pressure on her psychologically after her parents got divorced. She perceived that she was being blamed, frequently fell ill, struggled with focusing, and suffered from social anxiety. The DASS-21 assessment of her placed her in the moderate category for depression, anxiety, and stress.

Aisyah (16 years old, female)

Aisyah was mentally and verbally abused by her family. As a result, she frequently became sick, fainted, and had severe anxiety. Aisyah reported that she experienced rejection, always felt scared, and avoided socialising. Her DASS-21 results showed that she was experiencing moderate symptoms of depression, anxiety, and stress.

Melati (16 years old, female)

Since middle school, Melati had been a victim of verbal bullying, which had followed her to the tenth grade, among which there was also verbal abuse by her father. She displayed symptoms of anxiety and low self-esteem. During social interactions, she would manifest physical symptoms such as cold sweats. According

to her DASS-21 results, she was moderately depressed, anxious, and stressed.

Rara (17 years old, female)

Rara, a junior high school student, was socially pressured by peers in an organisation she was a part of after she was elected as the chairperson. She disclosed that fear, worrying, and being anxious about seeing them again at school were the things she felt. According to her DASS-21 assessment, her psychological symptoms were at the moderate level.

Given the single-subject design and small number of participants, the findings should be interpreted as preliminary evidence of intervention effects rather than results that can be generalised to broader populations.

Measurement

The current research utilises the Depression Anxiety Stress Scale (DASS-21), a questionnaire comprising 21 items that reflect the three main psychological aspects: depression, anxiety, and stress. The scale was created by S.H. Lovibond and P.H. Lovibond and, by now, has been tested in a variety of situations with both adolescent and adult groups and has been shown to be a credible tool for emotional disturbance evaluation. The study implemented a 4-point Likert scale to conduct the assessments, with the options ranging from 0 (does not apply) to 3 (applies very much). The DASS-21 is a highly reliable measure as it has a high Cronbach's alpha coefficient for

each of the three subscales and, therefore, can be considered a valid and reliable tool for tracking psychological changes of individuals during the research (Ifdil et al., 2022).

After the intervention and social validation were performed to understand participants' interpretation of their therapy experiences. Participants in the study took part in online focus group discussions (FGDs) with an independent moderator who led the discussions to reduce the chance of social desirability bias (Bariyyah, Andrianie, et al., 2025; Meisters et al., 2020; Zhu et al., 2024). The qualitative data generated through this process shed light on the effectiveness and perceived impact of the intervention as presented by the students. The open-ended questions used in the interviews aimed to elicit the respondents' points of view concerning the benefits, relevance, and influence of the Ifdil Perceptual Light Technique (IPLT) in their coping with emotional distress caused by bullying.

Data Analysis

The single-subject design applied in this study was the A-B-A model, consisting of three main stages: the initial baseline (A1), the IPLT intervention (B), and the final baseline (A2). This design was chosen to directly monitor changes in depression, anxiety, and stress levels among students who were victims of bullying after receiving the intervention. The collected data were analysed using visual graph analysis to map changes in depression, anxiety, and

stress levels across phases A1, B, and A2. Conclusions were drawn based on patterns emerging from the data. These changes were evaluated through mean scores, stability levels, and trend directions (increasing or decreasing), which reflected the direct impact of the IPLT sessions on each student.

A downward trend in symptom severity served as an indicator of intervention success. Beyond visual analysis, the effectiveness of IPLT was also evaluated using the Percentage of Non-Overlapping Data (PND), calculated by determining the proportion of data points in the intervention phase (B) that did not overlap with the highest data point in the initial baseline (A1). PND provided evidence of the magnitude of change following the intervention. Furthermore, effect sizes were calculated using Cohen's formula, where values below 0.87 indicate a small effect, 0.87-2.67 indicate a medium effect, and values above 2.67 indicate a large effect. To ensure that observed changes in each student were psychologically significant, the Reliable Change Index (RCI) was also calculated, with values above 1.96 indicating meaningful change.

Ethical Approval

This study obtained ethical approval from the Research Ethics Committee of the Indonesian Counsellors Association under approval number 118/EC/IKI/VII/2025. All research procedures were conducted in accordance with the Ethical Principles of counsellors and the Professional Code of Ethics for counsellors. Informed consent

forms were signed by both respondents and IPLT practitioners. These forms contained information that was mutually agreed upon concerning the activities that were part of the study. As part of the first meeting, respondents were given an information sheet, and they provided written consent by which they allowed the use of the collected data for this study.

With the permission of the respondents, each intervention session was filmed, and they were allowed to have the right to stop the recording process whenever they wanted. Respondents were given the opportunity to look at their sensitive personal information before it was published. The research was carried out in accordance with the principles of confidentiality, psychological safety, and participant autonomy.

RESULTS

Depression

The results of the visual analysis of changes in depression across all research respondents in each phase are presented in Figures 1, 2, 3, 4, and 5. Overall, the findings indicate a significant decrease in depression levels. Statistical analysis of depression is presented in Table 2. Raka showed a significant reduction ($d = 31.75$) in total depression scores from the pre-test phase ($M = 22.67$, $SD = 0.58$) to the intervention phase ($M = 4.33$, $SD = 0.58$), and further to the post-intervention phase ($M = 2.33$, $SD = 0.58$). Dina experienced a significant decrease ($d = 11.67$) from the pre-test ($M = 20.33$, $SD = 0.58$) to the intervention ($M = 8.67$, $SD = 4.73$) and post-

intervention phases ($M = 3.33$, $SD = 0.58$). Aisyah demonstrated a significant reduction ($d = 22.52$) in total depression scores from the pre-test ($M = 19.33$, $SD = 0.58$) to the intervention ($M = 6.33$, $SD = 0.58$) and post-intervention ($M = 5.33$, $SD = 0.58$). Melati showed a significant decrease ($d = 28.87$) from the pre-test ($M = 19.67$, $SD = 0.58$) to the intervention ($M = 2.67$, $SD = 1.00$) and post-intervention ($M = 1.67$, $SD = 0.58$). Rara experienced a significant reduction ($d = 8.66$) from the pre-test ($M = 17.67$, $SD = 1.15$) to the intervention ($M = 9.33$, $SD = 5.77$) and post-intervention ($M = 1.67$, $SD = 0.58$). The calculation of the Reliable Change Index (RCI) confirmed significant changes for Raka, Dina, Aisyah, Melati, and Rara.

Stress

An overall decrease in the stress level of the respondents in different phases, as per their visual perception, was depicted in Figures 1, 2, 3, 4, and 5. A formal statistical treatment of these changes is illustrated in Table 2. Raka showed a significant reduction ($d = 11.55$) from the pre-test ($M = 10.67$, $SD = 0.58$) to the intervention ($M = 4.00$, $SD = 0.00$) and post-intervention phases ($M = 2.00$, $SD = 0.00$). Dina experienced a significant decrease ($d = 3.08$) from the pre-test ($M = 12.00$, $SD = 1.73$) to the intervention ($M = 6.67$, $SD = 3.06$) and post-intervention ($M = 4.33$, $SD = 0.58$). Aisyah showed a significant reduction ($d = 4.04$) from the pre-test ($M = 18.33$, $SD = 2.89$) to the intervention ($M = 6.67$, $SD = 0.58$) and post-intervention ($M = 2.33$, $SD = 0.58$).

Melati experienced a significant decrease ($d = 23.83$) from the pre-test ($M = 14.33$, $SD = 0.58$) to the intervention ($M = 5.33$, $SD = 0.58$) and post-intervention ($M = 2.00$, $SD = 1.73$). Rara showed a significant reduction ($d = 19.78$) from the pre-test ($M = 12.00$, $SD = 1.73$) to the intervention ($M = 2.67$, $SD = 0.58$) and post-intervention ($M = 1.33$, $SD = 0.58$). The RCI results confirmed significant changes for all five respondents: Raka, Dina, Aisyah, Melati, and Rara.

Anxiety

Figures 1, 2, 3, 4, and 5 show the outcomes of the visual analysis of the anxiety level changes of each respondent during all the phases, which generally pointed to a considerable reduction. The statistical analysis of anxiety changes is shown in Table 2. Raka showed a significant reduction ($d = 9.24$) from the pre-test ($M = 13.67$, $SD = 0.58$) to the intervention ($M = 8.33$, $SD = 0.58$) and post-intervention phases ($M = 3.33$, $SD = 0.58$). Dina experienced a significant decrease ($d = 8.37$) from the pre-test ($M = 15.67$, $SD = 1.15$) to the intervention ($M = 6.00$, $SD = 2.00$) and post-intervention ($M = 4.67$, $SD = 0.58$). Aisyah demonstrated a significant reduction ($d = 16.17$) from the pre-test ($M = 16.33$, $SD = 0.58$) to the intervention ($M = 7.00$, $SD = 1.00$) and post-intervention ($M = 5.00$, $SD = 1.00$). Melati showed a significant decrease ($d = 9.33$) from the pre-test ($M = 14.67$, $SD = 0.58$) to the intervention ($M = 3.33$, $SD = 0.58$) and post-intervention ($M = 1.67$, $SD = 0.58$). Rara experienced

a significant reduction ($d = 6.93$) from the pre-test ($M = 14.33$, $SD = 0.58$) to the intervention ($M = 10.33$, $SD = 2.08$) and post-intervention ($M = 3.00$, $SD = 1.73$). The RCI calculations confirmed significant changes for all respondents: Raka, Dina, Aisyah, Melati, and Rara

The findings indicate a shift in criteria from moderate depression, stress, and anxiety to normal levels among all research respondents (Table 1). To further examine the magnitude of the intervention effect, statistical calculations using the Percentage of Non-Overlapping Data (PND) were conducted. The results showed that the PND value was 100% for all respondents, indicating that the IPLT intervention was highly effective in reducing depression, stress, and anxiety in all participants.

Social Validation

The findings reveal that the criteria have shifted from moderate depression, stress, and anxiety to normal levels among all the research subjects. For further effect, a statistical assessment of the intervention impact by the Percentage of Non-Overlapping Data (PND) method was used. The PND value was 100% for all respondents; therefore, the IPLT intervention was highly effective in reducing depression, stress, and anxiety in all participants.

Consequently, social validation was leveraged to gather more evidence in support of the results presented above. Respondent Raka shared that before the intervention, the insults like "fat and lazy" and the rough treatment from his peers made him feel

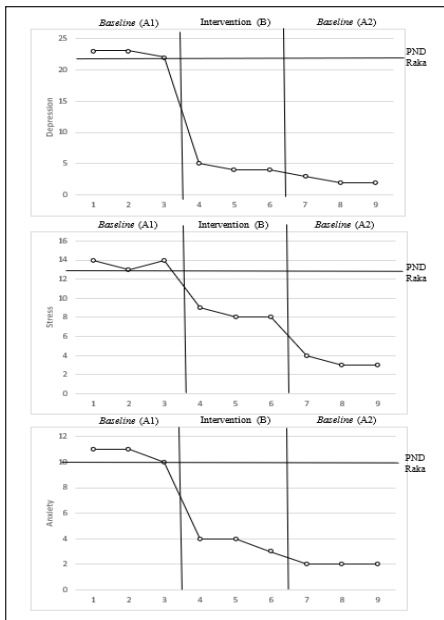


Figure 1. The results of the visual analysis of depression, anxiety, and stress changes for respondent 1

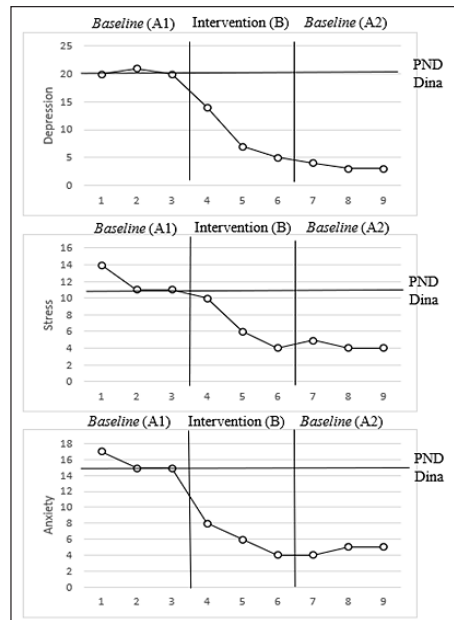


Figure 2. The results of the visual analysis of depression, anxiety, and stress changes for respondent 2

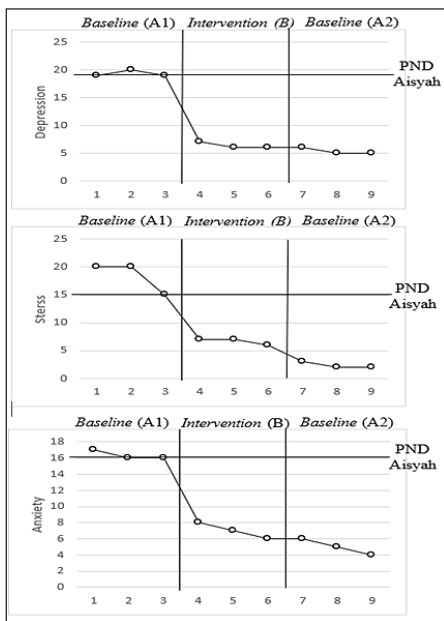


Figure 3. The results of the visual analysis of depression, anxiety, and stress changes for respondent 3

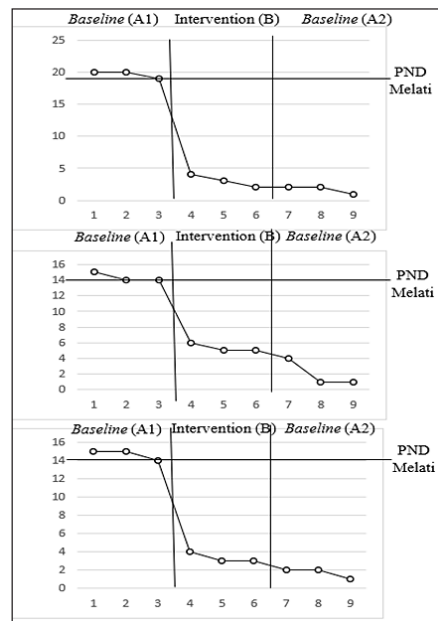


Figure 4. The results of the visual analysis of depression, anxiety, and stress changes for respondent 4

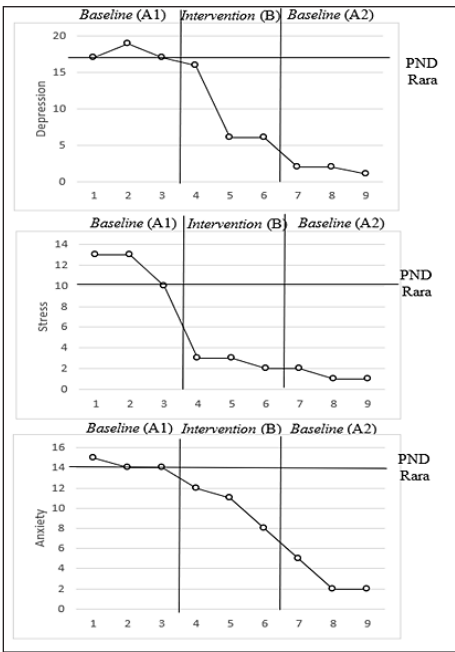


Figure 5. The results of the visual analysis of depression, anxiety, and stress changes for respondent 5

worthless, lose his motivation to study, and withdraw from his social environment. However, after several sessions of the IPLT, Raka started to experience changes in himself: he felt calmer, less easily provoked, and was able to sleep better. He also mentioned that the serene atmosphere experienced during light visualisation made his mind feel lighter; it was no longer filled with anger or shame. Raka expressed that he became more confident and less affected by the insults that used to throw him into a deep pit of pain. This experience shows that IPLT was instrumental in Raka's emotional recovery as a victim of bullying.

Respondent Dina shared that the IPLT method helped her a lot in the reduction of the anxiety that she was feeling because of verbal and emotional pressure from her

family. Prior to the intervention, Dina, who saw herself as a burden after her parents' divorce, was overwhelmed with anxiety, had disturbed sleep, and would often faint. She said that the blaming and comparing done by her mother and brother were the factors that caused her fear and anxiety the most. Through relaxation, light visualisation, soft music, and positive affirmation sessions of IPLT, Dina's anxiety level dropped from 10 to 3. She became capable of facing distressing memories in a neutral manner, felt emotionally lighter, and even smiled after the sessions. This is evidence that IPLT was successful in emotional recovery for Dina; it also helped her to regain calmness and develop new hope.

Respondent Aisyah was similarly positive about the effects of the IPLT.

Table 1
Changes in DASS-21scores across baseline, intervention, and follow-up phases

	Pre-test (Baseline 1)		Post-test (Intervensi)		Baseline 2		Gain	RCI	Effect size	PND
	M	SD	M	SD	M	SD				
Raka										
Depression	22.67	0.58	4.33	0.58	2.33	0.58	18.33	74.85	31.75	100
Stress	10.67	0.58	4.00	0.00	2	0.00	6.67	27.22	11.55	100
Anxiety	13.67	0.58	8.33	0.58	3.33	0.58	5.33	21.77	9.24	100
Dina										
Depression	20.33	0.58	8.67	4.73	3.33	0.58	11.67	47.63	20.21	100
Stress	12.00	1.73	6.67	3.06	4.33	0.58	5.33	7.26	3.08	100
Anxiety	15.67	1.15	6.00	2.00	4.67	0.58	9.67	19.73	8.37	100
Aisyah										
Depression	19.33	0.58	6.33	0.58	5.33	0.58	13.00	53.07	22.52	100
Stress	18.33	2.89	6.67	0.58	2.33	0.58	11.67	9.53	4.04	100
Anxiety	16.33	0.58	7.00	1.00	5.00	1.00	9.33	38.10	16.17	100
Melati										
Depression	19.67	0.58	3.00	1.00	1.67	0.58	16.67	16.67	28.87	100
Stress	14.33	0.58	5.33	0.58	2.00	1.73	9.00	13.76	23.83	100
Anxiety	14.67	0.58	3.33	0.58	1.67	0.58	11.33	9.33	16.17	100
Rara										
Depression	17.67	1.15	9.33	5.77	1.67	0.58	8.33	20.41	8.66	100
Stress	12.00	1.73	2.67	0.58	1.33	0.58	9.33	46.63	19.78	100
Anxiety	14.33	0.58	10.33	2.08	3.00	1.73	4.00	16.33	6.93	100

During the social validation session, she reported that after the sessions she was feeling calmer and less likely to panic. Earlier, Aisyah was regularly gripped with fear, experienced excessive anxiety, and had physical complaints like headaches and fainting - symptoms that were the result of continuous verbal and emotional abuse carried out by her family; among the abuses was the mentioning of "you should just die." Through the implementation of the gentle touch method, positive affirmations, and favourite music during relaxation, Aisyah was able to experience emotional

progress step by step. She shared that she became stronger, was no longer in the "guilt" or "fear" trap and felt more social. Her fear rating was reduced from 8 to 4 after intervention. Additionally, she noted that the emotional moment of letting go through crying during the session was very helpful. This is an example of how IPLT diminished Aisyah's psychological symptoms and, at the same time, gave her a safe place for emotional healing and confidence rebuilding.

Respondent Melati shared that IPLT counselling was a great help to her as it

provided a secure area where she could relax her mind, which was under the emotional pressure brought about by verbal bullying that she had experienced since junior high school. Before the intervention, she was constantly nervous, lacked confidence, and was even accompanied by some physical issues, such as cold sweat while interacting with her peers. She was downhearted by the insults directed at her, such as being called “slow learner” or mocked with her father’s name, and that pushed her confidence further down. Through the use of the IPLT method, which consisted of visual relaxation, favourite music, and positive affirmations, Melati became aware of the difference that by the end of the programme she was able to calm down, felt less tense physically, and more at ease in social situations. Her anxiety score, which was initially 7, was reduced significantly to 2 after the intervention. She also became very confident in talking to the class and was no longer afraid of her peers’ comments. This proves that IPLT not only helped Melati to lessen her anxiety symptoms but also gave her confidence and a feeling of power during her social interactions.

Respondent Rara shared her experience of the positive changes after the IPLT counselling. She was able to remain calm and handle her anxiety better when it was caused by the scolding from her peers that she used to get and that made her nervous a lot. Upon reflection, she shared that her emotional state was better, as evidenced by her decreased anxiety score from 8 to 6 and then to 4. She said that visualisation

and affirmation during IPLT helped her to view the scary events that she had experienced before in a more detached and less emotionally burdensome manner. Moreover, Rara was more confident about school, and the same fears did not trouble her anymore. Social validation here shows that Rara saw the benefits of IPLT in providing her with the necessary skills to manage post-bullying anxiety within her school organisation context.

It should be realised that effect sizes of a very large magnitude are typical in single-subject designs because of the limited number of participants and the repeated measurements. Hence, these figures should, on one hand, be considered with great care as evidence of intervention-related patterns of change, and, on the other hand, not be regarded as precise estimates of effect size at the population level.

DISCUSSION

This study presented evidence that the Ifdil Perceptual Light Technique (IPLT) is an effective counselling method to reduce symptoms of depression, anxiety, and stress. Psychological monitoring of individuals was improved with the help of an A-B-A experimental design, and the results of all individuals showed that after the intervention, their DASS-21 scores had fallen. This design was successful in determining the effect of IPLT on the psychological background, as each participant was in his/her own control, which thus reduced the inter-individual differences (Saputra et al., 2024; Sugara &

Fadhilah, 2024). As per earlier research, the A-B-A design gives a chance to the scientists to register the variations in different stages, find out if the changes happening in phase B are due to the intervention and check if such changes are kept or the baseline level is restored when the intervention is stopped (Ledford & Gast, 2018; Sugara & Fadhilah, 2024).

A closer examination of the findings for each subject revealed consistent patterns of psychological improvement across the intervention phases. During the baseline phase (A1), all participants demonstrated relatively high levels of depression, anxiety, and stress, reflecting the psychological distress associated with their bullying experiences. After the IPLT intervention was introduced in phase B, a gradual decrease in DASS-21 scores was observed for each subject, indicating a positive response to the counselling process. Although the magnitude of change varied slightly among participants, the overall pattern showed a consistent reduction in emotional distress during the intervention phase. In the follow-up phase (A2), the reduced scores remained relatively stable, suggesting that the intervention effects were maintained beyond the active treatment phase. These individual patterns indicate that IPLT may contribute to emotional regulation and trauma processing among bullying victims, supporting previous findings that perceptual-based brief interventions can facilitate meaningful psychological change within a relatively short therapeutic duration (Ifdil et al., 2020b, 2022; Ifdil, Zola, et al., 2019)

These results are consistent with studies disclosing the neuropsychological impact of bullying, which include hyperactivity of the limbic system and dysfunction of the prefrontal cortex, which are the main sources of emotion regulation and decision-making (Cubillo, 2022; Nesin et al., 2025; Sugara et al., 2025). Such malfunctioning in these areas of the brain makes the victims of bullying have a hard time controlling their emotions and making decisions adaptively (Camodeca & Nava, 2022; Urano et al., 2020; H.-Y. Wang et al., 2024). By means of perceptual stimulation coupled with suggestion, IPLT gets to the emotional level of the implicitly stored memory and hence can change this memory, which in turn supports the revival of the balance between the systems that regulate emotions and cognitive functioning. In this way, IPLT agrees with trauma-informed intervention models that aim at rebuilding the brain connections related to fear, shame, and threat (Marvar et al., 2021; Moallem et al., 2024; Ressler et al., 2022).

Various statistical methods were used to check the changes brought about by the IPLT, such as Cohen's *d* effect size, the Percentage of Non-Overlapping Data (PND), and the Reliable Change Index (RCI), which all pointed to the fact that IPLT had a considerable influence on the depression, anxiety, and stress of the bullied individuals. The improvements that had been observed were not only the natural fluctuations, but also the changes made by the IPLT intervention, which were the direct causes of these improvements.

This discovery provides more evidence that short counselling interventions, if done in a structured and measurable way, can be very effective and therefore, can be considered as an evidence-based practice in school counselling (Lin et al., 2025; Markussen et al., 2021).

Moreover, the qualitative data from social validation also point in the same direction as these outcomes. The respondents reported that among the improvements they had experienced were emotional clarity, reduction of negative emotions, better sleep quality, reduction of feelings of shame and anxiety, increase of self-confidence, and gaining the courage again to engage with people socially. The qualitative accounts mirror the quantitative data, showing the reduction of depressive, anxious, and stress-related symptoms that were measured using the DASS-21. These findings are consistent with the previous IPLT studies that proved its ability to significantly reduce ophidiophobia, social anxiety, nomophobia, trauma, psychological problems in general, and pathological anxiety, especially after IPLT sessions, among other things (Arrahman et al., 2024; Ifdil et al., 2023; Lika et al., 2024). The intervention of success may be explained by the negative emotional memory reprocessing into more adaptive ones. In this way, IPLT helps people to visualise bullying in a positive manner, which in turn lessens the psychological burden and increases mental well-being (Ifdil, Zola, et al., 2019).

In summary, the outcomes of the present study endorse IPLT as a timely, flexible, and

trauma-sensitive psychological intervention that can effectively be utilised for bullied students. As brief as it is, IPLT still offers a powerful and convenient way to tackle the issue; since the procedure takes around 15 minutes, the method does not interfere with the students' routine of attending classes, and yet, it brings about significant therapeutic results. The organised method of IPLT, which makes use of visual stimulation, encouraging affirmations, and personalised sensory techniques, helps the individual's sense of security and trauma processing; hence, it aligns with the principles of brief therapy and trauma-informed counselling (Briere & Scott, 2012; Budman & Gurman, 2002).

This research enhances the scientific understanding of trauma-based models that involve the rapid and yet impactful reprocessing of negative emotional memories. It supports the theoretical basis that perceptual-based interventions like IPLT are capable of achieving deep emotional reprocessing within a short period of time. Moreover, the results presented here also advocate for the employment of the A-B-A design as a tool sensitive to capturing the changes happening within the same individual in the case of mild trauma. On a practical level, the IPLT has demonstrated that it is a well-performing school counselling method that could be utilised in schools, especially in scenarios where there is a scarcity of time and resources.

However, its implementation requires appropriate training for school counsellors

to ensure that the intervention is delivered consistently and ethically. Counsellors need structured guidance regarding the stages of the IPLT procedure, the use of perceptual light stimulation, and the application of guided suggestions during counselling sessions. In addition, ethical safeguards such as informed consent, participant comfort, and professional supervision should be considered when applying brief trauma-focused interventions in school settings.

Future studies should consider the use of randomised controlled trials (RCTs) with a larger number of participants. In addition to that, it is quite essential to assess the long-term effectiveness of the IPLT through follow-up meetings and include physiological indicators like heart rate and heart rate variability as complements to psychological data. Another priority should be the development of formal training courses for school counsellors so that they may deliver IPLT in a uniform and ethical manner. Lastly, incorporating IPLT into educational policies as well as evidence-based psychosocial support programmes will extend the intervention's systemic.

CONCLUSION

This research reveals that the Ifdil Perceptual Light Technique (IPLT) effectively reduced depression, anxiety, and stress symptoms among students who experienced bullying. The A-B-A design used in this study helped directly recognise psychological changes brought about by the intervention. Quantitative results were supported by qualitative data obtained from

social validation. Participants indicated that after IPLT sessions, they felt more emotional clarity, better sleep quality, and more vibrant social interaction. These results show that IPLT not only relieves the symptomatic distress of bullying victims but also promotes their psychosocial recovery on a broader level.

Additionally, IPLT is advantageous for its short duration, simple execution, and a flexible approach to students' mental states, which makes it a very appropriate school counselling service that offers practical yet significant interventions.

As a next step, the researchers should consider including more participants in their studies and adopting a randomised controlled trial (RCT) design to enhance the generalisability of their findings. It will also be important to measure the long-term effects and add physiological indicators to determine the sustainability and depth of IPLT's impact. Moreover, the creation of well-organised training programmes for school counsellors is vital in facilitating the use of this method in evidence-based school counselling.

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CONFLICT OF INTEREST

The authors declare no conflict of interest in this paper.

DECLARATION OF ARTIFICIAL INTELLIGENCE (AI) USE

The authors declare that artificial intelligence (AI) was used solely for checking grammar, spelling, and improving the language quality in this manuscript. AI was used as an aid to ensure readability and language accuracy, but all conclusions and interpretations remain the sole responsibility of the authors. AI did not replace the authors' critical thinking or scientific judgment in the research and writing process.

REFERENCES

- Arrahman, I., Ifdil, I., Karneli, Y., Fadli, R. P., & Khairati, A. (2024). Efektivitas Ifdil perceptual light technique untuk mengurangi social anxiety siswa obesitas. *Jurnal Konseling dan Pendidikan*, 12(2), 52-59. <https://doi.org/10.29210/1118800>
- Bariyyah, K., Andrianie, S., Ariyanto, R. D., Soejanto, L. T., Setyorini, S., Oktasari, M., Muttaqiin, M., & Ifdil, I. (2025). Shaping future-ready learners: A Rasch analysis of university students' digital competence and demographic factors using SDiCoS. In *2025 11th International Conference on Education and Technology (ICET)* (pp. 366-374). <https://doi.org/10.1109/ICET67257.2025.11290902>
- Bariyyah, K., Soejanto, L. T., Septiaji, A., Hafizi, R., Hasanah, U., Rosyalita, D., Perdana, M. R., Ilahi, A., & Ramadhani, E. (2025). Simple coping behaviours and their role in mitigating anxiety and depression: A call for further research. *Spanish Journal of Psychiatry and Mental Health*. <https://doi.org/https://doi.org/10.1016/j.sjpmh.2025.07.005>
- Bhatia, R. (2023). The impact of bullying in childhood and adolescence. *Current Opinion in Psychiatry*, 36(6), 461-465. <https://doi.org/10.1097/YCO.0000000000000900>
- Birkeland, M. S., Ormhaug, S. M., Hayes, A. M., & Jensen, T. K. (2025). Changing maladaptive trauma-related cognitions and emotional activation during trauma-focused cognitive behavioural therapy: Thematic content and relationships with post-traumatic stress symptoms. *Behaviour Research and Therapy*, 195, Article 104910. <https://doi.org/10.1016/j.brat.2025.104910>
- Borualogo, I. S. (2025). Poly-bullying victimisation in Indonesia: Prevalence and factors related to children exposure to multiple bullying incidents, and its correlation to subjective well-being. *Behavioural Sciences & the Law*, 43(1), 114-134. <https://doi.org/10.1002/bsl.2699>
- Briere, J., & Scott, C. (2012). *Principles of trauma therapy: A guide to symptoms, evaluation, and treatment*. Sage.
- Budman, S. H., & Gurman, A. S. (2002). *Theory and practice of brief therapy*. Guilford Press.
- Camodeca, M., & Nava, E. (2022). The long-term effects of bullying, victimisation, and bystander behaviour on emotion regulation and its physiological correlates. *Journal of Interpersonal Violence*, 37(3-4), NP2056-NP2075. <https://doi.org/10.1177/0886260520934438>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage.

- Cubillo, A. (2022). Neurobiological correlates of the social and emotional impact of peer victimization: A review. *Frontiers in Psychiatry*, 13, Article 866926. <https://doi.org/10.3389/fpsyt.2022.866926>
- Daniëls, M., Meewisse, M.-L., Nugter, A., Rameekers, S. A., Fassbinder, E., & Arntz, A. (2025). Imagery rescripting (ImRs) and eye movement desensitisation and reprocessing (EMDR) as treatment of childhood trauma-related post-traumatic stress disorder (Ch-PTSD) in adults: Effects on schema modes. *European Journal of Psychotraumatology*, 16(1). <https://doi.org/10.1080/20080666.2025.2454191>
- de Jongh, A., de Roos, C., & El-Leithy, S. (2024). State of the science: Eye movement desensitisation and reprocessing (EMDR) therapy. *Journal of Traumatic Stress*, 37(2), 205-216. <https://doi.org/10.1002/jts.23012>
- Ding, J.-L., Wu, Y.-W., & Yan, W.-J. (2024). Unravelling the complex interactions of psychological factors contributing to cyber reactive aggression among college students: Network and mediation analyses. *Journal of Interpersonal Violence*, 39(3-4), 499-518. <https://doi.org/10.1177/08862605231198809>
- Ferraz De Camargo, L., Rice, K., & Thorsteinsson, E. B. (2023). Bullying victimisation CBT: A proposed psychological intervention for adolescent bullying victims. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1122843>
- Franzen, M., de Jong, P. J., Veling, W., & aan het Rot, M. (2021). Victims of bullying: Emotion recognition and understanding. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.729835>
- Gaffney, H., Ttofi, M. M., & Farrington, D. P. (2021). What works in anti-bullying programmes? Analysis of effective intervention components. *Journal of School Psychology*, 85, 37-56. <https://doi.org/10.1016/j.jsp.2020.12.002>
- Gao, W., Yan, X., & Yuan, J. (2022). Neural correlations between cognitive deficits and emotion regulation strategies: understanding emotion dysregulation in depression from the perspective of cognitive control and cognitive biases. *Psychoradiology*, 2(3), 86-99. <https://doi.org/10.1093/psyrad/kkac014>
- Gielkens, E. M. J., Sobczak, S., Rossi, G., & van Alphen, S. P. J. (2024). The feasibility of eye movement desensitization and reprocessing (EMDR) for older adults with posttraumatic stress disorder (PTSD) and comorbid psychiatric and somatic disorders. *Psychological Trauma: Theory, Research, Practice, and Policy*, 16(Suppl 3), S568-S581. <https://doi.org/10.1037/tra0001402>
- Halliday, S., Taylor, A., Turnbull, D., & Gregory, T. (2024). The relationship between traditional and cyber bullying victimisation in early adolescence and emotional wellbeing: A cross-sectional, population-based study. *International Journal of Bullying Prevention*, 6(2), 110-123. <https://doi.org/10.1007/s42380-022-00144-8>
- Han, Z.-Y., Ye, Z.-Y., & Zhong, B.-L. (2025). School bullying and mental health among adolescents: a narrative review. *Translational Pediatrics*, 14(3), 463-472. <https://doi.org/10.21037/tp-2024-512>
- Hikmat, R., Yosep, I., Hernawaty, T., & Mardhiyah, A. (2024). A scoping review of anti-bullying interventions: Reducing traumatic effects of bullying among adolescents. *Journal of Multidisciplinary Healthcare*, 17, 289-304. <https://doi.org/10.2147/JMDH.S443841>
- Ifdil, I., Bariyyah, K., Maputra, Y., Zola, N., & Fadli, R. P. (2024a). Rasch-based validation of meaning of life scale of students. *Islamic Guidance and Counselling Journal*, 7(1). <https://doi.org/10.25217/0020247447800>
- Ifdil, I., Fadli, R. P., Amalianita, B., Zola, N., Putri, Y. E., Suhartiwi, S., & Taufik, T. (2022). Effectiveness of Ifdil perceptual light therapy

- in reducing post-traumatic stress disorder of Lombok's earthquake victims. *Konselor*, 11(4), 161-168.
- Ifdil, I., Fadli, R. P., Zola, N., Churnia, E., Putri, Y. E., & Amalianita, B. (2020a). The effectiveness of Ifdil perceptual light technique in reducing ophidiophobia. *Addictive Disorders & Their Treatment*, 19(4), 247-251. <https://doi.org/10.1097/ADT.0000000000000206>
- Ifdil, I., Fadli, R. P., Zola, N., Churnia, E., Putri, Y. E., & Amalianita, B. (2020b). The effectiveness of Ifdil perceptual light technique in reducing ophidiophobia. *Addictive Disorders & Their Treatment*, 19(4), 247-251. <https://doi.org/10.1097/ADT.0000000000000206>
- Ifdil, I., Fadli, R. P., Zola, N., Erwindi, L., Sari, A., Churnia, E., Rangka, I. B., Solihatun, S., Suranata, K., Bariyyah, K., Ardi, Z., Afdal, A., Refnadi, R., Zufriani, Z., Nikmarijal, N., Dahlan, D., Fitria, L., & Barseli, M. (2019). Chromotherapy: An alternative treatment for mathematics anxiety among elementary school students. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012183>
- Ifdil, I., Fadli, R. P., Zola, N., Ismail, I. B., & Hadi, M. F. Z. (2023). IP-light technologies Gen 2: Intervention tools on IPLT for trauma, phobia, and psychological problems. *JOIV: International Journal of Informatics Visualisation*, 7(1), 186-192. <https://doi.org/10.30630/joiv.7.1.1343>
- Ifdil, I., Putri, Y. E., & Amalianita, B. (2021). Stress and anxiety among adolescents during the COVID-19 outbreak. *Konselor*, 10(1), 1-5. <https://doi.org/10.23916/0020200528830>
- Ifdil, I., Zola, N., & Fadli, R. P. (2019). Ifdil perceptual light technique (IPLT): An alternative brief approach for the reduction of trauma, phobia, and psychological problems. *Jurnal Konseling dan Pendidikan*, 7(2), 50-57. <https://doi.org/10.29210/134500>
- Ime, Y. (2025). The effect of cognitive behavioural group counselling on bullying and empathy levels of adolescents. *Anales de Psicología/Annals of Psychology*. <https://revistas.um.es/analesps/article/view/601671>
- Kenwood, M. M., Kalin, N. H., & Barbas, H. (2022). The prefrontal cortex, pathological anxiety, and anxiety disorders. *Neuropsychopharmacology*, 47(1), 260-275. <https://doi.org/10.1038/s41386-021-01109-z>
- Kiing, J. S. H., Ragen, E. S., Sulaiman, M. S. B. M., Goh, W. S., Tan, N. J. H., Ng, S. H., Luo, Y., Samuel, M., Young, D., & Loh, V. W. K. (2025). Bullying and depression among adolescents in East Asia: A scoping review on prevalence rates, risk and protective factors. *Frontiers in Psychiatry*, 16, Article 1497866. <https://doi.org/10.3389/fpsy.2025>.
- Kinugasa, T., Cerin, E., & Hooper, S. (2004). Single-subject research designs and data analyses for assessing elite athletes' conditioning. *Sports Medicine*, 34(15), 1035-1050. <https://doi.org/10.2165/00007256-200434150-00003>
- Krisnanda, V. D., Soejanto, L. T., & Ramadhani, E. (2024). Understanding the socioeconomic determinants of gambling harm: A population-based study. *Journal of Public Health (United Kingdom)*, 46(1), E199-E200. <https://doi.org/10.1093/pubmed/fdad172>
- Laniga-Wijnen, L., Huisman, M., Graf, D., & Salmivalli, C. (2025). Do targeted interventions diminish victimisation? Testing the short- and longer-term effectiveness of condemning, empathy-raising, and combined approaches. *Journal of Youth and Adolescence*, 54(7), 1659-1676. <https://doi.org/10.1007/s10964-025-02173-0>
- Ledford, J. R., & Gast, D. L. (2018). *Single case research methodology*. <https://doi.org/10.4324/9781315150666>

- Lika, L., Ifdil, I., Fadli, R. P., Khairati, A., Zola, N., Putri, Y. E., Adlya, S. I., & Zatrachadi, M. F. (2024). Efektivitas Ifdil perceptual light technique (IPLT) untuk mereduksi kecenderungan nomophobia pada siswa. *Jurnal Konseling dan Pendidikan*, 12(3), 89-98. <https://doi.org/10.29210/1118700>
- Lin, H., Wang, Y., He, G., Li, J., & Zheng, H. (2025). The effect of school-based group counselling on Chinese mainland adolescents' mental health and academic functioning: A meta-analysis of controlled studies. *Journal of Counselling Psychology*, 72(4), 416-431. <https://doi.org/10.1037/cou0000789>
- Manrique, M., Allwood, M. A., Pugach, C. P., Amoh, N., & Cerbone, A. (2020). Time and support do not heal all wounds: Mental health correlates of past bullying among college students. *Journal of American College Health*, 68(3), 227-235. <https://doi.org/10.1080/07448481.2018.1538999>
- Markussen, H. V., Aasdahl, L., Viksveen, P., Hedberg, B., & Rise, M. B. (2021). A treatment strategy for meeting life as it is. Patients' and therapists' experiences of brief therapy in a district psychiatric centre: A qualitative study. *PLOS ONE*, 16(10), e0258990-e0258990. <https://doi.org/10.1371/journal.pone.0258990>
- Marvar, P. J., Andero, R., Hurlemann, R., Lago, T. R., Zelikowsky, M., & Dabrowska, J. (2021). Limbic neuropeptidergic modulators of emotion and their therapeutic potential for anxiety and post-traumatic stress disorder. *The Journal of Neuroscience*, 41(5), 901-910. <https://doi.org/10.1523/JNEUROSCI.1647-20.2020>
- Meisters, J., Hoffmann, A., & Musch, J. (2020). Controlling social desirability bias: An experimental investigation of the extended crosswise model. *PLOS ONE*, 15(12), e0243384. <https://doi.org/10.1371/journal.pone.0243384>
- Menken, M. S., Rodriguez Rivera, P. J., Isaiah, A., Ernst, T., Cloak, C. C., & Chang, L. (2023). Longitudinal alterations in brain morphometry mediated the effects of bullying victimisation on cognitive development in preadolescents. *Developmental Cognitive Neuroscience*, 61, Article 101247. <https://doi.org/10.1016/j.dcn.2023.101247>
- Miftahhuddin, M., Suhaimi, S., Nadifa, C., Zatrachadi, M. F., Suhertina, S., Rahmad, R., Istiqomah, I., & Ifdil, I. (2024). Penggunaan Ifdil perceptual light technique (IPLT) dengan ayat-ayat Al-Quran. *Jurnal Konseling dan Pendidikan*, 12(4), 186-196. <https://doi.org/10.29210/1133000>
- Moallem, B. I., Wen, Z., Hammoud, M. Z., Su, W., Pace-Schott, E. F., & Milad, M. R. (2024). Impact of trauma type on neural mechanisms of threat conditioning and its extinction. *Journal of Psychiatric Research*, 178, 50-58. <https://doi.org/10.1016/j.jpsychires.2024.07.039>
- Nesin, S. M., Sharma, K., Burghate, K. N., & Anthony, M. (2025). Neurobiology of emotional regulation in cyberbullying victims. *Frontiers in Psychology*, 16, Article 1473807. <https://doi.org/10.3389/fpsyg.2025.1473807>
- Noret, N., Hejazi, H., Wilson, K., Timms, P., Fuller, K., & Lambe, Y. (2025). The trauma of bullying: Evaluating the impact of a trauma-informed therapeutic intervention to support children who have been chronically bullied in school. *Journal of Psychologists and Counsellors in Schools*, 35(2), 99-111. <https://doi.org/10.1177/20556365251321846>
- Paillere-Martinot, M. L., Briffod, A., Beaudoin, P. A., Hassani, O., Martinot, J. L., & Artiges, E. (2023). Brain structure changes associated with depression outcome in adolescents bullied throughout adolescence. *European Psychiatry*, 66(S1), S105-S105.
- Palamarchuk, I. S., & Vaillancourt, T. (2022). Integrative brain dynamics in childhood bullying victimisation: Cognitive and emotional convergence associated with stress

- psychopathology. *Frontiers in Integrative Neuroscience*, 16. <https://doi.org/10.3389/fnint.2022.782154>
- Palantza, C., Morgan, K., Welton, N. J., Micklitz, H. M., Sander, L. B., & Feder, G. (2025). Individual participant data network meta-analysis of psychosocial interventions for survivors of intimate partner violence: Study protocol. *PLOS ONE*, 20(3), e0306669. <https://doi.org/10.1371/journal.pone.0306669>
- Pedrini, L., Meloni, S., Lanfredi, M., & Rossi, R. (2022). School-based interventions to improve emotional regulation skills in adolescent students: A systematic review. *Journal of Adolescence*, 94(8), 1051-1067. <https://doi.org/10.1002/jad.12090>
- Ressler, Kerry. J., Berretta, S., Bolshakov, V. Y., Rosso, I. M., Meloni, E. G., Rauch, S. L., & Carlezon, W. A. (2022). Post-traumatic stress disorder: clinical and translational neuroscience from cells to circuits. *Nature Reviews Neurology*, 18(5), 273-288. <https://doi.org/10.1038/s41582-022-00635-8>
- Riley-Tillman, T. C., Burns, M. K., & Kilgus, S. (2020). *Evaluating educational interventions: Single-case design for measuring response to intervention*. Guilford Publications.
- Rizka, M., Pohan, R. A., Andrianie, S., Pranowo, T. A., & Suhardita, K. (2026). Evaluating ethnoracial differences in treatment outcomes: A critical review of CBT and DBT effectiveness in partial hospital programmes. *Psychiatry Research*, 358, Article 116986. <https://doi.org/https://doi.org/10.1016/j.psychres.2026.116986>
- Salmivalli, C. (2023). Focus on targeted interventions addressing bullying: what explains their success or failure? *European Journal of Developmental Psychology*, 20(6), 1082-1098. <https://doi.org/10.1080/17405629.2022.2156857>
- Saputra, R., Aminah, S., Soejanto, L. T., Oktasari, M., & Ariyanto, R. D. (2024). Correspondence to Sæther et al.: Cognitive and inflammatory heterogeneity in severe mental illness-translating findings from blood to brain. *Brain, Behavior, and Immunity*, 118, 521-522. <https://doi.org/10.1016/j.bbi.2024.03.030>
- Simpson, E., Carroll, C., Sutton, A., Forsyth, J., Rayner, A., Ren, S., Franklin, M., & Wood, E. (2025). Clinical and cost-effectiveness of eye movement desensitisation and reprocessing for treatment and prevention of post-traumatic stress disorder in adults: A systematic review and meta-analysis. *British Journal of Psychology*, 116(4), 1128-1149. <https://doi.org/10.1111/bjop.70005>
- Snodgrass, M. A., Smith, S. S., & Gregus, S. (2024). Understanding children and adolescents' experiences of being bullied: A mixed-methods study. *Trends in Psychology*. <https://doi.org/10.1007/s43076-024-00385-0>
- Spicer, L. (2024). Eye movement desensitisation and reprocessing (EMDR) therapy for prolonged grief: Theory, research, and practice. *Frontiers in Psychiatry*, 15. <https://doi.org/10.3389/fpsyt.2024.1357390>
- Stratton, S. J. (2023). Population sampling: Probability and non-probability techniques. *Prehospital and Disaster Medicine*, 38(2), 147-148. <https://doi.org/10.1017/S1049023X23000304>
- Suddell, S., Mahedy, L., Skirrow, C., Penton-Voak, I. S., Munafò, M. R., & Wootton, R. E. (2023). Cognitive functioning in anxiety and depression: Results from the ALSPAC cohort. *Royal Society Open Science*, 10(8). <https://doi.org/10.1098/rsos.221161>
- Sugara, G. S., & Fadhilah, R. (2024). Treatment for social media addiction with hypnotic-oriented counselling. *Discover Psychology*, 4(1). <https://doi.org/10.1007/s44202-024-00125-6>
- Sugara, G. S., Rachmawati, S., Muhajirin, M., Rahimsyah, A. P., Bariyyah, K., & Muqodas, I. (2025). Mindfulness-based stress reduction as a treatment for adolescent social media addiction.

- Journal of Addictions & Offender Counselling*. <https://doi.org/10.1002/jaoc.70006>
- Thielemann, J. F. B., Kasparik, B., König, J., Unterhitzberger, J., & Rosner, R. (2022). A systematic review and meta-analysis of trauma-focused cognitive behavioural therapy for children and adolescents. *Child Abuse & Neglect*, 134, Article 105899. <https://doi.org/10.1016/j.chiabu.2022.105899>
- Urano, Y., Takizawa, R., Ohka, M., Yamasaki, H., & Shimoyama, H. (2020). Cyberbullying victimisation and adolescent mental health: The differential moderating effects of intrapersonal and interpersonal emotional competence. *Journal of Adolescence*, 80, 182-191. <https://doi.org/10.1016/j.adolescence.2020.02.009>
- Vanderschoot, T., & Van Dessel, P. (2022). EMDR therapy and PTSD: A goal-directed predictive processing perspective. *Journal of EMDR Practice and Research*, 16(3), 108-122. <https://doi.org/10.1891/EMDR-2022-0009>
- Wang, H., Zhang, M.-R., He, J., Saiding, A., Zong, C., Zhang, Y., & Chen, C. (2024). Exploring the association between bullying victimisation and poor mental health in rural Chinese adolescents: The mediating effects of emotion regulation. *School Mental Health*, 16(4), 1107-1119. <https://doi.org/10.1007/s12310-024-09676-4>
- Wang, H.-Y., You, H.-L., Song, C.-L., Zhou, L., Wang, S.-Y., Li, X.-L., Liang, Z.-H., & Zhang, B.-W. (2024). Shared and distinct prefrontal cortex alterations of implicit emotion regulation in depression and anxiety: An fNIRS investigation. *Journal of Affective Disorders*, 354, 126-135. <https://doi.org/10.1016/j.jad.2024.03.032>
- Zatrahadi, M. F., Miftahuddin, M., Ifdil, I., & Istiqomah, I. (2023). A bibliometric analysis of anxiety disorder topics in 2023. *Konselor*, 12(2), 74-85. <https://doi.org/10.24036/0202312245-0-86>
- Zhu, O. Y., Greene, D., & Dolnicar, S. (2024). Should the risk of social desirability bias in survey studies be assessed at the level of each pro-environmental behaviour? *Tourism Management*, 104, Article 104933. <https://doi.org/10.1016/j.tourman.2024.104933>

Psychometric Properties of the Malay Child Adjustment and Parent Efficacy Scale (CAPES)

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ABSTRACT

This study aims to evaluate the psychometric properties of the Malay version of the Child Adjustment and Parent Efficacy Scale (CAPES-Malay) and assess the relationship between parental self-efficacy (PSE) and adolescent mental health. CAPES was translated into Malay and administered to 478 parents of adolescents aged 10-14. Confirmatory factor analysis supported the robustness of the CAPES-Malay psychometric properties, demonstrating its reliability and validity. CAPES-Malay consists of two scales: 1) Parent Self-efficacy and 2) Child Adjustment, which comprises Emotional and Behavioural Problems (EBP) and Competence subscales. Pearson's correlation showed PSE had a strong negative correlation with adolescent EBP, but a moderate positive correlation with adolescent competence. Strengthening PSE in managing adolescent emotional and behavioural challenges and competence contributes to positive adolescent mental health and fosters a better family environment. Overall, CAPES-Malay demonstrates potential as an assessment tool to gauge the levels of PSE, EBP and competence of early adolescents. Further research is necessary to evaluate the psychometric properties of CAPES-Malay before its extensive implementation.

Keywords: Adolescent mental health, child adjustment, Malaysia, parental self-efficacy, psychometric properties, scale validation

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INTRODUCTION

In recent years, adolescent mental health has gathered increasing attention worldwide. Mental health among adolescents is usually reflected by the presence or absence of mental disorders, emotional and behavioural problems, and psychological well-being. In Malaysia, the National Health Morbidity Survey 2023 reported that the prevalence

of overall mental health problems among adolescents aged 10 to 15 years old increased to 16.5% in 2023, compared to 9.5% in 2019 (Institute for Public Health, 2024). The number of adolescents with experiences of suicidal ideation, planning, and attempts due to various mental health problems was at 13.1%, 10.0%, and 9.5%, respectively, which showed an increase since 2015 and 2017 (Institute for Public Health, 2022). Depressive symptoms and feelings of loneliness were also reported by Malaysian adolescents with 26.9% and 16.2% of them reporting the respective indications. These statistics suggest that mental health issues among adolescents in Malaysia have worsened but are still somewhat understudied, urging the need for comprehensive and improved mental health interventions (World Health Organisation, 2024). Recognising the symptoms of mental health problems promptly is crucial, as diagnoses often surface around the age of 14 (Solmi et al., 2022).

Parental factors are one of the significant microsystem factors affecting the mental health of adolescents (Eriksson et al., 2018). Parental self-efficacy (PSE), defined as parents' belief in their ability to influence their child's development, behaviour, and well-being, has emerged as a critical factor in mitigating these challenges (Albanese et al., 2019; Jones & Prinz, 2005). Rooted in Bandura's theory of self-efficacy, PSE is a modifiable factor that is responsive to psychological interventions and adaptive to situational contexts, thus making it a pertinent parental factor that needs to be

further examined (Schuengel & Oosterman, 2019). Various studies from Western regions have corroborated the direct relationship between PSE and adolescent emotional and behavioural outcomes (Di Giunta et al., 2018; Dumka et al., 2010; Remondi et al., 2023; Salo et al., 2022; Steca et al., 2011). These studies reported that higher levels of PSE were related to fewer emotional and behavioural problems in adolescents.

The Child Adjustment and Parent Efficacy Scale (CAPES) is among the commonly used measures that assess PSE in relation to specific children's emotional and behavioural difficulties (Morawska et al., 2014). The CAPES consists of two primary scales: 1) the Intensity of Child Adjustment scale, which measures emotional maladjustments and behavioural problems, and 2) the Parent Self-Efficacy scale, which measures parents' level of parental self-efficacy in managing these challenging behaviours. Morawska et al. (2014) established robust reliability among English-speaking samples in Australia, reporting internal consistency coefficients of $\alpha = 0.74$ for the Emotional Maladjustment subscale, $\alpha = 0.90$ for the behavioural Problems subscale, and $\alpha = 0.96$ for the Parent Self-Efficacy scale. The CAPES was established to address the need for an assessment tool that is relevant for both public health and individual/group parenting intervention contexts. Beyond its initial development and validation, the CAPES has been translated into several languages to serve diverse populations. Several adaptations of the CAPES into

other languages, such as Spanish-Panama (Mejia et al., 2015), Spanish-Spain (Seijo et al., 2021), Chinese (Guo et al., 2018), and Indonesian (Sumargi et al., 2013) have been conducted and validated within their respective populations.

The Indonesian version demonstrated strong internal consistency with $\alpha = 0.86$ for the child adjustment scale and $\alpha = 0.97$ for the Parent Self-efficacy scale, supporting the original two-factor structure (Sumargi et al., 2013). In contrast, the Chinese, Spanish-Panama, and Spanish-Spain adaptations revealed a distinct three-factor structure for the Child Adjustment scale comprising: 1) Emotional and Behavioural Problems (EBP), and 2) Child Competencies, alongside the Parent Self-efficacy scale. These versions demonstrated robust reliability: the Chinese adaptation yielded construct reliability coefficients (Coefficient H) of $H = 0.88$ for EBP, $H = 0.92$ for Child Competence, and $H = 0.95$ for Parent Self-efficacy (Guo et al., 2018); the Spanish-Panama version showed $H = 0.93$ for EBP, $H = 0.87$ for Child Competence, and $H = 0.93$ for Parent Self-efficacy (Mejia et al., 2015); and the Spanish-Spain validation confirmed $\alpha = 0.84$ for EBP, $\alpha = 0.94$ for Child Competence, and $\alpha = 0.97$ for Parent Self-efficacy (Seijo et al., 2021).

This unique outcome of the Child Adjustment scale into problem-focussed and competence-focussed dimensions aligns with WHO's definition of mental health as encompassing both the absence of psychopathology and the presence of positive functioning, where an individual

is able to effectively recognise their potential, regulate emotions and behaviour, learn and work productively, and engage meaningfully in their community (World Health Organisation, 2022). Despite these structural differences, all cross-cultural adaptations demonstrated robust psychometric properties across all subscales and populations.

The CAPES has been primarily translated and validated among parents of children aged 0 to 12 years. In these previous studies, the children's age range was relatively diverse, which can potentially underrepresent the unique developmental needs of specific age groups, such as early adolescents. The early adolescence stage represents a critical transitional phase from childhood to adolescence marked by rapid physical, psychological, and socioemotional changes. During this period, both adolescents and parents struggle as they learn to manage and navigate the difficulties that arise from or along these changes (Glatz & Buchanan, 2015). Emotional and behavioural difficulties often emerge or intensify during this period, potentially influencing long-term developmental outcomes (Scheiner et al., 2022).

While the original CAPES validation focussed on children aged 2-12 years (Morawska et al., 2014), the developmental indicators it assesses, such as social competence, emotional and behavioural problems, and prosocial behaviour, remain critical domains for assessing developmental progress throughout adolescence. However, the parenting tasks and challenges associated

with these domains may manifest differently during early adolescence compared to early or middle childhood. For instance, managing emotional regulations in a 10-year-old navigating peer pressure differs substantially from managing tantrums in a 4-year-old. Despite this, no previous research has specifically examined parenting self-efficacy using the CAPES exclusively among parents of early adolescents. The present study addresses this gap by focussing specifically on parents of children aged 10 to 14 years old, providing the first developmentally focussed examination of the CAPES during this critical transitional period.

Rationale of the Study

Despite its extensive use, a significant gap remains in the availability of a linguistically appropriate tool for measuring PSE in managing early adolescent emotional and behavioural difficulties within the Malaysian context. Psychometric validations of the CAPES in non-English-speaking contexts further substantiate the applicability of CAPES in diverse populations, reinforcing its relevance for non-Western communities. Hence, the availability of a translated Malay version of CAPES would facilitate inclusivity and accessibility, given that Malay is the national language and primary medium of communication in Malaysia. Extending CAPES to include Malay-speaking parents of early adolescents addresses the current absence of a validated, practical tool to assess and strengthen PSE in this demographic. Importantly, strengthening PSE during the critical period

of early adolescence may improve parenting practices, support parental mental health, and thereby promote adolescent mental health and overall family functioning. This study offers valuable insights into how PSE is related to adolescent mental health outcomes, potentially guiding future research, and interventions aimed at promoting parental skills and adolescent mental health development.

Study Objectives

The objectives of the present study are: 1) to evaluate the internal consistency and composite reliability of the CAPES-Malay; 2) to evaluate the convergent and discriminant validity of the CAPES-Malay; and 3) to examine the relationship between PSE and early adolescent mental health using the CAPES-Malay.

METHODS

Study Design and Sample

This quantitative study employed a cross-sectional, correlational design to assess the reliability and validity of the CAPES-Malay through confirmatory factor analysis (CFA). Sample size determination for CFA followed established guidelines, with a minimum of 200 participants and adherence to the three-indicator rule per latent construct (Hair et al., 2014). Participants were recruited through purposive sampling via multiple online channels, including social media platforms (e.g., Facebook, Instagram), WhatsApp and Telegram groups, and school or institutional networks. The survey was

administered online using Zoho Survey, and the link was disseminated through these channels to reach eligible participants nationwide. Eligibility criteria included parents of at least one early adolescent child aged between 10 and 14 years and having sufficient proficiency in the Malay language to complete a self-administered questionnaire.

Participants

The sample comprised 478 parents of early adolescents recruited through a nationwide online survey conducted across Malaysia. Participants were predominantly mothers (n = 402) and Malays (n = 433). A detailed demographic profile is provided in Table 1, and implications of this composition are discussed in the Limitations section.

Table 1
Participants' demographics (N = 480)

Characteristic	Category	n	%	M (SD)
Parents' Profile				
Sex	Male	76	15.9	
	Female	402	84.1	
Ethnicity	Malay	433	90.6	
	Chinese	8	1.7	
	Indian	8	1.7	
	Bumiputera Sabah	24	4.8	
	Bumiputera Sarawak	6	1.3	
Marital Status	Married	450	94.1	
Number of Children				3.4 (1.4)
Monthly Household Income (MYR)				9,946.77 (8,696.35)
Focus Child's Profile				
Sex	Male	252	52.7	
	Female	226	47.3	
School Level	Primary school	298	62.3	
	Secondary school	180	37.7	
Age Group	10 years old	118	24.7	
	11 years old	86	18	
	12 years old	93	19.5	
	13 years old	95	19.9	
	14 years old	86	18	
Age (years)				11.88 (1.44)

Procedure

Ethical approval was obtained from the Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia (Reference No: JKEUPM-2021-161). Data were collected from August 2021 to December 2021 through an online survey disseminated via various social media platforms and email invitations sent to governmental and non-governmental institutions across Malaysia. Participants read the study information sheet and provided consent before completing the survey.

Child Adjustment and Parent Self-efficacy Scale (CAPES)

The original version of the CAPES was developed based on a sample of Australian parents with children aged from 2 to 12 years old (Morawska et al., 2014). The CAPES comprises two subscales, which assess the intensity of child adjustment (emotional and behavioural problems) and PSE. The Intensity of Child Adjustment scale was used to assess the mental health of adolescents, with all ratings based on parent-reported observations of their adolescents' adjustment. The Behavioural Problems (BP) and Emotional Maladjustments (EM) scales consist of 24 and three (3) items, respectively. The EM scale comprises items 3, 11, and 18, while the rest make up the BP scale. Parents reported their adolescent's adjustment for the past 4 weeks from 0 (Not true at all) to 3 (True most of the time). Each total score of the BP and EM scales was summed up to yield the adolescent's total

adjustment score. Higher scores indicate poorer adjustment, which reflects a poor mental health state.

Parental self-efficacy in managing their adolescent's challenging behaviours was assessed using the Parental Self-efficacy Scale. Parents rated their self-efficacy in successfully managing their adolescent's difficult behaviour from the range of 1 (Certain I can't do it) to 10 (Certain I can do it). The scale is composed of 20 items, and higher scores indicate higher levels of parental self-efficacy. Initial validation of the CAPES found that the internal consistency of EM ($\alpha = 0.74$), BP ($\alpha = 0.90$) (Morawska et al., 2014), Total Child Adjustment Intensity of EM and BP ($\alpha = 0.90$), and Parental Self-efficacy ($\alpha = 0.96$) all ranged from good to excellent (Morawska et al., 2014).

Translation of the CAPES

The original version of CAPES was translated into the Malay language using the forward-backwards translation method (Cruchinho et al., 2024). Initially, the instrument was translated from English into Malay by a bilingual translator. The Malay version was then backtranslated into English by an independent bilingual translator who was blinded to the original version to ensure that the translated items retained their original meaning. The original and back-translated versions were compared, and any discrepancies were resolved through discussion between the research team and expert panel to ensure semantic and conceptual equivalence by maintaining the

sociocultural terms used in the context of the Malaysian population. The CAPES-Malay is provided in Appendix A. Selected items that underwent expert revision are presented in Appendix B to illustrate the nature of the translation refinements made.

Content and Face Validity

Content validity of the Malay CAPES was evaluated by six experts (one academic in Psychiatry and five in Clinical and Developmental Psychology) via an online survey. Experts rated each item's relevance on a four-point Likert scale (1 = not relevant to 4 = highly relevant) (Yusoff, 2019a). Ratings were dichotomised (3-4 = relevant; 1-2 = not relevant), and the item-level content validity index (I-CVI), scale-level content validity index using the average method (S-CVI/Ave), and universal agreement (UA) were calculated. For panels of at least six experts, $I-CVI \geq 0.78$ and $S-CVI/Ave \geq 0.90$ were considered acceptable (Polit & Beck, 2006). All items in the Child Adjustment Scale achieved an I-CVI of 1.00 with universal agreement across all six experts ($UA = 1.00$), and an S-CVI/Ave of 1.00. For the PSE scale, 19 of 20 items achieved an I-CVI of 1.00 with universal agreement ($UA = 1.00$), while one item demonstrated an I-CVI of 0.83 ($UA = 0$). The overall S-CVI/Ave for the PSE scale was 0.99, indicating excellent content validity.

Face validity was assessed as part of a pilot study involving 30 parents of early adolescents recruited through the research team's networks. Ten participants

(seven mothers and three fathers) agreed to participate in the face validity assessment via an online survey and were excluded from the main study. As representatives of the target population, parents were considered appropriate raters for evaluating item clarity and comprehensibility (Yusoff, 2019b). This procedure was carried out to gauge the clarity and comprehensibility of the CAPES-Malay to achieve approachability and user-friendliness (Lim, 2024). Participants rated item clarity and comprehensibility on a four-point Likert scale (1 = not clear to 4 = very clear) (Yusoff, 2019b). Ratings were dichotomised, and the item-level face validity index (I-FVI), scale-level face validity index (S-FVI/Ave), and universal agreement were computed. A value of ≥ 0.83 was considered acceptable for both indices with 10 rates (Yusoff, 2019a). All items in the Child Adjustment Scale demonstrated acceptable I-FVI values (≥ 0.80), with most items achieving universal agreement and an overall S-FVI/Ave of 0.98. All items in the PSE scale achieved universal agreement ($UA = 1.00$), with I-FVI and S-FVI/Ave values of 1.00.

Statistical Analysis

IBM Statistical Package for the Social Sciences (SPSS) Statistics was used to analyse the descriptive statistics for demographic background and study variables, as well as to examine the correlation between the variables. Pearson's correlation was employed to examine the relationship between PSE and adolescent mental health. IBM SPSS Amos was used

to examine the psychometric properties (i.e., the statistical qualities of a measurement tool such as reliability and validity) of the CAPES-Malay.

Confirmatory factor analysis (CFA) was employed to validate the hypothesised factor structure of the CAPES-Malay, as this study aimed to examine an existing theoretically established instrument in a new cultural context. CFA is a statistical technique used to verify the structure of a set of observed variables. The analysis was conducted to assess the psychometric properties and validity of the instrument. Model fit was evaluated using established criteria: relative chi-square (χ^2) < 5.0, comparative fit index (CFI) > 0.90, root mean square error of approximation (RMSEA) < 0.08, and standardised root mean square residual (SRMR) < 0.08 (Bentler, 1992; Byrne, 2016; Hair et al., 2014).

Modification indices were examined to identify areas of model misfit and were adjusted iteratively, with each modification theoretically justified, until acceptable fit indices were achieved. Internal reliability was assessed using Cronbach's alpha, and composite reliability was calculated to estimate the proportion of true score variance in the scale. Adequate internal and composite reliability was considered when values were greater than 0.7 (Hair et al., 2014). Convergent validity gauges the extent to which the same conceptual measures are correlated and was examined through three parameters: average variance extracted (AVE) ≥ 0.5 , composite reliability (CR) ≥ 0.7 , and standardised

factor loadings ≥ 0.5 (Hair et al., 2014). Discriminant validity measures the extent of distinctiveness of two similar concepts, where the squared correlation (r^2) between two latent constructs (i.e., variables that are inferred from measured items) must not exceed the AVE estimates (Hair et al., 2014; Fornell & Larcker, 1981).

RESULTS

Assessment of Model Fit

Model Fit of Child Adjustment Scale

CFA was performed on the individual subscales of the Child Adjustment scale: Behavioural Problems (BP) and Emotional Maladjustments (EM). Initial BP model showed poor model fit ($\chi^2(252) = 5.01$, CFI = 0.79, RMSEA = 0.09, SRMR = 0.07). Modification indices were carried out on the BP model to improve model fit, where a total of 13 correlated error terms were introduced for the final model to obtain adequate fit ($\chi^2(239) = 3.23$, CFI = 0.90, RMSEA = 0.07, SRMR = 0.06). The CFA of the EM model resulted in a saturated model with zero degrees of freedom, making the computation of χ^2/df and RMSEA irrelevant. As expected, SRMR showed no residuals (SRMR = 0.00), and CFI revealed a perfect fit (CFI = 1.00).

The model fit of both BP and EM combined as a 2-factor structure model has been continued examined. Results revealed that the initial 2-factor structure model was a poor fit to the data (Model 1: $\chi^2(323) = 4.57$, CFI = 0.79, RMSEA = 0.09, SRMR = 0.07).

Next, modification indices were employed on the model, resulting in 18 correlated error terms (Model 2: $\chi^2(305) = 2.87$, CFI = 0.90, RMSEA = 0.06, SRMR = 0.05) and standardised factor loadings ranging from 0.44 to 0.72. Model 2 demonstrated a good fit only after 17 modification indices were applied, which exceeded 50% of the total number of items in the Child Adjustment subscale. Consequently, we explored an alternative factor structure for the CAPES-Malay Child Adjustment scale to achieve more parsimonious results.

Following the factor structure of the Spanish CAPES that was validated by Mejia et al. (2015) and Seijo et al. (2021) and the Chinese CAPES by Guo et al. (2018), we attempted CFA on their subscales, which were Emotional and Behavioural Problems (EBP) and Competence. CFA was first performed separately for each subscale. The initial model of EBP revealed an unsatisfactory model fit ($\chi^2(152) = 4.38$, CFI = 0.86, RMSEA = 0.08, SRMR = 0.06). Three pairs ($e12 \leftrightarrow e19$, $e15 \leftrightarrow e17$, and $e2 \leftrightarrow e15$) of correlated error terms were introduced to improve the model fit of the final EBP model ($\chi^2(149) = 3.41$, CFI = 0.90, RMSEA = 0.07, SRMR = 0.05). The initial Competence model fit indices were $\chi^2(20) = 5.86$, CFI = 0.94, RMSEA = 0.10, SRMR = 0.05; thus, correlation of error terms 24 and 25 was done to improve the final Competence model $\chi^2(19) = 3.95$, CFI = 0.96, RMSEA = 0.08, SRMR = 0.04.

A two-factor model combining EBP and Competence (Model 3) was

then examined and demonstrated inadequate fit ($\chi^2(323) = 3.77$, CFI = .84, RMSEA = .08, SRMR = .06). Modification indices were reviewed, and theoretically justifiable correlated error terms were introduced to improve model fit, resulting in the revised Model 4. As shown in Table 2, correlated error terms in the EBP subscale reflected overlapping content among items assessing similar domains, including defiance toward authority, emotional dysregulation, anxiety-related symptoms, and aggressive or disruptive behaviours. In the Competence subscale, correlated errors indicated overlap in domains such as self-regulation and independence, compliance with routines, and prosocial or family-oriented behaviours.

The modified model (Model 4), which included 10 correlated error terms, demonstrated acceptable fit ($\chi^2(313) = 2.92$, CFI = 0.90, RMSEA = 0.06, SRMR = 0.05). Standardised factor loadings ranged from .44 to .72, indicating adequate to good item performance. Overall, Model 4 provided the best fit to the data and was retained as the final model. The findings support a two-factor structure comprising (1) Emotional and Behavioural Problems and (2) Competence. This differs from the originally hypothesised structure separating Behavioural Problems and Emotional Maladjustment, suggesting a revised factor organisation for the Malaysian sample. Figure 1 illustrates the final two-factor model of the Child Adjustment scale for CAPES-Malay.

Table 2
Correlated error terms among Child Adjustment items

Error Terms	Item		Rationale
Emotional and Behavioural Problems (EBP)			
e2 ↔ e15	Item 2	Enggan melakukan pekerjaan di sekitar rumah apabila diminta	Oppositional defiance in response to adult directives
	Item 15	Bertindak menentang apabila diminta melakukan sesuatu)	
e3 ↔ e11	Item 3	Risau	Emotional problems related to anxiety and fear
	Item 11	Nampak takut	
e6 ↔ e13	Item 6	Berdebat atau bertengkar dengan anak-anak lain, saudara kandung lelaki atau perempuan	Aggressive and behavioural problems
	Item 13	Berteriak atau menjerit	
e10 ↔ e14	Item 10	Mengganggu ketika saya bercakap dengan orang lain	Disruptive or attention-seeking behaviours
	Item 14	Merengek atau mengadu	
e12 ↔ e19	Item 12	Mempunyai masalah untuk buat kerja sendiri tanpa perlu diperhatikan oleh orang dewasa	Difficulties in managing tasks independently and organising activities without external support
	Item 19	Mempunyai masalah dalam mengatur tugas dan aktiviti	
e14 ↔ e16	Item 14	Merengek atau mengadu	Difficulty managing emotions and handling frustration
	Item 16	Menangis lebih banyak daripada kanak-kanak lain seusianya	
e15 ↔ e17	Item 15	Bertindak menentang apabila diminta melakukan sesuatu	Defiance and disrespect toward parental authority
	Item 17	Membalas dengan kasar kepada saya	
Competence			
e20 ↔ e22	Item 20	Boleh buat kerja sendiri tanpa perhatian orang dewasa yang berterusan.	Self-regulation and independence
	Item 22	Boleh melakukan tugas yang sesuai dengan usia dengan sendirinya	
e21 ↔ e23	Item 21	Bekerjasama pada waktu tidur	Compliance with routine and structure
	Item 23	Ikut peraturan dan had	
e24 ↔ e25	Item 24	Baik dengan ahli keluarga	Prosocial and family-oriented behaviour
	Item 25	Baik dan suka menolong orang lain	

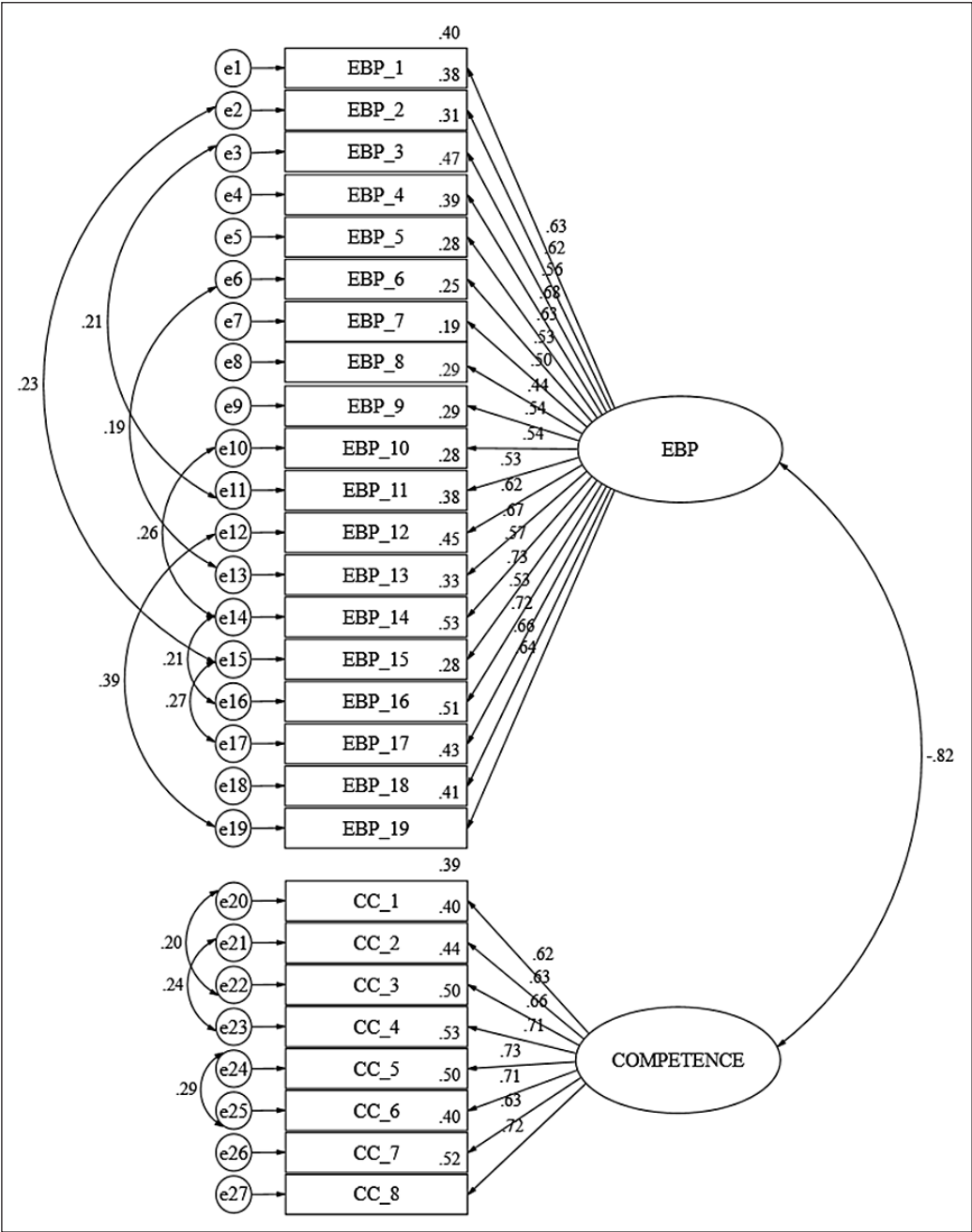


Figure 1. Factor structure of the Malay Child Adjustment scale

Note. Subscales: 1) Emotional and Behavioural Problems and 2) Child Competence as the subscales. Model fit: $\chi^2 = 2.92$; CFI = 0.90; RMSEA = 0.06; SRMR = 0.05; based on N = 478. All standardised factor loadings are significant at $p < 0.001$; correlations between error terms are significant at $p < 0.005$

Notably, the standardised factor loadings of the Child Adjustment scale, which comprises EBP and Competence subscales, were between 0.44 and 0.72. Only one item (Item 8) had a factor loading less than 0.5. After contextual evaluation, Item 8 (“Takes too long getting dressed”) was retained in the model because clothing is associated with adolescents’ self-esteem and identity formation, which influences the positive self-image of adolescents (Dubovitskaya et al., 2020). Adolescents who take a longer time to get dressed may struggle with self-image, which could be the underlying sign of body dysmorphia, low self-esteem, or social anxiety (Javaid & Ajmal, 2019; Kuck et al., 2021). The retention of Item 8 with a factor loading 0.44 was therefore justified due to its contextual importance to the EBP domain. Further, Item 8 was only 0.06 less than the preferred threshold and factor loadings of greater than 0.4 could still be accepted for interpretative reasons (Brown, 2015; Onde & Alvarado, 2018).

Model Fit of PSE Scale

CFA was performed on the 20-item CAPES PSE scale (Morawska et al., 2014). Initial analysis of the 1-factor model demonstrated inadequate model fit: $\chi^2(170) = 5.00$, CFI = 0.93, RMSEA = 0.09, and SRMR = 0.03. Modification indices were examined to improve model fit, leading to the introduction of two theoretically correlated error terms ($e1 \leftrightarrow e2$ and $e3 \leftrightarrow e4$; Table 3). Item 1 and 2 reflect PSE in managing oppositional behaviour and emotional reactivity in response to

demands, while Item 3 and 4 reflect PSE in managing emotional dysregulation involving worry and temper loss. Following these modifications, the result showed excellent model fit as indicated by $\chi^2(168) = 4.37$, CFI = 0.94, RMSEA = 0.08, and SRMR = 0.03. Figure 2 illustrates the 1-factor model of the Self-efficacy scale for CAPES-Malay.

Assessment of Reliability

Reliability of Child Adjustment Scale

The EBP and Competence subscales both demonstrated excellent composite reliability with $CR_{EBP} = 0.91$ and $CR_{COMPETENCE} = 0.87$, and internal consistency with Cronbach’s alpha, $\alpha_{EBP} = 0.92$ and $\alpha_{COMPETENCE} = 0.88$.

Reliability of PSE Scale

The internal consistency of the PSE scale was high ($\alpha = 0.98$). While very high Cronbach’s alpha values have been associated with potential item redundancy, alpha alone is insufficient to determine scale quality and should be interpreted alongside item-level and structural evidence (Taber, 2018). To examine whether item reduction was warranted, item-level diagnostics were conducted. Item-level analyses indicated that all items contributed meaningfully to the construction, with corrected item-total correlations ranging from 0.70 to 0.86. The “Cronbach’s alpha if item deleted” values ranged narrowly from 0.975 to 0.976, confirming that no individual item disproportionately inflated the reliability estimate and that removal of any item

Table 3
Correlated error terms among parental self-efficacy items

Error Terms	Item	Rationale
e1 ↔ e2	Item 1	Child's oppositional behaviour and emotional reactivity in response to demands.
	Item 2	
e3 ↔ e4	Item 3	Child's emotional dysregulation, involving worry and temper loss.
	Item 4	

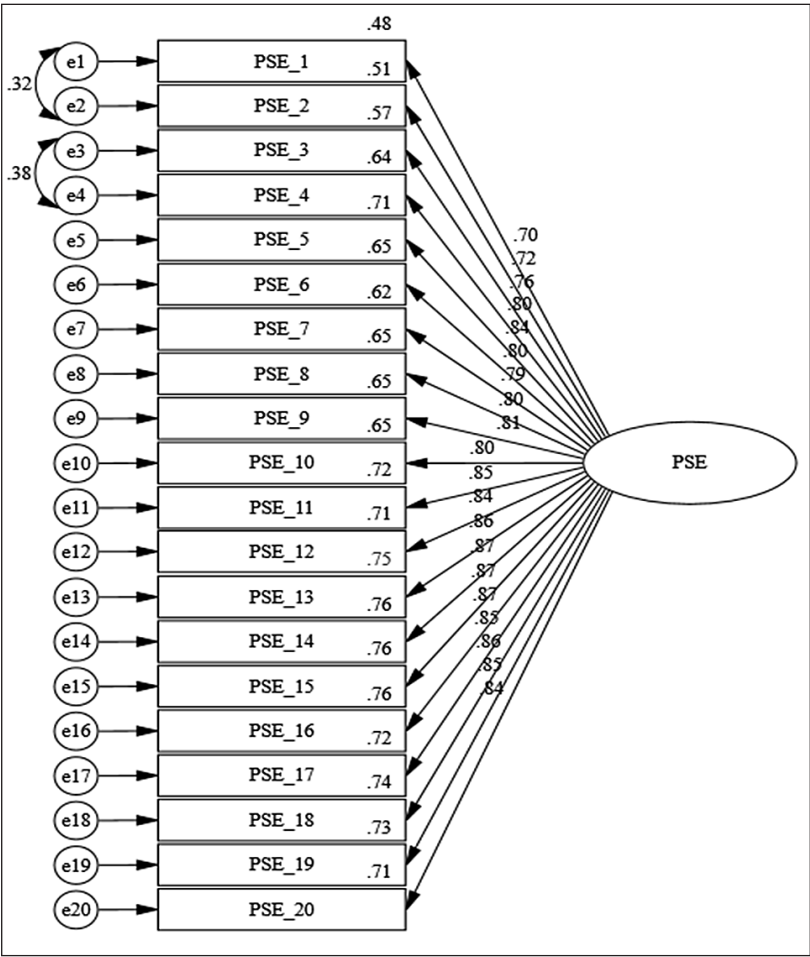


Figure 2. Factor structure of the Malay PSE scale
Note. Model fit: by $\chi^2 = 4.37$; CFI = 0.94; RMSEA = 0.08; and SRMR = 0.03; based on N = 478. All standardised factor loadings are significant at $p < 0.001$; correlated error terms are significant at $p < 0.005$

would not improve internal consistency. In addition, confirmatory factor analysis further supported a unidimensional structure, with all 20 items loading strongly on a single factor (0.70-0.87). Together, these findings support retention of the full item scale and indicate that the high internal consistency of 0.98 reflects construct coherence rather than redundancy.

Assessment of Convergent Validity

Convergent Validity of Child Adjustment Scale

The AVE estimates of EBP and Competence subscales were at 0.36 and 0.46, respectively. Although these values did not meet the conventional requirement of convergent validity ($AVE > 0.5$), Fornell and Larcker (1981) suggested that convergent validity can still be achieved provided that the CR is greater than 0.6. The calculations indicated that the CR of EBP and Competence exceeded the threshold of ≥ 0.6 , with $CR_{EBP} = 0.91$ and $CR_{COMPETENCE} = 0.87$. Additionally, the standardised factor loadings of both EBP and Competence subscales were between 0.44 and 0.72. These results indicate that the Child Adjustment scale of CAPES-Malay exhibited adequate convergent validity.

Convergent Validity of the PSE Scale

The AVE estimate for the PSE scale was 0.67, surpassing the conventional cutoff value of 0.50. The CR value was 0.98 surpassing the cut-off value of ≥ 0.7 . In addition, the standardised factor loadings ranged from 0.70 to 0.88, all of which exceeded

the recommended minimum threshold of 0.50, indicating that the individual items were strongly associated with the latent construct. These results demonstrate that the PSE items converged well in representing the underlying construct, thus providing evidence of adequate convergent validity.

Assessment of Discriminant Validity

Discriminative Validity of the Child Adjustment Scale

The inter-construct correlation between EBP and Competence was $r = 0.67$. The AVE estimates of EBP and Competence subscales were at 0.36 and 0.46, yielding $\sqrt{AVE}$ of 0.60 and 0.68. The correlation between these constructs exceeded the $\sqrt{AVE}$ value, suggesting that the Fornell-Larcker criterion was unmet, therefore, indicating limited discriminant validity between EBP and Competence subscales. To further assess discriminant validity, we employed a more flexible approach based on nested model comparison using the chi-square difference test (Hair et al., 2014). The unconstrained model, which consisted of a freely estimated correlation between EBP and Competence, demonstrated acceptable model fit: $\chi^2(313) = 913.86$, CFI = 0.90, RMSEA = 0.06. In contrast, the constrained model, in which the correlation between EBP and Competence was fixed to 1.0, demonstrated a substantially poorer model fit: $\chi^2(314) = 1797.16$, CFI = 0.74, RMSEA = 0.10. The chi-square difference was $\Delta\chi^2 = 883.30$, $\Delta df = 1$, $p < 0.001$, indicating that constraining the correlation significantly worsened model fit. This provides strong evidence of discriminant

validity between EBP and Competence despite the Fornell-Larcker criterion not being fully met.

Discriminant Validity of PSE Scale

Since PSE is an unidimensional scale, the inter-construct correlations were done between PSE, EBP, and Competence in a single model. The inter-constructing correlations between PSE and EBP and PSE and Competence were $r = 0.29$ and $r = 0.26$, respectively. The AVE estimate for the PSE scale was 0.67. These findings indicate that the scale demonstrates discriminant validity.

Descriptive Statistics of the CAPES-Malay

The descriptive statistics for the total scores of the CAPES-Malay subscales: Parental Self-efficacy (PSE), Emotional and Behavioural Problems (EBP), and Competence were examined. For the PSE scale, fathers reported an average score of 158.22 ($SD = 39.81$), while mothers had an average score of 157.81 ($SD = 33.5$). For the parent-reported measures of adolescent mental health, male adolescents had a mean EBP score of 20.48 ($SD = 10.02$) and female adolescents had a mean score of 20.21 ($SD = 9.11$). Female adolescents had a mean Competence score of 17.44 ($SD = 3.65$), while male adolescents had a mean Competence score of 17.27 ($SD = 3.82$).

Relationship between PSE and Adolescent Mental Health

The computation of Pearson's correlation coefficient was done to assess the linear

relationship between PSE and adolescent mental health, which is reflected by adolescent EBP and competence. Both the relationships between PSE and EBP, as well as PSE and competence showed significant correlation at $p < 0.001$. There was a strong negative correlation between PSE and EBP ($r = -0.507$, $p < 0.001$), and a moderately positive correlation between PSE and competence ($r = 0.477$, $p < 0.001$).

DISCUSSION

The current study aimed to assess the psychometric properties of the CAPES-Malay and examine its practicality in evaluating the relationship between PSE and adolescent mental health. This is the first validation study of the CAPES conducted with parents of early adolescents aged between 10 to 14 years. In Erikson's theory of psychosocial development, early adolescence is related to the stage of industry vs. inferiority, during which children develop a sense of competence. Failure to achieve this sense of competence can lead to a sense of inferiority or incompetence. CAPES incorporates elements of mental health as defined by the World Health Organisation, which includes emotional and behavioural regulation, the ability to learn and work effectively, and the capacity to have meaningful interactions and contributions to society. Aligned with the psychosocial developmental construction of early adolescence, the CAPES is deemed an appropriate tool to measure early adolescent mental health by incorporating both measures of emotional and behavioural

regulation and competence as perceived by their parents.

The findings of the confirmatory factor analysis indicated that the 1-factor structure of the Parent Self-Efficacy scale of CAPES-Malay was consistent with the original CAPES study. On the other hand, the Child Adjustment scale of CAPES-Malay showed better model fit when the constructs were adapted from the CAPES-Spanish (Mejia et al., 2015; Seijo et al., 2021) and CAPES-Chinese (Guo et al., 2018), which separates the Competence subscale from the Emotional and Behavioural Problems (EBP) subscale. These results, however, did not align with the two-factor model originally developed in English (Morawska et al., 2014) and Indonesian (Sumargi et al., 2013) studies, which separates the subscales of Emotional Maladjustments from Behavioural Problems. The discrepancy in the factor structure of the Child Adjustment scale suggests that, while the bifactorial model demonstrates robustness across various language adaptations, cultural and contextual factors may influence how child adjustment is captured.

Mejia et al. (2015) highlighted that the discrepancy in factor structure could be due to the item-parcelling approach used by Morawska et al. (2014). The authors critiqued the application of item parcelling, which could oversimplify the underlying structure of data at the item level, leading to incorrect interpretations of the scale (Bandalos, 2002). Although the current study could have adopted the same parcelling method to achieve a significantly improved

model fit, we opted to retain the individuality of each item, particularly because this is the initial validation of CAPES in the Malay language. Maintaining the items as distinct items provides the opportunity to identify any items that may be deemed unsuitable or irrelevant for Malaysian samples, by excluding items with factor loadings below 0.4 (Brown, 2015; Byrne, 2016; Onde & Alvarado, 2018). Thus, the present study performed the CFA for both the PSE and Child Adjustment scales without employing the item parcelling approach to maintain the integrity and contextual specificity of each item.

Regarding reliability, CAPES-Malay demonstrated robust composite reliability and internal consistency with Cronbach's alpha values above the acceptable threshold of 0.8 for the Parent Self-efficacy and Child Adjustment scales. These findings are consistent with the psychometric performance of the CAPES in other settings, such as in Australia, Panama, Spain, China, and Indonesia, where excellent reliability coefficients were reported. In terms of validity, the Parent Self-efficacy scale obtained satisfactory convergent and discriminant validity aligned with the specified threshold. In assessing the Child Adjustment scale, we adopted the less stringent approach suggested by Fornell and Larcker (1981) to obtain convergent validity by depending on the CR of the scale. While we acknowledge that this more lenient method may not be ideal, it was necessary given the circumstances. The non-optimal convergent validity observed

may be attributed to the limited variation in sample characteristics, which were predominantly of Malay ethnicity (Cheung et al., 2023). Though this was the case, the CR was highly robust with $CR_{EBP} = 0.91$ and $CR_{COMPETENCE} = 0.87$. The validation process of CAPES across various settings revealed that while cultural variations exist, the adequate validity and reliability of the scale demonstrate its potential as a reliable tool for assessing the mental health of children and adolescents in Malaysia. The findings also underscore the importance of continuous psychometric evaluation of CAPES-Malay to ensure the cultural relevance of the scale.

The present study identified a moderate to strong relationship between PSE and adolescent mental health, which highlights the fundamental role of parents and their beliefs in shaping their child's developmental outcomes. As expected, higher levels of PSE were associated with better adolescent mental health outcomes. This finding is consistent with previous studies, which persistently demonstrate a significant association between better PSE and lower emotional and behavioural problems (Di Giunta et al., 2018; Dumka et al., 2010; Remondi et al., 2023; Salo et al., 2022; Steca et al., 2011). This study found that higher PSE was positively correlated with greater adolescent competence, extending the previous study, which focussed on the influence of PSE on adolescent social competence (Junttila & Vauras, 2014). These findings also support Bandura's notion that one's belief may have an impact on others through underlying mechanisms

such as one's behaviour and actions. For example, parents with higher levels of PSE are likely to engage in positive parenting behaviours which foster an environment that encourages children and adolescents to be capable of emotional and behavioural regulation and have a better socioemotional adjustment (Dumka et al., 2010; Hamovitch et al., 2019; Shumow & Lomax, 2002; Slagt et al., 2012). Further, competence as a component of adolescent mental health has been less explored in comparison to emotional and behavioural outcomes. The alternative factor structure which emerged from the study data implies that adolescent mental health or adjustment can be studied beyond the absence or presence of EBP as a lack of competence can result in poor self-esteem, low motivation, and overall well-being (Deci & Ryan, 2008). Therefore, including age-appropriate competence as a component of mental health may provide insights into understanding adolescent mental health better.

CONCLUSION

CAPES is a valid and reliable parent-reported tool for assessing PSE and early adolescent mental health for Malay language speakers in the Malaysian context. Its robust psychometric properties, including satisfactory model fit, excellent construct and internal reliability, as well as adequate convergent and discriminant validity, suggest its applicability among Malaysian parents. The relationship between PSE and adolescent mental health, while consistent with global trends, highlights the influence

of cultural factors on parent-adolescent dynamics. As such, culturally sensitive interventions aimed at improving PSE could be effective in promoting better adolescent mental health in Malaysia.

Implications

This study contributes to the growing body of research on psychometric evaluation and cross-cultural adaptation of the CAPES. The validated CAPES-Malay scale provides a linguistically relevant tool for assessing parental self-efficacy and early adolescent mental health in Malaysia. It enables parents to better understand their child's developmental and behavioural needs, potentially encouraging more proactive efforts to strengthen their parenting skills, particularly in managing challenging behaviours. The scale can be used in community and research settings to assess and support PSE, therefore contributing to broader family well-being by promoting more positive parenting practices and harmonious family dynamics. Its utility is particularly relevant in (1) research contexts examining how individuals interpret and respond to parenting situations in general populations, (2) psychoeducational initiatives aimed at increasing awareness of these processes among community members, and (3) informing population-level public health policy discussions. Accordingly, the CAPES-Malay supports timely and targeted population-level interventions and informed decision-making within these non-clinical contexts, as its applicability to clinical populations warrants further investigation.

Limitations and Recommendations

Despite the strengths and valuable insights of this study, several limitations must be acknowledged. First, the present study was a cross-sectional study, which did not allow us to examine the changes in PSE and adolescent mental health over time, nor can we assess the bidirectionality of these two factors. Future studies should explore longitudinal designs to examine how changes in PSE over time influence adolescent mental health in Malaysia. Second, although the sample size was sufficient for performing CFA, the generalisability of the findings may be limited, especially when parents who responded to the survey were predominantly mothers and of Malay ethnicity. The higher participation of mothers is likely reflective of their greater availability and primary caregiving responsibilities, as well as the likelihood that survey recruitment channels (e.g., parent-focussed online groups) tend to attract more maternal engagement in parenting-related research. Although ethnic diversity was considered during the planning stage, the Malay-language nature of the instrument and the recruitment approach resulted in a predominantly Malay sample. Additionally, although the survey was distributed nationally via an online platform, the geographical distribution of participants by state was not tracked, and it remains unclear whether the sample is representative of parents across all regions of Malaysia. Adaptation of the scale to a bigger and more diverse Malaysian sample could provide increased generalisability for the

CAPES-Malay, as well as reveal potential cultural variations and gendered parental roles within the Malaysian context.

Third, the study was regarded within the community setting as a whole and did not specifically recruit parents from the clinical setting. Researchers can consider incorporating samples within the clinical context to further expand the use of the scale beyond non-clinical settings. Fourth, this study adopted the less stringent approach in determining the Child Adjustment scale's convergent validity. While this does not invalidate the findings, future studies could involve participants of diverse profiles such as including more fathers and parents from other Malaysian ethnicities. This approach increases the variability in responses, which improves the factor loadings and ensures the attainment of the widely adopted AVE threshold of over 0.5, leading to more robust outcomes (Kline, 2016). Fifth, CFA was performed only at the item level but not the parcel level as previously done in the validation of CAPES in the English language. Future studies should compare the results obtained from both item-level and parcel-level confirmatory factor analyses to increase understanding of the methodological nuances. Item parcelling can provide a more parsimonious model by grouping related items into composites, potentially improving model fit indices, especially in cross-cultural research (Bandalos, 2002). However, item-level analysis, as employed in this study, can reveal finer details about the appropriateness of specific items for a given cultural context.

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REFERENCES

- Albanese, A. M., Russo, G. R., & Geller, P. A. (2019). The role of parental self-efficacy in parent and child well-being: A systematic review of associated outcomes. *Child: Care, Health and Development*, 45(3), 333-363. <https://doi.org/10.1111/cch.12661>
- Bandalos, D. L. (2002). The effects of item parcelling on goodness-of-fit and parameter estimate bias in structural equation modelling. *Structural Equation Modelling: A Multidisciplinary Journal*, 9(1), 78-102. https://doi.org/10.1207/s15328007sem0901_5
- Bentler, P. M. (1992). On the fit of models to covariances and methodology to the bulletin. *Psychological Bulletin*, 112(3), 400-404. <https://doi.org/10.1037/0033-2909.112.3.400>
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). The Guilford Press.
- Byrne, B. M. (2016). *Structural equation modelling with AMOS: Basic concepts, applications, and programming* (3rd ed.). Routledge. <https://doi.org/10.4324/9781315757421>
- Cheung, G. W., Cooper-Thomas, H. D., Lau, R. S., & Wang, L. C. (2023). Reporting reliability, convergent, and discriminant validity with structural equation modelling: A review and best-practice recommendations. *Asia Pacific*

- Journal of Management*, 41(2), 745-783. <https://doi.org/10.1007/s10490-023-09871-y>
- Cruchinho, P., López-Franco, M. D., Capelas, M. L., Almeida, S., Bennett, P. M., Miranda da Silva, M., Teixeira, G., Nunes, E., Lucas, P., Gaspar, F., & Handovers4SafeCare. (2024). Translation, cross-cultural adaptation, and validation of measurement instruments: A practical guideline for novice researchers. *Journal of Multidisciplinary Healthcare*, 17, 2701-2728. <https://doi.org/10.2147/JMDH.S419714>
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne*, 49(3), 182-185. <https://doi.org/10.1037/a0012801>
- Department of Statistics Malaysia. (2022). *Household income & expenditure*. <https://open.dosm.gov.my/dashboard/household-income-expenditure>
- Di Giunta, L., Iselin, A. R., Lansford, J. E., Eisenberg, N., Lunetti, C., Thartori, E., ... Gerbino, M. (2018). Parents' and early adolescents' self-efficacy about anger regulation and early adolescents' internalising and externalising problems: A longitudinal study in three countries. *Journal of Adolescence*, 64, 124-135. <https://doi.org/10.1016/j.adolescence.2018.01.009>
- Dubovitskaya, T., Oskolkov, I., Lukyanova, R., & Ivanova, O. (2020). The culture of clothing and "I" image among adolescents. In I. Murzina (Ed.), *Humanistic practice in education in a postmodern age* (Vol. 93, pp. 422-431). European Publisher. <https://doi.org/10.15405/epsbs.2020.11.44>
- Dumka, L. E., Gonzales, N. A., Wheeler, L. A., & Millsap, R. E. (2010). Parenting self-efficacy and parenting practices over time in Mexican American families. *Journal of Family Psychology*, 24(5), 522-531. <https://doi.org/10.1037/a0020833>
- Eriksson, M., Ghazinour, M., & Hammarström, A. (2018). Different uses of Bronfenbrenner's ecological theory in public mental health research: What is their value for guiding public mental health policy and practice? *Social Theory & Health*, 16(4), 414-433. <https://doi.org/10.1057/s41285-018-0065-6>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.2307/3151312>
- Glatz, T., & Buchanan, C. M. (2015). Change and predictors of change in parental self-efficacy from early to middle adolescence. *Developmental Psychology*, 51(10), 1367-1379. <https://doi.org/10.1037/dev0000035>
- Guo, M., Morawska, A., & Filus, A. (2018). Initial validation of the parent-report child adjustment and parent efficacy scale (CAPES) in a Chinese cultural context. *Assessment*, 25(8), 1056-1073. <https://doi.org/10.1177/1073191116681493>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson.
- Hamovitch, E. K., Acri, M. C., & Bornheimer, L. A. (2019). An analysis of the relationship between parenting self-efficacy, the quality of parenting, and parental and child emotional health. *Journal of Family Social Work*, 22(4-5), 337-351. <https://doi.org/10.1080/10522158.2019.1635939>
- Institute for Public Health. (2022). *National health and morbidity survey (NHMS) 2022: Adolescent health survey, Malaysia* (NMRR-21-157-58261). https://iku.gov.my/images/nhms-2022/Report_Malaysia_nhms_ahs_2022.pdf
- Institute for Public Health. (2024). *National health and morbidity survey (NHMS) 2023: Non-communicable diseases and healthcare demand: Technical report* (NMRR-22-00545-XAC). <https://iku.nih.gov.my/images/nhms2023/report-nhms-2023.pdf>

- Javaid, Q. A., & Ajmal, A. (2019). The impact of body image on self-esteem in adolescents. *Clinical and Counselling Psychology Review*, 1(1), 44-54. <https://doi.org/10.32350/ccpr.11.04>
- Jones, T. L., & Prinz, R. J. (2005). Potential roles of parental self-efficacy in parent and child adjustment: A review. *Clinical Psychology Review*, 25(3), 341-363. <https://doi.org/10.1016/j.cpr.2004.12.004>
- Junttila, N., & Vauras, M. (2014). Latent profiles of parental self-efficacy and children's multisource-evaluated social competence. *British Journal of Educational Psychology*, 84(3), 397-414. <https://doi.org/10.1111/bjep.12040>
- Kline, R. B. (2016). *Principles and practice of structural equation modelling* (4th ed.). The Guilford Press.
- Kuck, N., Cafitz, L., Bürkner, P. C., Hoppen, L., Wilhelm, S., & Buhlmann, U. (2021). Body dysmorphic disorder and self-esteem: A meta-analysis. *BMC Psychiatry*, 21(1), Article 310. <https://doi.org/10.1186/s12888-021-03185-3>
- Lim, W. M. (2024). A typology of validity: Content, face, convergent, discriminant, nomological, and predictive validity. *Journal of Trade Science*, 12(3), 155-179. <https://doi.org/10.1108/JTS-03-2024-0016>
- Mejia, A., Filus, A., Calam, R., Morawska, A., & Sanders, M. R. (2015). Validation of the Spanish version of the CAPES: A brief instrument for assessing child psychological difficulties and parental self-efficacy. *International Journal of Behavioural Development*, 40(4), 359-372. <https://doi.org/10.1177/0165025415591229>
- Morawska, A., Sanders, M. R., Haslam, D., Filus, A., & Fletcher, R. (2014). Child adjustment and parent efficacy scale: Development and initial validation of a parent report measure. *Australian Psychologist*, 49(4), 241-252. <https://doi.org/10.1111/ap.12057>
- Onde, D., & Alvarado, J. M. (2018). Scale validation conducting confirmatory factor analysis: A Monte Carlo simulation study with LISREL. *Frontiers in Psychology*, 9, Article 751. <https://doi.org/10.3389/fpsyg.2018.00751>
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health*, 29(5), 489-497. <https://doi.org/10.1002/nur.20147>
- Remondi, C., Gerbino, M., Zuffiano, A., Pastorelli, C., Thartori, E., Bacchini, D., ... Dodge, K. A. (2023). The developmental trends of parental self-efficacy and adolescents' rule-breaking behaviours in the Italian context: A 7-wave latent growth curve study. *PLOS ONE*, 18(11), e0293911. <https://doi.org/10.1371/journal.pone.0293911>
- Salo, A.-E., Junttila, N., & Vauras, M. (2022). Parental self-efficacy and intra- and extra-familial relationships. *Journal of Child and Family Studies*, 31(10), 2714-2729. <https://doi.org/10.1007/s10826-022-02380-4>
- Scheiner, C., Grashoff, J., Kleindienst, N., & Buerger, A. (2022). Mental disorders at the beginning of adolescence: Prevalence estimates in a sample aged 11-14 years. *Public Health in Practice*, 4, Article 100348. <https://doi.org/10.1016/j.puhip.2022.100348>
- Schuengel, C., & Oosterman, M. (2019). Parenting self-efficacy. In M. H. Bornstein (Ed.), *Handbook of parenting* (3rd ed., Vol. 3, *Being and becoming a parent*). Routledge. <https://doi.org/10.4324/9780429433214-19>
- Seijo, D., Tomé, D., Sanmarco, J., Morawska, A., & Fariña, F. (2021). Spanish adaptation and validation of the child adjustment and parent efficacy scale. *Sustainability*, 13(9), Article 4647. <https://doi.org/10.3390/su13094647>
- Shumow, L., & Lomax, R. (2002). Parental efficacy: Predictor of parenting behaviour and adolescent

- outcomes. *Parenting*, 2(2), 127-150. https://doi.org/10.1207/s15327922par0202_03
- Slagt, M., Deković, M., de Haan, A. D., van den Akker, A. L., & Prinzie, P. (2012). Longitudinal associations between mothers' and fathers' sense of competence and children's externalising problems: The mediating role of parenting. *Developmental Psychology*, 48(6), 1554-1562. <https://doi.org/10.1037/a0027719>
- Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., ... Fusar-Poli, P. (2022). Age at onset of mental disorders worldwide: Large-scale meta-analysis of 192 epidemiological studies. *Molecular Psychiatry*, 27(1), 281-295. <https://doi.org/10.1038/s41380-021-01161-7>
- Steca, P., Bassi, M., Caprara, G. V., & Delle Fave, A. (2011). Parents' self-efficacy beliefs and their children's psychosocial adaptation during adolescence. *Journal of Youth and Adolescence*, 40(3), 320-331. <https://doi.org/10.1007/s10964-010-9514-9>
- Sumargi, A., Sofronoff, K., & Morawska, A. (2013). Understanding parenting practices and parents' views of parenting programmes: A survey among Indonesian parents residing in Indonesia and Australia. *Journal of Child and Family Studies*, 24(1), 141-160. <https://doi.org/10.1007/s10826-013-9821-3>
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48, 1273-1296. <https://doi.org/10.1007/s11165-016-9602-2>
- World Health Organisation. (2022). *Mental health*. <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>
- World Health Organisation. (2024). *Strengthening minds: Malaysia strengthens efforts to enhance the mental health of children and adolescents*. <https://www.who.int/westernpacific/news-room/feature-stories/item/strengthening-minds---malaysia-strengthens-efforts-to-enhance-the-mental-health-of-children-and-adolescents>
- Yusoff, M. S. B. (2019a). ABC of content validation and content validity index calculation. *Education in Medicine Journal*, 11(2), 49-54. <https://doi.org/10.21315/eimj2019.11.2.6>
- Yusoff, M. S. B. (2019b). ABC of response process validation and face validity index calculation. *Education in Medicine Journal*, 11(3), 55-61. <https://doi.org/10.21315/eimj2019.11.3.6>

APPENDIX A

The Malay version of Child Adjustment and Parent Self-efficacy Scale (CAPES)

Skala Penyesuaian Kanak-kanak dan Efikasi Diri Ibu Bapa

Sila baca setiap pernyataan dan pilih nombor yang menunjukkan seberapa benar pernyataan itu terhadap anak anda selama empat (4) minggu terakhir. Kemudian, dengan menggunakan skala yang disediakan, tandakan pada skala nombor yang paling menggambarkan bagaimana yakinnya anda pasti berjaya menangani tingkah laku anak anda, walaupun itu adalah tingkah laku yang jarang berlaku atau tidak membimbangkan anda. Tidak ada jawapan yang betul atau salah. Jangan menghabiskan terlalu banyak masa untuk sebarang kenyataan.

Efikasi Diri Ibu Bapa											
No.	Anak saya:	Nilai keyakinan anda									
		1 = Pasti saya tidak dapat melakukannya									
		10 = Pasti saya boleh melakukannya									
		1	2	3	4	5	6	7	8	9	10
1	Tidak puas hati atau marah apabila mereka tidak mendapat cara sendiri										
2	Enggan melakukan pekerjaan di sekitar rumah apabila diminta										
3	Risau										
4	Hilang sabar										
5	Salah laku pada waktu makan										
6	Berdebat atau bertengkar dengan anak-anak lain, saudara kandung lelaki atau perempuan										
7	Enggan makan makanan yang dibuat untuk mereka										
8	Terlalu lama untuk berpakaian										
9	Menyakitkan saya atau orang lain (cth: pukul, tolak, cakar, gigit)										
10	Mengganggu ketika saya bercakap dengan orang lain										
11	Nampak takut										
12	Berkelakuan buruk di sekolah atau pusat jagaan										
13	Mempunyai masalah untuk buat kerja sendiri tanpa perlu diperhatikan oleh orang dewasa										

Skala Penyesuaian Kanak-kanak dan Efikasi Diri Ibu Bapa (*sambungan*)

Efikasi Diri Ibu Bapa										
No.	Anak saya:	Nilai keyakinan anda								
		1 = Pasti saya tidak dapat melakukannya								
		10 = Pasti saya boleh melakukannya								
		1	2	3	4	5	6	7	8	9 10
14	Berteriak atau menjerit									
15	Merengek atau mengadu									
16	Bertindak menentang apabila diminta melakukan sesuatu									
17	Menangis lebih banyak daripada kanak-kanak lain seusianya									
18	Membalas dengan kasar kepada saya									
19	Nampak tidak gembira atau sedih									
20	Mempunyai masalah dalam mengatur tugas dan aktiviti									
		Sangat tidak benar	Tidak benar	Benar	Sangat benar					
1	Tidak puas hati atau marah apabila mereka tidak mendapat cara sendiri	0	1	2	3					
2	Enggan melakukan pekerjaan di sekitar rumah apabila diminta	0	1	2	3					
3	Risau	0	1	2	3					
4	Hilang sabar	0	1	2	3					
5	Salah laku pada waktu makan	0	1	2	3					
6	Berdebat atau bertengkar dengan anak-anak lain, saudara kandung lelaki atau perempuan	0	1	2	3					
7	Enggan makan makanan yang dibuat untuk mereka	0	1	2	3					
8	Mengambil masa terlalu lama untuk berpakaian	0	1	2	3					
9	Menyakitkan saya atau orang lain (cth: pukul, tolak, cakar, gigit)	0	1	2	3					
10	Mengganggu ketika saya bercakap dengan orang lain	0	1	2	3					
11	Nampak takut	0	1	2	3					
12	Mempunyai masalah untuk buat kerja sendiri tanpa perlu diperhatikan oleh orang dewasa	0	1	2	3					

Skala Penyesuaian Kanak-kanak dan Efikasi Diri Ibu Bapa (*sambungan*)

		Sangat tidak benar	Tidak benar	Benar	Sangat benar
13	Berteriak atau menjerit	0	1	2	3
14	Merengek atau mengadu	0	1	2	3
15	Bertindak menentang apabila diminta melakukan sesuatu	0	1	2	3
16	Menangis lebih banyak daripada kanak-kanak lain seusianya	0	1	2	3
17	Membalas dengan kasar kepada saya	0	1	2	3
18	Nampak tidak gembira atau sedih	0	1	2	3
19	Mempunyai masalah dalam mengatur tugas dan aktiviti	0	1	2	3
20	Boleh buat kerja sendiri tanpa perhatian orang dewasa yang berterusan.	0	1	2	3
21	Bekerjasama pada waktu tidur	0	1	2	3
22	Boleh melakukan tugas yang sesuai dengan usia dengan sendirinya	0	1	2	3
23	Ikut peraturan dan had	0	1	2	3
24	Baik dengan ahli keluarga	0	1	2	3
25	Baik dan suka menolong orang lain	0	1	2	3
26	Bercakap mengenai pandangan, idea, dan keperluan mereka dengan tepat	0	1	2	3
27	Melakukan apa yang disuruh oleh orang dewasa	0	1	2	3

APPENDIX B

Comparison of Original English Items, Initial Malay Translations, and Expert-revised CAPES-Malay Items

Item	Original (English)	Initial Malay Translation	Expert-revised Malay
5	Misbehaves at mealtimes	Berkelakuan buruk pada waktu makan	Salah laku pada waktu makan
12	Has trouble keeping busy without adult attention	Menghadapi masalah tanpa perhatian orang dewasa	Mempunyai masalah untuk buat kerja sendiri tanpa perlu diperhatikan oleh orang dewasa
14	Whines or complains (whinges)	Merengek atau mengeluh	Merengek atau mengadu
22	Can do age appropriate tasks by themselves	Boleh melakukan tugas yang sesuai dengan umur dengan sendiri	Boleh melakukan tugas yang sesuai dengan usia dengan sendirinya

The STAR Reflective Growth Cycle: An Integrative Framework Linking Growth Mindset, Mathematics Anxiety, and Fraction Numeracy in Elementary Teacher Education

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ABSTRACT

Mathematics anxiety and limited understanding of fractions remain persistent challenges in elementary teacher education, often constraining conceptual learning and instructional confidence. Addressing these challenges requires learning frameworks that integrate cognitive, affective, and reflective processes. This study examines the relationships among growth mindset, mathematics anxiety, and fraction numeracy within the framework of the STAR Reflective Growth Cycle, an integrative reflective learning framework for pre-service elementary teachers. An explanatory sequential mixed-methods design was employed involving 71 pre-service teachers. Quantitative data were collected using a growth mindset scale, a mathematics anxiety scale, and a fraction numeracy test. Qualitative data were obtained through structured self-assessment reflections aligned with the four-STAR phases: self-awareness, take action, analysis and self-assessment, and rise and growth.

The results indicate that a growth mindset is positively associated with fraction numeracy and negatively associated with mathematics anxiety. Regression analysis further shows that a growth mindset significantly predicts fraction numeracy performance, accounting for 35.9% of the variance. These relationships should be interpreted as associative rather than causal, consistent with the correlational design of the study. Qualitative findings reveal a gradual shift from anxiety and avoidance toward reflective persistence, strategic engagement, and increased confidence across the STAR phases. These findings provide interpretive insight into

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participants' experiences rather than evidence of causal impact. Overall, the findings suggest the potential relevance of structured reflective learning frameworks that integrate belief, emotion, and self-assessment in understanding numeracy development within elementary teacher education.

Keywords: Elementary teacher education, fraction numeracy, growth mindset, mathematics anxiety, reflective self-assessment,

INTRODUCTION

Mathematics education remains a major challenge in teacher education programmes, especially in elementary education. Many pre-service teachers begin their learning with high levels of mathematics anxiety and limited understanding of basic topics such as fractions, ratios, and proportional reasoning (Nasiruddin & Hayati, 2019; Nasiruddin & Basri, 2020; Zahra Nasiruddin et al., 2024). These problems are not only cognitive in nature but are also closely connected to emotional and motivational factors, which affect how future educators learn and later teach mathematics to their students (Ashcraft et al., 2007; D. Park et al., 2014). Therefore, developing instructional frameworks that address both cognitive and affective dimensions of mathematics learning has become a critical priority in improving teacher education.

Therefore, the need to integrate emotional and cognitive aspects of mathematics learning has been widely emphasised in recent research (Carey et al., 2017). For many pre-service educators, their fear of mathematics originates from prior negative learning experiences, which often leads them to avoid mathematics, feel less confident, and doubt their ability to teach it (Yunus & Nasiruddin, 2022).

At the same time, many of them demonstrate fragmented or procedural understanding of fractions, even though fractions are one of the most crucial and difficult concepts in early mathematics learning (Siegler & Lortie-Forgues, 2015). The combination of emotional difficulties and limited conceptual understanding creates a cycle of low confidence and surface-level learning, which may affect both their own achievement and their future students learning outcomes.

In the past few decades, the concept of a growth mindset has been introduced to address this problem (Dweck, 2017; Yunus & Nasiruddin, 2022) and has emerged as a promising approach to mitigating these challenges. A growth mindset refers to the belief that intelligence and ability can be developed through effort, effective strategies, and persistence. This perspective has been associated with greater resilience, adaptive help-seeking, and persistence in the face of difficulty (Yeager et al., 2022). However, empirical evidence suggests that holding a growth mindset alone is insufficient to produce meaningful changes in learning behaviour or academic outcomes. Many students exhibit what is described as a "false growth mindset," where they express positive beliefs but do not engage in reflective or effortful learning practices

(Memari et al., 2024). This discrepancy between belief and action indicates that meaningful cognitive and emotional change requires structured support through self-assessment and self-regulation, rather than motivational beliefs alone.

Parallel developments in reflective learning theory (Gibbs, 1988; Schön, 1983; Nusantara, 2016a) and self-regulated learning (SRL) (Zimmerman, 2002; Matitaputty et al., 2024) emphasise that metacognitive awareness, self-monitoring, and feedback processes are essential mechanisms for learning and development. Reflective learning frameworks enable learners to examine their thoughts, emotions, and strategies when encountering difficulties. This process can transform failure into insight and frustration into improved planning. However, in mathematics teacher education, self-assessment is often implemented in a limited and disconnected manner, focusing more on teaching methods rather than helping students deeply understand mathematical concepts or regulate their emotions during problem solving (Hutajulu & Minarti, 2024). As a result, pre-service educators rarely perceive self-assessment as an integrated mechanism that supports both cognitive and emotional aspects of mathematics learning.

This study addresses this conceptual and practical gap by introducing the STAR Reflective Growth Cycle, an integrative framework that combines the principles of growth mindset (Stohlmann & Yang, 2024), reflective practice, and self-regulated

learning into a coherent model of emotional-cognitive development. The STAR framework consists of four iterative stages: Self-Awareness, Take Action, Analysis & Self-Assessment, and Rise & Growth. Within this framework, self-assessment is not treated as a final step but as a central mechanism for supporting adaptive learning processes. As learners move through each stage, they first become aware of their thoughts and emotions (Self-Awareness), apply strategies (Take Action), evaluate their performance (Analysis & Self-Assessment), and reconstruct their understanding and confidence (Rise & Growth). This cycle aligns with Zimmerman's model of self-regulated learning while also incorporating the emotional and motivational dimensions highlighted in Dweck's and Gibbs's theories.

Importantly, this study does not aim to establish the causal effectiveness of the STAR framework. Instead, it seeks to explore the associations between growth mindset, mathematics anxiety, numeracy, and reflective experiences among pre-service teachers. By linking theory with empirical observations, this study positions the STAR framework as a conceptual and exploratory model that may support understanding of how cognitive and affective processes interact in mathematics learning. Rather than eliminating difficulty, the framework encourages learners to interpret challenges as opportunities for reflection and development, transforming failure into feedback and anxiety into adaptive learning responses.

LITERATURE REVIEW

Growth Mindset in Mathematics Learning

Growth mindset theory conceptualises intelligence and ability as malleable attributes that can be developed through effort, effective strategies, and persistence (Dweck, 2017; Dweck & Yeager, 2019). A substantial body of empirical research demonstrates that learners who endorse growth mindset beliefs are more likely to persist when facing difficulty, interpret errors as learning opportunities, and engage in adaptive help-seeking behaviours (Yeager et al., 2022; Rahayuningsih et al., 2023). In mathematics education, growth mindset has been associated with improved achievement, increased strategy use, and reduced fear of failure, particularly in learning contexts that require sustained cognitive effort (Boaler et al., 2022; Lunardon et al., 2022; Yunus & Nasiruddin, 2022).

Despite these positive associations, recent empirical studies have highlighted important limitations of growth mindset interventions when implemented as isolated belief-based messages. Barger et al. (2022) describe the phenomenon of false growth mindset, in which learners verbally endorse growth-oriented beliefs without engaging in reflective or effortful learning behaviours. Similarly, Dweck and Yeager (2020) argue that mindset interventions are most effective when embedded within learning environments that provide explicit opportunities for strategy use, feedback, and self-monitoring.

In mathematics learning, particularly in conceptually demanding domains such as fractions, effort without reflection may reinforce misconceptions rather than promote understanding (Brewster & Miller, 2023; Muzaini et al., 2023). Therefore, a growth mindset should be understood not only as a belief system but also as a practice enacted through structured cognitive and metacognitive processes. Without mechanisms that guide learners to reflect on errors, regulate emotions, and adapt strategies, a growth mindset risks remaining motivational rather than instructional in nature.

Mathematics Anxiety and Emotional Regulation

Mathematics anxiety is commonly defined as a feeling of tension or apprehension that interferes with numerical manipulation and mathematical reasoning (Ramirez et al., 2013). Extensive empirical evidence indicates that mathematics anxiety negatively affects working memory, attentional control, and problem-solving performance (Chuderski & Necka, 2012; Cipora et al., 2022). In fraction learning, where tasks require multi-step reasoning and conceptual coordination, anxiety can significantly constrain learners' ability to engage productively with mathematical content (Chang, 2023). Within teacher education, mathematics anxiety presents a dual challenge. First, it limits pre-service teachers' own conceptual development and learning engagement. Second, it may influence future instructional practices, as

anxious teachers tend to avoid mathematics-rich activities or convey negative attitudes toward mathematics to their students (Chamberlain, 2023; Seo & Lee, 2021; Peterman & Ewing, 2019). Empirical studies further demonstrate that reducing mathematics anxiety requires more than repeated exposure to mathematical tasks; it necessitates explicit support for emotional regulation and metacognitive awareness (O'Leary & Fletcher, 2024; Aydin et al., 2022; Seo & Lee, 2021). Research on emotional regulation in mathematics learning emphasises the role of awareness, monitoring, and reflective interpretation of emotional experiences. Learners who recognise anxiety as a temporary and manageable response are more likely to persist and engage in adaptive problem-solving strategies (O'Leary & Fletcher, 2024). These findings suggest that effective mathematics learning environments must integrate emotional regulation with cognitive engagement, rather than treating affective factors as secondary or peripheral.

Reflective Learning and Self-Assessment

Reflective learning theory emphasises deliberate reflection on experience as a mechanism for professional and cognitive growth. Schön (1983) distinguishes between reflection-in-action and reflection-on-action, both of which enable learners to examine their thinking, emotions, and decisions during and after learning activities. Gibbs (1988) further operationalises reflective learning through structured cycles that guide learners from experience to evaluation and action

planning. Empirical studies in mathematics teacher education demonstrate that reflective practices support metacognitive awareness, error diagnosis, and conceptual change. Structured self-assessment activities, in particular, have been shown to help pre-service teachers identify misconceptions, regulate emotional responses to errors, and refine learning strategies (Erdemir & Yeşilçınar, 2021; Font et al., 2024; Ashiddiqi et al., 2024). By making tacit cognitive and emotional processes explicit, reflective self-assessment facilitates deeper learning and adaptive strategy use. Despite its documented benefits, self-assessment in teacher education is often implemented superficially, functioning primarily as a summative evaluation of performance rather than as an ongoing learning mechanism (Markkanen et al., 2020). When self-assessment is not explicitly linked to emotional regulation and strategy adaptation, its potential to support both conceptual understanding and growth mindset enactment remains limited.

Self-Regulated Learning as an Integrative Framework

Self-regulated learning (SRL) provides a comprehensive framework for understanding how learners actively manage cognition, motivation, and emotion during learning. Zimmerman (2002) conceptualises SRL as a cyclical process involving forethought (goal setting and motivation), performance (strategy use and monitoring), and self-reflection (evaluation and adaptation).

A robust body of empirical research demonstrates that learners who engage in SRL processes achieve higher academic performance, show greater persistence, and respond more adaptively to academic challenges (Graham et al., 2024; Heyder et al., 2023; Matitaputty et al., 2024). In mathematics education, SRL has been shown to mediate the relationship between beliefs, emotions, and performance. Learners who monitor their understanding, evaluate errors, and adjust strategies are better able to manage anxiety and sustain engagement with complex mathematical tasks (Aydın & Özgeldi, 2024; Muslim et al., 2024). However, SRL processes are not automatically acquired; they require explicit scaffolding and structured opportunities for practice, particularly in teacher education contexts where learners are developing both mathematical knowledge and pedagogical identity. This highlights the need for integrative instructional frameworks that make SRL processes explicit and operational within domain-specific learning contexts such as mathematics.

Positioning the STAR Reflective Growth Cycle

Although growth mindset, reflective learning, and self-regulated learning have each been extensively studied, existing approaches frequently address these constructs in isolation. Growth mindset interventions often emphasise belief change without sufficient guidance for enactment. Reflective practices may focus on teaching methods rather than on learners'

emotional and cognitive experiences with mathematical content. SRL frameworks, while theoretically comprehensive, are frequently presented in abstract terms and lack explicit integration with affective regulation in mathematics learning. The STAR Reflective Growth Cycle is positioned as an integrative framework that addresses these limitations by explicitly linking belief, emotion, reflection, and strategy within a single cyclical learning process (Aka et al., 2025; Zayyadi et al., 2020). The four phases (self-awareness, act, analysis and self-assessment, and rise and growth) align with core SRL processes while foregrounding emotional regulation and reflective meaning-making. Unlike traditional growth mindset approaches that emphasise belief endorsement, STAR conceptualises growth mindset as a reflective practice enacted through self-assessment and strategic adaptation. Self-assessment functions as the central mechanism connecting emotional awareness, cognitive strategy use, and conceptual reconstruction. Importantly, this framework is proposed as a conceptual and exploratory model rather than as evidence of established instructional effectiveness, aligning with the non-experimental design of the present study. In this way, STAR extends existing frameworks by operationalising how growth mindset beliefs are translated into observable learning behaviours during mathematically challenging tasks such as fraction problem solving. By positioning STAR at the intersection of growth mindset theory, reflective learning, and self-regulated learning, this study contributes

a theoretically grounded and contextually responsive framework for mathematics teacher education (Hanafi et al., 2025; Rahayungsih et al., 2025a; Rahayungsih et al., 2025b). The framework addresses a critical gap in literature by offering a structured mechanism through which pre-service teachers can regulate emotions, engage reflectively with errors, and develop a deeper conceptual understanding of mathematics.

Table 1 illustrates the conceptual alignment between the STAR Reflective Growth Cycle and key elements of reflective learning, self-regulated learning, and growth mindset theory.

The STAR Reflective Growth Cycle integrates cognitive, affective, metacognitive, and belief-related dimensions within a structured reflective learning framework (Table 2).

Table 1
Theoretical integration underpinning the STAR reflective growth cycle

STAR Phase	Reflective Learning (Gibbs, 1988)	Self-regulated Learning (Zimmerman, 2002)	Growth Mindset Perspective (Dweck, 2017)	Key Learning Outcome
Self-Awareness	Reviewing experience	Forethought (goal setting, motivation)	Belief in the malleability of ability	Metacognitive awareness
Take Action	Exploring feelings and thoughts	Performance (strategy use)	Effortful engagement	Deliberate persistence
Analysis and Self-Assessment	Evaluating experience	Self-reflection (monitoring and evaluation)	Learning from errors	Conceptual understanding
Rise and Growth	Action planning	Adaptive regulation	Adaptive and growth-oriented mindset	Resilience and growth-oriented identity

Table 2
Conceptual structure of the STAR reflective growth cycle

Dimension	Focus of Enhancement	Operationalisation in STAR	Expected Learning Outcome
Cognitive	Conceptual understanding and numeracy reasoning	Take Action; Analysis and Self-Assessment	Improved problem-solving and fraction numeracy
Affective	Emotional regulation and anxiety management	Self-Awareness: Rise and Growth	Reduced mathematics anxiety and increased confidence
Metacognitive	Self-monitoring and self-evaluation	Analysis and Self-Assessment	Enhanced reflective awareness and adaptive thinking
Belief System	Growth-oriented beliefs and effort attribution	Rise and Growth	Increased motivation, persistence, and resilience

Unlike generic self-regulated learning models that emphasise cognitive regulation in broad academic contexts, the STAR Reflective Growth Cycle explicitly foregrounds emotional awareness and structured self-assessment as central mechanisms through which growth mindset beliefs are enacted during mathematically demanding tasks. Rather than treating reflection as a peripheral or post-hoc activity, STAR positions self-assessment as an ongoing regulatory process that links emotion, strategy use, and conceptual understanding. In this way, STAR extends existing reflective and self-regulated learning frameworks by providing a domain-sensitive structure for examining how growth-oriented beliefs translate into observable learning behaviours in mathematics teacher education.

METHODOLOGY

Research Design

This study employed an explanatory sequential mixed-methods design, in which quantitative data collection and analysis were followed by qualitative exploration to elaborate and contextualise the statistical findings. This design was selected to examine not only the relationships among growth mindset, mathematics anxiety, and fraction numeracy but also to explore how reflective self-assessment processes shape learners' emotional and cognitive experiences during mathematics learning.

The quantitative phase focused on examining associative and non-causal

relationships among the study variables, whereas the qualitative phase provided insight into the reflective mechanisms underlying the observed patterns. Importantly, this design does not permit causal inference but is intended to explore patterns of association and meaning-making processes. Integration occurred at the interpretation stage through triangulation of quantitative results and qualitative themes, consistent with best practices in mixed-methods research.

Participants and Context

Participants were 71 pre-service elementary teachers enrolled in the third semester of an elementary teacher education programme at a public university in Indonesia. The sample consisted predominantly of female students (approximately 88%), with ages ranging from 18 to 21 years. All participants were enrolled in a compulsory mathematics course focusing on foundational topics, including fractions. This cohort was selected because early-stage pre-service teachers are in a critical period for developing mathematical self-efficacy, emotional dispositions toward mathematics, and foundational conceptual understanding prior to teaching practicum experiences (Bani et al., 2022; Berg et al., 2025; Rahayungsih et al., 2025a; Rahayungsih et al., 2025b). Participation was voluntary, and informed consent was obtained before data collection. However, the use of a single institutional sample and a relatively small sample size may limit the generalisability of the findings.

Instruments

All questionnaire instruments employed a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The use of a four-point scale was intended to reduce central tendency bias and encourage participants to express clear positions regarding their beliefs and emotional experiences.

Growth Mindset Scale

Growth mindset was measured using a 15-item questionnaire adapted from established mindset instruments (Barger et al., 2022; Dweck, 2017). The items assessed beliefs about the malleability of mathematical ability, effort, and learning strategies. Reliability analysis demonstrated high internal consistency (Cronbach's $\alpha = .88$), exceeding recommended thresholds for psychological measurement. The instrument was used to capture perceived beliefs rather than direct behavioural enactment, and therefore should be interpreted within the limits of self-reported data.

Mathematics Anxiety Scale

Mathematics anxiety was assessed using an 8-item scale adapted from Carey et al. (2017), measuring emotional, cognitive, and physiological responses to mathematical tasks. The instrument demonstrated strong internal consistency in the present study (Cronbach's $\alpha = .85$), supporting its suitability for examining affective dimensions of mathematics learning. This measure reflects perceived anxiety levels

and does not capture real-time emotional fluctuations during task performance.

Fraction Numeracy Test

Fraction numeracy was measured using a 10-item diagnostic test designed to assess conceptual understanding, procedural reasoning, and applied problem-solving involving fractions. Test items were aligned with international numeracy frameworks and national assessment indicators, covering three cognitive domains: knowing, applying, and reasoning. Content validity was established through expert review by mathematics education specialists to ensure alignment with instructional objectives and conceptual demands. Reliability analysis indicated satisfactory internal consistency (Cronbach's $\alpha = .86$), supporting the use of the instrument for inferential analysis.

Qualitative Data Source

Structured Self-Assessment Reflections

Qualitative data were collected through written self-assessment reflections guided by the STAR Reflective Growth Cycle. Participants completed structured reflection prompts corresponding to the four-STAR phases: (1) Self-Awareness, (2) Take Action, (3) Analysis and Self-Assessment, and (4) Rise and Growth. The prompts encouraged participants to reflect on emotional responses, learning strategies, errors, and changes in understanding during fraction learning activities. This approach aligns with reflective practice research emphasising the use of structured prompts

to support analytic depth and metacognitive engagement (Erdemir & Yeşilçınar, 2021; Gibbs, 1988; Schön, 1983).

Data Collection Procedure

Data collection was conducted over a six-week instructional period. Quantitative instruments were administered after participants completed instructional units on fractions. Qualitative self-assessment reflections were collected subsequently, allowing participants to reflect on their learning experiences informed by the prior quantitative assessment results. This sequential procedure ensured alignment with the explanatory mixed-methods design, enabling qualitative data to elaborate on and contextualise observed quantitative relationships. No experimental manipulation or control group was employed in this study.

Data Analysis

Quantitative Analysis

Quantitative data were analysed using SPSS. Descriptive statistics were computed to examine central tendencies and variability. Pearson correlation analyses were conducted to examine relationships among growth mindset, mathematics anxiety, and fraction numeracy. A simple linear regression analysis was performed to assess the predictive role of growth mindset on fraction numeracy performance. Mathematics anxiety was not included as a predictor in the regression model, as the primary purpose of the analysis was to examine the

direct predictive contribution of growth mindset prior to qualitative exploration of emotional regulation and reflective processes. Assumptions of regression analysis, including normality, linearity, and homoscedasticity, were examined prior to inferential testing. Statistical significance was determined at the .05 level. The regression results are interpreted as indicative of statistical association rather than causal influence.

Qualitative Analysis

Qualitative data were analysed using thematic analysis following a systematic coding process. Initial open coding was conducted to identify emotional, cognitive, and strategic patterns within participants' reflections. Codes were subsequently organised into themes corresponding to the STAR phases. To enhance trustworthiness, themes were reviewed iteratively across participants to identify convergence and divergence in experiences. Reflexive memoing was employed throughout the analytic process to support analytic transparency and reduce researcher bias. This approach enabled qualitative findings to function not merely as illustrative examples but as interpretive evidence explaining how reflective self-assessment mediated emotional regulation and learning processes. Researcher subjectivity was acknowledged as part of the interpretive process and managed through iterative validation of themes.

Integration of Quantitative and Qualitative Data

Integration occurred at the interpretation stage through joint display analysis, linking statistical relationships with qualitative themes across the STAR phases. This integration aimed to provide explanatory insight rather than causal confirmation of relationships among variables.

Ethical Considerations

Ethical approval was obtained from the institutional review board. Participants were informed of the voluntary nature of participation, confidentiality of responses, and their right to withdraw at any time without academic consequences.

RESULTS

Quantitative Results

Descriptive Statistics

Descriptive analyses were conducted to examine participants' profiles in terms of growth mindset, mathematics anxiety, and fraction numeracy. The results show that pre-service teachers demonstrated a moderately high level of growth mindset ($M = 48.1$, $SD = 6.4$; possible range = 15-60). Mathematics anxiety scores were in the moderate range ($M = 21.3$, $SD = 5.9$). Fraction numeracy performance also fell within a moderate range ($M = 39.7$, $SD = 7.8$).

Correlation Analysis

Pearson correlation analyses were conducted to examine the relationships between growth

mindset, mathematics anxiety, and fraction numeracy. The results revealed a significant positive correlation between growth mindset and fraction numeracy ($r = 0.631$, $p < .01$). In contrast, mathematics anxiety was significantly and negatively correlated with fraction numeracy ($r = -0.482$, $p < .01$). These results indicate moderate to strong statistical associations among the variables; however, they do not imply causal relationships.

Regression Analysis

A simple linear regression analysis was conducted to examine whether growth mindset significantly predicted fraction numeracy performance. The model was statistically significant, $F(1, 69) = 18.47$, $p < .001$. Growth mindset was found to be a significant statistical predictor of fraction numeracy within the regression model ($\beta = 0.598$, $p < .001$); however, this relationship should be interpreted as associative rather than causal. The model explained 35.9% of the variance in fraction numeracy as indicated by the adjusted coefficient of determination (adjusted $R^2 = 0.359$), while the corresponding zero-order correlation between growth mindset and fraction numeracy was $r = 0.631$. This proportion of explained variance indicates a moderate level of statistical association rather than a definitive explanatory effect. Mathematics anxiety was not included as a predictor in the regression model, as the analysis was designed to examine the direct predictive role of growth mindset before qualitative exploration.

Taking together, these quantitative patterns indicate that cognitive beliefs and affective responses are statistically associated and may interact in shaping fraction learning outcomes; however, these relationships should not be interpreted as causal.

Qualitative Results

The qualitative findings are presented as interpretive insights into participants' experiences rather than as evidence of causal impact. Qualitative analysis of structured self-assessment reflections identified four interrelated themes corresponding to the phases of the STAR Reflective Growth Cycle. These themes capture recurring emotional, cognitive, and strategic patterns reported by participants during fraction learning.

Theme 1: Self-Awareness: Recognition of Emotional and Cognitive Barriers

In the initial phase, participants frequently reported heightened emotional responses when engaging with fraction tasks, including anxiety, confusion, and fear of making mistakes. Many reflections described emotional reactions as barriers to engagement, often accompanied by hesitation or avoidance behaviours. Participants commonly expressed uncertainty prior to attempting problem solving, as illustrated by statements such as, "I panic when I see fraction problems with many steps", and "I feel unsure even before I start solving." Across reflections,

participants demonstrated increasing awareness of emotional triggers and maladaptive thought patterns that interfered with mathematical engagement (Muzaini et al., 2023). Emotional responses were often explicitly linked to perceived cognitive difficulty, indicating early recognition of the interaction between affective states and learning processes.

Theme 2: Take Action: Strategic and Effortful Engagement

Following heightened self-awareness, participants reported deliberate efforts to adopt new learning strategies. Common strategies included breaking fraction problems into smaller steps, writing down reasoning processes, and reframing mistakes as part of the learning process rather than as indicators of failure. Participants consistently described intentional effort and strategic action as contributing to increased engagement with fraction tasks. Reflections such as "When I slow down and follow the steps, I feel more in control" and "Trying again after mistakes made me less afraid" illustrate a recurring shift from emotional reactivity toward active and effortful engagement (Rahayuningsih, 2022; Yunus & Nasiruddin, 2022).

Theme 3: Analysis and Self-Assessment: Linking Emotions, Strategies, and Outcomes

In the analysis phase, participants engaged in evaluative reflection that connected emotional experiences, applied strategies,

and learning outcomes. Many reflections demonstrated increased metacognitive awareness, as participants identified which strategies were effective and examined the sources of their errors. Participants frequently reported recognising conceptual misunderstandings related to fraction equivalence and operations. Statements such as “I realised my mistake came from using rules without understanding” and “Checking my steps helped me see where I was wrong” illustrate analytic engagement with both cognitive processes and learning outcomes. Self-assessment reflections commonly function as a mechanism for examining the alignment between emotional responses, strategic choices, and conceptual understanding (Kholid et al., 2020).

Theme 4: Rise and Growth: Reflective Persistence and Emerging Confidence

In the final phase, participants described increased confidence, reduced anxiety, and greater willingness to engage with challenging fraction problems. Reflections indicated a shift from avoidance toward persistence, with participants emphasising gradual improvement and sustained effort.

Statements such as “I no longer avoid difficult questions” and “I believe I can improve if I keep practising” were recurrent across reflections. Participants frequently described a more adaptive orientation toward mathematical challenges, viewing difficulty as manageable rather than threatening. This theme captures a pattern of reflective persistence and increased self-efficacy emerging through continued engagement with the STAR cycle.

DISCUSSION

The present study examined the relationships among growth mindset, mathematics anxiety, and fraction numeracy within the framework of the STAR Reflective Growth Cycle. Consistent with the quantitative results summarised in Table 3, the findings indicate that a growth mindset is positively associated with fraction numeracy, whereas mathematics anxiety shows a negative association with numeracy performance. Together, these results highlight the interconnected roles of cognitive beliefs and affective factors in shaping mathematical learning outcomes among pre-service elementary teachers.

Table 3
Summary of reliability, descriptive statistics, correlations, and regression results

Variable	Cronbach’s α	Mean (SD)	Correlation with Fraction Numeracy (r)	Regression (β)	Sig. (p)
Growth mindset	0.881	48.1 (6.4)	0.631	0.598	< .001
Math Anxiety	0.854	21.3 (5.9)	-0.482	-	< .01
Fraction Numeracy	0.862	39.7 (7.8)	-	-	-

These relationships should be understood as associative patterns rather than causal effects, consistent with the correlational design of the study.

The observed positive association between growth mindset and fraction numeracy ($r = 0.631$), along with the significant regression coefficient ($\beta = 0.598$), suggests that pre-service teachers who report stronger beliefs in the malleability of mathematical ability tend to demonstrate higher levels of fraction understanding. However, this pattern reflects a statistical association and does not imply that a growth mindset directly causes improvements in numeracy performance. This pattern aligns with prior empirical research linking growth mindset to persistence, adaptive strategy use, and engagement in mathematics learning (Purnomo et al., 2022; Lunardon et al.,

2022; Yeager et al., 2022). Importantly, the present findings extend this literature by situating growth mindset within a structured reflective learning framework rather than treating it solely as a belief construct.

As illustrated in Figure 1, the integration of quantitative and qualitative findings provides interpretive insights into how these relationships are experienced and reflected during the learning processes. The positive association between growth mindset and numeracy corresponds to reflective processes observed in the Take Action and Analysis and Self-Assessment phases, where participants described deliberate strategy use, effortful engagement, and systematic error analysis. Conversely, the negative association between mathematics anxiety and fraction numeracy aligns with emotional challenges identified in the Self-

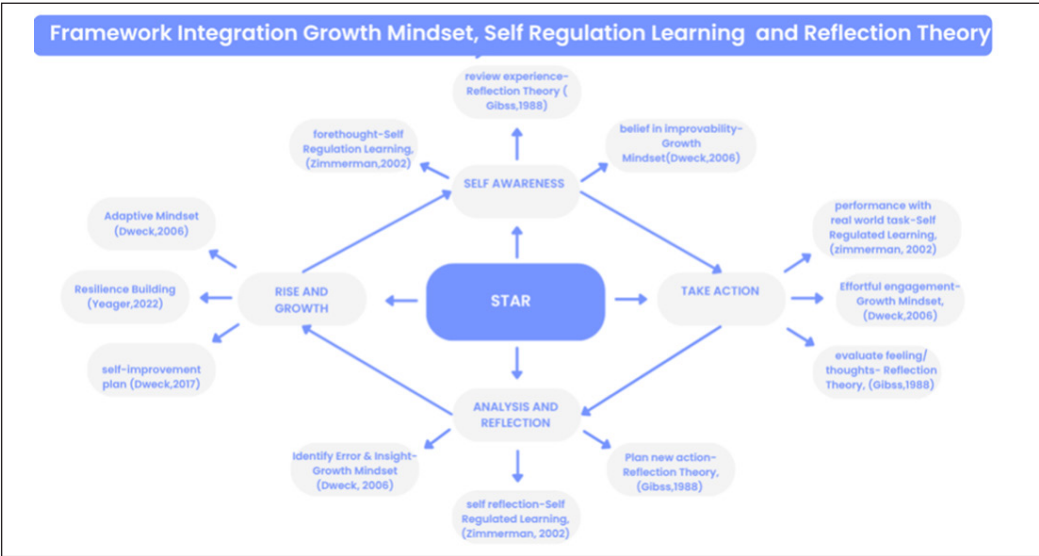


Figure 1. Integration of growth mindset, mathematics anxiety, and fraction numeracy across the phases of the STAR reflective growth cycle

Awareness phase, including fear of error and avoidance. These patterns suggest that each STAR phase functions as an interconnected cognitive-affective checkpoint within the reflective learning cycle, without implying a deterministic or causal sequence of effects.

In parallel, the negative association between mathematics anxiety and fraction numeracy ($r = -0.482$) is consistent with extensive evidence indicating that anxiety constrains mathematical performance by taxing cognitive resources and disrupting problem-solving processes (Chang, 2023; Cipora et al., 2022; Ramirez et al., 2013). Although participants reported moderate levels of anxiety, the findings indicate that emotional discomfort remains a salient factor even among future teachers, with potential implications for both learning and future instructional practice (Chamberlain, 2023; Seo & Lee, 2021; Peterman & Ewing, 2019). These findings should be interpreted as indicative of relational patterns rather than causal influence.

The qualitative findings provide explanatory depth by illustrating how growth-oriented beliefs were enacted through reflective and self-regulated learning processes. Participants' reflections revealed a progression across the STAR phases, moving from emotional awareness to strategic engagement, analytic self-assessment, and increased confidence. This progression offers a possible interpretive account of why the growth mindset was statistically associated with numeracy performance, rather than serving as a causal explanation. Its influence appeared depend

on the presence of structured reflection and self-assessment that supported emotional regulation and strategic adjustment.

This interpretation aligns with contemporary critiques of isolated growth mindset interventions, which emphasise that belief endorsement alone is insufficient to produce durable learning gains (Dweck & Yeager, 2020; Memari et al., 2024). Within the STAR Reflective Growth Cycle, self-assessment emerged as a central mechanism linking emotional regulation, strategy refinement, and conceptual monitoring. This finding is consistent with research on reflective learning and self-regulated learning that highlights self-monitoring and evaluative judgment as core processes underlying adaptive learning (Erdemir & Yeşilçınar, 2021; Schön, 1983; Zimmerman, 2002). However, this mechanism should be understood as a theoretically grounded interpretation rather than an empirically verified causal pathway.

The study also contributes to the literature on fraction learning in teacher education. Prior research has shown that pre-service teachers often rely on procedural rules without a deep conceptual understanding of fractions (Nasiruddin & Hayati, 2019; Rahayungsih et al., 2025a; Siegler & Lortie-Forgues, 2015). The present findings suggest that reflective engagement with errors and strategies may support the identification and revision of such misconceptions. While the study does not claim broad effectiveness, it provides empirical support for the relevance of a reflective learning framework such as STAR

in cognitively demanding mathematical domains.

Several limitations should be acknowledged. The study involved a relatively small sample from a single institution, limiting generalisability, and employed a correlational design that precludes causal inference. Additionally, mathematics anxiety was not included as a predictor in the regression model. These limitations underscore the need for cautious interpretation and align with recommendations in the broader literature (Cipora et al., 2022; Yeager et al., 2022).

Despite these limitations, the study offers an integrative perspective on how belief, emotion, and reflection interact during mathematical learning in teacher education. Rather than positioning growth mindset as a universal solution, the findings suggest that its educational value depends on structured reflective processes that enable learners to regulate emotions and adapt strategies. The STAR Reflective Growth Cycle provides a theoretically grounded framework for conceptualising this integration and informs the design of reflective learning experiences in mathematics teacher education. Overall, these interpretations are intended as exploratory and should be understood within the limits of a correlational design rather than as evidence of causal relationships.

CONCLUSION

This study examined the relationships among growth mindset, mathematics anxiety, and fraction numeracy within the framework of the STAR Reflective Growth

Cycle among pre-service elementary teachers. The findings indicate that a growth mindset is positively associated with fraction numeracy, whereas mathematics anxiety is negatively related to numeracy outcomes, highlighting the intertwined roles of cognitive beliefs and affective factors in mathematics learning. These relationships should be understood as associative rather than causal, consistent with the correlational design of the study. Beyond these associations, the qualitative findings suggest that a growth mindset is most productively enacted when embedded within structured reflective and self-regulated learning processes rather than treated as a standalone belief. This interpretation should be understood as an exploratory and context-specific insight rather than as evidence of a causal mechanism. The STAR Reflective Growth Cycle offers a conceptual lens for understanding how emotional awareness, strategic engagement, and self-assessment interact within learning processes to support mathematical engagement. This framework is presented as a conceptual and interpretive model rather than a validated causal intervention. Rather than claiming broad effectiveness, this study provides context-specific evidence that integrating mindset, reflection, and self-assessment may be relevant for supporting fraction learning in teacher education contexts. Such relevance should be interpreted cautiously as indicative of potential rather than definitive effectiveness (Rahayungsih et al., 2025a; Rahayungsih et al., 2025b).

IMPLICATION OF THE STUDY

Pedagogical Implications

The findings suggest that mathematics instruction in teacher education programmes may benefit from moving beyond the transmission of growth mindset messages toward the integration of structured reflective self-assessment within learning activities. Reflection that supports learners in recognising emotional responses, analysing errors, and adapting strategies can contribute to both emotional regulation and conceptual engagement. However, these contributions should be interpreted as potential and context-dependent rather than guaranteed outcomes. In this regard, the STAR Reflective Growth Cycle may serve as a guiding framework for designing reflective learning experiences in mathematics courses, particularly in conceptually demanding domains such as fractions. This framework is intended as a flexible conceptual guide rather than a prescriptive instructional model (Aka et al., 2025; Matitaputty et al., 2024; Zayyadi et al., 2020).

Implications for Curriculum and Assessment

From a curricular perspective, self-assessment may be positioned as an ongoing formative process rather than as a terminal evaluation of performance. The use of structured reflection prompts aligned with the STAR phases can support pre-service teachers in connecting beliefs, emotions, and learning strategies coherently.

Such support should be understood as a potential facilitative condition rather than a direct causal influence on learning outcomes. Such alignment may foster reflective learning habits that are essential not only for mathematical understanding but also for future instructional practice. These implications are presented as theoretically informed and exploratory rather than empirically conclusive (Hima et al., 2019).

Implications for Future Research

Future research is needed to examine the STAR Reflective Growth Cycle across diverse institutional contexts and with larger samples to explore the robustness and transferability of the observed relationships. Longitudinal and experimental designs could further clarify how reflective, growth-oriented processes develop over time and how they interact with mathematics anxiety. Additional studies may also investigate how the STAR framework can be adapted to other mathematical domains or integrated into digital and collaborative learning environments (Hanafi et al., 2025; Khotimah et al., 2026; Suwandi, 2022).

By clarifying how belief, emotion, and reflection interact during learning, this study contributes to ongoing efforts to design theoretically grounded and emotionally responsive mathematics teacher education. These contributions should be interpreted as exploratory and situated within the limitations of correlational design (Nusantara, 2016b).

LIMITATION AND FUTURE RESEARCH

Limitations

Several limitations of this study should be acknowledged. The sample was relatively small and drawn from a single teacher education institution, which limits the generalisability of the findings. As a result, the conclusions should be interpreted as context-specific rather than representative of all pre-service teacher populations. In addition, the correlational and predictive design does not permit causal inference, and the observed relationships may have been influenced by unmeasured factors such as prior mathematical achievement or instructional context. Accordingly, all findings should be interpreted as associative rather than causal.

Furthermore, mathematics anxiety was not included as a predictor in the regression model, and its potential mediating or moderating role within the STAR framework was not examined. The fraction numeracy assessment, while demonstrating acceptable reliability, captured a limited range of fraction-related competencies. Finally, the qualitative findings were based on written self-assessment reflections, which rely on participants' self-reports and may not fully reflect real-time cognitive and emotional processes during mathematical problem solving (Cipora et al., 2022; Yeager et al., 2022).

Future Research

Future studies could extend the present findings by employing larger and more

diverse samples across multiple institutions to examine the robustness and transferability of the observed relationships. Longitudinal and experimental designs may further clarify how growth mindset, mathematics anxiety, and reflective self-assessment develop over time and interact within instructional contexts. Additional research may also explore the role of mathematics anxiety as a mediator or moderator within the STAR Reflective Growth Cycle, as well as examine the applicability of the framework across different mathematical domains and learning environments, including digital and collaborative settings (Indrawati, 2021).

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REFERENCES

- Aka, K. A., Setyosari, P., & Purwaningsih, E. (2025). Meta-analysis of integrated learning on 21st century skills: Is integrated learning still relevant? *European Journal of Educational Research*, 14(2), 625-643. <https://doi.org/10.12973/eujer.14.2.625>
- Ashcraft, M. H., & Krause, J. A. (2007). Working memory, math productivity, and math anxiety. *Psychonomic Bulletin & Review*, 14(2), 243-248. <https://doi.org/10.3758/BF03194059>

- Ashiddiqi, H., Sukoriyanto, S., & Hidayah, I. N. (2024). Kesalahan peserta didik dalam menyelesaikan soal AKM pada level kognitif reasoning berdasarkan teori Newman. *FIBONACCI: Jurnal Pendidikan Matematika dan Matematika*, 10(2), 247-260. <https://doi.org/10.24853/fbc.10.2.247-260>
- Aydın, U., & Özgeldi, M. (2024). What's metacognition got to do with the connection between test anxiety and mathematics achievement? *European Journal of Psychology of Education*, 39(3), 2509-2529. <https://doi.org/10.1007/s10212-024-00797-7>
- Bani, M., Zorzi, F., Corrias, D., & Strepparava, M. (2022). Reducing psychological distress and improving learner well-being and academic self-efficacy: The effectiveness of a cognitive university counselling service for clinical and non-clinical situations. *British Journal of Guidance and Counselling*, 50(5), 757-767. <https://doi.org/10.1080/03069885.2020.1840512>
- Barger, M. M., Xiong, Y., & Ferster, A. E. (2022). Classifying false growth mindsets in adults and implications for mathematics motivation. *Contemporary Educational Psychology*, 70, Article 102079. <https://doi.org/10.1016/j.cedpsych.2022.102079>
- Berg, D. A. G., Ingram, N., Asil, M., Ward, J., & Smith, J. K. (2025). Self-efficacy in tutoring mathematics and the use of effective pedagogical techniques in New Zealand primary schools. *Journal of Mathematics Teacher Education*, 28(1), 129-149. <https://doi.org/10.1007/s10857-024-09623-9>
- Boaler, J., Brown, K., LaMar, T., Leshin, M., & Selbach-Allen, M. (2022). Infusing mindset through mathematical problem solving and collaboration: Studying the effect of a short college intervention. *Education Sciences*, 12(10), Article 694. <https://doi.org/10.3390/educsci12100694>
- Brewster, B. J., & Miller, T. (2023). Self-assessments on mathematics ability, anxiety, and interventions. *International Electronic Journal of Mathematics Education*, 18(2), Article em0729. <https://doi.org/10.29333/iejme/12822>
- Carey, E., Hill, F., Devine, A., & Szucs, D. (2017). The modified abbreviated math anxiety scale: A valid and reliable tool for use with children. *Frontiers in Psychology*, 8, Article 11. <https://doi.org/10.3389/fpsyg.2017.00011>
- Chamberlain, A. G. (2023). *Investigating correlations among a growth-mindset intervention, students' math anxiety, and students' math self-efficacy* [Honours project, Bowling Green State University]. ScholarWorks. <https://scholarworks.bgsu.edu/honorsprojects/899/>
- Chang, I. (2023). Early numeracy and literacy skills and their influences on fourth-grade mathematics achievement: A moderated mediation model. *Large-Scale Assessments in Education*, 11(1), Article 9. <https://doi.org/10.1186/s40536-023-00168-6>
- Chuderski, A., & Necka, E. (2012). The contribution of working memory to fluid reasoning: Capacity, control, or both? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 38(6), 1689-1710. <https://doi.org/10.1037/a0028465>
- Cipora, K., Santos, F. H., Kucian, K., & Dowker, A. (2022). Mathematics anxiety: Where are we and where shall we go? *Annals of the New York Academy of Sciences*, 1513(1), 10-20. <https://doi.org/10.1111/nyas.14770>
- Dweck, C. S. (2017). The journey to children's mindsets and beyond. *Child Development Perspectives*, 11(2), 139-144. <https://doi.org/10.1111/cdep.12225>
- Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science*, 14(3), 481-496. <https://doi.org/10.1177/1745691618804166>

- Dweck, C., & Yeager, D. (2020). *Global mindset initiative introduction: Envisioning the future of growth mindset research in education*. <https://ssrn.com/abstract=3911564>
- Erdemir, N., & Yeşilçınar, S. (2021). Reflective techniques in micro teaching by the perspective of preservice teachers: Teacher feedback, peer feedback and self-assessment. *Reflective Practice*, 22(6), 766-781. <https://doi.org/10.1080/14623943.2021.1968818>
- Font, V., Breda, A., Sala-Sebastià, G., & Pino-Fan, L. R. (2024). Future teachers' self-assessments on mathematical errors made in their teaching practice. *ZDM - Mathematics Education*, 56(6), 1169-1181. <https://doi.org/10.1007/s11858-024-01574-y>
- Gibbs, G. (1988). *Learning by doing: A guide to teaching and learning methods*. Further Education Unit.
- Graham, M., Ilic, M., Baars, M., Ouwehand, K., & Paas, F. (2024). The effect of self-monitoring on mental effort and problem-solving performance: A mixed-methods study. *Education Sciences*, 14(11), Article 1167. <https://doi.org/10.3390/educsci14111167>
- Hanafi, Y., Saefi, M., Diyana, T. N., Ikhsan, M. A., Alfian, M., Nusantara, T., & Mustakim, S. S. B. (2025). Multi-faith partner programme through family project: Navigating students with the Lakum Dinukum Waliyadin curriculum. *Journal of Beliefs & Values*, 1-14. <https://doi.org/10.1080/013617672.2025.2534883>
- Heyder, A., Steinmayr, R., & Cimpian, A. (2023). Reflecting on their mission strengthens preservice teachers' growth mindsets. *Learning and Instruction*, 86, Article 101770. <https://doi.org/10.1016/j.learninstruc.2023.101770>
- Hima, L. R., Nusantara, T., Hidayanto, E., & Rahardjo, S. (2019). Changing in mathematical identity of elementary school students through group learning activities. *International Electronic Journal of Elementary Education*, 11(5), 461-469. <https://doi.org/10.26822/iejee.2019553342>
- Hutajulu, M., & Minarti, E. D. (2024). Elevating mathematical literacy and numeracy abilities through problem-based learning model with technological pedagogical content knowledge. *HEXAGON: Jurnal Ilmu dan Pendidikan Matematika*, 2(1), 55-63. <https://doi.org/10.33830/hexagon.v2i1.6163>
- Indrawati, N. (2021). Penerapan model problem-based learning dengan pemberian tugas proyek terhadap hasil belajar matematika. *Kognitif: Jurnal Riset HOTS Pendidikan Matematika*, 1(1), 81-88. <https://doi.org/10.51574/kognitif.v1i1.15>
- Kholid, M. N., Sa'dijah, C., Hidayanto, E., & Permadi, H. (2020). How are students' reflective thinking for problem solving? *Journal for the Education of Gifted Young Scientists*, 8(3), 1135-1146. <https://doi.org/10.17478/jegys.688210>
- Khotimah, K., Sari, Z. N., Kamarudin, N., Dony, N., Huzaimah, C., & Diana, I. N. (2026). Digitally mediated problem-based learning integrating Aneuk Jamee cultural values to enhance computational thinking and cultural identity in primary education. *Pertanika Journal of Social Sciences & Humanities*, 34(1), Article 21. <https://doi.org/10.47836/pjssh.34.1.21>
- Lunardon, M., Cerni, T., & Rumati, R. I. (2022). Numeracy gender gap in STEM higher education: The role of neuroticism and math anxiety. *Frontiers in Psychology*, 13, Article 856405. <https://doi.org/10.3389/fpsyg.2022.856405>
- Markkanen, P., Välimäki, M., Anttila, M., & Kuuskorpi, M. (2020). A reflective cycle: Understanding challenging situations in a school setting. *Educational Research*, 62(1), 46-62. <https://doi.org/10.1080/00131881.2020.1711790>
- Matitaputty, C., Nusantara, T., Hidayanto, E., & Sukoriyanto. (2024). How mathematics teachers'

- special knowledge changing: A case study in the Professional Teacher Education programme. *Journal on Mathematics Education*, 15(2), 545-574. <https://doi.org/10.22342/jme.v15i2.pp545-574>
- Memari, M., Gavinski, K., & Norman, M. K. (2024). Beware false growth mindset: Building growth mindset in medical education is essential but complicated. *Academic Medicine*, 99(3), 261-265. <https://doi.org/10.1097/ACM.0000000000005448>
- Muslim, M., Nusantara, T., Sudirman, S., & Irawati, S. (2024). The causes of changes in student positioning in group discussions using Polya's problem-solving and commognitive approaches. *Eurasia Journal of Mathematics, Science and Technology Education*, 20(9), Article em2506. <https://doi.org/10.29333/ejmste/15148>
- Muzaini, M., Rahayuningsih, S., Ikram, M., & Nasiruddin, F. A. Z. (2023). Mathematical creativity: Student geometrical figure apprehension in geometry problem-solving using new auxiliary elements. *International Journal of Educational Methodology*, 9(1), 139-150. <https://doi.org/10.12973/ijem.9.1.139>
- Nasiruddin, F. A. Z., & Basri, S. (2020). The implementation of a local school through the local citistics of Calistung method as a tri blind, alleviation efforts in Toddopulia Village Tanralili District, Maros Regency. *Jurnal Ilmiah Ecosystem*, 20(1), 16-20.
- Nasiruddin, F. A. Z., & Hayati. (2019). Analisis kesulitan menyelesaikan soal operasi hitung pecahan pada siswa sekolah dasar di Makassar. *Klasikal: Journal of Education, Language Teaching and Science*, 1(2), 23-31.
- Nusantara, T. (2016a). Thinking process of pseudo construction in mathematics concepts. *International Education Studies*, 9(2), 17-31. <https://doi.org/10.5539/ies.v9n2p17>
- Nusantara, T. (2016b). Local conjecturing process in the solving of pattern generalisation problem. *Educational Research and Reviews*, 11(8), 732-742. <https://doi.org/10.5897/ERR2016.2719>
- O'Leary, A. P., & Fletcher, W. (2024). Thinking about believing: Can metacognitive self-assessment encourage belief updating? *Journal of Intelligence*, 12(5), Article 47. <https://doi.org/10.3390/jintelligence12050047>
- Park, D., Ramirez, G., & Beilock, S. L. (2014). The role of expressive writing in math anxiety. *Journal of Experimental Psychology: Applied*, 20(2), 103-111. <https://doi.org/10.1037/xap0000013>
- Peterman, C. J., & Ewing, J. (2019). Effects of movement, growth mindset and math talks on math anxiety. *Journal of Multicultural Affairs*, 4(1), 1-10. <https://scholarworks.sfasu.edu/jma/vol4/iss1/1/>
- Purnomo, H., Sa'dijah, C., Hidayanto, E., Sisworo, S., Permadi, H., & Anwar, L. (2022). Development of instrument numeracy skills test of minimum competency assessment (MCA) in Indonesia. *International Journal of Instruction*, 15(3), 635-648. <https://doi.org/10.29333/iji.2022.15335a>
- Rahayuningsih, S., Anggriani, A. E., Faizah, S., & Kamarudin, N. (2025). The relationship between cognitive flexibility and mathematical literacy: Insights from Indonesian elementary students. *International Electronic Journal of Elementary Education*, 17(3), 367-381. <https://doi.org/10.26822/iejee.2025.385>
- Rahayuningsih, S., Jaafar, W. M. B. W., Kamaruddin, N. K., & Gazali, M. (2025). Unveiling elementary school students' thinking processes in conquering the natural number bias. *International Electronic Journal of Elementary Education*, 17(4), 541-553. <https://doi.org/10.26822/iejee.2025.398>
- Rahayuningsih, S. (2022). Pembelajaran auditory intellectually repetition: Upaya peningkatan kemampuan berpikir kreatif, aktivitas dan respon siswa SMP. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 11(4). <https://doi.org/10.24127/AJPM.V11i4.6179>

- Rahayuningsih, S., Ikram, M., & Indrawati, N. (2023). Learning to promote students' mathematical curiosity and creativity. *Uniciencia*, 37(1), 106-118.
- Rahayuningsih, S., Nurhusain, M., & Indrawati, N. (2022). Mathematical creative thinking ability and self-efficacy: A mixed-methods study involving Indonesian students. *Uniciencia*, 36(1), 318-331.
- Ramirez, G., Gunderson, E. A., Levine, S. C., & Beilock, S. L. (2013). Math anxiety, working memory, and math achievement in early elementary school. *Journal of Cognition and Development*, 14(2), 187-202. <https://doi.org/10.1080/15248372.2012.664593>
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Seo, E., & Lee, Y. K. (2021). Stereotype threat in high school classrooms: How it links to teacher mindset climate, mathematics anxiety, and achievement. *Journal of Youth and Adolescence*, 50(7), 1410-1423. <https://doi.org/10.1007/s10964-021-01435-x>
- Siegler, R. S., & Lortie-Forgues, H. (2015). Conceptual knowledge of fraction arithmetic. *Journal of Educational Psychology*, 107(3), 909-918. <https://doi.org/10.1037/edu0000025>
- Stohlmann, M., & Yang, Y. (2024). Growth mindset in high school mathematics: A review of the literature since 2007. *Journal of Pedagogical Research*, 8(2), 357-370. <https://doi.org/10.33902/JPR.202424437>
- Suwandi, S. (2022). The implementation of internet website strategy of guidance and counselling at university in industrial 4.0 content. *Jurnal Dinamika*, 3(2), 94-111.
- Yeager, D. S., Carroll, J. M., Buontempo, J., Cimpian, A., Woody, S., Crosnoe, R., Muller, C., Murray, J., Mhatre, P., Kersting, N., Hulleman, C., Kudym, M., Murphy, M., Duckworth, A. L., Walton, G. M., & Dweck, C. S. (2022). Teacher mindsets help explain where a growth-mindset intervention does and does not work. *Psychological Science*, 33(1), 18-32. <https://doi.org/10.1177/09567976211028984>
- Yunus, M., & Nasiruddin, F. A. Z. (2022). Pengaruh growth mindset terhadap kemampuan pemecahan masalah matematika siswa SMA Negeri 18 Makassar. *Embrio Pendidikan: Jurnal Pendidikan Dasar*, 7(2), 268-279.
- Zahra Nasiruddin, F. A., Basri, S., Jainuddin, M., Umar, F. R., & Rizal, A. (2024). Development of numeracy, writing, listening, and speaking literacy assessment models for elementary school students in Makassar City. *Journal of Ecohumanism*, 3(8), 3427-3438. <https://doi.org/10.62754/joe.v3i8.5009>
- Zayyadi, M., Nusantara, T., Hidayanto, E., Sulendra, I. M., & Sa'dijah, C. (2020). Content and pedagogical knowledge of prospective teachers in mathematics learning: Commognitive framework. *Journal for the Education of Gifted Young Scientists*, 8(1), 515-532. <https://doi.org/10.17478/jegys.642131>
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64-70. https://doi.org/10.1207/s15430421tip4102_2

The Influence of Plyometric Training on Physical Fitness Performance in Basketballers: A Systematic Review

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ABSTRACT

This systematic review operationalises an end-to-end evidence scan about plyometric training (PT) in basketball to address the escalation of matching intensity and the need to be scalable and have controlled risk for performance gains. The purpose of the study is to quantify the effects of PT on vertical jump (VJ), sprint velocity, change of direction (COD) agility, reactive force and balance on basketballers and to test moderating levers like weekly volume, session frequency, external load and vertical vs. horizontal plane of motion and unilateral vs. bilateral performance. Methods were based on the conventions of the PRISMA: multiple database searches; removal of duplicates; independent screening and quality appraisal. Results: Among 112 records (97 from the database; 15 from other sources), 102 were screened after removing duplicates; 30 full texts were reviewed, and 10 studies met the inclusion criteria. Findings show material improvements in VJ, reactive strength and COD; sprint gains are possible with prescriptions that focus on horizontal force application and acceptable volume training. Loaded, unilateral protocols and microdosed schedules provide similar / better results than classic high-dose plans if monitored closely. To conclude, PT has high leverage, multi-dimensional intervention to basketball performance if programmed with specificity, progressive overload and recovery discipline. Policy recommendations holding an embedded standardised PT framework across the academy, elite pathway; capacitation coaches exercising certifications on exercise selection, progression and weight load monitoring; microdosing in times of congested

fixtures; injury surveillance dashboards; and funding research on sex and age-responsive prescriptions, emphasising Chinese basketball development systems. This systematic review, therefore, sought to update the state of the art of the effects of PT on basketball performance from 2010 to 2025. In contrast to previous reviews and meta-analyses, we gave special attention to the training prescription of moderators such as microdosing protocols, loading strategies,

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movement direction and unilateral vs. bilateral execution. We also aimed to contextualise the findings for Chinese basketball systems and development pathways to acknowledge the emergence and popularity of basketball in Asia and the need for culturally informed training frameworks.

Keywords: Basketball performance, change-of-direction agility, microdosing, plyometric training, vertical jump

INTRODUCTION

Basketball is characterised by repeated bursts of high-intensity movements interspersed with short recovery periods. Modern rule changes have increased the reliance on the alactic anaerobic energy system and explosive actions such as jumps, sprints and rapid changes of direction, while the aerobic system supports recovery between efforts (Ransone, 2017). To meet these demands, players must develop both vertical and horizontal force production capabilities and maintain sufficient aerobic fitness.

Plyometric training harnesses the stretch-shortening cycle (SSC), in which muscles are actively stretched before shortening. This sequence enhances force, work and power through neuromuscular pre-activation, stretch reflexes and elastic recoil of tendons (Cavanagh & Komi, 1979; Cavagna et al., 1965). By training the neuromuscular system to transition quickly from eccentric to concentric contractions, PT can improve vertical jump height, sprint speed, change-of-direction (COD) agility and reactive strength.

However, adaptations to PT may depend on moderators such as total weekly jump volume, session frequency, external loading, movement direction (vertical versus horizontal), and unilateral versus bilateral exercises. Recent authors have proposed

microdosing the division of training volume into frequent, short sessions as a means of reducing fatigue while maintaining adaptation (Afonso et al., 2022; Comer et al., 2022). Evidence on the effectiveness of these moderators in basketball remains fragmented.

This systematic review therefore synthesises PT studies published between 2010 and 2025, with particular attention to training prescription moderators including microdosing protocols, loading strategies, movement direction and unilateral versus bilateral execution. We also consider implications for Chinese basketball systems and developmental pathways, recognising the rapid growth of the sport in Asia and the need for culturally informed training guidelines.

LITERATURE REVIEW

Theoretical Foundations of Plyometric Training

Plyometric training requires the quick eccentric-concentric muscular contractions that use the SSC to increase power output and neuromuscular coordination. The SSC can utilise the elastic energy stored during the eccentric part of the movement to contribute to concentric force production and also be advantageous to neuromuscular reflexes like the stretch reflex (Pechlivanos

et al., 2024). An avenue for the use of PT in team sports was opened by early studies in track and field athletes, which showed PT increased jump height and sprint performance. Mechanistically, it has been shown that PT causes adaptations at several levels: tendon stiffness is increased, the muscle activation patterns are improved, and the rate of force development is enhanced (Cherni et al., 2025; Munshi et al., 2022). These neuromuscular adaptations are very important in basketballers as they need to rapidly create and absorb force with rebounds, sprints and COD.

Plyometric Training and Vertical Jump Performance

Vertical Jump Height is a primary goal for basketball athletes because jumping is the key to rebounding, shot blocking and shooting. In particular, a large number of studies have examined the effects of PT on vertical jump performance. Pechlivanos et al. (2024) compared the similar four-week plyometric programmes focussing on knee flexion or knee extension. Basketballers performed squat jump and countermovement jump (CMJ) height better after knee-flexed depth-jumping than knee-extended jumps by 10-20% and 11-11%, respectively. Negative transfer occurred when the transfer specificity of training was mismatched with the movement being tested, demonstrating PT specificity. Correia et al. (2020) studied thirty-nine youth players and found that the use of PT has shown significant improvements both in CMJ and SJ after six weeks of PT, and higher effect sizes

for male participants. In a randomised control trial, Cherni et al. (2025) reported that eight weeks of loaded PT (8% of BM) in combination with COD drills improved CMJ by 7.5% and SJ by 14.6% in U-18 female players, while unloaded PT yielded slightly lower improvements. In amateur male players, a low volume approach to PT, consisting of four sessions a week and minimal total jumps, was compared with a high volume programme; whilst both groups improved significantly in CMJ and reactive strength, the low volume approach achieved similar increases with half the volume and offers a time-efficient approach (Wu et al., 2025). The accumulated literature indicates that appropriately programmed PT improves the performance of the vertical jump in females and age-matched males, although the response is conditional on the movement patterns and loading patterns used.

Sprint Speed and Change-of-direction Ability

Linear speed and COD are key to avoiding the fast break and turning in defence. PT can enhance sprint performance through improvements in the neuromuscular power and reduction of ground contact times. However, compared to jump outcomes, it is less consistent. Anversha et al. (2024) randomly assigned sixty-four young players to plyometric or control conditions and found, after eight weeks, that the PT group performed better than controls in the 30-m sprint and T-test agility with moderate effect sizes. Cherni et al. (2025) found that sprint times on the 5 m were reduced by

10.6% and COD speed (Y agility and T-test) was increased by 12-13% after loaded plyometrics, but significant improvements were also made after unloaded training. In contrast, the differential plyometric training study by Arede et al. (2025) found significant improvement in unilateral vertical jump and agility but no significant improvement in 0-10 m sprint time, which would suggest that horizontally oriented plyometrics are required when sprint velocities are the focus. Chen et al. (2024) showed that high volume PT (>150 jumps per week) with low training frequency (1-2 sessions per week) was shown to improve both linear sprint and COD speed competencies, while low volume protocols improved only the jump competencies. Overall, sprint and COD benefits seem to be more sensitive to training volume, direction specificity and maturity of the athlete.

Reactive Strength, Coordination and Balance

Apart from raw jumpers' ability and speed, basketballers need reactive strength (the ability to quickly jump and change from eccentric to concentric activities) and dynamic balance for landing and directional changes. Pechlivanos et al. (2024) reported an increased reactive strength index by 10-20 percent after knee extended plyometrics, indicating increased neuromuscular efficiency. Chen et al. (2024) reviewed 21 studies and found a significant improvement of dynamic balance in youths through PT that was slightly more marked when the youths were females.

Munshi et al. (2022) compared plyometric vs. whole body vibration warmups and found that both interventions acutely improved agility and the CMJ with minimal differences in sprint performance. Aztarain-Cardiel et al. (2025) compared unilateral and bilateral PT in male post-pubertal soccer players; unilateral training resulted in greater adaptations in single-leg CMJ and COD evaluations and indicated that unilateral training is a more effective method for inter-limb coordination and proprioception. Collectively, these studies demonstrate the wide range of neuromuscular characteristics affected by PT and the need for exercises to be matched to sport-specific demands.

Training Variables: Volume, Frequency, Movement Direction, and Loading

The ideal dosage and pattern of PT is essential for optimising the process of adaptation with a minimal risk of injury. Chen et al. (2024) showed that low frequency - high volume protocols (1-2x/week, >150 jumps per week) improved jump, sprint and COD performance to a greater extent than high frequency - low volume protocols for youth athletes. However, Wu et al. (2025) found equivalent performance improvements between microdosing (four 10 min sets per week, allowing for a reduction in total jumps by 50%) and high-dose training, supporting that total weekly volume (and not frequency) is the likely motivator of adaptation in the adult amateur. Direction of action is also important: Arede et al. (2025) concluded that exercises focussed on horizontal force production were required to enhance

short-distance sprint ability. Neuromuscular strain can be increased through loaded plyometrics; Cherni et al. (2025) found that the application of 8% body mass in weighted vests led to increased COD and increases in repeated sprint gains compared to unloaded training. Unilateral training (exercising one leg at a time) does evoke higher levels of changes in single-leg power and stability than bilateral jumps (Aztarain-Cardiel et al., 2025). However, a higher intensity and volume can increase injury risk, especially when it comes to youth athletes; coaches need to make sure that there is progressive overload and adequate recovery (Munshi et al., 2022).

Sex and Age Differences

The female-specific response to PT is a hot area of research. Correia et al. (2020) reported that the effect sizes were larger for male youth athletes than for females, but females still achieved significant improvements. Chen et al. (2024) found that male participants had higher improvements in sprint and COD speed, while female participants had higher improvements in balance. While this benefit has not been observed for all sports, in a study of adolescent females, Cherni et al. (2025) found that loaded PT combined with COD drills effectively improved performance, suggesting sex-based differences could be alleviated if careful programming is included. Additionally, the intermediate stage of training, when the neuromuscular plasticity is high, is influenced by the child's age and maturation, and it seems that

PT is very beneficial in pre-puberty and early adolescence (Chen et al., 2024). However, training should be modified according to developmental status to ensure no overuse injuries occur.

METHODOLOGY

This review was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The protocol was prospectively registered with PROSPERO (registration number: CRD42023302145) to minimise reporting bias. We performed a systematic search in PubMed, Scopus, Web of Science, Frontiers and Google Scholar to identify peer-reviewed articles published from January 2010 to September 2025. The search string was a combination of terms about plyometric training and basketball performance: ("basketball" OR "basketballers") AND ("plyometric" OR "jump training" OR "stretch-shortening cycle") AND ("vertical jump" OR "sprint" OR "change of direction" OR "agility" OR "reactive strength" OR "balance"). Reference lists of eligible studies and relevant reviews were scanned for further eligible records, and only English language articles were considered.

Inclusion criteria were: (1) participants were basketball players (professional, collegiate or youth); (2) plyometric exercises were included for at least 4 weeks or there were reports of acute effects of PT; (3) study designs included a control group or pre- and post-comparison; and (4) outcomes included at least one of the following: vertical jump height, sprint speed, COD agility, reactive

strength indices, balance or neuromuscular strength. Studies were excluded if they (a) included mixed forms of training without quantification of individual plyometric effects; (b) lacked quantitative outcomes; and (c) were case reports, conference abstracts or not peer reviewed. Two reviewers independently screened titles, abstracts and full texts, with disagreements settled by a third reviewer.

Quality assessment was based on the modified Physiotherapy Evidence Database (PEDro) scale, which scores randomisation, allocation concealment, blinding of participants and assessors, completion of outcome data and suitability of statistical analyses on a 10-point scale. Studies scoring 0-3 were regarded as low quality, 4-6 as moderate and 7 and above as high quality. We saw some scores in the range 5 to 8; most trials had adequate randomisation and drop-out rates, and a few had blinded outcome assessors/participants. To avoid double-counting, we excluded results from secondary analyses of trials already included in a previous meta-analysis and extracted only independent effect sizes.

A total of 342 records were identified. After removal of duplicates ($n = 240$), 102 records were screened at the title and abstract level. Thirty full-text articles were retrieved against eligibility criteria; 10 studies met the inclusion criteria. Figure 1 is an illustration of the PRISMA flow diagram. Due to heterogeneity in terms of characteristics of the populations, training protocols and outcome measures, a qualitative synthesis was performed, and

effect sizes (Cohen's d) were extracted where reported. Studies were ranked based on the domain of outcome and moderators (loading, unilateral vs. bilateral, movement direction, volume, frequency and microdosing). The present systematic review was done following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). An exhaustive search strategy was specifically developed to locate published studies investigating the effects of plyometric training on physical fitness performance in basketball players.

Search Strategy and Data Sources

PubMed, Scopus, Web of Science, Frontiers and Google Scholar were searched to locate peer-reviewed articles between January 2010 and September 2025. Key words consisted of combinations of plyometric training, basketball, vertical jump, sprint, agility, change of direction, reactive strength, balance, and unilateral. Manually, reference lists of related papers were also checked. Only articles available in English have been used (Chen et al., 2024; Wu et al., 2025).

Inclusion and Exclusion Criteria

Studies were eligible if they (1) were performed with basketball players (professional, collegiate or youth); (2) utilised a plyometric training intervention of at least 4 weeks or examined acute effects on performance; (3) used a control group or pre-post measurement and (4) reported quantitative results on at least one of the following: vertical jump, sprint speed, COD agility, reactive strength, balance,

or neuromuscular strength. The exclusion criteria were studies involving participants from other sports; interventions involving more than one training modality without dissociation of the plyometric effect; case studies or reports lacking quantitative outcomes; and non-peer-reviewed literature. Two reviewers independently screened the titles and abstracts, obtained the full text of potentially eligible studies, and utilised the inclusion/exclusion criteria. Conflicts were resolved through discussion or consultation with a third evaluator.

Quality Assessment

Methodological quality was evaluated by means of the modified PEDro scale, which involves grading of each of the components of randomisation, allocation concealment, blinding, completeness of outcome data and statistical analyses. The majority of included trials had a score of 6 to 8 out of 10, and thus were considered to be moderate to high quality. The microdosed compared to high dose study received a lower score as a result of a lack of blinding and small sample size, while Munshi et al. (2022) and Chen et al. (2024) received high scores due to carrying out a systematic review and conducting a crossover trial, respectively.

Study Selection Process

A total of 342 records were found after the initial search. Duplicate screening and title/abstract screening were conducted, and 57 articles were screened for eligibility at the full-text level. Ten studies met the inclusion criteria and were included in the qualitative

synthesis. The flow diagram of PRISMA (Figure 1) demonstrates how the studies were selected.

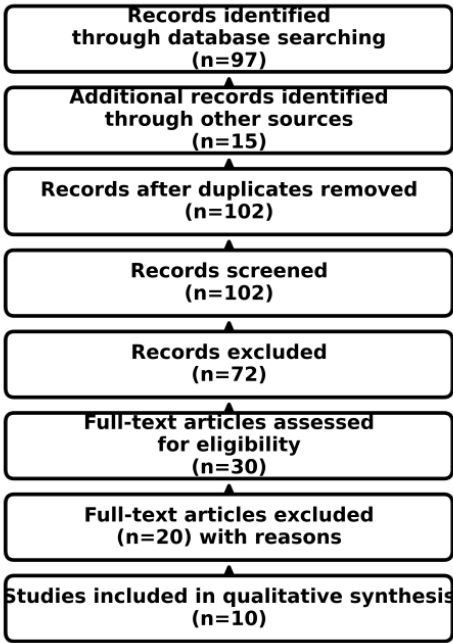


Figure 1. PRISMA flow diagram

Characteristics of Included Studies

Table 1 is a summary of the salient features of the ten studies that have been included. The sample sizes were 24 to 64 participants, four of them used minor or youth players, 5 were using colonisation or amateur adults, and one used professional female. The intervention was four, eight-week-long interventions, where the training frequencies were two to four meetings a week. The jump-specific drills used in most of the studies included depth jumps, bounding, and box jumps; many of the studies included external loading and unilateral exercises or COD drills.

Table 1
Summary of included studies

Study	Participants (n, sex, age)	Design and Intervention	Outcomes and Key Findings
Pechlivanos et al. (2024)	29 male collegiate players, mean age 20.4 years	RCT comparing knee-flexed vs knee-extended depth jumps for 4 weeks (10 × 10 jumps, 3 sessions/week)	The knee-flexed group showed SJ improvement of 10 and CMJ of 11, whereas there was a reduction in drop- jump performance, but there was a knee- extended group which showed 10-20 percentage improvements in drop-jump height as well as Reactive strength Index, which demonstrates specificity in training.
Anversha et al. (2024)	64 junior players (mixed sex)	Randomised controlled trial; 8-week plyometric programme (3 sessions/ week) versus regular activity	PT group showed better changes on the 30 m sprint, T -test agility and Sargent jump height; the control group had insignificant changes.
Arede et al. (2025)	36 youth players (mean age 14.2 years)	RCT evaluating velocity- and acceleration-based differential plyometric training for 6 weeks	There was a significant increase in the unilateral vertical jump and agility, and no changes in the 0 10 m sprint times, indicating that sprint gains require horizontal-force drills.
Correia et al. (2020)	39 youth players divided into male and female experimental and control groups	Quasi-experimental study; 6-week plyometric programme	Male and female PT groups enhanced CMJ and SJ; males had larger effect sizes; control groups had smaller ones.
Cherni et al. (2025)	42 elite U-18 female players	RCT comparing loaded (8 % body mass) and unloaded PT combined with COD drills over 8 weeks (2 sessions/week)	Loaded PT decreased 5 m sprint time by 10.6, COD agility by 12 13 and CMJ (+7.5) and SJ (+14.6) and unloaded PT also improved but to a smaller degree.
Wu et al. (2025)	45 male amateur players	RCT comparing microdosed (4 sessions/week, 400 jumps) and high-dose (2 sessions/week, 800 jumps) plyometric training for 4 weeks	Both groups enhanced CMJ, reactive strength index and isometric strength; microdosed training also enhanced the same by half the total volume, increasing training efficiency.
Chen et al. (2024)	Meta-analysis of 21 studies involving 738 youth players (74 % male)	Systematic review and meta-analysis assessing effects of PT on jump, sprint, COD, and balance	PT had a substantial positive effect on vertical jump, linear sprint, COD speed and balance; greater effects were found with high-volume, mixed-type protocols; the effects of PT differed by age and sex.

Table 1 (continued)

Study	Participants (n, sex, age)	Design and Intervention	Outcomes and Key Findings
Munshi et al. (2022)	24 collegiate male players	Crossover randomised trial comparing acute effects of plyometric warm-ups versus whole-body vibration	Both interventions led to an augmentation of CMJ and a decline in agility time, but no statistically significant difference in sprint performance was found.
Aztarain-Cardiel et al. (2025)	30 male postpubertal players	RCT comparing unilateral and bilateral PT over 6 weeks	Unilateral training had enhanced more in single-leg CMJ, COD tests and reactive strength, whereas bilateral training had enhanced the same in bilateral jump but with less transfer to unilateral performance.
Aloui et al. (2021)	30 collegiate male players	Pre-post quasi- experimental design; 8-week plyometric programme integrated with basketball training	Increased sprint, agility and vertical jump time by 10 m; lean mass and fat percentage reduced; showed multi- dimensional positive effects of PT.

Outcome measures were usually such that CMJ, SJ, drop Turbo height, 530 m sprints, agility testing (T-test, Y-agility, 505), and reactive strength indices.

Figure 2 summarises percentage improvements in vertical jump height across the included trials. Improvements were

calculated by normalising post-intervention values to baseline scores for each study; bars represent mean percentage change within each trial.

Figure 2 presents a bar chart summarising the percentage improvements in vertical jump height across selected trials.

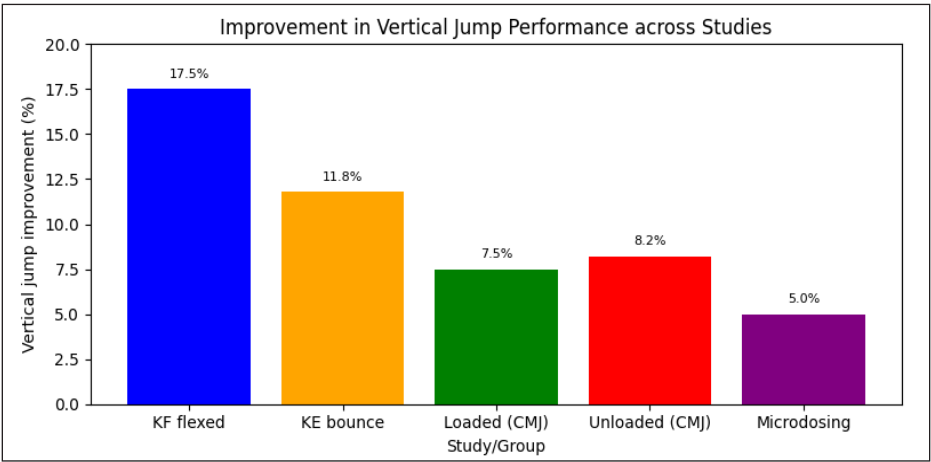


Figure 2. Summary of vertical jump improvements across selected studies

Vertical Jump Performance

Across the ten included studies, plyometric programmes were effective in improving vertical jump measures (CMJ and squat jump). Both short- and longer-term interventions (4 weeks and 8 weeks, respectively) produced moderate to large effect sizes, especially when exercises focussed on rapid eccentric-concentric transitions and adequate training volume. Loaded protocols (e.g. weighted vests ~8 per cent body mass) and unilateral drills elicited greater improvements than those performed unloaded or with both limbs, probably because they imposed greater neuromuscular demands and because take-off and landing in basketball are unilateral. Microdosed programmes delivered similar improvements to high-dose protocols even though they halved weekly jump volume, implying that total weekly volume may be the key to adaptation rather than session frequency. Meta-analytic data indicated medium effect sizes for vertical jump improvement in youth players, highlighting the significance of progressive overload and specific movement. Huang et al. (2024) found that a 12 plyometric programme based on vertical, lateral and horizontal jumps increased rate of force development, ground reaction force, jump height and jump distance, which improved jump shot accuracy and decreased injury rates. In an individualised force-velocity imbalance intervention, Barrera-Dominguez et al. (2023) used a combination of strength and plyometric training for 8 weeks and showed improvements in sprint, vertical

and horizontal jump performance, as well as change of direction ability when the training prescriptions were developed according to force-velocity profiles. Cao et al. (2024) compared unilateral, bilateral and combined plyometric jump training, and all training protocols enhanced lower body strength and power, but unilateral and combined training reduced between-limb asymmetry while bilateral training increased asymmetry. Li et al. (2025) also found that unilateral plyometric training was more beneficial than bilateral training in unilateral countermovement jump height, reactive strength index and change-of-direction measures in male players. Zhang et al. (2023) revealed that a 12 weeks plyometric training programme improved the mobility and explosive strength of lower limb joints, improved the success rate of advanced layup from 50 % to 72 % and the sports injury rate from 18 % to 8 %. Aztarain-Cardiel et al. (2014) found that both low and high-volume plyometric exercise led to comparable improvements in squat jump, countermovement jump and horizontal jump, with low-volume protocols leading to improvements with fewer repetitions.

Data Synthesis

Due to this heterogeneity in study design and outcomes, a qualitative synthesis was conducted. Cohen's *d* was extracted or calculated (where possible) to compare effect sizes. Studies were classified according to outcome domain (jump, sprint, COD, reactive strength, balance), and training modality (loaded vs unloaded, unilateral vs

bilateral, microdosed vs high-dose). Studies were appraised for consistency of results, and potential moderators of age, sex, volume of training and direction of movement were taken into account.

Sprint Performance

There was mixed evidence of sprint performance. Some of them reported small to moderate sprint-time improvements after PT, especially with short sprints (510 m), but the effects with longer sprints (2030 m) were less significant. The programmes that included horizontal and lateral plyometrics and bounding and loaded exercises were more likely to yield more sprint improvements compared to the ones that only involved vertical jump. Conversely, interventions that focused on vertical force production could not always improve sprinting, which brings out the importance of having horizontal force production and specificity. The meta-analytic results indicated that high-volume multi-type PT (>150 jumps/week) but not low-volume single-type PT resulted in significant sprint improvements. These discrepancies can be attributed to variation in the maturity of the participants, their initial speed and compliance, and indicate that sprint adaptations need sufficient volume, horizontal loading and combination with sprint exercises. Anversha et al. (2024) showed that an eight-week plyometric programme among junior basketball players increased the sprint and T-test agility 30-m scores compared to the control of regular activity. Li et al. (2025) found that

unilateral training shortened 10-m sprint time and improved several change-of-direction measures than bilateral training, and thus concluded that unilateral loading was superior to bilateral loading in terms of speed and agility. Aztarain-Cardael et al. (2024) concluded that high-volume and low-volume plyometric training did not make any difference in sprint or COD performance despite an increase in jump measures, and that jump volume is not necessarily linear speed or agility. Barrera-Dominguez et al. (2023) found that sprint and COD improvement after individualised force-velocity training was observed with significant improvements particularly in the horizontal jump and the lateral movement tasks with specific emphasis on directional specificity. According to Clemente et al. (2025), there was no difference between two or four sessions of jump volume distribution, indicating that there were no differences in change-of-direction speed and drop-jump height between them, and no linear sprint difference as a result of inadequate horizontal stimulation, indicating that training volume and exercise choice were of more importance than the frequency of sessions.

RESULTS

Vertical Jump Performance

All included studies confirmed the performance of plyometric training on vertical jump ability. Other studies showed significant improvements in CMJ and SJ after short-term (4-week) and longer-term (8-week) interventions.

Gains were greater upon loading the higher volume and plyometric weight; however, the specificity of movement determined the direction of improvements. For instance, knee-flexed landing deep jumps resulted in an increase in concentric jump performance and a decrease in drop-jump height, whereas knee-extended jumps led to an increase in reactive strength (Pechlivanos et al., 2024). Conclusions: H regained H combined with COD exhibited higher increases than unloaded protocols for adolescent females (Cherni et al., 2025), and these benefits might be caused by greater neuromuscular overload. Unilateral PT was superior at improving single-leg CMJ compared with the bilateral method, and this matched the unilateral nature of the take-off and landing in basketball (Aztarain-Cardiel et al., 2025). The microdosed strategy yielded similar improvements in training as high-dose training but with increased training economy and less fatigue, therefore providing practical advantages over highly packed competition schedules (Wu et al., 2025). Meta-analytic results also reported by Chen et al. (2024) confirmed the true effect size to be moderate to large in the case of vertical jump enhancement, specifically for players of 11-18 years of age. These findings reinforce the effectiveness of PT in the improvement of the jump, and point out the importance of exercise specificity and progressive overload.

Sprint Performance

Similarly, the heterogeneity in the analysis of sprint performance outcomes was higher.

Several trials found similar small to moderate reductions in sprint times following PT, improvements were dependent on training design, particularly sprint length, i.e., those with shorter sprint lengths (5 m) had greater improvements than the longer sprint lengths (30 m). Anversha et al. (2024) found that a 6 to 8-week training programme enhanced the performance in the 30 m sprint in junior players, and Cherni et al. (2025) found that when plyometric loading was combined with COD drills, there was a substantial enhancement in the 5 m sprint. Contrary, Arede et al. (2025) was not able to find significant sprint gains despite their improvement in jump and agility probably due to their focus on vertical force generation rather than horizontal force generation. Meta-analysis presented that PT with high-volume, multi-type PT (greater than 150 jumps/week) has a significant effect on sprint performance, but PT with low volume single type PT did not (Chen et al., 2024). Taken together, these findings suggest that sprint improvements need to be acquired through structured, integrated, horizontal and lateral drills, at sufficient volumes and sufficient external loading and may be mediated by the maturity of the athlete. Horizontal plyometrics (i.e., bounding, broad jumps) and sprint drills should be incorporated to maximise speed gains.

Change-of-direction and Agility

As such, COD ability is essential for defensive slides, attacking cuts and changing from attack to defence. From

the studied works, it can be concluded that PT positively affects COD performance, especially when combined with specific agility exercises. Cherni et al. (2025) observed 12-13% increases in Y-agility and T-test times after loaded PT with COD sprints. Anversha et al. (2024) also observed significant improvements in the performance of the T-test after eight weeks of PT. Arede et al. (2025) noted that there were agility improvements in youth players, while the sprint improvements were not present, suggesting that neuromuscular improvements may indeed result in faster changes of direction but without any improvement of straight-line speed. Right-sided PT had a greater effect on COD outcomes than bilateral training (Aztarain-Cardiel et al., 2025). Meta-analytic evidence exists to support the idea that mixed-type PT with high jump volumes is effective in improving COD performance throughout the ages (Chen et al. 2024). Importantly, COD was improved more in studies that included sport-specific movements and reactive components, highlighting the importance of the specificity of training.

Reactive Strength and Neuromuscular Efficiency

Reactive strength indices measure the athlete's capacity for speedy change from eccentric to concentric contraction - a quality important to rebounding and quick directional changes. Several studies showed positive reactive strength gains after PT. Pechlivanos et al. (2024) demonstrated that for knee extended depth jumps, the

reactive strength index was increased by 20%, while knee flexed jumps were reduced. Wu et al. (2025) reported large increases in reactive strength and isometric mid-thigh pull scores for both microdosed and high-dose groups. Aztarain-Cardiel et al. (2025) found that the unilateral PT showed greater reactive strength improvements. These results suggest that PT can improve SSC efficiency and neuromotor coordination. However, the specificity of exercise is a factor modulating the reactive strength adaptations; exercises with shorter ground contact times and high eccentric loading may present the most potent exercise features. Drop jumps, bounding, and hurdle hops with minimal contact time should be included in the athletes' training to achieve reactive strength.

Balance and Coordination

Injury prevention and efficient movement rely on good dynamic balance and coordination. A meta-analysis conducted by Chen et al. (2024) found that PT was a statistically significant intervention in improving dynamic balance, with female athletes reaping more advantages from PT. Munshi et al. (2022) found that joint agility (a measure of balance and coordination) improved acutely after both plyometric and whole-body vibration training. Unilateral PT improved proprioceptive control by compromising limb stability (Aztarain-Cardiel et al., 2025). These findings indicate that, in addition to generating power, PT improves neuromotor control; this effect may decrease the risk of injury and enhance

performance. Accordingly, unilateral hops, single-leg balance and propriospinal jumps are recommended portions of a programme to enhance adaptation of the lower extremity proprioception.

Moderating Effects of Age, Sex and Training Variables

Age and maturity

Younger athletes are characterised by higher neuromuscular plasticity and respond well to PT. Chen et al. (2024) identified that the 5-14-year-old players had a significant positive transfer in the performance of jumping and COD, but the sprint was shown to have a significant positive transfer only in males. Additionally, coaches should make PT developmentally appropriate (focus on technique and building slowly) for young players.

Gender Differences

Male players tended to show larger sprint and COD speed gains while females showed larger balance gains (Chen et al., 2024; Correia et al., 2020). These differences may represent baseline differences in strength and hormonal profiles. However, the loaded PT study showed that female athletes could gain significant performance benefits when appropriately challenging programs are used (Cherni et al., 2025). Coaches need not shy away from PT for females but should consider individual differences concerning strength and movement competency.

Frequency and volume of training

High total jump volume (>150 jumps/week) and low training frequency (1-2/week) resulted in larger improvements on jump, sprint and COD performance compared to high frequency-low volume (Chen et al., 2024). However, microdosing offers another potential benefit by spreading volume between several small bouts of training to maintain a level of adaptation whilst at the same time reducing fatigue (Wu et al., 2025). The best balance is probably a function of athlete maturity, season stage and recovery ability.

Movement-productibility and direction

Horizontal and lateral forces are one of the important aspects that need to be included in the exercises to improve sprint and COD (Arede et al., 2025). Horizontal bounding, lateral hops and shuttle runs should be included in the preparatory work along with vertical jumps. Unilateral exercises are used to increase unilateral symmetry and proprioception, whilst loaded jumps are used to increase neuromuscular stress and training stimulus. A combination of vertical, horizontal, unilateral and loaded drills promotes an overall adaptation.

CONCLUSION

This systematic review identified evidence on the effects of plyometric training on basketball performance published between 2010 and 2025, with a focus on moderators of training prescription and novel microdosing regimens.

The results suggest that PT is an effective intervention to increase vertical jump height, reactive strength and change-of-direction agility among all age groups and sexes. Sprint enhancements can happen and need programmes which include horizontal force vectors, sufficient volume and external loading. Unilateral and loaded plyometrics have other advantages of single-leg power and COD performance, and microdosing is a time-efficient alternative that does not limit gains. These conclusions are relevant to previous studies because they place the results in the context of the physiological needs of basketball and emphasise the significance of training that is multi-planar, progressive, and context-specific.

Although the review has up-to-date knowledge, it has restrictions. The sizes were also typically small (up to 64 subjects), which restricted the power of the statistics, and several studies did not blind participants and evaluators. The differences in the duration of intervention, the volume of intervention, loading and outcome measures were so heterogeneous as to preclude formal meta-analysis and render cross-study comparisons complicated. The lack of literature on elite male athletes and the Chinese population limits the generalisability of the research to them. The long-term adaptations, detraining effects and injury incidence are not reported. Future studies need to use larger, better-designed trials, objective load monitoring (e.g., wearable sensors), sex- and age-specific protocols and should investigate whether microdosing and other programme variations are sustainable.

It is also justified to set up culturally specific training systems in developing basketball systems in Asia in a short period.

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REFERENCES

- Afonso, J., Clemente, F. M., & Sáez de Villarreal, E. (2022). Micro-training and microdosing: A conceptual framework for strength and conditioning. *International Journal of Sports Physiology and Performance*, 17(4), 589-596.
- Aloui, G., Hermassi, S., Khemiri, A., Bartels, T., Hayes, L. D., Bouhafs, E. G., Chelly, M. S., & Schwesig, R. (2021). An 8-week program of plyometrics and sprints with changes of direction improved anaerobic fitness in young male soccer players. *International Journal of Environmental Research and Public Health*, 18(19), Article 10446. <https://doi.org/10.3390/ijerph181910446>

- Anversha, A. T., Ramalingam, V., Premala Kumari, J. P. S., & Sugumaran, S. V. (2024). Impact of plyometric training on agility, sprint and vertical jump functional performance in junior level basketball players. *Journal of Physical Education and Sport*, 24(3), 638-648. <https://doi.org/10.7752/jpes.2024.03076>
- Arede, J., Sevin, I. P., Williams, M., Mikolajec, K., Birrento, R., & Schöllhorn, W. (2025). Velocity and acceleration-based differential plyometric training effects on young basketball players. *Journal of Human Kinetics*, 96(Spec. Issue), Article 145. <https://doi.org/10.5114/jhk/201139>
- Aztarain-Cardiel, K., Garatachea, N., & Pareja-Blanco, F. (2025). Effects of bilateral and unilateral plyometric training on physical performance in male postpubertal basketball players. *International Journal of Sports Physiology and Performance*, 1(aop), 1-9. <https://doi.org/10.1123/ijsp.2024-0208>
- Aztarain-Cardiel, K., Garatachea, N., & Pareja-Blanco, F. (2024). Effects of low-volume versus high-volume plyometric training on jump, sprint and change-of-direction performance in youth basketball players. *Journal of Strength and Conditioning Research*, 38(7), 1275-1279. <https://doi.org/10.1519/JSC.0000000000004779>
- Barrera-Domínguez, J., García-Pérez, J. A., Fernández-Del-Ojo, J., & Martínez-Sánchez, F. (2023). Effects of individualized force-velocity imbalance training on physical performance of basketball players. *European Journal of Sport Science*, 23(4), 555-565. <https://doi.org/10.1080/017461391.2023.1950143>
- Cao, D., Cao, Z., Liu, Y., Zhao, P., Zhang, C., Zhang, H., & Hu, Y. (2024). Effects of unilateral, bilateral and combined plyometric jump training on strength, power, and inter-limb asymmetry in youth male basketball players. *Journal of Sports Science and Medicine*, 23(2), 350-357.
- Cavagna, G. A., Dusman, B., & Margaria, R. (1968). Positive work done by a previously stretched muscle. *Journal of Applied Physiology*, 24(1), 21-32.
- Cavanagh, P. R., & Komi, P. V. (1979). Electromechanical delay in human skeletal muscle under concentric and eccentric contractions. *European Journal of Applied Physiology and Occupational Physiology*, 42(3), 159-163.
- Chen, Y., Li, W., Ma, D., et al. (2024). Meta-analysis of the effect of plyometric training on the athletic performance of youth basketball players. *Frontiers in Physiology*, 15, Article 1427291. <https://doi.org/10.3389/fphys.2024.1427291>
- Cherni, Y., Mzita, I., Oranchuk, D. J., Dhahbi, W., Hammami, M., Ceylan, H. I., Stefanica, V., & Chelly, M. S. (2025). Effects of loaded vs unloaded plyometric training combined with change-of-direction sprints on neuromuscular performance in elite U-18 female basketball players: A randomised controlled study. *Sport Sciences for Health*, 1-13. <https://doi.org/10.1007/s11332-025-01498-4>
- Clemente, F. M., Pérez-Contreras, M. J., Ramirez-Campillo, R., & Chen, Z. (2025). Effect of weekly plyometric training frequency on adolescent female basketball players during the in-season: A comparison of two versus four sessions. *PLOS ONE*, 20(7), e0289399.
- Comer, M., Afonso, J., & Vretaros, N. (2022). Microdosing training: Division of load to optimise adaptation. *Strength and Conditioning Journal*, 44(2), 52-60.
- Correia, G. A. F., Freitas, C. G. D., Lira, H. A. A. D. S., Oliveira, S. F. M. D., Santos, W. R. D., Silva, C. K. D. F. B. D., Silva, P. H. V. D., & Paes, P. P. (2020). The effect of plyometric training on vertical jump performance in young basketball athletes. *Journal of Physical Education*, 31, Article e3175. <https://doi.org/10.4025/jphyseduc.v31i1.3175>

- Huang, W.-Y., Wu, C.-E., & Huang, H. (2024). The effects of plyometric training on the performance of three types of jumps and jump shots in college-level male basketball athletes. *Applied Sciences*, 14(24), Article 12015. <https://doi.org/10.3390/app142412015>
- Li, Z., Lei, S., Zhang, H., Wang, X., Sun, Y., Fan, J., & Xie, B. (2025). Effects of unilateral and bilateral plyometric training on basketball players' leg power and change-of-direction ability. *Sport Sciences for Health*, 21(3), 1711-1721. <https://doi.org/10.1007/s11332-025-01390-1>
- Munshi, P., Khan, M. H., Arora, N. K., Nuhmani, S., Anwer, S., Li, H., & Alghadir, A. H. (2022). Effects of plyometric and whole-body vibration on physical performance in collegiate basketball players: A crossover randomised trial. *Scientific Reports*, 12(1), Article 5043. <https://doi.org/10.1038/s41598-022-09142-8>
- Pechlivanos, R. G., Amiridis, I. G., Anastasiadis, N., Kannas, T., Sahinis, C., Duchateau, J., & Enoka, R. M. (2024). Effects of plyometric training techniques on vertical jump performance of basketball players. *European Journal of Sport Science*, 24(6), 682-692. <https://doi.org/10.1002/ejsc.12097>
- Ransone, J. (2017). Physiologic profile of basketball athletes. *Sports Science Exchange*, 163, 1-8.
- Wu, B., Zhang, B., Yin, M., Xu, K., Ramirez-Campillo, R., Huang, S., Zhou, L., Yue, L., Li, J., Liu, Z., Song, Z., Zhang, B., Liu, H., Li, L., & Zhang, K. (2025). Plyometric jump training micro- and high-dose effects on amateur basketball players' athletic performance: A randomised controlled trial. *Frontiers in Physiology*, 16, Article 1684022. <https://doi.org/10.3389/fphys.2025.1684022>
- Zhang, J., Li, J., Yang, F., & Liu, Z. (2023). Effects of plyometric training on lower limb joint mobility, explosive strength, advanced layup success rate and sports injury rate among college male basketball players. *Applied Sciences*, 15(10), Article 5356. <https://doi.org/10.3390/app15105356>

Social Transformation of Leadership in Ethnic Groups of Indonesian Society: A Study of the Authority and Power of Traditional Leadership in Indonesia

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ABSTRACT

The transformation of traditional leadership in rural societies has become increasingly significant in the post-industrial era, yet limited attention has been given to how authority is reconfigured within customary institutions. This study examines the transformation of traditional leadership among four ethnic communities in South Sulawesi, Indonesia—Bugis, Makassar, Mandar, and Toraja by analysing how digitalisation, information openness, and shifting social expectations reshape authority and power. Using a qualitative approach with an embedded single-case study design, data were collected through observation, in-depth interviews, focus group discussions, and document analysis. The findings reveal that traditional authority is not diminishing but being reconfigured into a hybrid form that combines inherited legitimacy, formal-legal positioning, and recognition-based authority grounded in competence and adaptive capacity. Comparative analysis shows differentiated patterns: adaptive hybridisation among Bugis and Makassar leaders, contextual flexibility among Mandar leaders, and selective conservatism among Toraja leaders. This study argues that authority transformation in the post-industrial era is not a linear shift from ascribed to achieved status, but

a dynamic process of reconfiguration shaped by digital change, community participation, and sustainability concerns. These findings contribute to the literature by advancing a hybrid perspective on authority in non-Western rural contexts.

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INTRODUCTION

The transformation of traditional leadership in rural societies has become increasingly significant in the context of the post-industrial era, where digitalisation, information openness, and shifting social expectations reshape patterns of authority and governance. Social transformation, understood as changes in social structures, cultural values, and institutional arrangements, can occur gradually or abruptly and often involves shifts in social institutions, patterns of behaviour, and dominant ways of thinking (Nonci et al., 2023; Wagoner & Power, 2022). Such transformation is commonly driven by technological development, economic restructuring, political change, and evolving cultural values (Hilbert, 2020; Keeves et al., 2021). It may generate both positive outcomes, such as improved welfare and social progress, and negative consequences, including inequality and social tension (Halim et al., 2017; Louis & Montiel, 2018). In post-industrial societies, knowledge, information, and communication technologies increasingly influence not only economic activities but also social relations and leadership practices (Rost, 1997; Rost & Smith, 1992; Roztock et al., 2019).

The transition toward post-industrial society is characterised by several key features, including the dominance of service-based economic sectors, the centrality of digital technology and information, increased flexibility in work and social interaction, heightened environmental awareness, and significant socio-cultural

change (Bastos et al., 2021; Meng et al., 2023; Rundshagen, 2013; Witt & Gross, 2020; Zhang et al., 2022). These transformations have profound implications for leadership, including in traditional and customary communities, where authority has historically been rooted in inherited status, social hierarchy, and normative continuity.

Traditional leadership is generally characterised by hierarchical structures, strong authority, reliance on experience, and the preservation of established norms and customs (Tadesse & Debela, 2024; Yusup, 2022). Such leadership often manifests in authoritarian decision-making, clear hierarchical control, conservatism, assertiveness, and the maintenance of social order (Acharya & Berry, 2023; Du et al., 2020; Fernandopulle, 2021; Huang et al., 2022; Joullié et al., 2021; McLaren et al., 2023; Pizzolitto et al., 2023; Specchia et al., 2021; Van Kleef & Cheng, 2020). Although traditional leadership remains effective in certain cultural contexts, increasing social complexity and rapid technological development have encouraged shifts toward more collaborative, participatory, and adaptive leadership models.

A crucial dimension of this transformation lies in the changing relationship between authority and power. While power refers to the capacity to influence or control outcomes, authority refers to the legitimate exercise of that power within a recognised social order (Haugaard, 2018; Joullié et al., 2021). In Weberian terms, authority is grounded in legitimacy derived from

tradition, legal structures, or charisma. In many customary societies, authority remains deeply embedded in lineage, cultural systems, and *adat* institutions, making it relatively resistant to rapid structural change. However, under post-industrial conditions characterised by digitalisation and information openness, the basis of legitimacy is increasingly renegotiated, as communities demand greater transparency, participation, and accountability.

Recent studies indicate that leadership in the post-industrial era is increasingly characterised by collaboration, adaptability, competence, and public recognition rather than solely by hierarchical control (Behie et al., 2023; Kniffin & Patterson, 2019; Rost, 1997). Digital technologies expand access to information and reshape the visibility and accountability of leaders, thereby altering the basis upon which authority is recognised and maintained (Hilbert, 2020; Roztocki et al., 2019; Verma et al., 2022). However, existing literature tends to examine either the persistence of traditional leadership or the emergence of modern leadership models, with limited integration between the two perspectives.

Three major tendencies can be identified in previous studies. First, studies focussing on traditional authority emphasise the enduring dominance and legitimacy of customary leaders within communities (Milstead, 2004; Yusup, 2022). Second, studies on post-industrial leadership highlight competence, collaboration, and participatory governance, often suggesting a gradual displacement of traditional leadership (Harrell & Thye,

2018; Haugaard, 2018; Kniffin & Patterson, 2019; Rost, 1997; Rost & Smith, 1992). Third, some research emphasises the role of charisma, communication, and symbolic influence in shaping leadership effectiveness in contemporary contexts (Cicero & Pierro, 2007; Fiol et al., 1999). However, these strands remain fragmented and tend to position traditional and modern leadership as separate, even opposing, phenomena.

This fragmentation results in a critical gap, particularly in non-Western and rural contexts where traditional leadership systems continue to operate alongside modern governance structures. Much of the existing scholarship is based on Western organisational settings, while studies on customary leadership often focus on continuity rather than transformation. Consequently, there is still a limited understanding of how authority and power are reconfigured within traditional leadership systems facing digitalisation, participatory demands, and institutional change.

This study addresses this gap by examining the transformation of traditional leadership among four ethnic communities in South Sulawesi, Indonesia: Bugis (Ade Pitue), Makassar (Sombayya), Mandar (Tomakaka), and Toraja (Sokkong Bayu). These communities provide a relevant empirical setting in which traditional authority remains socially significant while simultaneously interacting with modern governance and digital transformation. Preliminary indications suggest that these communities exhibit distinct patterns in the construction of legitimacy, distribution of

authority, and adaptation to social change, indicating that leadership transformation does not occur uniformly across contexts.

The study argues that the transformation of traditional leadership in the post-industrial era does not represent a linear shift from traditional to modern authority. Instead, it involves a process of authority reconfiguration, in which traditional legitimacy coexists with formal-legal structures and recognition-based authority grounded in competence, education, and adaptive capacity. This process reflects a form of hybrid authority, where inherited status, institutional legitimacy, and socially constructed recognition operate simultaneously in shaping leadership practices.

Accordingly, this study addresses three research questions: (1) How does the post-industrial era influence the authority and power of traditional leaders? (2) What forms do authority and power take in traditional leadership under post-industrial conditions? (3) How is the sustainability of traditional leadership authority maintained in the post-industrial era? By answering these questions, this study makes three contributions. First, it advances theoretical understanding by conceptualising leadership transformation as a process of authority reconfiguration rather than replacement. Second, it provides a comparative analysis of how different ethnic communities negotiate leadership transformation in distinct ways. Third, it contributes empirical insights from a non-Western rural context, thereby enriching broader debates on leadership, social transformation, and institutional resilience.

LITERATURE REVIEW

Social Transformation and Leadership Change

Social transformation refers to fundamental changes in social structures, cultural values, and institutional arrangements that shape patterns of interaction and behaviour within society (Nonci et al., 2023; Wagoner & Power, 2022). Such transformation is often driven by technological innovation, economic restructuring, and shifting social values (Hilbert, 2020; Keeves et al., 2021). In the context of post-industrial society, these changes are increasingly influenced by the dominance of information, communication technologies, and knowledge-based systems (Rost, 1997; Rost & Smith, 1992; Roztocki et al., 2019).

Existing studies consistently show that social transformation significantly reshapes leadership patterns, particularly in terms of authority, decision-making processes, and legitimacy (Bastos et al., 2021; Witt & Gross, 2020; Zhang et al., 2022). However, most of this literature is situated in organisational and urban contexts, with limited attention to how these transformations affect leadership structures embedded in traditional and rural communities. This indicates a critical gap in understanding how social transformation operates within culturally grounded leadership systems.

Authority and Power in Traditional Leadership

The concepts of authority and power are central to understanding leadership transformation. Power refers to the capacity

to influence or control outcomes, whereas authority refers to the legitimacy of that power within a recognised social system (Haugaard, 2018; Joullié et al., 2021). Classical sociological perspectives, particularly Weber's typology, distinguish between traditional, legal-rational, and charismatic authority as ideal types that structure leadership legitimacy.

In traditional leadership systems, authority is typically grounded in inherited status, lineage, and customary norms, often reinforced through hierarchical and conservative structures (Tadesse & Debela, 2024; Yusup, 2022). Such systems emphasise continuity, obedience, and the preservation of established social order (Du et al., 2020; Fernandopulle, 2021; McLaren et al., 2023).

However, recent studies indicate that authority is increasingly shaped by competence, communication, and public recognition, suggesting a shift towards more dynamic and negotiated forms of legitimacy (Behie et al., 2023; Kniffin & Patterson, 2019). Importantly, this shift should not be interpreted as a replacement of traditional authority, but rather as a transformation within it. Despite this, existing studies often treat authority as a static category and fail to explain how traditional authority adapts to changing technological and social conditions.

Post-industrial Society and Leadership Transformation

Post-industrial society is characterised by the increasing importance of information,

services, and technology in shaping economic and social life (Rost, 1997; Rost & Smith, 1992). This transformation leads to changes in communication systems, social interaction, and institutional arrangements, which in turn influence leadership practices (Meng et al., 2023; Roztock et al., 2019). Leadership in this context tends to emphasise collaboration, flexibility, and adaptability rather than hierarchical control (Kniffin & Patterson, 2019).

Digitalisation plays a crucial role by expanding access to information, increasing transparency, and reshaping the visibility of leadership (Hilbert, 2020; Verma et al., 2022). However, most studies on post-industrial leadership are based on organisational and Western contexts, with limited attention to traditional leadership systems in rural societies. This creates a gap in understanding how digital transformation interacts with customary institutions and culturally embedded authority systems.

Research Gap and Conceptual Positioning

A review of the literature reveals three dominant tendencies. First, studies on traditional leadership emphasise continuity and stability, focussing on the enduring legitimacy of customary authority (Milstead, 2004; Yusup, 2022). Second, studies on post-industrial leadership highlight competence, collaboration, and participatory governance, often suggesting a decline or displacement of traditional leadership (Harrell & Thye, 2018; Kniffin & Patterson, 2019; Rost, 1997). Third, some studies emphasise the role of charisma and symbolic influence in shaping leadership effectiveness in

contemporary contexts (Cicero & Pierro, 2007; Fiol et al., 1999).

However, these perspectives remain fragmented and rarely address how traditional authority adapts to post-industrial conditions. In particular, there is limited understanding of how authority and power are reconfigured within leadership systems that operate simultaneously within customary and modern institutional environments.

In the Indonesian context, traditional leadership is closely linked to adat institutions, which regulate social norms, conflict resolution, and community governance. Studies of customary leadership in regions such as Sulawesi indicate that traditional authority remains resilient, while simultaneously adapting to external influences, including state governance and digital transformation. This suggests that leadership transformation in Indonesia must be understood as a process embedded in cultural and institutional contexts, rather than as a simple transition toward modern leadership models.

Conceptual Framework: Authority Reconfiguration and Hybrid Leadership

Building on these gaps, this study adopts a conceptual perspective that views leadership transformation as a process of authority reconfiguration rather than simple replacement. In this perspective, traditional authority does not disappear but interacts with formal-legal structures and emerging forms of recognition based on competence, education, and adaptability.

This process leads to the emergence of hybrid authority, where multiple sources of legitimacy, traditional, institutional, and recognition-based, co-exist and interact in shaping leadership practices. Such hybridity reflects the dynamic nature of leadership in the post-industrial era, particularly in rural and non-Western contexts where customary institutions remain socially relevant.

This framework provides a basis for analysing how different communities respond to social transformation and how leadership systems adapt to changing technological, social, and institutional conditions, which is shown in Figure 1.

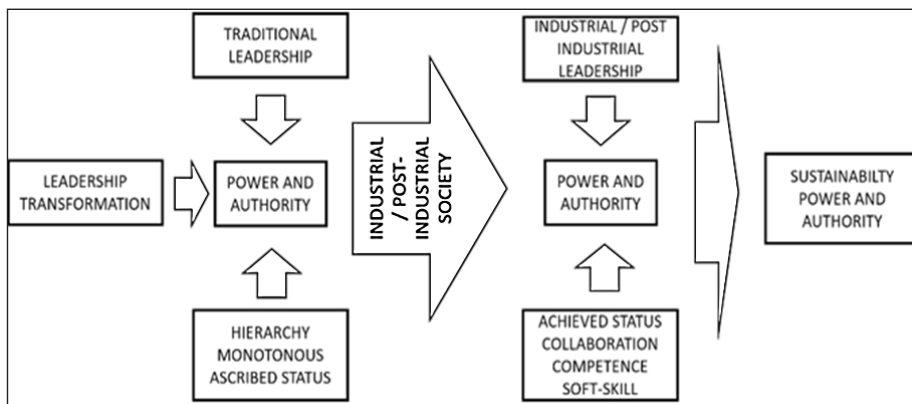


Figure 1. Conceptual framework of leadership transformation

RESEARCH METHOD

Research Design

This study adopts a qualitative approach using an embedded single-case study design to examine the dynamics of authority and power in traditional leadership undergoing social transformation in the post-industrial era, following Yin (2018). The main unit of analysis is traditional leadership, which is elaborated into four embedded sub-units representing ethnic diversity in South Sulawesi: Bugis (Ade Pitue), Makassar (Sombayya), Mandar (Tomakaka), and Toraja (Sokkong Bayu). This design allows for in-depth exploration of each leadership system within its socio-cultural context while enabling systematic cross-case comparison.

Research Site and Context

The study was conducted in South Sulawesi, Indonesia, a region characterised by the persistence of diverse traditional leadership

systems that coexist with processes of modernisation and digitalisation. This context is analytically significant because it reflects the intersection between customary institutions and contemporary socio-technological change.

The research is grounded in three key dimensions of social transformation. First, the structural transition from agrarian to post-industrial society reshapes economic orientation, social relations, and institutional arrangements. Second, the increasing penetration of digital technology into traditional communities alters communication patterns, information flows, and mechanisms of leadership legitimacy. Third, the interaction between customary authority and formal governance generates processes of institutional adaptation, negotiation, and potential hybridisation of power.

The geographical distribution of the four ethnic leadership systems in South Sulawesi is illustrated in Figure 2.

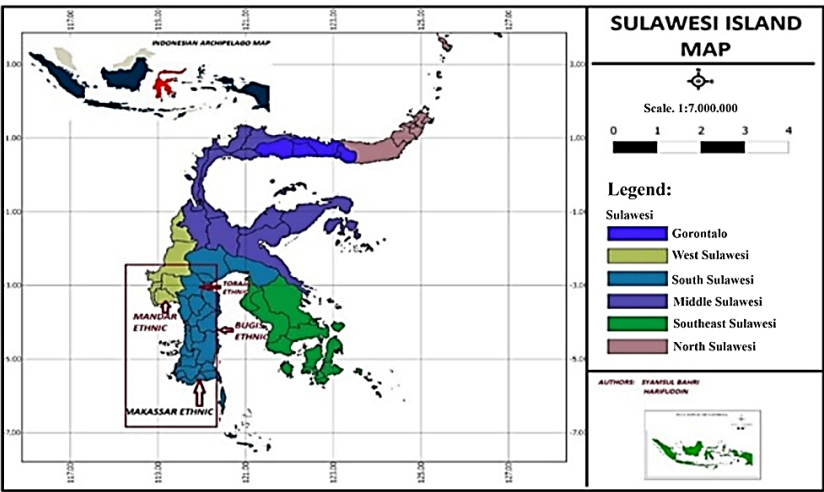


Figure 2. Map of Sulawesi Island, Indonesia

Informant Selection

Informants were selected using purposive sampling based on the following criteria: recognised legitimacy as traditional leaders, social and cultural recognition by the community, experience in responding to social and technological changes, and willingness to participate in the study. Four key informants were selected, each representing one ethnic leadership system. This selection prioritises depth and representativeness of authority structures rather than statistical generalisation, which is consistent with qualitative case study research. The characteristics of the informants are presented in Table 1.

Data Collection Techniques

Data were collected using four complementary techniques to ensure depth and triangulation. Moderate participant observation was conducted to examine leadership practices and social interactions in their natural context. Semi-structured in-depth interviews were carried out using an interview guide derived from the conceptual framework of authority and power, and all interviews were recorded and transcribed verbatim. Focus group discussions (FGDs) were

conducted to capture collective community perspectives on leadership legitimacy and transformation. In addition, a document and literature review were undertaken through the analysis of customary records, local archives, and relevant academic sources.

Data Analysis Procedure and Validity

Data analysis was conducted iteratively and cyclically following the interactive model of Miles and Huberman (2014), which emphasises the dynamic relationship between data reduction, data display, and conclusion drawing and verification.

The first stage involved data reduction, including coding processes to identify meaningful units related to authority, power, and leadership transformation. These codes were then grouped into broader analytical categories such as legitimacy, authority structure, digital adaptation, and leadership sustainability. The second stage involved data display through matrices, tables, and thematic narratives to identify patterns and relationships across cases. The third stage involved conclusion drawing and verification, where findings were continuously refined through iterative comparison with empirical data.

Table 1
Characteristics of traditional leaders (key informants)

Ethnic Group	Leadership Institution	Age	Education Level	Digital Facilities
Bugis	Ade Pitue	70	Doctor	Smartphone
Makassar	Sombayya	58	Doctor	Smartphone
Mandar	Tomakaka	64	Magister	Smartphone
Toraja	Sokkong Bayu	67	Postgraduate	Smartphone

Source: Primary Data, 2024

To enhance credibility, validity procedures were embedded throughout the analytical process. Data triangulation was conducted by comparing information from interviews, observations, FGDs, and documents. Iterative validation was also applied to ensure consistency between data and interpretation, thereby strengthening the trustworthiness of the findings.

Researcher Reflexivity

Given the interpretive nature of qualitative research, the researchers acknowledge their positionality and familiarity with the socio-cultural context of South Sulawesi. While this proximity facilitates deeper contextual understanding, reflexivity was maintained throughout the research process to minimise potential bias, particularly in coding, interpretation, and conclusion drawing.

Ethical Considerations

This study adheres to ethical research principles. Informed consent was obtained from all participants before data collection. Participants were informed about the purpose of the study, and their confidentiality and anonymity were maintained throughout the research process.

RESULTS

Influence of the Post-industrial Era on Authority and Power

The findings show that the expansion of digital technology has fundamentally reshaped the authority and power of traditional leaders across the four ethnic groups. The increasing use of smartphones and digital

media has enhanced access to information and facilitated real-time communication, resulting in greater openness and increased public literacy. This transformation has altered the relationship between leaders and communities, where authority that was previously exercised through hierarchical structures and customary norms is now increasingly mediated through interaction, communication, and responsiveness to community needs. As a result, traditional leaders are required to adapt their leadership practices to address the growing complexity of social, economic, and cultural challenges.

Empirical evidence across the Bugis, Makassar, Mandar, and Toraja communities indicates that digital technology initially functioned as a communication tool, particularly for coordination with government institutions, but has gradually evolved into a strategic instrument for leadership, social interaction, and information dissemination. In the Bugis and Mandar contexts, this transition is reflected in the use of digital communication to coordinate community activities and facilitate decision-making processes. In the Makassar context, authority is also reinforced through symbolic representation and digital visibility, where traditional leaders maintain hierarchical legitimacy while simultaneously engaging in modern communication platforms. In contrast, Toraja leadership demonstrates a more selective adaptation, particularly in ritual contexts where customary authority remains dominant and less influenced by digital intervention.

Forms of Authority and Power in the Post-industrial Era

The results demonstrate a significant transformation in the form of authority and power, shifting from ascribed authority based on lineage and customary status toward achieved authority grounded in competence, education, and social recognition. This shift is reflected in changes in decision-making processes, the construction of legitimacy, and the distribution of power.

Decision-making, which was previously determined solely by customary rules and hierarchical authority, has become more participatory and context sensitive. For instance, the scheduling of rituals, which traditionally followed fixed customary calendars, is now adjusted based on practical considerations such as community availability, weather conditions, and socio-economic activities. This indicates that authority is no longer absolute but negotiated and responsive to contextual conditions.

At the same time, authority is increasingly shaped by recognition rather than inheritance alone. Educational background, communication skills, and digital literacy play a crucial role in shaping leadership legitimacy. Leaders such as Ade Pitue and Sombayya illustrate how higher education contributes to more rational and adaptive leadership practices, enabling them to integrate traditional legitimacy with contemporary demands. Furthermore, digital platforms have become an important arena for constructing authority, as traditional leaders engage in online communication, collaborate with

content creators, and utilise digital media to disseminate information. This demonstrates that authority is increasingly constructed through visibility, interaction, and public recognition.

In addition, authority and power are becoming more distributed and less centralised. Community members are increasingly involved in decision-making processes, and authority is shared with various actors, including government institutions, experts, and digital intermediaries. This reflects a transition toward more collaborative and networked forms of leadership in the post-industrial era, which aligns with the broader process of authority reconfiguration identified in this study.

Comparative Patterns across Ethnic Groups

Although the transformation of authority occurs across all four ethnic groups, the patterns of change are not uniform and reflect distinct socio-cultural characteristics. In the Bugis community, authority transformation is characterised by a collective and adaptive pattern, where traditional legitimacy is integrated with competence-based authority and deliberative decision-making. In the Makassar community, authority remains relatively centralised but is symbolically reinforced through digital visibility, reflecting a hybrid form that combines hierarchical authority with modern representation.

In contrast, the Mandar community demonstrates a pragmatic and flexible pattern,

where leadership adapts to community needs and technological opportunities in a more contextual manner. Meanwhile, the Toraja community exhibits a selective and conservative pattern, particularly in maintaining ritual and cosmological authority, while adopting technological change in a limited and strategic way. These variations indicate that leadership transformation is shaped by cultural structures, institutional arrangements, and varying degrees of openness to social change. Table 2 shows the comparative transformation of authority and power in Toraja community.

Sustainability of Authority and Power

The findings further indicate that the sustainability of traditional leadership is determined by the ability to integrate social, economic, and environmental dimensions. From a social perspective, legitimacy is maintained through moral responsibility, trust, and concern for community welfare. From an economic perspective, traditional leaders play a role in addressing inequality and supporting community livelihoods.

From an environmental perspective, sustainability is embedded in customary values that emphasise harmony with nature and ecological balance.

Importantly, the sustainability of authority is increasingly dependent on the capacity of leaders to combine traditional legitimacy with modern competencies, including education, digital literacy, and adaptive leadership skills. This demonstrates that the continuity of traditional leadership is not based solely on preserving tradition, but on the ability to remain relevant within a dynamic and complex social environment.

DISCUSSION

The findings of this study demonstrate that the transformation of traditional leadership in the post-industrial era is best understood as an evolutionary process of social change that occurs gradually and contextually, rather than as a linear replacement of traditional systems (Kasińska, 2023; Safonov et al., 2018). While classical perspectives emphasise the stability of traditional authority based on inherited legitimacy, the results indicate that leadership is increasingly

Table 2
Comparative transformation of authority and power

Ethnic Group	Traditional Authority	Post-industrial Authority	Key Transformation
Bugis	Hierarchical, adat-based, collective	Hybrid (formal and recognition-based), collaborative	Adaptive hybridisation
Makassar	Centralised, symbolic, aristocratic	Hybrid with symbolic reinforcement via digital media	Symbolic-digital hybrid
Mandar	Flexible, community-based	Pragmatic, participatory, competence-based	Contextual flexibility
Toraja	Ritual, hierarchical, cosmological	Selective adaptation, preservation-oriented	Selective conservatism

characterised by adaptability, participation, and responsiveness to changing social conditions.

From a theoretical perspective, these findings both confirm and extend Weberian concepts of authority. Traditional authority, rooted in customs, continuity, and inherited status, remains a foundational source of legitimacy. However, the empirical evidence suggests that authority is no longer singular and hierarchical, but is increasingly reconfigured into more distributed, negotiated, and competence-based forms. This finding supports the argument that leadership transformation in the post-industrial era should not be interpreted as a transition from traditional to modern authority, but rather as a process of authority reconfiguration, in which multiple sources of legitimacy coexist and interact.

This study further advances the concept of hybrid authority, where inherited status, institutional legitimacy, and recognition-based authority operate simultaneously. Unlike dominant perspectives that assume the erosion of traditional leadership under modernisation, the findings demonstrate that traditional leadership remains resilient and adaptive. This contributes to the broader literature by showing that leadership transformation in non-Western rural contexts does not follow a linear modernisation trajectory, but instead reflects a context-dependent process shaped by cultural and institutional factors.

In line with contemporary leadership studies, the findings indicate a shift toward more collaborative and participatory

leadership practices (Bodenhausen & Curtis, 2016; Komal et al., 2023). Authority is no longer monopolised by traditional leaders but is increasingly distributed across multiple actors, including community members, government institutions, and knowledge holders. This aligns with the concepts of distributed and shared leadership, which emphasise collective decision-making and relational forms of power.

From a digital transformation perspective, this study highlights the role of technology in reshaping authority structures. Digital platforms expand access to information, increase transparency, and alter the visibility of leadership (Hilbert, 2020; Verma et al., 2022). Traditional leaders are no longer confined to customary spaces but are increasingly engaged in digital environments, where authority is constructed through communication, interaction, and public recognition. This finding supports the notion of networked authority, in which power is mediated through digital connectivity and social networks.

However, the findings also suggest that transformation is not uniform across all contexts. The comparative analysis reveals distinct patterns among the four ethnic groups, reflecting varying degrees of adaptation and resistance. While Bugis and Makassar leadership systems demonstrate hybridisation between traditional and modern authority, Mandar leadership exhibits greater flexibility and pragmatism, and Toraja leadership maintains a more selective and conservative approach,

particularly in preserving ritual authority. This indicates that leadership transformation is shaped by cultural values, institutional structures, and the degree of openness to change.

In terms of sustainability, the study shows that the continuity of traditional leadership depends on the integration of social, economic, and environmental dimensions (Ferdig, 2007; Kniffin & Patterson, 2019; Purwanto, 2024). Leaders who can combine cultural legitimacy with adaptive competencies such as digital literacy, communication skills, and collaborative capacity are more likely to maintain their authority in the post-industrial era. This suggests that sustainability is not merely about preserving tradition, but about maintaining relevance in dynamic social environments.

Overall, this study contributes to literature in three key ways. First, it introduces the concept of authority reconfiguration as a framework for understanding leadership transformation beyond the dichotomy of traditional versus modern authority. Second, it demonstrates that hybrid authority provides a more accurate explanation of leadership dynamics in post-industrial contexts. Third, it provides empirical evidence from a non-Western rural setting, thereby enriching global discussions on leadership, social transformation, and institutional resilience.

Limitations and Future Research

This study has several limitations that should be acknowledged. First, the use of a

qualitative approach within an interpretive paradigm means that the analysis is inherently influenced by the researchers' reflexivity and subjectivity. Although various procedures were employed to ensure data validity, the potential for bias in coding, categorisation, and interpretation cannot be eliminated.

Second, this study adopts a cross-sectional design, capturing the dynamics of leadership transformation at a specific point in time. As such, it does not fully account for the longitudinal evolution of authority and power in traditional leadership systems, which may develop differently over time.

Third, the study does not comprehensively incorporate macro-level factors, such as state policies, global economic dynamics, and the broader digital ecosystem, which may also shape the transformation of traditional leadership in more complex ways.

Future research is therefore recommended to address these limitations by adopting longitudinal approaches, expanding the geographical scope beyond South Sulawesi, and integrating multi-level analysis that considers both local and macro-level dynamics. In addition, quantitative or mixed-method approaches may be useful to examine community perceptions of leadership legitimacy and to further validate the patterns identified in this study.

CONCLUSION

This study demonstrates that the transformation of traditional leadership in the post-industrial era does not reflect the

decline of customary authority, but rather a process of authority reconfiguration, in which traditional and contemporary forms of legitimacy coexist and interact. Authority is no longer derived solely from inherited status and customary norms, but is increasingly shaped by competence, education, communication capacity, and digital engagement.

The comparative analysis across the Bugis, Makassar, Mandar, and Toraja communities shows that leadership transformation is context-dependent. While some leadership systems exhibit hybridisation between traditional and modern authority, others demonstrate more flexible or selective adaptation, reflecting differences in cultural structures, institutional arrangements, and openness to change.

Theoretically, this study contributes by advancing the concepts of authority reconfiguration and hybrid authority as a framework for understanding leadership transformation in non-Western rural contexts. These findings challenge the dominant assumption that modernisation leads to the erosion of traditional leadership, and instead highlight the adaptive capacity and resilience of customary institutions.

Practically, the findings suggest that strengthening the sustainability of traditional leadership requires enhancing adaptive capacity, particularly in digital literacy, communication skills, and collaborative governance. Policy efforts may focus on integrating traditional leadership structures into formal governance systems while

supporting capacity-building initiatives that enable traditional leaders to remain relevant in rapidly changing social environments.

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REFERENCES

- Acharya, K., & Berry, G. R. (2023). Characteristics, traits, and attitudes in entrepreneurial decision-making: Current research and future directions. *International Entrepreneurship and Management Journal*, 19(4), 1965-2012. <https://doi.org/10.1007/s11365-023-00912-y>
- Bastos, C., Novoa, A., & Salazar, N. B. (2021). Mobile labour: An introduction. *Mobilities*, 16(2), 155-163. <https://doi.org/10.1080/17450101.2021.1885840>
- Behie, S. W., Pasman, H. J., Khan, F. I., Shell, K., Alarfaj, A., El-Kady, A. H., & Hernandez, M. (2023). Leadership 4.0: The changing landscape of industry management in the smart digital era. *Process Safety and Environmental Protection*, 172, 317-328. <https://doi.org/10.1016/j.psep.2023.02.014>
- Bodenhause, C., & Curtis, C. (2016). Transformational leadership and employee involvement: Perspectives from millennial workforce entrants. *Journal of Quality Assurance in Hospitality & Tourism*, 1-17. <https://doi.org/10.1080/1528008X.2015.1048920>

- Cicero, L., & Pierro, A. (2007). Charismatic leadership and organisational outcomes: The mediating role of employees' work-group identification. *International Journal of Psychology*, 42(5), 297-306. <https://doi.org/10.1080/00207590701248495>
- Du, J., Li, N. N., & Luo, Y. J. (2020). Authoritarian leadership in organisational change and employees' active reactions: Have-to and willing-to perspectives. *Frontiers in Psychology*, 10, Article 3076. <https://doi.org/10.3389/fpsyg.2019.03076>
- Ferdig, M. A. (2007). Sustainability leadership: Co-creating a sustainable future. *Journal of Change Management*, 7(1), 25-35. <https://doi.org/10.1080/14697010701233809>
- Fernandopulle, N. (2021). To what extent does hierarchical leadership affect health care outcomes? *Medical Journal of the Islamic Republic of Iran*, Article 117. <https://doi.org/10.47176/mjiri.35.117>
- Fiol, C. M., Harris, D., & House, R. (1999). Charismatic leadership. *The Leadership Quarterly*, 10(3), 449-482. [https://doi.org/10.1016/S1048-9843\(99\)00021-1](https://doi.org/10.1016/S1048-9843(99)00021-1)
- Halim, H., Zainuddin, R., & Zainuddin, F. (2017). Eco-profetik: Integrasi pengetahuan lokal dengan Islam tentang lingkungan. *Al-Tahrir: Jurnal Pemikiran Islam*, 17(2), 311-330.
- Harrell, A., & Thye, S. (2018). Power and authority. In *Core concepts in sociology* (pp. 222-224). Wiley. <https://doi.org/10.1002/9781394260331.ch63>
- Haugaard, M. (2018). What is authority? *Journal of Classical Sociology*, 18(2), 104-132. <https://doi.org/10.1177/1468795X17723737>
- Hilbert, M. (2020). Digital technology and social change: The digital transformation of society from a historical perspective. *Dialogues in Clinical Neuroscience*, 22(2), 189-194. <https://doi.org/10.31887/DCNS.2020.22.2/mhilbert>
- Huang, Q., Zhang, K., Wang, Y., Bodla, A. A., & Zhu, D. (2022). When is authoritarian leadership less detrimental? The role of leader capability. *International Journal of Environmental Research and Public Health*, 20(1), Article 707. <https://doi.org/10.3390/ijerph20010707>
- Joullié, J. E., Gould, A. M., Spillane, R., & Luc, S. (2021). The language of power and authority in leadership. *The Leadership Quarterly*, 32(4), Article 101491. <https://doi.org/10.1016/j.leaqua.2020.101491>
- Kasińska, A. (2023). Ewolucja przywództwa politycznego od ujęcia tradycyjnego do neoprzywództwa. *Politeja*, 19(5(80)), 21-35. <https://doi.org/10.12797/Politeja.19.2022.80.02>
- Keeves, J. P., Darmawan, I. G. N., & Lietz, P. N. (2021). Globalisation, culture, and social transformation. In *Third international handbook of globalisation, education and policy research* (pp. 415-438). Springer International Publishing. https://doi.org/10.1007/978-3-030-66003-1_23
- Kniffin, L. E., & Patterson, R. M. (2019). Re-imagining community leadership development in the post-industrial era. *Journal of Leadership Education*, 18(4), 188-209. <https://doi.org/10.12806/V18/I4/T1>
- Komal, K. A., Tauqir, T. T., Mujtaba, M. H. A., & Rameez, R. K. (2023). Investigating the role of risk mitigation strategies on supply chain disruption impact amidst the COVID-19 outbreak. *NUST Business Review*, 3(2). <https://doi.org/10.37435/NBR21031701>
- Louis, W. R., & Montiel, C. J. (2018). Social movements and social transformation: Steps towards understanding the challenges and breakthroughs of social change. *Peace and Conflict: Journal of Peace Psychology*, 24(1), 3-9. <https://doi.org/10.1037/pac0000309>
- McLaren, T. A. S., Van der Hoorn, B., & Fein, E. C. (2023). Why vilifying the status quo can derail a change effort: Kotter's contradiction, and theory

- adaptation. *Journal of Change Management*, 23(1), 93-111. <https://doi.org/10.1080/14697017.2022.2137835>
- Meng, F., Liu, Z., Lin, H., & Bhuiyan, M. A. (2023). The impact of labour mobility with fellow townsmen on the wages of rural migrants: Evidence from China. *Humanities and Social Sciences Communications*, 10(1), Article 376. <https://doi.org/10.1057/s41599-023-01795-8>
- Miles, M. B., & Huberman, A. M. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.
- Milstead, J. A. (2004). Challenging five traditional leadership principles. *Policy, Politics, & Nursing Practice*, 5(1), 5-9. <https://doi.org/10.1177/1527154403260148>
- Nonci, N., Azuz, F., Arifin, A., Harifuddin, H., & Iskandar, I. (2023). The dialectic of globalisation and social transformation of Silariang in Makassar, Indonesia. *Etnosia*, 8(1), 127-144. <https://journal.unhas.ac.id/index.php/etnosia/article/view/26149>
- Pizzolitto, E., Verna, I., & Venditti, M. (2023). Authoritarian leadership styles and performance: A systematic literature review and research agenda. *Management Review Quarterly*, 73(2), 841-871. <https://doi.org/10.1007/s11301-022-00263-y>
- Purwanto, M. (2024). Sustainable leadership: A new era of leadership for organisational sustainability and challenges. *International Journal of Research and Scientific Innovation*, 11(3), 62-68. <https://doi.org/10.51244/IJRSI.2024.1103007>
- Rost, J. C. (1997). Moving from individual to relationship: A postindustrial paradigm of leadership. *Journal of Leadership Studies*, 4(4), 3-16. <https://doi.org/10.1177/107179199700400402>
- Rost, J., & Smith, A. (1992). Leadership: A postindustrial approach. *European Management Journal*, 10(2), 193-201. [https://doi.org/10.1016/0263-2373\(92\)90069-G](https://doi.org/10.1016/0263-2373(92)90069-G)
- Roztock, N., Soja, P., & Weistroffer, H. R. (2019). The role of information and communication technologies in socioeconomic development: Towards a multi-dimensional framework. *Information Technology for Development*, 25(2), 171-183. <https://doi.org/10.1080/02681102.2019.1596654>
- Rundshagen, V. M. (2013). Post-industrial society. In *Encyclopedia of corporate social responsibility* (pp. 1859-1867). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-28036-8_175
- Safonov, Y., Maslennikov, Y., & Lenska, N. (2018). Evolution and modern tendencies in the theory of leadership. *Baltic Journal of Economic Studies*, 4(1), 304-310. <https://doi.org/10.30525/2256-0742/2018-4-1-304-310>
- Specchia, M. L., Cozzolino, M. R., Carini, E., Di Pilla, A., Galletti, C., Ricciardi, W., & Damiani, G. (2021). Leadership styles and nurses' job satisfaction: Results of a systematic review. *International Journal of Environmental Research and Public Health*, 18(4), Article 1552. <https://doi.org/10.3390/ijerph18041552>
- Tadesse, B. A., & Debela, K. L. (2024). Organisational culture: A systematic review. *Cogent Business & Management*, 11(1), Article 2340129. <https://doi.org/10.1080/23311975.2024.2340129>
- Van Kleef, G. A., & Cheng, J. T. (2020). Power, status, and hierarchy: Current trends and future challenges. *Current Opinion in Psychology*, 33, iv-xiii. <https://doi.org/10.1016/j.copsyc.2020.03.011>
- Verma, R., Bharti, U., & Tripathi, U. (2022). Digital era and its impact on leadership transformation. *Sachetas*, 1(2), 36-41. <https://doi.org/10.55955/120003>
- Wagoner, B., & Power, S. A. (2022). Social change. In *The Palgrave encyclopedia of the possible* (pp.

- 1503-1508). Springer International Publishing. https://doi.org/10.1007/978-3-030-90913-0_143
- Witt, U., & Gross, C. (2020). The rise of the “service economy” in the second half of the twentieth century and its energetic contingencies. *Journal of Evolutionary Economics*, 30(2), 231-246. <https://doi.org/10.1007/s00191-019-00649-4>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.
- Yusup, M. (2022). The concept of leadership in traditional and modern. *Indonesian Journal of Education*, 2(1), 41-49. <https://doi.org/10.54443/injoe.v2i1.9>
- Zhang, L., Xu, M., Chen, H., Li, Y., & Chen, S. (2022). Globalisation, green economy and environmental challenges: State of the art review for practical implications. *Frontiers in Environmental Science*, 10, Article 870271. <https://doi.org/10.3389/fenvs.2022.870271>

The Expectation and Satisfaction of Chinese Young Visitors for Longmen Calligraphy Works' Image Symbolism

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ABSTRACT

Longmen calligraphy is one of the highest achievements of Weibei calligraphy and plays a significant role in helping young learners acquire Weibei calligraphy skills. Chinese calligraphy is a compulsory subject for young learners; however, their interest in learning calligraphy has declined in recent years. This study investigates the expectations and satisfaction of young Chinese visitors regarding the image symbolism of Longmen calligraphy works. A quantitative research approach was adopted, and Importance-Performance Analysis (IPA) was employed to analyse the data. The sample consisted of 407 young visitors to the Longmen Grottoes. The study examined visitors' expectations and satisfaction levels to identify their preferences for the image symbolism of five selected calligraphy works. Based on the findings, this study proposes strategies to enhance young people's interest in learning calligraphy.

Keywords: Expectation and satisfaction, chinese youngster, longmen calligraphy work, image symbolism

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INTRODUCTION

In the history of Chinese calligraphy, the Longmen Twenty Statues Inscriptions are regarded as representative masterpieces of Weibei calligraphy (Li, 2022). Weibei calligraphy not only inherited elements of clerical script from the Han Dynasty (202 BC - 220 AD) but also laid the foundation for the emergence of regular script in the Tang Dynasty (618-907 AD),

marking a crucial transitional stage from clerical to regular script (S. Xu, 2023). As shown in Figure 1, this transformation reflects an important phase in the evolution of Chinese calligraphy. The preservation of calligraphy is essential for the inheritance and development of Chinese culture and also contributes to the diversity of global cultural creativity. Interpreting and understanding the Longmen calligraphy works can provide a comprehensive understanding. Longmen calligraphy works can provide deeper insights into the historical development

process of Chinese calligraphy and enhance public appreciation of the art form (L. Xu, 2022).

However, recent studies have shown that contemporary young people have limited time to learn calligraphy, and their interest and concentration are insufficient (Jia, 2023). In addition, the limited resources for calligraphy education have led to youngsters' lack of exposure and interest in calligraphy. In addition, limited educational resources have reduced their exposure to calligraphy, further weakening their engagement.



Figure 1. One of Longmen's calligraphy works

Existing teaching content and approaches also fail to effectively stimulate learners' interest (Jia, 2023). Moreover, a survey conducted by Niu (2010) indicates that visitors to the Longmen Grottoes tend to focus primarily on the Buddha carvings, often overlooking the calligraphy works. Therefore, understanding young visitors' preferences in calligraphy is crucial for enhancing their engagement. By analysing these preferences, it is possible to identify effective entry points for stimulating interest and improving learning outcomes (Jia, 2023).

Through visitor satisfaction surveys, a more comprehensive understanding of audience perception can be achieved. Based on these findings, targeted improvement strategies can be proposed to support heritage managers in promoting the value of calligraphy and enhancing public engagement and learning.

Zhu (2018) notes that the origin of Chinese characters can be traced back to pictographic forms, with oracle bone inscriptions representing an early stage in the development of Chinese writing. This stage marks a crucial transition from image-based symbols to abstract textual symbols, enabling the recording of production, daily life, thoughts, and emotions. Chinese characters convey meaning through visual form and gradually evolved into a unique aesthetic system.

With the development of Chinese history, calligraphy has transformed into an art form that combines both practical and aesthetic functions. The evolution of

Chinese characters has progressed through stages such as oracle bone script, bronze inscriptions, stone drum script, large seal script, small seal script, clerical script, and regular script, forming a rich and diverse tradition of calligraphy.

The symbolic meaning of images is fundamental to the interpretation of artworks (Zhao, 2024). Recent studies in visual culture and heritage interpretation emphasise that visitors do not passively receive visual information but actively construct meaning through cultural frameworks (Smith, 2006; Urry, 2002). In this context, calligraphy can be understood as a visual cultural artefact, where symbolic meanings are negotiated between the artwork and the viewer. Image symbolism thus serves as a bridge between visual form and cultural interpretation, influencing how young visitors perceive and engage with calligraphy works.

From this perspective, calligraphy image symbolism can be defined as the process of generating a certain meaning. For instance, visual elements such as brushstrokes, structure, layout, etc., serve as the expression forms of symbols. While the images, as cultural intermediaries and aesthetic associations, play the role of the content of the symbols. Through the process of perception and interpretation, these elements form the symbolic meaning shaped by historical, cultural and psychological backgrounds. (Arnheim, 1974; Jung, 1968; Peirce, 1931–1958; Saussure, 1916).

Within Chinese calligraphy, symbolic meaning extends beyond visual resemblance to include expressive qualities such as

strength, order, and rhythm. These qualities evoke shared cultural perceptions and emotional responses, contributing to the aesthetic experience of calligraphy.

From technique to aesthetic expression, calligraphy represents a continuous process of expansion (Hung, 2024). Writing serves a dual function: as a practical means of communication and as an artistic form of expression. While it retains its linguistic functions—such as conveying information and expressing intentions—it is distinguished by its strong aesthetic and artistic value.

Calligraphy imagery can be further categorised into external and internal dimensions. External imagery refers to visible formal features, including character structure and writing techniques. Structural aspects involve configurations such as top-bottom, left-right, enclosed, semi-enclosed, and single-component structures, as well as relationships between stroke positions. Key structural features include the alignment of the character centre, proportional relationships among components, and overall contour shape. In addition, writing techniques play a crucial role in calligraphic expression. From an artistic perspective, these techniques not only convey meaning but also reflect broader cultural aesthetics (S. Xu & Shen, 2023). In the case of Longmen calligraphy, such techniques are manifested in strong and forceful brushstrokes, variation in stroke forms, and irregular distribution of strokes.

Internal imagery refers to more implicit aspects, including style, aesthetic qualities,

emotional expression, and underlying meanings (Zhao, 2024). As noted by Y. Xu and Shen (2022), Longmen calligraphy exhibits stylistic characteristics such as grandeur, orderliness, and expressiveness. In terms of latent meaning, these works often convey historical narratives, religious content, and contextual information about Buddha statues. The Longmen Twenty Statues Inscriptions encapsulate the diverse characteristics of Weibei calligraphy and represent a comprehensive embodiment of the Longmen calligraphic style.

In summary, based on existing research, this study identifies a total of 12 image symbolism features of Longmen calligraphy, encompassing both internal and external dimensions, as shown in Table 1.

The objective of this study is to investigate the expectations and satisfaction of Chinese young visitors to the Longmen Grottoes regarding the image symbolism of five selected Longmen calligraphy works, namely Bei Hai Wang Yuan Xiang, Shi Ping Gong, Zheng Chang You, Ci Xiang, and He Lan Han.

Furthermore, this study aims to analyse young visitors' interest preferences in calligraphy learning, examine their understanding of Longmen calligraphy works, and propose strategies to enhance their engagement with and appreciation of Longmen calligraphy.

Research Limitations

This study has several limitations that should be acknowledged. First, the sample was limited to 407 Chinese young visitors to

Table 1
The feature dimensions of the image symbolism of the Longmen calligraphy works

Image Type	Dimensionality	Feature
External Image	Structural Character	The center of the font is vertical
		Each part of the font is a different size
		The fonts have different contour shapes
	Writing Technique	The brushstroke is strong and powerful
		The brushstroke shapes in the calligraphy work are various
Internal Image	Brushwork Style	The brushstroke distribution is irregular
		Majestic style
		Orderly style
	Latent Meaning	Fun style
		Record the historical background and events
		About religion
		The introduction to the statues

the Longmen Grottoes, which may restrict the generalisability of the findings to other visitor groups or cultural contexts.

Second, the scope of the study focused on visitors' expectations and satisfaction regarding the image symbolism of Longmen calligraphy works. As such, other factors that may influence calligraphy appreciation—such as prior knowledge, educational background, or cultural experience—were not examined in detail.

Third, the analysis was confined to the Longmen Twenty Statues Inscriptions, with particular emphasis on five representative calligraphy works. Although these works were selected to reflect stylistic diversity, they may not fully represent all characteristics of Longmen calligraphy.

Finally, the study relied on questionnaire-based data collection, which

may be influenced by respondents' subjective perceptions and self-reporting bias. Future research may incorporate qualitative methods or experimental approaches to provide a more comprehensive understanding of calligraphy image symbolism and audience perception.

METHOD

This study employed a questionnaire survey to collect quantitative data. Questionnaire-based methods are widely used in social science research to capture attitudes, perceptions, and behavioural tendencies through structured instruments (Murphy, 2023). In this study, the questionnaire was designed to measure visitors' expectations and satisfaction regarding the image symbolism of Longmen calligraphy works.

Compared with other data collection methods, questionnaire surveys allow for the efficient collection of data from a relatively large sample, enabling statistical analysis and enhancing the objectivity of the findings (Frey, 1994). In addition, standardised questionnaire design ensures consistency in data collection and facilitates comparative analysis across respondents (Vaziri, 2012).

To improve the validity and reliability of the data, the questionnaire was designed with clear research objectives and a manageable number of items. Each dimension was measured using a limited set of focused questions to reduce respondent fatigue and improve response quality.

In addition, Importance-Performance Analysis (IPA) was selected because it allows for the simultaneous evaluation of visitors' expectations and satisfaction, providing a structured framework to identify priority areas for improvement. Compared with other methods, IPA is particularly suitable for cultural heritage studies as it translates subjective perceptions into actionable insights (Bacon, 2003; Matzler et al., 2003; Patton, 2002).

In the study, the five selected calligraphy works were chosen as representative examples of the Longmen Twenty Statues Inscriptions, reflecting variations in style, structure, and inscription content. However, as purposive sampling was adopted, the findings may not be fully generalisable to all visitor groups. Future studies may consider broader sampling strategies and comparative analysis across different calligraphy styles.

Study Sample

Purposive sampling was adopted in this study to select participants who met specific research criteria. This sampling approach is appropriate when the research focuses on a particular group with shared characteristics, allowing for more targeted and relevant data collection (Thomas, 2022).

The sample consisted of young Chinese visitors from different regions who visited the Longmen Grottoes, with an age range of 18 to 25 years. This group was selected as it represents the target population of interest for examining young audiences' perceptions of calligraphy.

According to Cochran's sample size formula, a minimum sample size of 385 is required at a 95% confidence level. The final sample of 407 respondents, therefore, meets the recommended threshold for statistical analysis.

As a non-probability sampling method, purposive sampling enables researchers to select participants based on predefined criteria, such as relevance to the research topic and willingness to participate (Oliver, 2015). While this approach enhances the focus and practicality of the study, it may also limit the generalisability of the findings.

Data Collection Tools

The data for this study were collected using a structured questionnaire titled "Survey of Chinese Young Visitors' Expectations and Satisfaction with the Image Symbolism of the Longmen Twenty Statues

Inscriptions,” developed by the researchers. Respondents completed the questionnaire by scanning a QR code using their mobile devices.

PROCESS AND PROCEDURE

Before data collection, the questionnaire was designed based on the 12 dimensions of image symbolism identified for the Longmen Twenty Statues Inscriptions. The questionnaire consisted of three sections: (1) demographic information, (2) expectation assessment, and (3) satisfaction evaluation of five representative calligraphy works.

The questionnaire was developed and administered using the online survey platform Wenjuanxing. Before the formal survey, a pilot test was conducted with 80 young visitors and one calligraphy practitioner to ensure clarity, reliability, and validity of the instrument. Minor revisions were made based on the pilot results.

The formal survey was conducted anonymously. Participants were informed of the purpose and content of the study before participation, and informed consent was obtained before they proceeded to complete the questionnaire. The overall research process is illustrated in Figure 2.

After the data collection was completed, the data were analysed using appropriate statistical methods. Detailed results are presented in the Results section.

Data Analysis

The data collected in this study were analysed using IBM SPSS Statistics. Importance-Performance Analysis (IPA) was employed to examine the relationship

between visitors' expectations (importance) and satisfaction (performance) regarding the image symbolism attributes of Longmen calligraphy.

IPA is a widely used analytical technique that presents data in a two-dimensional grid, where importance and performance values are plotted along the vertical and horizontal axes, respectively (Feng et al., 2014). This approach enables researchers to identify priority areas for improvement by comparing the relative importance and performance of different attributes (Matzler et al., 2003).

The IPA framework categorises attributes into four quadrants: (1) “Keep up the good work” (high importance, high performance), (2) “Concentrate here” (high importance, low performance), (3) “Low priority” (low importance, low performance), and (4) “Possible overkill” (low importance, high performance). These quadrants provide a clear basis for interpreting visitor perceptions and identifying areas that require managerial attention (Ford, 1999; Lai & To, 2010).

Given its ability to translate subjective perceptions into actionable insights, IPA is particularly suitable for analysing visitor experience in cultural heritage contexts. In this study, it was used to evaluate young visitors' perceptions of calligraphy image symbolism and to identify key attributes that influence their engagement (Figure 3).

RESULTS

The questionnaire data were analysed to provide a detailed overview of the findings.

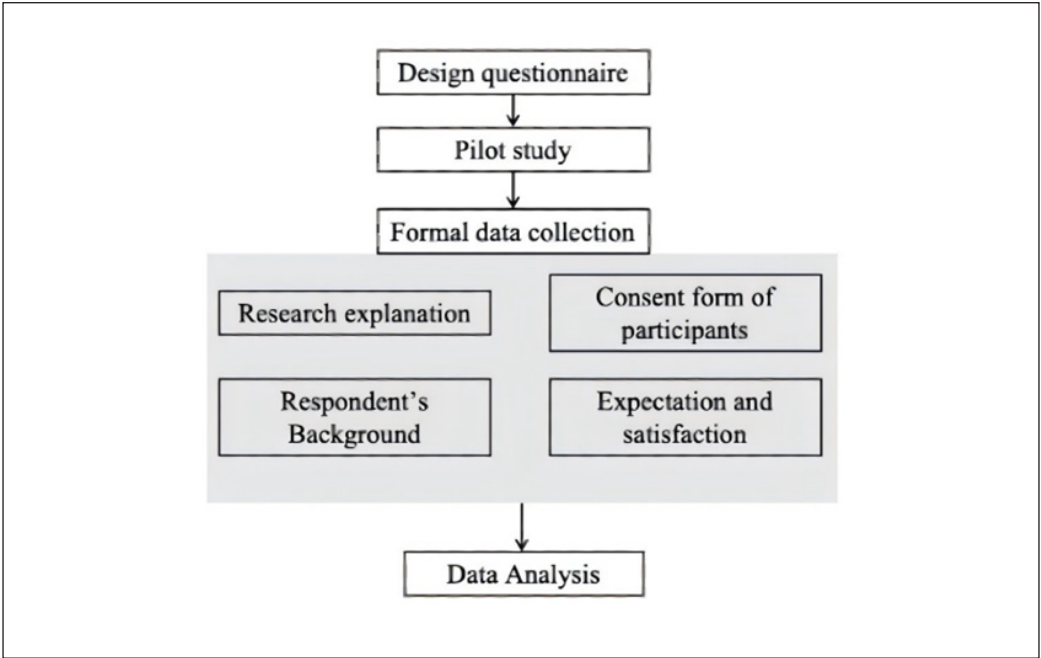


Figure 2. The process of the questionnaire survey

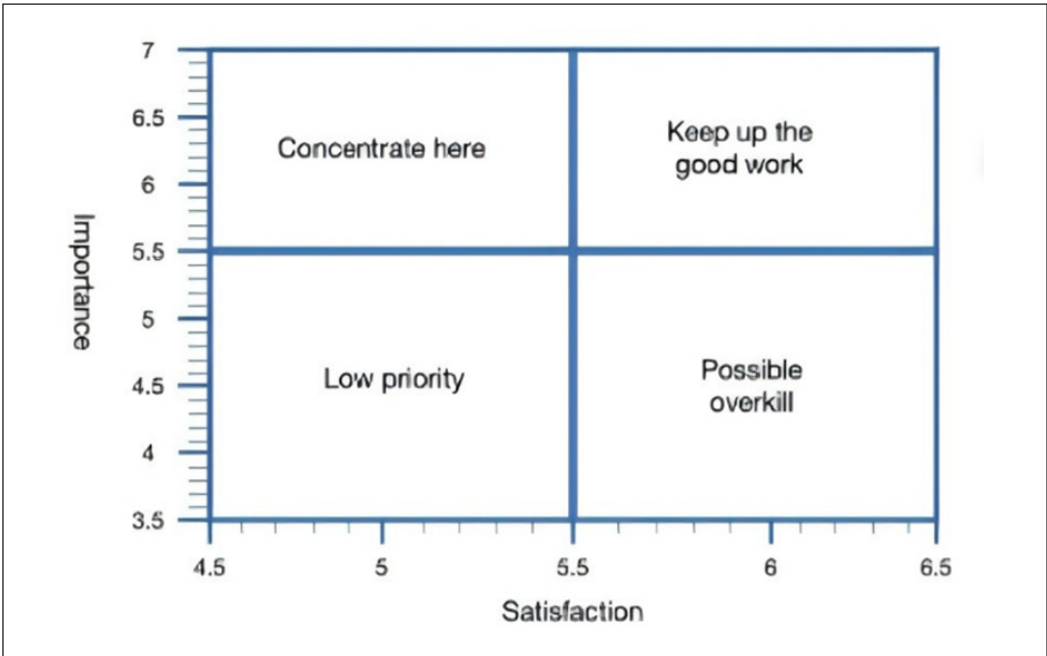


Figure 3. IPA quadrant diagram

Personal Information of Respondents

Among the respondents, males accounted for 52.33% of the sample, while females represented 47.67%. In terms of age distribution, 45.21% of respondents were aged 18-21, and 54.79% were aged 22-25.

Regarding calligraphy experience, 41.03% of respondents were amateur learners with 6–10 years of experience, while 36.61% were beginners with 0–5 years of experience. In addition, 22.36% of respondents were classified as advanced learners with more than 10 years of experience.

These demographic characteristics are summarised in Table 2.

Reliability Analysis

For the expectation section, Cronbach’s alpha coefficients for the four variables were 0.845, 0.849, 0.837, and 0.853, respectively. All values exceed the

recommended threshold of 0.7, indicating good internal consistency and reliability of the measurement instrument. The detailed results are presented in Table 3.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy for this survey was 0.850, indicating that the data were suitable for factor analysis. The detailed results are presented in Table 4.

For the satisfaction section, the data for the five calligraphy works were analysed separately. Table 5 presents the Cronbach’s alpha values for the four variables in the questionnaire, while Table 6 reports the corresponding KMO values for sampling adequacy.

Cronbach’s alpha values are influenced by factors such as the number of items, inter-item correlations, and dimensionality. Previous studies suggest that acceptable alpha values typically range from 0.70 to 0.95 (Tavakol & Dennick, 2011).

Table 2
Frequency analysis results of personal information of respondents in the questionnaire survey

Characteristics of the participants	Option	Frequency	Percentage (%)	Cumulative Percentage (%)
Gender	Male	213	52.33	52.33
	Female	194	47.67	100.00
Age	18-21 years old	184	45.21	45.21
	22-25 years old	223	54.79	100.00
Learning Level of Calligraphy	Beginner (0-5 years of learning experience)	149	36.61	36.61
	Amateur (6-10 years of learning experience)	167	41.03	77.64
	Professional (10 years of learning experience)	91	22.36	100.00
Total		407	100.0	100.0

Table 3
Cronbach's Alpha analysis results of Chinese young visitors' expectations

Dimensionality	Number of Terms	Sample Size	Cronbach's alpha
Brushwork Style	3	407	0.845
Structural Character	3	407	0.849
Writing Technique	3	407	0.837
Latent Meaning	3	407	0.853

Table 4
KMO and Bartlett's Test of Chinese young visitors' expectations

	KMO	0.850
	Approx. chi-square	2560.812
Bartlett Test	df	66
	P value	0.000

Table 5
Cronbach's Alpha Analysis results of Chinese young visitors' satisfaction

Work	Dimensionality	Number of Terms	Cronbach's Alpha
Bei Hai Wang Yuan Xiang	S Brushwork Style	3	0.87
	S Structural Character	3	0.859
	S Writing Technique	3	0.816
	S Latent Meaning	3	0.851
Shi Ping Gong	S Brushwork Style	3	0.838
	S Structural Character	3	0.86
	S Writing Technique	3	0.817
	S Latent Meaning	3	0.838
Zheng Chang You	S Brushwork Style	3	0.893
	S Structural Character	3	0.883
	S Writing Technique	3	0.837
	S Latent Meaning	3	0.886
Ci Xiang	S Brushwork Style	3	0.85
	S Structural Character	3	0.858
	S Writing Technique	3	0.873
	S Latent Meaning	3	0.831
He Lan Han	S Brushwork Style	3	0.897
	S Structural Character	3	0.847
	S Writing Technique	3	0.905
	S Latent Meaning	3	0.896
Sample Size: 407			

Table 6
KMO and Bartlett's test of Chinese young visitors' satisfaction

		KMO	0.819
Bei Hai Wang Yuan Xiang	Bartlett Test	Approx. Chi-Square	2292.011
		df	55
		P value	0.000
	KMO	0.865	
Shi Ping Gong	Bartlett Test	Approx. Chi-Square	2504.094
		df	66
		P value	0.000
	KMO	0.847	
Zheng Chang You	Bartlett Test	Approx. Chi-Square	3111.307
		df	66
		P value	0.000
	KMO	0.858	
Ci Xiang	Bartlett Test	Approx. Chi-Square	2687.560
		df	66
		P value	0.000
	KMO	0.864	
He Lan Han	Bartlett Test	Approx. Chi-Square	3219.458
		df	66
		P value	0.000

In this study, all Cronbach’s alpha values exceeded 0.70, indicating strong internal consistency across all dimensions of the questionnaire.

Regarding construct validity, KMO values between 0.60 and 0.70 are generally considered acceptable for factor analysis (Nkansah, 2018). In this study, all KMO values exceeded 0.60, indicating that the data were suitable for factor analysis and that the questionnaire demonstrated satisfactory validity.

IPA Results

Importance-Performance Analysis (IPA) was employed in this study to evaluate

the relationship between young visitors’ expectations (importance) and satisfaction (performance) regarding the image symbolism attributes of Longmen calligraphy.

According to the IPA framework, attributes are categorised into four quadrants based on their importance and performance values (Saggaf, 2017). Quadrant A (“Concentrate here”) includes attributes with high importance but low performance, indicating priority areas for improvement. Quadrant B (“Keep up the good work”) represents attributes with both high importance and high performance, which should be maintained.

Quadrant C (“Low priority”) includes attributes with low importance and low performance, suggesting limited immediate concern. Quadrant D (“Possible overkill”) refers to attributes with low importance but high performance, where resources may be over-allocated.

As illustrated in Figure 4, the horizontal axis represents the importance of attributes, reflecting young visitors’ expectations, while the vertical axis represents performance, indicating their satisfaction levels. This framework provides a systematic basis for analysing visitor perceptions and identifying key factors influencing engagement with Longmen calligraphy.

This pattern suggests that young visitors tend to prioritise visually striking and easily interpretable symbolic features. From a visual perception perspective, bold and irregular strokes create stronger visual

stimuli, which are more likely to attract attention. Meanwhile, from a cultural perspective, religious and historical elements provide narrative context, enhancing interpretability. This indicates that the effectiveness of calligraphy appreciation is closely related to the accessibility of its symbolic meaning.

Bei Hai Wang Yuan Xiang Statue Inscription

As depicted in Figure 5, the survey findings concerning the Bei Hai Wang Yuan Xiang Statue Inscription reveal several key attributes distributed across the four quadrants.

In the first quadrant, known as the ‘advantage area’, five attributes stand out, including distinct contour shapes, orderly style, strong brushstrokes, religious references, and introductions to the statues.

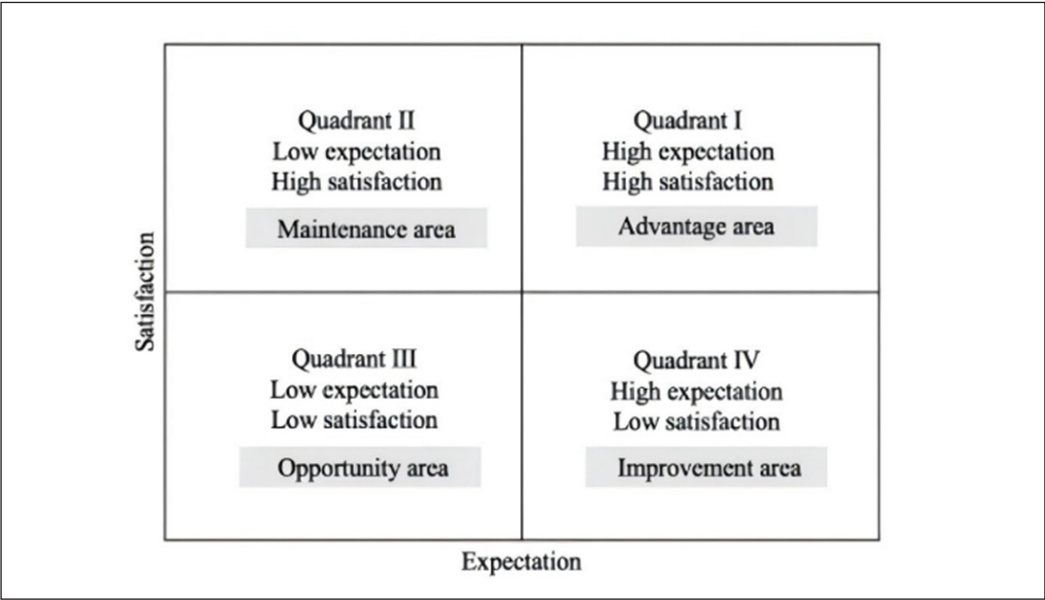


Figure 4. The importance-performance model of expectation and satisfaction

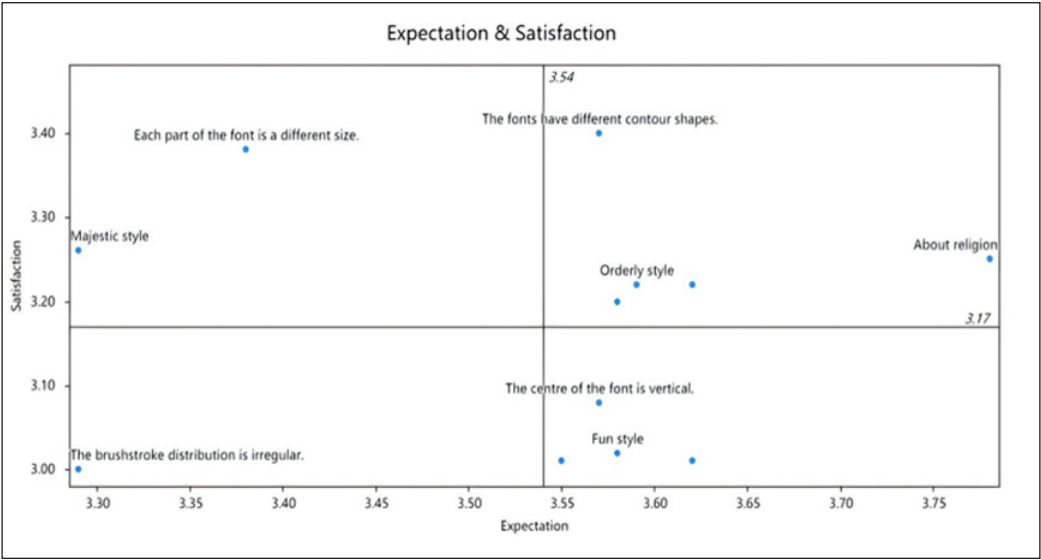


Figure 5. IPA quadrants of Bei Hai Wang Yuan Xiang statue inscription

These attributes demonstrate both high importance and high satisfaction, suggesting that they align well with visitors’ aesthetic expectations. From the perspective of calligraphy image symbolism, strong brushstrokes and clear contour variations provide immediate visual impact, while religious content and narrative introductions offer culturally familiar symbolic cues. This combination of visual salience and cultural accessibility enhances interpretability, making these features more easily appreciated by young visitors.

In the second quadrant, the ‘maintenance area’, two attributes are identified: variation in font size and majestic style. Although these attributes are associated with relatively lower expectations, they achieve high satisfaction levels. This may indicate that such features are perceived as supplementary

aesthetic qualities rather than primary evaluative criteria. The “majestic style,” in particular, reflects a broader stylistic perception that may not be consciously expected but still contributes positively to the overall impression once experienced.

In the third quadrant, labelled the ‘opportunity area’, irregular brushstroke distribution is identified as having both low importance and low satisfaction. This suggests that this feature is not only less noticeable to young visitors but may also be difficult to interpret without prior knowledge of calligraphic aesthetics. From a symbolic perspective, irregularity in stroke distribution often conveys dynamism and expressive freedom in professional calligraphy evaluation; however, for general audiences, such abstract qualities may lack clear symbolic reference, leading to lower engagement.

In the fourth quadrant, known as the ‘improvement area’, four attributes are identified: vertical alignment of the font centre, playful (fun) style, variation in brushstroke forms, and records of historical background and events. These attributes are considered important by visitors but yield lower satisfaction levels, indicating a gap between expectation and perception. This gap may be attributed to the limited interpretive accessibility of these features. For instance, structural characteristics such as vertical alignment require a certain level of formal training to be appreciated, while historical content may not be effectively communicated without adequate contextual interpretation. This suggests that enhancing interpretive support, such as explanatory materials or guided narratives, could improve visitors’ understanding and satisfaction with these aspects.

Overall, the results indicate that young visitors’ engagement with the Bei Hai Wang Yuan Xiang Statue Inscription is strongly influenced by the balance between visual immediacy and cultural interpretability. Features that are both visually prominent and symbolically accessible tend to achieve higher evaluations, while more abstract or knowledge-dependent elements require additional interpretive mediation.

Shi Ping Gong Statue Inscription

Figure 6 illustrates the survey results for the Shi Ping Gong Statue Inscription. The distribution of attributes across the IPA quadrants reveals a pattern largely consistent with the previous work, highlighting the

importance of visual salience and cultural interpretability in shaping visitor perception.

In the first quadrant, or the ‘advantage area’, five attributes are identified: distinct contour shapes, orderly style, strong brushstrokes, religious references, and introductions to the statues. These features demonstrate both high importance and high satisfaction, indicating that they effectively meet visitors’ expectations. From the perspective of calligraphy image symbolism, these attributes combine strong visual expressiveness with clear cultural narratives, making them more accessible to young audiences and easier to interpret.

In the second quadrant, the ‘maintenance areas’, two attributes—variation in font size and majestic styles show relatively lower importance but high satisfaction. This suggests that while these features are not primary determinants of visitor expectations, they still contribute positively to the overall aesthetic experience. The perception of “majestic style” may function as a holistic impression rather than a consciously evaluated feature.

In the third quadrant, irregular brushstroke distribution appears as an ‘opportunity area’s attribute, with both low importance and satisfaction. This indicates that such abstract stylistic features may not be readily perceived or valued by young visitors. Although irregularity can convey dynamism and individuality in professional calligraphy discourse, its symbolic meaning may not be immediately accessible to non-expert audiences.

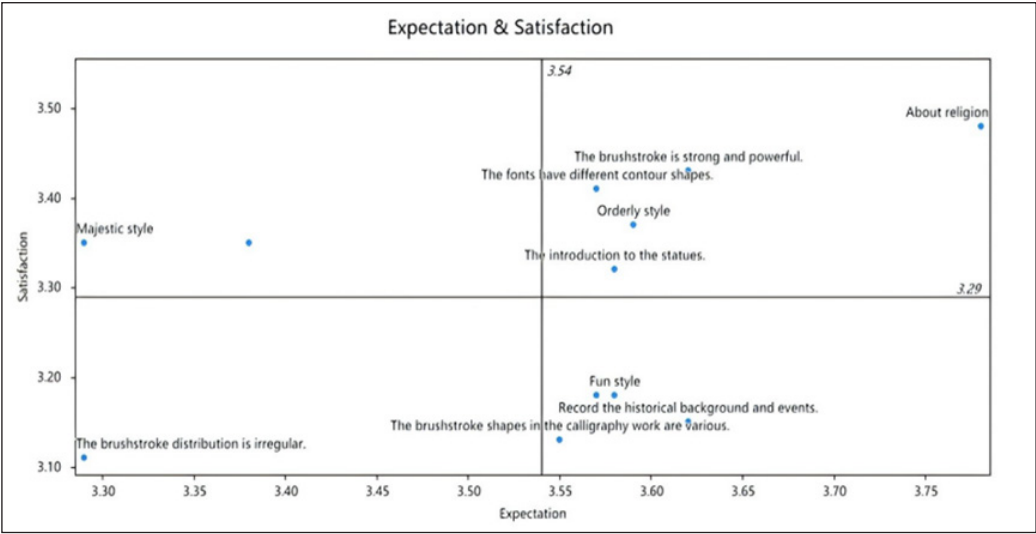


Figure 6. IPA quadrants of Shi Ping Gong statue inscription

In the fourth quadrant, the ‘improvement area’, four attributes are identified: vertical alignment of the font centre, playful style, variation in stroke forms, and historical background records. These attributes are considered important but yield lower satisfaction levels, suggesting a mismatch between expectation and experience. This gap may result from insufficient interpretive support, as structural and historical elements often require contextual knowledge to be fully understood.

Overall, the results suggest that the perception of this inscription is strongly influenced by the immediacy of visual impact and the clarity of symbolic meaning, reinforcing the importance of interpretability in calligraphy appreciation.

Zheng Chang You Statue Inscription

Figure 7 presents the survey results for the Zheng Chang You Statue Inscription.

Compared with other works, this inscription shows a broader distribution of attributes in the ‘advantage area’, indicating a higher overall alignment between visitor expectations and satisfaction.

In the first quadrant, seven attributes are identified, including vertical font alignment, orderly style, strong brushstrokes, religious content, introductions to the statues, historical records, and playful style. The presence of both structural and symbolic attributes in this quadrant suggests that this work achieves a balance between formal composition and cultural meaning. From the perspective of image symbolism, the integration of visually clear structures and culturally meaningful content enhances both perceptual clarity and interpretive accessibility.

In the second quadrant, three attributes—variation in font size, majestic style, and irregular stroke distribution—are in the ‘maintenance area’.

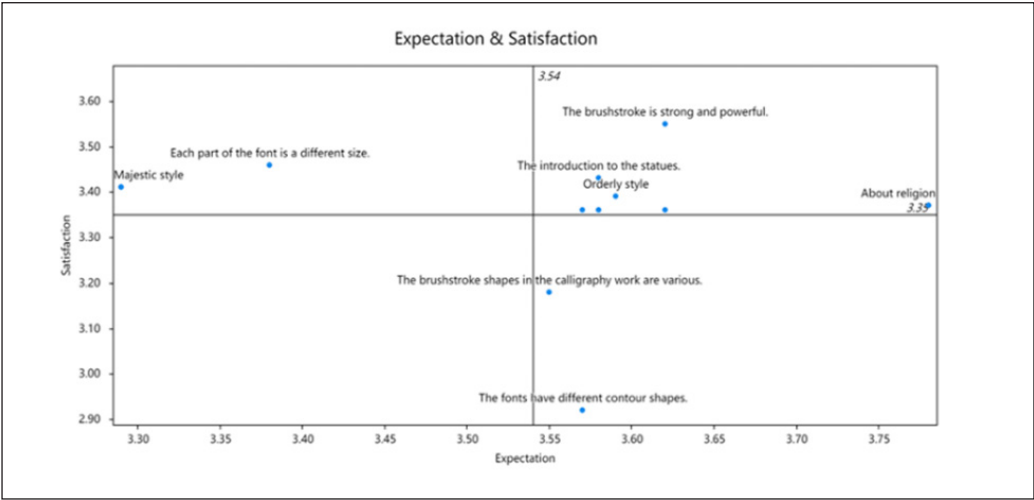


Figure 7. IPA quadrants of Zheng Chang You statue inscription

These features, while not highly prioritised, still achieve high satisfaction, indicating that they contribute to the richness of the visual experience without being central to visitor evaluation.

Notably, no attributes are found in the third quadrant, suggesting that there are no features that are both low in importance and satisfaction. This may indicate that the work is relatively well-balanced and does not contain elements that are entirely overlooked or undervalued by visitors.

In the fourth quadrant, two attributes—distinct contour shapes and variation in stroke forms—are identified as needing improvement. Despite their high importance, satisfaction levels are lower, which may be attributed to the complexity of these visual features. Such elements often require a more refined level of visual literacy to interpret, highlighting a gap between expert-level appreciation and general audience perception.

Overall, this inscription demonstrates a relatively high level of coherence between visual form and symbolic meaning, though certain complex formal features still require enhanced interpretive support to improve visitor engagement.

Ci Xiang Statue Inscription

Figure 8 depicts the survey findings for the Ci Xiang Statue Inscription. The results reveal a distribution pattern that emphasises the importance of both visual distinctiveness and symbolic clarity in shaping visitor responses.

In the first quadrant, six attributes are identified: distinct contour shapes, orderly and playful styles, religious content, vertical stroke forms, and historical records. These attributes achieve both high importance and satisfaction, suggesting that they effectively integrate visual expressiveness with meaningful content. The coexistence

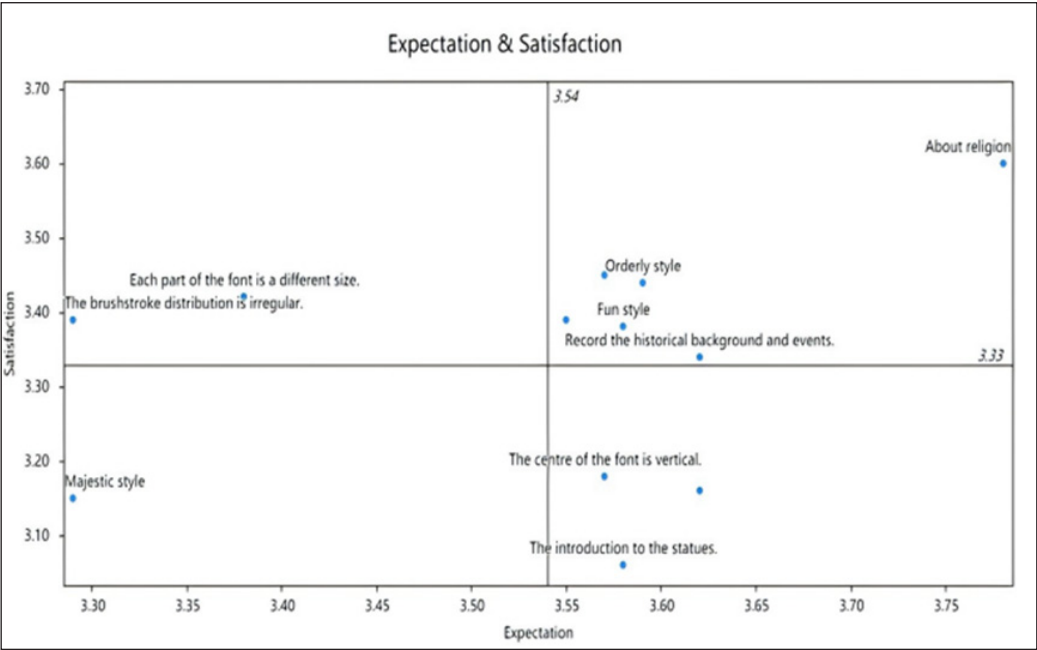


Figure 8. IPA quadrants of Ci Xiang statue inscription

of “orderly” and “fun” styles also indicates a diversity of aesthetic appreciation among young visitors.

In the second quadrant, variation in font size and irregular brushstroke distribution are categorised as ‘maintenance area’ attributes. Their high satisfaction despite lower importance suggests that these features enhance the visual richness of the work, even if they are not consciously prioritised by viewers.

In the third quadrant, majestic style is identified as having low importance and satisfaction. This may indicate that this stylistic quality is less perceptible or less relevant to younger audiences, possibly due to its abstract and holistic nature.

In the fourth quadrant, three attributes—vertical font alignment, strong brushstrokes, and introductions to the statues—are identified as areas for improvement. Although these attributes are considered important, their lower satisfaction suggests that their symbolic meaning may not be effectively communicated. For example, while strong brushstrokes are visually prominent, their deeper aesthetic or expressive significance may not be fully understood without guidance.

Overall, the findings suggest that visitor engagement with this inscription is influenced by both diversity in visual expression and the clarity of symbolic communication, highlighting the need for interpretive strategies that bridge perception and understanding.

He Lan Han Statue Inscription

Figure 9 illustrates the survey results for the He Lan Han Statue Inscription. The distribution of attributes reflects a strong emphasis on expressive and narrative elements in shaping visitor perception.

In the first quadrant, six attributes are identified: vertical stroke forms, playful style, strong brushstrokes, religious content, historical records, and introductions to statues. These attributes demonstrate both high importance and satisfaction, indicating that they effectively combine visual dynamism with accessible symbolic meaning. The presence of both expressive (e.g., strong strokes) and narrative (e.g., historical content) features suggests a well-rounded engagement with visitors.

In the second quadrant, variation in font size, majestic style, and irregular brushstroke distribution are identified as ‘maintenance area’ attributes. These features, while not highly emphasised by visitors, still contribute positively to the overall aesthetic experience.

There are no attributes in the third quadrant, indicating that no features are simultaneously low in importance and satisfaction. This suggests a relatively balanced perception of the work.

In the fourth quadrant, two attributes—vertical font alignment and orderly style—are identified as needing improvement. Despite their perceived importance, lower satisfaction levels suggest that these structural features may not be effectively

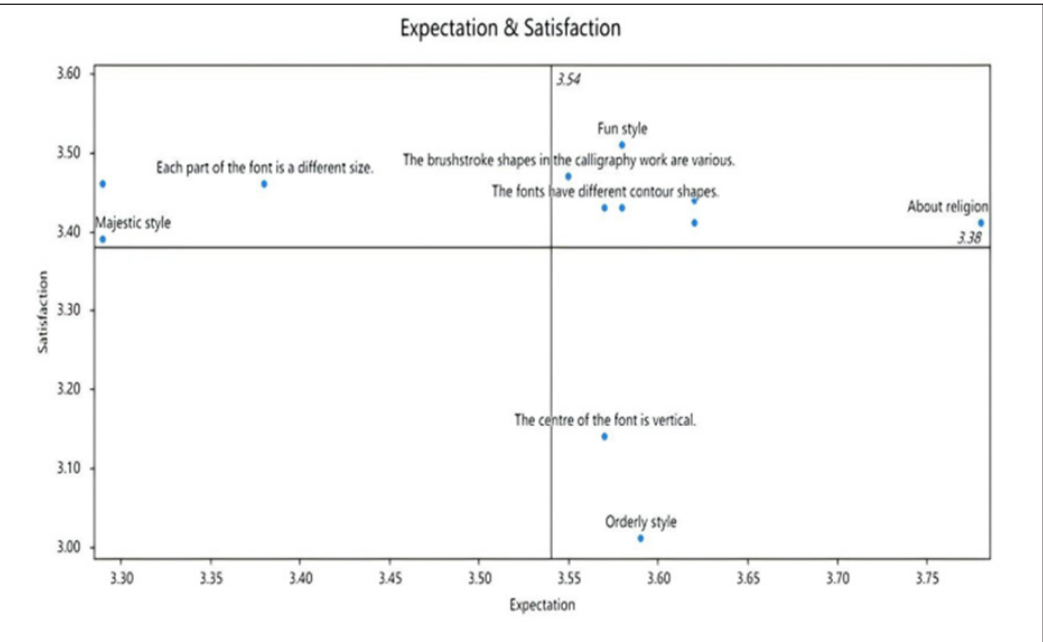


Figure 9. IPA quadrants of He Lan Han statue inscription

perceived or appreciated. This again points to the role of visual literacy, as such formal characteristics often require training to be recognised and valued.

Overall, the results indicate that this inscription successfully engages young visitors through visually expressive and culturally meaningful features, while more subtle structural aspects remain less accessible without interpretive support.

The findings of this study can be further interpreted through symbolic and perceptual theories. According to semiotic theory (Saussure, 1916), visual elements in calligraphy function as carriers of meaning, while their interpretation depends on cultural context. The preference for features such as “strong brushstrokes” and “religious content” suggests that young visitors rely on recognisable symbolic cues. This aligns with Jung’s (1968) concept of collective imagery, where shared cultural symbols shape perception. In contrast, features such as structural balance or stroke distribution require higher levels of aesthetic literacy, which may explain their lower satisfaction scores.

DISCUSSION

This study applied Importance-Performance Analysis (IPA) to examine Chinese young visitors’ expectations and satisfaction regarding the image symbolism of Longmen calligraphy. Drawing on Expectation Disconfirmation Theory (EDT), the findings demonstrate that visitor satisfaction is shaped by the relationship between perceived performance and prior expectations.

The results indicate that certain image symbolism features meet or exceed young visitors’ expectations. Attributes such as variation in font size and irregular brushstroke distribution consistently received higher-than-expected evaluations across multiple calligraphy works, suggesting a strong preference for visually dynamic and expressive forms. In addition, the “majestic style” was positively evaluated in several cases, reflecting young visitors’ appreciation for stylistic qualities associated with cultural authority and aesthetic impact, as shown in Table 7.

These findings suggest that young audiences are more responsive to symbolic features that are visually distinctive and easily interpretable, rather than purely structural or technical elements. From the perspective of calligraphy image symbolism, this highlights the importance of enhancing the visibility and interpretability of symbolic meanings in calligraphy presentation and education.

Overall, this study contributes to the understanding of how image symbolism influences visitor perception in the context of cultural heritage. It also provides a theoretical and practical basis for improving

In addition, several attributes were identified as performing below visitors’ expectations (Table 8). Although these dimensions were rated as highly important (Expectation ≥ 3.5), their corresponding satisfaction scores were significantly lower, indicating a clear negative disconfirmation.

This finding suggests that certain image symbolism features are not effectively

Table 7
The image symbolism features high satisfaction in Longmen's calligraphy works

Artwork	Dimension	Expectation	Satisfaction	Disconfirmation
He Lan Han	The brushstroke distribution is irregular	3.285	3.459	0.174
Zheng Chang You	The brushstroke distribution is irregular	3.285	3.405	0.12
Zheng Chang You	Majestic style	3.287	3.408	0.12
Ci Xiang	The brushstroke distribution is irregular	3.285	3.393	0.108
He Lan Han	Majestic style	3.287	3.393	0.106
Zheng Chang You	Each part of the font is a different size	3.378	3.459	0.081
He Lan Han	Each part of the font is a different size	3.378	3.457	0.079
Shi Ping Gong	Majestic style	3.287	3.349	0.061
Ci Xiang	Each part of the font is a different size	3.378	3.418	0.039
Bei Hai Wang Yuan Xiang	Each part of the font is a different size	3.378	3.378	0

Table 8
The image symbolism features low satisfaction in Longmen's calligraphy works

Artwork	Dimension	Expectation	Satisfaction	Disconfirmation
Zheng Chang You	The fonts have different contour shapes	3.57	2.92	-0.65
Bei Hai Wang Yuan Xiang	Record the historical background and events	3.62	3.01	-0.61
He Lan Han	Orderly style	3.59	3.01	-0.58
Bei Hai Wang Yuan Xiang	Fun style	3.58	3.02	-0.56
Bei Hai Wang Yuan Xiang	The brushstroke shapes in the calligraphy work are various	3.55	3.01	-0.54
Bei Hai Wang Yuan Xiang	About religion	3.78	3.25	-0.53
Ci Xiang	The introduction to the statues	3.58	3.06	-0.52
Bei Hai Wang Yuan Xiang	The center of the font is vertical	3.57	3.08	-0.49
Shi Ping Gong	Record the historical background and events	3.62	3.15	-0.47
Ci Xiang	The brushstroke is strong and powerful	3.62	3.16	-0.46

understood or appreciated by young visitors. It highlights the need to further examine the extent to which these symbolic elements are cognitively accessible and culturally interpretable to this audience. Future research should explore the underlying factors contributing to this gap, such as insufficient interpretive guidance, abstract visual representation, or limited prior knowledge.

Across the five calligraphy works, several consistent patterns can be observed. First, attributes related to brushwork strength and religious content frequently appear in the high-importance and high-satisfaction quadrant, suggesting that these features are central to young visitors' perception of calligraphy. These elements are visually salient and culturally accessible, making them easier to interpret.

Second, structural characteristics such as font alignment, proportional variation, and stroke distribution tend to receive lower satisfaction scores despite relatively high expectations. This may indicate that such features are less immediately perceptible and require prior knowledge or training in calligraphy aesthetics.

Third, stylistic attributes such as “majestic” and “orderly” show mixed results, reflecting differences in individual aesthetic preferences and interpretive ability. From the perspective of calligraphy image symbolism, this suggests that symbolic meaning is not uniformly perceived but mediated by cultural familiarity and visual literacy.

Overall, the findings indicate that young visitors' engagement with calligraphy is strongly influenced by the accessibility of symbolic elements, highlighting the importance of interpretive support in heritage presentation and calligraphy education.

CONCLUSION

This study set out to explore the expectations and satisfaction of young Chinese visitors regarding the image symbolism of Longmen calligraphy works using Importance-Performance Analysis (IPA). The findings reveal several consistent patterns that provide deeper insights into how young audiences perceive and engage with calligraphy as a form of visual culture.

First, the results indicate that young visitors tend to prioritise visually salient and symbolically accessible features. Attributes such as strong brushstrokes, distinct contour shapes, and religious or narrative content consistently appear in the high-importance and high-satisfaction quadrant across multiple works. From a visual perception perspective, these features generate stronger visual stimuli and are more likely to attract attention. From a symbolic perspective, they are associated with culturally familiar meanings, making them easier to interpret. This suggests that the effectiveness of calligraphy appreciation is closely related to the immediacy and clarity of its symbolic expression.

Second, structural characteristics—such as font alignment, proportional variation, and stroke distribution—tend to

receive lower satisfaction despite relatively high expectations. This pattern reflects a gap between perceived importance and experience. One possible explanation is that such features require a higher level of calligraphic literacy to be fully understood. While these elements are essential in professional evaluation, their symbolic meanings are often implicit and less accessible to general audiences. This finding highlights a key challenge in calligraphy appreciation: the disconnect between expert-oriented formal aesthetics and public perception.

Third, stylistic attributes such as “majestic” and “orderly” exhibit more varied distributions across the IPA quadrants, suggesting differences in individual aesthetic preferences and interpretive abilities. These qualities are often holistic and abstract, making them more difficult to define and recognise without prior experience. This variability indicates that symbolic meaning in calligraphy is not uniformly perceived but is mediated by viewers’ cultural background, aesthetic sensitivity, and familiarity with the art form.

These findings can be further understood through a semiotic perspective, in which calligraphy operates as a system of signs. Visual elements function as signifiers, while their meanings are constructed through culturally mediated interpretation. The preference for visually explicit and narratively rich features suggests that young visitors rely more on immediately recognisable symbols rather than abstract formal relationships. This aligns with

theories of visual perception and symbolic interpretation, which emphasise that meaning-making is an active process shaped by prior knowledge and cultural context.

Furthermore, the results support the view from visual culture and heritage studies that audiences are not passive receivers of information but active interpreters of meaning. The varying levels of satisfaction across different attributes indicate that engagement with calligraphy depends not only on the intrinsic qualities of the works but also on the accessibility of their symbolic meanings. When symbolic cues are clear and culturally familiar, visitor engagement is enhanced; when they are abstract or require specialised knowledge, engagement tends to decline.

Overall, this study demonstrates that the appreciation of calligraphy among young visitors is shaped by a dynamic interaction between visual perception, cultural symbolism, and interpretive accessibility. The findings highlight the importance of bridging the gap between formal artistic features and audience understanding, suggesting that both heritage presentation and calligraphy education should place greater emphasis on making symbolic meanings more accessible and interpretable.

Authors’ Contribution

This study makes three main contributions. First, it introduces the concept of calligraphy image symbolism into visitor perception research, providing a new theoretical perspective for understanding calligraphy appreciation. Second, it applies Importance-

Performance Analysis (IPA) to the field of calligraphy and cultural heritage, extending its application beyond traditional service evaluation. Third, the study offers practical insights for calligraphy education and heritage interpretation, particularly in engaging younger audiences.

Implications of the Study

The findings of this study have important implications for both heritage management and calligraphy education.

For heritage management, the results suggest that young visitors are more responsive to visually salient and symbolically accessible features, such as strong brushstrokes and religious or narrative content. Therefore, heritage sites such as the Longmen Grottoes should enhance interpretive strategies that make symbolic meanings more explicit. This may include the use of explanatory panels, digital guides, or interactive media that translate abstract calligraphic features into understandable visual and cultural narratives. By improving the interpretability of calligraphy works, heritage managers can increase visitor engagement and deepen cultural appreciation.

For calligraphy education, the findings highlight a gap between technical knowledge and aesthetic perception among young learners. While traditional teaching often emphasises stroke techniques and structural accuracy, the results of this study indicate that learners are more engaged with visually expressive and symbolically meaningful

elements. Therefore, incorporating visual-symbolic interpretation into teaching practices—such as explaining the cultural meanings behind brushwork styles or encouraging imaginative interpretation—can help bridge the gap between skill acquisition and aesthetic understanding.

More broadly, this study suggests that the effectiveness of calligraphy appreciation depends not only on the intrinsic qualities of the artwork but also on the accessibility of its symbolic meaning. Enhancing interpretive support, both in educational and heritage contexts, is therefore essential for fostering deeper engagement with calligraphy among younger audiences.

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REFERENCES

- Arnheim, R. (1974). *Art and visual perception: A psychology of the creative eye*. University of California Press.
- Bacon, D. R. (2003). A comparison of approaches to importance–performance analysis. *International Journal of Market Research*, 45(1), 55-71. <https://doi.org/10.1177/147078530304500101>
- Feng, M., Mangan, J., Wong, C., Xu, M., & Lalwani, C. (2014). Investigating the different approaches

- to importance–performance analysis. *Service Industries Journal*, 34(12), 1021–1041. <https://doi.org/10.1080/02642069.2014.915949>
- Ford, J., Joseph, M., & Joseph, B. (1999). Importance–performance analysis as a strategic tool for service marketers: The case of service quality perceptions of business students in New Zealand and USA. *Journal of Services Marketing*, 13(2), 171–186. <https://doi.org/10.1108/08876049910261111>
- Frey, J. H. (1994). Questionnaire design, interviewing and attitude measurement. *Evaluation and Program Planning*, 17(1), 49–50. [https://doi.org/10.1016/0149-7189\(94\)90021-3](https://doi.org/10.1016/0149-7189(94)90021-3)
- Hung, K.-H. (2024). Self-cultivation through art: Chinese calligraphy and the body. *Studies in Art Education*, 65(2), 140–152. <https://doi.org/10.1080/00131857.2021.1977624>
- Jia, B. (2023). Appeal for aesthetics education among teenagers. *Frontiers in Art Research*, 5(15), 115–118. <https://doi.org/10.25236/FAR.2023.051519>
- Jung, C. G. (1968). *The archetypes and the collective unconscious* (2nd ed.). Princeton University Press.
- Lai, L. S. L., & To, W. M. (2010). Importance–performance analysis for public management decision making: An empirical study of China’s Macao Special Administrative Region. *Management Decision*, 48(2), 277–295. <https://doi.org/10.1108/00251741011022626>
- Matzler, K., Sauerwein, E., & Heischmidt, K. A. (2003). Importance–performance analysis revisited: The role of the factor structure of customer satisfaction. *Service Industries Journal*, 23(2), 112–129. <https://doi.org/10.1080/0264206032000041233>
- Murphy, L. (2023). The questionnaire surveying research method: Pros, cons, and main aspects. *ScienceOpen Preprints*. <https://doi.org/10.14293/S2199-1006.1.SOR-PP3WYS8.v1>
- Niu, Y. C. (2010). Thinking about the development of new products in Longmen Scenic Area [Dui Longmen Fengjing Qu Xin Chanpin Kaifa De Sikao]. *Urban Economy in China*.
- Nkansah, B. K. (2018). On the Kaiser–Meyer–Olkin’s measure of sampling adequacy. *Mathematical Theory and Modeling*, 8(7), 52–76. <https://iiste.org/Journals/index.php/MTM/article/view/44386>
- Oliver, P. (2015). *Sociology: A complete introduction: Teach Yourself*. Teach Yourself.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Sage Publications.
- Peirce, C. S. (1931–1958). *Collected papers of Charles Sanders Peirce* (Vols. 1–8).
- Saggaf, M. S., Salam, R., Darwis, M., & Jamaluddin, M. (2017, September). Examining academic service using importance–performance analysis (IPA). In *Proceedings of the 2nd International Conference on Education, Science, and Technology (ICEST 2017)* (pp. 139–141). Atlantis Press. <https://doi.org/10.2991/icest-17.2017.33>
- Saussure, F. de. (1916). *Course in general linguistics*. McGraw-Hill.
- Smith, L. (2006). *Uses of heritage*. Routledge.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach’s alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Thomas, F. B. (2022). The role of purposive sampling technique as a tool for informal choices in social sciences research methods. *Just Agriculture*, 2(5), 1–8. <https://doi.org/10.5281/zenodo.7036977>
- Urry, J. (2002). *The tourist gaze* (2nd ed.). Sage Publications.
- Vaziri, R. (2012). A questionnaire-based data quality methodology. *International Journal of Database Management Systems*, 4(2), 55–68. <https://doi.org/10.5121/ijdms.2012.4204>

- Xu, L. L. (2022). From cultural heritage to image symbolism: The Weibei calligraphy in the inscriptions of Longmen's twenty statues. *Educational Administration: Theory and Practice*, 30(5), 531-540. <https://doi.org/10.53555/kuey.v30i5.2892>
- Xu, S. Q. (2023). Shixian Lishu dao Weibei ti de yanbian guocheng. *China National Expo*, 2, 103-105. <https://doi.org/10.5281/zenodo.7036977>
- Xu, Y., & Shen, R. (2022). Aesthetic evaluation of Chinese calligraphy: A cross-cultural comparative study. *Current Psychology*, 42(2), 23096-23109. <https://doi.org/10.1007/s12144-022-03390-7>
- Xu, Y., & Shen, R. (2023). Aesthetic evaluation of Chinese calligraphy: A cross-cultural comparative study. *Current Psychology*, 42(7), 23096-23109. <https://doi.org/10.1007/s12144-022-03390-7>
- Zhang, D. (2025). Space, patronage, and ritual art: Steles in the Guyang Cave (late 5th–early 6th century). *Religions*, 16(6), Article 779. <https://doi.org/10.3390/rel16060779>
- Zhao, X. (2024). Calligraphic iconology on literature: The image relationship between language art and writing art. *Journal of Cultural Interaction in East Asia*, 15(1), 55-70. <https://doi.org/10.1515/jciea-2024-0004>
- Zhu, W. L. (2018). Analysis of the advantages of using Chinese characters in graphic design [Hanzi zai pingmian sheji zhongde yunyong youshi fenxi]. *Science and Education Guide (Second Half)*, 21, 160-161. <https://doi.org/10.16400/j.cnki.kjdkx.2018.07.077>

Eco-innovation through Strategic Integration: A Capability-based Approach to Green Transformation in SMEs

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ABSTRACT

The study examines the relationship between green orientation, big data analytics capability, and green absorptive capacity in enhancing sustainable innovation, with green management practices serving as a mediating variable in response to the increasing demand for sustainable innovation. This study bridges an existing knowledge gap by providing insights into the interplay between internal strategic and technological capabilities that drive eco-innovation in SMEs from the perspectives of the Dynamic Capability View, Natural Resource-Based View, and Practice-Based View. A positivist, hypothetical-deductive approach was adopted, and data were collected from 340 employees of manufacturing SMEs in Bangladesh using stratified random sampling. Data were analysed using SPSS v26 and SmartPLS 4.0. These results provide empirical evidence that green orientation and big data analytics capability can significantly facilitate the development of green innovation, while green absorptive capacity influences green innovation indirectly through the promotion of

green management practices. The mediating role of green management practices indicates that they play an important role in translating strategic orientation into innovation outcomes. The study provides important implications for investors and policymakers by highlighting the need to invest and develop sustainability-oriented information-based competencies and management systems within SMEs. These constructs have been integrated and lean into an integrated framework that is distinctive in

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that it captures the interactive effects and strategic relevance of internal capabilities in achieving sustainable competitiveness.

Keywords: Big data analytics, green absorptive capacity, green innovation, green management practices, green orientation, sustainable development goals (SDGS)

INTRODUCTION

In recent years, green innovation has become a significant component of enterprises' global strategic agendas, particularly in developing economies (Al-Swidi et al., 2024; Al-Husain et al., 2025; Arslan et al., 2022; Begum et al., 2023). Environmental shifts caused by growing challenges, increasing regulatory pressure, and the international discourse on sustainable growth, including the United Nations' Sustainable Development Goals (SDGs), have influenced new trends in business practices (Chau et al., 2024). Specifically, Industry, Innovation and Infrastructure (SDG 9), Responsible Consumption and Production (SDG 12) and Climate Action (SDG 13) have become key reference frameworks guiding businesses toward environmentally friendly practices aimed at fostering sustainability (Bresciani et al., 2023; Chen et al., 2025). Moreover, the path to green innovation is challenging, particularly for SMEs in developing countries, as they often operate under conditions of resource scarcity, limited technological endowments, and institutional deficiencies (Wang et al., 2023; Ma et al., 2025a). These firms are also constrained by inadequate management skills, limited access to green technologies and insufficient knowledge on how to effectively implement

green strategies (Bresciani et al., 2023; Dhaigude & Kamath, 2025).

Furthermore, by concentrating on manufacturing SMEs in Bangladesh, this study joins the burgeoning literature on eco-innovation (Al-Husain et al., 2025; Alhumud & Elshaer, 2024; Jell-Ojobor & Raha, 2022). At the same time, however, Bangladeshi SMEs are like no other in their struggle from resource scarcity, incomplete legal regulations, lack of technological infrastructure and ad hoc management practices. It is these conditions that set the stage for the translation of each firm's strategic orientation, digital technologies and external green knowledge into actual innovation results (Khan et al., 2024). An examination of this context provides for a finer grasp on how internal capabilities in the form of green entrepreneurial orientation, big data analytics capability and green absorptive capacity must come through green management practices before they can yield any worthwhile green innovation. By locating the discussion within Bangladeshi manufacturing SMEs, this study moves past eco-innovation and sustainability literature that is limited to developed economies and endeavours to provide insight that is sensitive to the context in which capabilities must be deployed under institutional and resource constraints (Dhaigude & Kamath, 2025; Dong et al., 2024).

This study highlights the synergy between strategic capabilities comprising of entrepreneurial orientation, data analytics, and absorptive capacity has been created in a complementary way to facilitate green transformation among eco-innovation in SMEs (Ma et al., 2025b; Wamba et al., 2017). The strategic capabilities are synergistic and lead to greater eco-innovation by creating complementary effects that enhance their respective contributions. Green Entrepreneurship Orientation (GEO) offers strategic intents, BDAC offers information-based perspectives for making informed decisions regarding green, and the GAC facilitates the assimilation and implementation of external environmental knowledge (Khan et al., 2024; Zhang et al., 2025). These capabilities together can make an integrated system where the entrepreneurial vision is the driving force in data analytics and absorption of knowledge, leading to more productive green practices and innovation results. This complementarity is consistent with the Dynamic Capability View that focusses on the orchestration of capabilities, and the Practice-Based View, which describes how such synergy is converted into routinised actions that bring about sustainable change (Dhaigude & Kamath, 2025; Haile, 2025).

The contribution of this study is the two-pronged utilisation the DCV and NRBV to demonstrate how SMEs can employ internal strategic capabilities and technological skills to induce eco-innovation. While previous studies have discussed individual capacities, we broaden the discussion

to their facilitating complementarities and to mediating mechanisms for GM practices. The basis of this theory is also relevant in a developing country setting (Bangladesh), given that SMEs are facing unique challenges and opportunities for green innovation. Such a marrying of theories provides a solid foundation that contributes to the body of knowledge and offers practical action points for fostering sustainability within SMEs. The study questions below are being investigated to achieve these objectives:

- RQ1 : What is the impact of internal strategic orientations and capabilities on green innovation in SMEs?
- RQ2 : What is the role of Green Management Practices as a mediator between internal capabilities and green-innovation outcomes?
- RQ3 : Which internal systems enable long-term innovation in SMEs?

LITERATURE REVIEW

Theoretical Foundations

The study combines the Dynamic Capability View, Natural Resource-Based View and Practices Based View to understand SME eco-innovation through strategy, resources and practice (Khan et al., 2024; Zhang et al., 2025). DCV stresses organisational flexibility, NRBV emphasises resource-based stability, and PBV is oriented towards routinised green routines (Khan et al., 2024; Yu et al., 2025; Zhang et al., 2025).

Combined, they offer a comprehensive approach of capability building, resource allocation, and implementation. The model considers contextual impediments in Bangladeshi SMEs, namely resource scarcity, regulatory uncertainty and knowledge gaps influencing green transformation (Ma et al., 2021; Makhoulfi et al., 2022a; Roshid et al., 2025). Synthesising these perspectives, then strategic readiness and green management practices are used to enhance eco-innovation under constraints so that SMEs may be prepared for either environmental pressure or have the possibility of sustainable operations (Siddiqi et al., 2025; Yu et al., 2025).

Altogether, the integrated framework suggests that ecological innovation in SMEs occurs only when there is strategic alignment between corporate strategy (GEO), technological intelligence (BDAC), and learning capability (GAC), the three of which materialise through Green Management Practices (GMPs) (Khan et al., 2024; Yu et al., 2025). GEO supplies a strategic view and environmental commitment, BDAC provides insights into what is happening in the environment from a data perspective, while GAC integrates outside knowledge with the added benefit of teamwork (Tuan, 2023). These capabilities can be translated through GMPs to become the actions of routine organisational practice. This interaction draws inspiration from dynamic capability view logic, natural resource-based view ideas and practice-based view's emphasis on process integration, all suggesting that

eco-innovations come about not just by one capability at a time (good company), but after many different efforts are coordinated (Tuan, 2023; Yu et al., 2025).

Integration of Theoretical Frameworks

Big data analytics capability (BDAC) and green absorptive capacity (GAC) represent two analytically distinguishable, however, mutually supportive combinations (Al-Swidi et al., 2024; Yin et al., 2022). A firm's capability means BDAC and GAC are independent of each other. It means a company can have one without the other (Begum et al., 2023; Yu et al., 2025). At the same time, companies that possess both capabilities will be much better situated to respond effectively under stress and environmental crisis (Soomro et al., 2024). In the aggregation of such data, which is ultimately technological skill independent, BDAC refers to a firm's ability to gather environmental and operational data on a massive scale (Karim et al., 2024). In turn, this information is processed in real-time to provide evidence-based for green decision making (Begum et al., 2023; Rashid et al., 2025). On the other hand, GAC reflects a firm's capacity for learning. In terms of information with respect to green (alternative from industry trade associations, suppliers or governments) absorbed from the external environment, although data has been processed to produce an analytical answer (as is the case for BDAC), and although knowledge drives insights (an emphasis in GAC) (Begum et al., 2023; Yu et al., 2025).

Conceptually, BDAC allows a firm to find ways to raise eco-efficient performance based on available data. But practically, there is no way that the organisation will be able to institutionalise such lessons without a well-developed GAC. These capabilities should be kept apart conceptually so as not to affect the clarity with which environmentally oriented business innovation research is put forward in an explanatory fashion (Riaz et al., 2024; Song & Yu, 2018).

Green Entrepreneurship Orientation on Green Management Practices and Green Innovation

The proactive strategic posture displayed by SMEs regarding the combination of environmental sustainability into entrepreneurial behaviour, such as opportunity identification, risk bearing, innovation and resource marshalling, is known as green entrepreneurship orientation (GEO) (Al-Swidi et al., 2024; Makhloufi et al., 2022; Tuan, 2023). GEO focusses on the aggressive integration of environmental goals into the firm's strategy and operations, resulting in a pledge for green business solutions and breakthroughs (Makhloufi et al., 2022, Momayez et al., 2023). The interaction between GEO and GMPs can be examined from the perspectives of DCV (Dynamic Capability View) and NRBV (Natural Resource-Based View). In the lens of DCV, HGEO enables organisations to adjust their processes and resources for environmental performance, hyper-geographically efficiently by minimising the frictions for capturing as well as

implementing green innovation (Makhloufi et al., 2022). This relationship is also reinforced in the NRBV by arguing that firms with high environmental commitments (like GEO) may achieve a persistent competitive advantage by organising resources and capabilities to develop eco-innovations (Yu et al., 2025).

When employees are active advocates of green chances, they enable the SMEs to begin structural action and obtain small successes like test projects regarding waste reduction or energy dispensation that could be up-scaled and regularised into general GMPs (Yin et al., 2022; Soomro et al., 2024). The Bottom-up GEO activation is a key enabler in the GMP and, thereby, also for Green Innovations (GI). When employees assimilate and apply GEO in their daily operations, they generate a culture of constant improvement and are on the path to introduce more sustainable ways of conducting business and new forms of eco-products or processes (Makhloufi et al., 2022). Several studies have also studied the positive association between GEO and green innovation (Yu et al., 2025; Zhang et al., 2024). High GEO firms are likely to embed GMPs and innovations that would lead to the adoption of cleaner technologies, eco-designs or circular practices (Makhloufi et al., 2022; Mondal et al., 2024; Tuan, 2023; Yin et al., 2022). The empirical findings provide evidence of the impact path from GEO to GMPs and green innovation through diverse SME environments (Song & Yu, 2018; Yu et al., 2025; Zhang et al., 2020). Thus, it was hypothesised:

- H1 : Green entrepreneurship orientation has a positive and significant impact on green innovation.
- H2 : Green entrepreneurship orientation has a direct and positive effect on green management practices.

Big Data Analytics Capability, Green Management Practices, and Green Innovation

Big data analytics capability (BDAC) reflects the potential of a firm to gather, piece together and yield useful information from large, varied and dynamic amounts of data (Alkhatib, 2024; Mishra et al., 2021; Rashid et al., 2025). It includes technology tools, architecture, people (data scientists and analysts) and organisational routines (data governance and decision protocols) that can facilitate quick decisions and quick changes (Karim et al., 2024; Watto et al., 2025). BDAC can help GMPs (Green Management Practices) by improving observability and enabling better decision-making support, as well as accelerating experimentation (Anin et al., 2024; Waqas & Tan 2023; Watto et al., 2025).

The theoretical underpinning for this linkage is based on the dynamic capabilities view (DCV) that organisations need to reconfigure their resources to keep pace with changes in their environment (Al-Swidi et al., 2024; Nguyen et al., 2025). BDAC and Green Absorptive Capacity are dynamic capabilities that enable SMEs to utilise insights from data to innovate towards sustainability. The natural resource-based view (NRBV)

also indicates that environmental resources and capacities are essential for sustainable competitive advantage (Çelik et al., 2025). These theories suggest that BDAC, GMPs, and GI are closely related, and the study results are consistent with the (SDGs), especially SDG 9 (Industry, Innovation and Infrastructure) and SDG 12 (Responsible Consumption and Production) by encouraging innovative sustainability both sustainable innovation from an environmental perspective as well as green practices (Siddiqi et al., 2025; Yu et al., 2025). Thus, it was hypothesised that:

- H3 : Big Data Analytics Capability has a positive and significant effect on Green Innovation.
- H4 : Big Data Analytics Capability has a positive and significant effect on Green Entrepreneurship Orientation.

Green Absorptive Capacity, Green Management Practices, and Green Innovation

Green absorptive capacity (GAC) represents a firm's capability to identify, internalise and utilise extrinsic environmental knowledge for ecological and commercial gains (Ahmad et al., 2022; Qu et al., 2022; Shehzad et al., 2024a; Siddiqi et al., 2025). While GAC expands the original absorptive capacity framework (Akhtar et al., 2024; Siddiqi et al., 2025; Yu et al., 2025), it emphasises cognitive or eco-sustainability-related information of cleaner production technologies, compliance with regulations, shared design for capacity,

and best practices among suppliers (Cheng et al., 2024; Makhoulfi, 2024; Nguyen et al., 2025; Riaz et al., 2024). These micro foundations enable firms to put in place Green Management Practices (GMPs) like environmental audits, eco- design initiatives and sustainable purchasing practices that further resource efficiency as a couple of aqueducts for Green Innovation (Baquero, 2024; Begum et al., 2023; Nguyen et al., 2025).

GAC promotes GMPs and Green Innovation (GI) by bringing environmental concerns into the clear and active (Çelik et al., 2025; Kim et al., 2025). The first is awareness of, and exposure to, environmental knowledge, which enables employees to perceive and address environmentally challenges such as energy wasted (sedans) or waste streams, thus realising opportunities for improvement (Čelik et al., 2025; Kim et al., 2025; Zhang et al., 2024). Second, it allows the firm to convert this knowledge into codified processes and performance metrics that will serve in shaping routines which generate adaptive behaviours throughout the organisation (Makhoulfi, 2024). Third, the current application of this knowledge in product development cycles mitigates uncertainty and enhances learning, supporting both progressive innovation (energy efficiency) and radical innovation (eco-design and recyclable products) (Čelik et al., 2025; Kim et al., 2025). Empirical evidence supports GAC in terms of the adoption of environmental management practices and eco-innovation outcomes (Kim et al., 2025; Wang et al.,

2024). In resource-scarce settings such as Bangladeshi manufacturing SMEs, GAC can be used by these firms to leverage external knowledge from suppliers, NGOs and regulatory organisations to develop low-cost and context-specific green innovations that elevate the environmental performance of firms, which will also result in enhanced competitiveness (Lee et al., 2024; Siddiqi et al., 2025; Yu et al., 2025). Thus, it was hypothesised that:

- H5 : Green Absorptive Capacity has a positive and significant effect on Green Innovation.
- H6 : Green Absorptive Capacity has a positive and significant effect on Green Entrepreneurship Orientation.

The Mediating Role of Green Management Practices

Green management practices are a mediator since these strategic capabilities, like GEO, BDAC, and GAC, do not directly transform into eco-innovation unless structured practices are operationalised (Bidmeshk et al., 2025; Bresciani et al., 2023). Using the Practice-Based View, capabilities reflect the potential, whereas GMPs reflect the routines and processes that transform the potential into actual environmental effects (Kim et al., 2025; Shehzad et al., 2024b; Zaid & Sleimi, 2023). The logic of the Dynamic Capability View can be supported with the fact that the capabilities should be implemented in the form of organisational processes to generate value.

Equally, the Natural Resource-Based View proposes that resource-based benefits can only become actualised when they are embedded in a practice that diminishes the impact of the environment. As such, GMPs are the channel via which strategic capabilities determine eco-innovation such that there is an alignment between purpose, capability, and action (Karim et al., 2024; Karmaker et al., 2023; Kim et al., 2025; Yusof et al., 2024).

The mediating role of GMPs has reinforced the association between the antecedents and GI. High GEO firms are likely to take a proactive attitude toward environmental responsibility (Barón Dorado et al., 2022; Kim et al., 2025). But unless GMPs are on the books, this entrepreneurial energy may lack a clear direction and become merely idealistic. GMPs serve as the requisite architecture for converting entrepreneurial motives to replicable routines overlaying sustainable product and process innovations (Barón Dorado et al., 2022; Karim et al., 2024). Similarly, BDAC facilitates the creation of useful environmental knowledge, but GMPs provide the necessary management structure to ensure that this knowledge is pursued in a consistent manner over time (Aref, 2024). For instance, energy waste identification with BDAC ought to be inculcated into GMPs through energy audits or process monitoring systems to enhance GI (Arslan et al., 2022). Further, GAC, which specifically attends to absorbing and converting external environmental knowledge, needs GMPs to allow this knowledge to permeate formal

practices and convert it into repeatable routines that enable eco-innovation (Siddiqi et al., 2025).

Recent studies have stressed the critical role of digital technology capabilities, absorptive capacity and renewable orientation for eco-innovation (Al-Swidi et al., 2024; Kim et al., 2025; Makhoulfi, 2024). But, overall, they look only at these capability combinations in isolation or simply consider the direct effects each has on environmental innovation. Building on the previous literature of eco-innovation, we show in this paper that green management practices serve as a crucial mediating factor, especially in a resource-stressed SME (Bidmeshk et al., 2025; Karim et al., 2024). This result suggests that, even though BDAC or GEO interprets both direct and alternative outcomes, GAC will only genetically green business innovation practice under other conditions (Yusof et al., 2024). Now that we have shown why those firms which understand their own knowledge resources better should nevertheless still benefit from formalising routines, we will have a bit more idea of how, in a filled cattle-market, internal capabilities can finally transform themselves into innovations that are durable and beneficial to society (Siddiqi et al., 2025). This finding offers a more detailed understanding of when internal capabilities translate into effective sustainable innovation, especially in developing countries where organisational structures are still being formed (Bidmeshk et al., 2025; Karim et al., 2024). Thus, it was hypothesised that:

- H7 : Green Management Practices have a positive and significant effect on Green Innovation.
- H8 : Green Management Practices mediates the relationship between Green Entrepreneurship Orientation and Green Innovation.
- H9 : Big Data Analytics Capability mediates the relationship between Green Entrepreneurship Orientation and Green Innovation.
- H10 : Green Absorptive Capacity mediates the relationship between Green Entrepreneurship Orientation and Green Innovation.

Figure 1 illustrates the conceptual framework of the study, showing that Green Entrepreneurship Orientation, Big Data Analytics Capability, and Green Absorptive Capacity directly influence Green Management Practices and Green Innovation. Additionally, Green Management Practices act as a mediating mechanism that further drives Green Innovation.

METHODOLOGY

Data Collection Process and Sampling Procedure

The study was based on a positivist hypothetical-deductive method as applied by others in the strategic management and innovation research field. This study was a quantitative study, and a structured questionnaire was used to collect the data. A random sampling procedure was used to obtain an adequate number of manufacturing SMEs in Dhaka city and adjacent industrial areas. A stratified random sampling was used to collect the data. There was the use of a stratified random sampling method to facilitate representativeness. The stratification was based on the size of the firms (small vs. medium) and the type of industry, which reflected differences in the level of technology usage and the practice of green innovations. The firms have been randomly selected within every stratum based on manufacturing SMEs in Dhaka and the surrounding industrial zones.

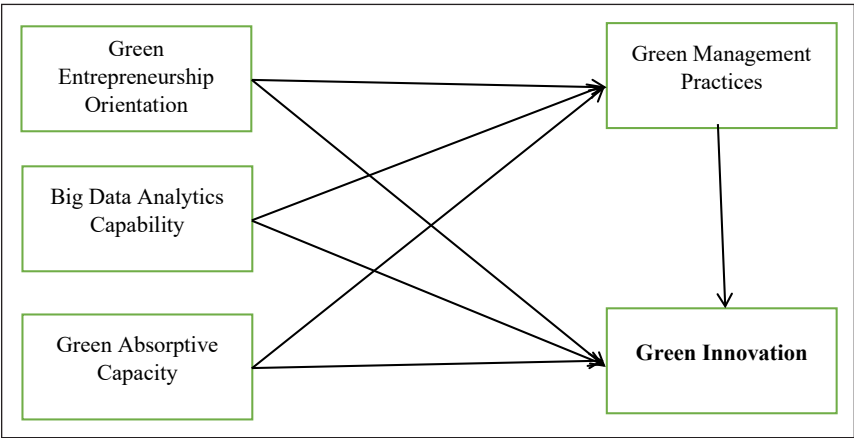


Figure 1. The conceptual framework of the study

The unit of analysis was employees since they are the ones who must implement green practices and activities in innovation.

The items on the measure were generated with reference to earlier validated measurement scales and adjusted to suit the context of this study. All constructs were measured using 5-point Likert-type scales (1 = strongly disagree to 5 = strongly agree), for consistency and ease of comparison. A pilot evaluation (30 responses) was performed among a sample of SME employees to evaluate the clarity, reliability and context appropriateness of the items before the main survey. Minor guided changes in wording and arrangement of items were informed by feedback from the pilot study.

The questionnaire was administered in hardcopy and online to personnel at SMEs, providing access to a broader audience. To promote participation and reduce potential nonresponse bias, reminders were sent later in data collection. A highly effective response rate was achieved, with 340 useable questionnaires out of the total 400 distributed. The sample size exceeds the threshold for Partial Least Squares Structural Equation Modelling (PLS-SEM) according to the sample to items ratio (Hair et al., 2019), thus providing ample statistical power for hypothesis testing.

To minimise social desirability bias and improve the quality of responses, confidentiality and anonymity was guaranteed. The respondents reported that they would use the information for academic research and voluntary participation was requested.

The data collection took three months, which was adequate to collect data as robust and representative as possible from the selected SMEs.

Instrumentation

The questionnaire was developed based on the validated scales of past research and adapted to the SMEs and Bangladeshi context. Four items that were selected from modified and revised items of the study by Song and Yu (2018), and Zhang et al. (2020). To measure BDAC, four adapted from Gupta and George (2016), Wamba et al. (2017), and Mikalef et al. (2020) to measure Big Data Analytics Capability (BDAC). GAC was measured by four items developed and revised based on Chen et al. (2014), and Camisón and Forés (2010), four items reworded from Chen et al. (2014), and Camisón and Forés (2010). Five items from the study of Zhu et al. (2008), Yu et al. (2017), and Saeidi et al. (2018) to assess Green Management Practices (GMP). Five items to measure Green Innovation (GI) were adapted from Chen et al. (2006), Xie et al. (2016), and Song and Yu (2018). Responses to each item were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A pilot study of 30 SME personnel was conducted to further fine-tune the wording, reliability, and determination of face validity before actual data collection.

Data Analysis Tools

The collected data were processed with the help of SPSS version 26, where preliminary

tests were conducted (descriptive statistics, missing values, normality tests, and reliability tests), and SmartPLS 4.0, where hypothesis testing was performed using PLS-SEM. The reason behind the selection of PLS-SEM is that it is used when complex models are required, when the sample sizes are small, and when the data has a non-normal distribution, which is primarily the case with social science studies.

RESULTS

Demographic Characteristics of Respondents

Table 1 represents the demographic features of respondents. The researchers surveyed 340 people in the manufacturing firms in Bangladesh. Most of the participants were males (61.8 percent), and females comprised 38.2 percent. The age group of 25-34 years belongs to 41.2 percent, and the age group of 35-44 years belongs to 27.9 percent, had the greatest number. With respect to education, 44.1 percent had a bachelor's degree, 27.9 percent had a master's degree, and 20.6 percent held a diploma/technical certificate. In terms of work experience, 27.9% had 6-10 years of industry experience and 30.9% had 2-5 years. The primary jobs of the respondents were production/operations (35.3%), and supply chain/logistics (17.6%). The number of job opportunities was divided between the staff at the entry-level (35.3%), supervisors/team leaders (27.9%), and middle management (25.0%). Most of them worked in textile/garments (44.1%), and then in food and beverage (20.6%).

Normality and Biasness Analysis

As a measure of the robustness of the dataset, several diagnostic tests were conducted and included normality test, non-response bias, multicollinearity and social desirability bias. The Kolmogorov-Smirnov and Shapiro-Wilk tests were first used for evaluating the normality of the data. As the significance values of all the graphs in Table 2 obtained are less than 0.05, it shows that the normality assumption has been violated in the data. Thus, nonparametric and variance-based methods, such as PLS-SEM, were considered as appropriate approaches to be employed in the subsequent analysis. Second, non-response bias was monitored by comparing the mean and standard deviation of the first 30 and the last 30 responses (Wallace & Cooke, 1990). As the results (Table 2) showed, since there was not a significant difference between the two groups, and these findings suggest that non-response bias did not exist, and the sample size was large enough for generalisation of findings to the target population.

The multicollinearity and common method bias were tested by the variance inflation factor (VIF) in turn of Kock (2015) parameter. The issue of multicollinearity and common method variance was not a concern as the highest VIF value for the measurement model was below 3.3 (Table 7). The 7-item scale form of Fischer and Fick (1993) was used after the survey. Its relation to the construct under study was not significant, as indicated by the results of the regression analysis (Table 2); thus, social desirability is an irrelevant variable in our study.

Table 1
Respondent's demographic profile

Characteristics	Frequency	Percentage	Characteristics	Frequency	Percentage
Gender			Work Experience (Years in the Industry)		
Male	210	61.80	Less than 2 years	45	13.20
Female	130	38.20	2–5 years	105	30.90
Age Group			6–10 years	95	27.90
Below 25 years	50	14.70	11–15 years	60	17.60
25–34 years	140	41.20	More than 15 years	35	10.30
35–44 years	95	27.90	Department / Functional Area		
45–54 years	40	11.80	Production / Operations	120	35.30
55 years and above	15	4.40	Research and Development (R & D)	35	10.30
Education Level			Supply Chain / Logistics	60	17.60
Diploma/Technical Certificate	70	20.60	Finance and Accounting	40	11.80
Bachelor's Degree	150	44.10	Human Resources (HR)	25	7.40
Master's Degree	95	27.90	Marketing / Sales	30	8.80
Doctoral Degree (DBA)	10	2.90	Sustainability / Environmental Management	15	4.40
Others	15	4.50	Others	15	4.40
Job Position / Designation			Type of Manufacturing Company		
Entry-level Staff	120	35.30	Textile / Garments	150	44.10
Supervisor / Team Leader	95	27.90	Food and Beverage	70	20.60
Middle Management	85	25.00	Electronics / Electrical	45	13.20
Senior Management / Executive	40	11.80	Chemical / Pharmaceutical	50	14.70
			Steel / Heavy Industry	25	7.40
			Others		
			Total: 340		

Table 2
Normality and biasness analysis

Test of Normality: Kolmogorov-Smirnova Shapiro-Wilk						
	Statistic	Df	Sig.	Statistic	df	Sig.
Green Entrepreneurship Orientation	0.112	340	0.000	0.771	340	0.001
Big Dara Analytics Capacity	0.142	340	0.000	0.751	340	0.001
Green Absorptive Capacity	0.147	340	0.000	0.767	340	0.000
Green Management Practices	0.131	340	0.000	0.711	340	0.001
Green Innovation	0.114	340	0.000	0.723	340	0.000
Non-response bias: Early Respondents Late Respondents						
	Mean	SD		Mean	SD	
Green Entrepreneurship Orientation	3.7654	0.7654		3.4312	0.7645	
Big Dara Analytics Capacity	3.2314	0.7123		3.5431	0.7851	
Green Absorptive Capacity	3.6513	0.8651		3.7861	0.6527	
Green Management Practices	3.7821	0.6781		3.6531	0.8765	
Green Innovation	3.6543	0.7893		3.7653	0.7861	
Social desirability bias						
	TO	EO	I	IU	SP	
Sig.	0.634	0.653	0.745	0.611	0.761	

Model Measurement, Validity, and Reliability

Table 3 presents the measurement model assessment of the study. The reliability of the indicators based on factor loadings ranged (substantially) above the cutoff score of .70 (Hair, et al., 2019), which were somewhat lower but remained because they thematically added to the theory. The reliability of the inner consistency was confirmed through Cronbach alpha values (CA) (0.711-0.843), composite reliability (CR) (0.798-0.901), where the positive threshold of 0.70 was reached in all cases under study (Hair et al., 2014). The items that have loadings that are slightly less than 0.70 were kept since they are theoretically necessary and offer construct validity. The existing literature recommends keeping the indicators at or above 0.60 in the case

of AVE and CR within the recommended levels; that guarantees the overall reliability and convergent validity of the measurement model. The convergent validity was established as the AVEs of all constructs were beyond 0.50, indicating that more than half of the variances in those indicators were captured by their corresponding constructs.

The quality of fit of the model has been examined. The R² value of Green Management Practices was 0.443, and the R² value rose to a higher level for Green Innovation (0.572). In response to common method bias, we did a complete collinearity test along with VIF. The variance inflation factors were less than 3.3, thereby showing that multicollinearity and CMB risk do not exist. It is generally suggested as a method of PLS-SEM research for the validity of the structural model.

Table 3
Measurement of model assessment

Constructs	Items	Loading	AVE	CR	Alpha	R-Square	NFI	SRMR
Green Entrepreneurship Orientation	GEO1	0.668	0.578	0.845	0.758			
	GEO2	0.737						
	GEO3	0.814						
	GEO4	0.814						
Big Data Analytics Capacity	BDAC1	0.723	0.500	0.798	0.711			
	BDAC2	0.758						
	BDAC3	0.743						
	BDAC4	0.588						
Green Absorptive Capacity	GAC1	0.759	0.658	0.885	0.826			
	GAC2	0.859						
	GAC3	0.846						
	GAC4	0.776						
	GMP1	0.756						
	GMP2	0.807						
Green Management Practices	GMP3	0.835	0.615	0.889	0.843	0.443		
	GMP4	0.803						
	GMP5	0.715						
	GI1	0.775						
	GI2	0.783						
	GI3	0.835						
Green Innovation	GI4	0.789	0.647	0.901	0.863	0.572	0.876	0.068
	GI5							

Note. AVE: Average Variance Extracted; CR: Composite Reliability; NFI: Normed Fit Index; SRMR: Standardised Root Mean Square Residual

As Cohen (1988) and Chin (1998) suggest, these values fall into moderate to large amounts of variation accounted for by the exogenous constructs. With respect to the model fit, the Normed Fit Index (NFI) value was 0.876, which is close to the 0.90 recommended level for fit acceptance, indicating a good level of fit (Chin, 1998).

The Standardised Root Mean Square Residual SRMR was 0.068, the cut-off for good model fit is < 0.08, and therefore the model fits well (Hair et al., 2016). PLS-SEM was selected based on it being resistant to non-uniform distributions of data, thus it can be used in the study. The algorithm is based on bootstrapping and

partial least squares estimation, which is not based on the assumptions of normality, making the algorithm valid in parameter estimation and significance testing even when previous tests have shown that there are normality problems.

Discriminant Validity

Fornell-Larcker Criterion Analysis

The results of the Fornell-Larcker criterion analysis are presented in Table 4. A rectangle of the diagonal presents the square root AVE in bold (with a range from 0.710 to 0.811). All these values are above the corresponding inter-construct correlations in both rows and columns, indicating that the constructs own more variance of related indicators than irrelevant ones. It suggests that discrimination validity is fine. Therefore, the constructs under study are unambiguous and valid with respect to the Fornell and Larcker (1981) criteria.

Heterotrait-Monotrait (HTMT) Analysis

Table 5 presents the findings of the Heterotrait-Monotrait (HTMT) ratio of correlations, which is deemed a stricter test of evaluating discriminant validity in a structural equation model. The threshold proposed by Henseler (2005) has not been determined as a value of 0.85, which is a conservative cut-off point of the HTMT values. All the HTMT values in the given research were found to be lower than this value, which validates that all the study constructs are empirically dissimilar. This result also supports the finding of discriminant validity in the measurement model.

Predictive Relevance and Effect Size of the Model

The structural model was tested for its robustness and predictive capabilities using PLS-SEM according to Hair et al. (2019). Several diagnostic indices were obtained, such as Variance Inflation Factor (VIF), Cohens f^2 , Stone Geislers Q^2 , root mean square error RMSE, and mean absolute error MAE. First, we calculated the values of VIF with consideration for multicollinearity. Table 6 indicates that all the VIF estimates were much less than the conservative value of 5.0 and thus confirmed the non-existence of a collinearity problem in this model.

Secondly, Cohen's f^2 values were examined to ascertain the sizes of the influences of exogenous constructs on endogenous variables. The results indicate relatively lower associations between the construct of Big Data Analytics Capability and Green Innovation and Green Management Practices. A medium effect of Green Absorptive Capacity on Green Innovation and Green Management Practices was observed. The mediating effect of Green Entrepreneurship Orientation on Green Innovation and Green Management Practices was moderate. Third, all endogenous constructs Q^2 values in Stone-Geisser were larger than 0, indicating the model has predictive relevance. Lastly, predictive accuracy measures (RMSE and MAE) showed that all the endogenous constructs had acceptable measures of error, which also supported the strength of the model.

Table 4
Fornell-Larcker criterion analysis for discriminant validity

	1	2	3	4	5
1 Big Data Analytics Capability	0.706				
2 Green Absorptive Capacity	0.321	0.811			
3 Green Entrepreneurship Orientation	0.403	0.346	0.760		
4 Green Innovation	0.463	0.441	0.534	0.804	
5 Green Management Practices	0.455	0.512	0.533	0.725	0.784

Note. The diagonal values represent the square root of the AVE of each construct and are greater than the corresponding inter-construct correlations in the same row and column

Table 5
Heterotrait-Monotrait (HTMT) analysis for discriminant validity

	1	2	3	4	5
1 Big Data Analytics Capability					
2 Green Absorptive Capacity	0.421				
3 Green Entrepreneurship Orientation	0.547	0.434			
4 Green Innovation	0.605	0.516	0.653		
5 Green Management Practices	0.607	0.613	0.649	0.844	

Note. *Discriminant validity exists if the HTMT<0.85 (Henseler, 2005)

Table 6
Values of the Stone Geisser indicator (Q^2) and Cohen's indicator (f^2) of the model in the SEM

Constructs	Q^2 Predict	RMSE	MAE	Green Innovation (f^2)	Green Management Practices(f^2)
Big Data Analytics Capability				0.067	0.067
Green Absorptive Capacity				0.163	0.163
Green Entrepreneurship Orientation				0.156	0.156
Green Innovation	0.385	0.791	0.558		
Green Management Practices	0.425	0.764	0.552		

Note. Large effect> 0.35; Medium effect > 0.15; Small effect > 0.02 (Cohen, 1988). N.B.: f^2 values represent the effect size of each exogenous construct on the corresponding endogenous variable

Structural Model Assessment

The Standardised Results of SEM calculations are illustrated in Figure 2. The structural model was tested based on PLS-SEM with bootstrapping of 4,999 resamples to examine the significance of the hypothesised relationships. All outer loadings of the composites were large and significant, thus supporting indicator reliability. The R² statistics for the dependent variables were high, displaying a great explanatory power of the model.

Hypotheses Testing (Direct and Indirect Effects)

The reinvented hypothesis-focused findings based on bootstrapping with 4,999 resamples by SmartPLS 4.0 for path structures are demonstrated in Table 7.

Analysis results such as Standardised path coefficients (β), t-values and p-values, 95% confidence intervals are provided for hypothesis validation. As seen in Table 7, H1 is supported; a positive and significant relationship is found between GEO and GI ($\beta = 0.172$, $t = 3.186$, $p < 0.05$). These results confirm the previous observations of Wamba et al. (2022) and Mikalef et al. (2020), although the important role of data analytics to support green innovation is emphasised. This reflects that green entrepreneurship orientation influences employees to adopt green innovation.

Moreover, H2 is supported, which shows that there is a positive and significant relationship found between Green Entrepreneurship Orientation and Green Management Practices (GMPs) ($\beta = 0.333$, $t = 6.655$, $p < 0.001$).

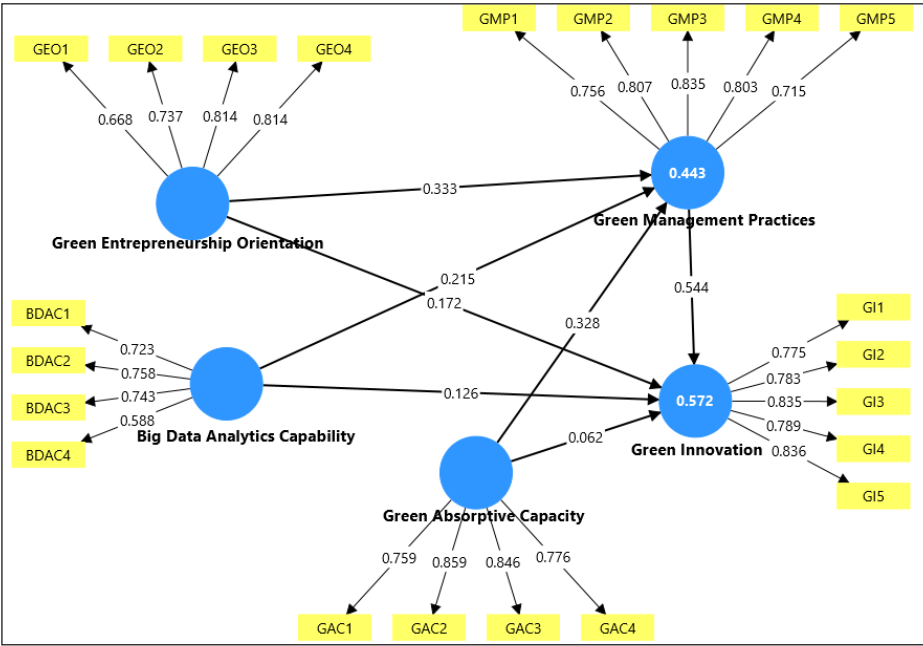


Figure 2. Standardised results of SEM calculations

Table 7
Results of direct effect hypotheses

Hypotheses	Relationships	Std Beta	2.5% CI	97.5% CI	VIF	t-value	p-value	Decision
H1	Green Entrepreneurship Orientation → Green Innovation	0.172	0.068	0.285	1.473	3.186	0.001	Supported
H2	Green Entrepreneurship Orientation → Green Management Practices	0.333	0.237	0.431	1.273	6.655	0.000	Supported
H3	Big Data Analytics Capability → Green Innovation	0.126	0.041	0.218	1.333	2.795	0.005	Supported
H4	Big Data Analytics Capability → Green Management Practices	0.215	0.123	0.312	1.251	4.519	0.000	Supported
H5	Green Absorptive Capacity → Green Innovation	0.062	-0.032	0.159	1.382	1.263	0.207	Rejected
H6	Green Absorptive Capacity → Green Management Practices	0.328	0.219	0.431	1.189	6.078	0.000	Supported
H7	Green Management Practices → Green Innovation	0.172	0.068	0.285	1.797	3.186	0.001	Supported

Note. CI: Confidence Interval; VIF: Variance Inflation Factor. All VIF values are below the recommended threshold, indicating no multicollinearity issues

The previous studies of Makhoulfi et al. (2022), Anin et al. (2024), and Ma et al. (2025b) support this finding. This finding suggests that green entrepreneurship enhances green management practices, which accelerates the SMEs green innovation adoption. H3 is also supported, which claims that there is a positive and significant relationship between Big Data Analytics Capability and Green Innovation ($\beta = 0.126$, $t = 2.795$, $p < 0.05$). The previous studies of El Manzani and El Idrissi (2025), Kalyar et al. (2024), and Wu et al. (2025) support this finding. This finding suggests that the Big Data Analytics Capability of employees of any firm enhances Green Innovation adoption. Moreover, H4 is supported, which shows that there is a positive and significant relationship between Big Data Analytics Capability and Green Management Practices ($\beta = 0.215$, $t = 4.519$,

$p < 0.001$). The previous studies of Shi et al. (2023), Rahaman et al. (2024), and Mikalef et al. (2020) support this finding. This finding suggests that Big Data Analytics Capability enhances employees' green management practices, which lead them to adopt green innovation.

As seen in Table 7, H5 is not supported, which shows that there is no relationship between Green Absorptive Capacity and Green Innovation ($\beta = 0.062$, $t = 1.263$, $p > 0.05$). The previous studies of Hong et al. (2019), Kim et al. (2025), and Dantas et al. (2025) support this finding. Rejection of this hypothesis suggests that mere absorptive capacity alone is inadequate and some more organised form of capital utilisation, such as formal management practices (GMPs), may be needed to make absorbed knowledge productive. Furthermore, Hypothesis 6 is supported, which suggests that GAC

and GMPs have a positive and significant association ($\beta = 0.328, t = 6.078, p < 0.001$). The previous studies of Zahra et al. (2022) and Lin et al. (2020a) support this finding. This means that SMEs acquiring external green knowledge have more tendency to adopt eco-friendly management practices.

The lack of a significant direct connection between GAC and green innovation draws attention to some important theoretical issues. With GAC, a firm can obtain and absorb environmental knowledge. Nonetheless, this capability is largely dormant if it is not built into the firm’s management system. In the case of SMEs and of many enterprises in the developing world, green knowledge is often improvisational and discontinuous. Without green management practices, such as environmental monitoring systems, Standardised procedures, and performance metrics, absorbed knowledge may not be readily introduced into either research results’ production or product innovation processes. Thus, GAC influences green innovation completely through green management practices. This confirms the practice-based view; it is not just capabilities

that account for organisational results, but routines will drive them.

Moving forward, H7 is confirmed, which suggested that there was a positive and significant connection between GMPs and green innovation ($\beta = 0.172, t = 3.186, p < 0.001$). This finding is consistent with the previous of Singh et al. (2021) and Tan et al. (2023), which highlight the importance of GMPs for green innovation. SMEs’ prospects of becoming environmentally sustainable innovators will increase if they implement GMP systems.

Table 8 shows the results of the indirect effect hypotheses. As seen in Table 8, H8 is supported, where indirect effect sizes and bootstrapped confidence intervals were reported to confirm mediation. $GEO \rightarrow GMP \rightarrow GI$ showed a significant indirect effect ($\beta = 0.181, t = 5.624, p < 0.001, CI [0.119, 0.245]$), supporting full mediation. This indicates that GEO influences GI primarily through GMP rather than directly, supporting the mediation hypothesis. This suggests that entrepreneurial orientation alone does not guarantee eco-innovation; it must be operationalised through structured green practices.

Table 8
Results of indirect effect hypotheses

Hypotheses	Relationships	Std Beta	2.5% CI	97.5% CI	t-value	p-value	Decision
H8	Green Entrepreneurship Orientation → GMP → Green Innovation	0.181	0.119	0.245	5.624	0.000	Supported
H9	Big Data Analytics Capability → GMP → Green Innovation	0.117	0.067	0.171	4.381	0.000	Supported
H10	Green Absorptive Capacity → GMP → Green Innovation	0.179	0.109	0.251	4.859	0.000	Supported

Note. GMP: Green Management Practices; CI: Confidence Interval

This finding is in line with Schaltegger and Wagner (2011), and Yusof et al. (2023).

Furthermore, H9 is supported, where indirect effect sizes and bootstrapped confidence intervals were reported to confirm mediation. BDAC → GMP → GI showed a significant indirect effect ($\beta = 0.117$, $t = 4.381$, $p < 0.001$, CI [0.067, 0.171]), supporting partial mediation. This indicates that BDAC influences GI primarily through GMP rather than solely through direct effects, reinforcing the mediation hypothesis. The confidence interval does not include zero, confirming the robustness of this effect. This suggests that analytics capability alone does not guarantee eco-innovation; it must be embedded within green management practices. This finding is consistent with Dubey et al. (2021) and Mikalef et al. (2020), who highlight the synergy between data analytics and sustainability.

Moreover, H10 is supported, where indirect effect sizes and bootstrapped confidence intervals were reported to confirm mediation. GAC → GMP → GI showed a significant indirect effect ($\beta = 0.179$, $t = 4.859$, $p < 0.001$, CI [0.109, 0.251]), supporting full mediation. This indicates that GAC influences GI

primarily through GMP rather than directly, reinforcing the mediation hypothesis. The confidence interval does not include zero, confirming the robustness of this effect. This suggests that absorptive capacity alone does not guarantee eco-innovation; it must be institutionalised through structured green management practices. This finding aligns with Zahra and George (2002) and Lin et al. (2020b), who argue that absorptive capacity must be realized through formal processes to lead to actual innovation.

The Importance of Performance Map Analysis (IPMA) for Startup Performance

Table 9 and figure 3 present the Importance-Performance Map Analysis (IPMA) results for startup performance. IPMA examined both the strategic relevance and performance appraisal of four constructs, which included GMP (Green Management Practice), GEO (green entrepreneurial orientation), BDAC (big data analytics capability) and GAC to leverage green-driven innovation for SMEs in Bangladesh (Wu et al., 2025). GMP demonstrates the largest importance (0.544) with moderate performance (24.527), GEO performs strongly important (0.353), yet he lowed performance (22.833),

Table 9
Importance-Performance Map Analysis (IPMA)

Constructs	Importance	Performances
Big Data Analytics Capability	0.243	25.57
Green Absorptive Capacity	0.241	25.535
Green Entrepreneurship Orientation	0.353	22.047
Green Management Practices	0.544	24.527

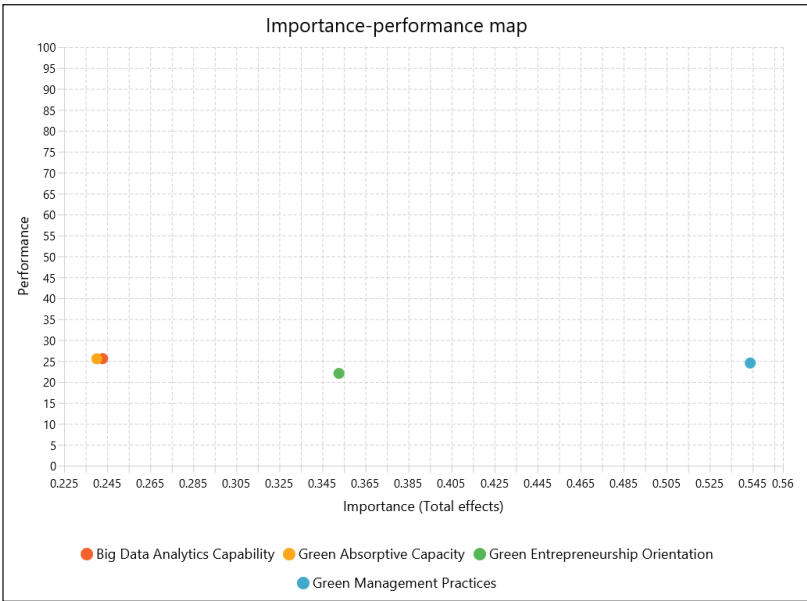


Figure 3. Importance Performance Map Analysis (IPMA)

which reflects that the under-use of entrepreneurial values and GWE has the lowest importance (0.273) but strong performance, reflecting maximise on entrepreneurial value. Operationally, BDAC (0.243; 25.57) and GAC (0.241; 25.535) do well, but the strategic impact of them is moderate. SMEs need to reinforce green culture and make more effective use of BDAC and GAC for better innovation performance.

CONCLUSION

This study determines the key components which influence green innovation and sustainable performance in Bangladeshi SMEs, such as GEO (Green Entrepreneurship Orientation), BDAC (Big Data Analytics Capability), GAC (Green Absorptive Capacity) and GMPs (Green Management Practices).

The empirical results strongly support the notion that these internal competences and strategic orientations are important stimulants of green innovation in SMEs. The study validates that Green Entrepreneurship Orientation, Big Data Analytics Capability and Green Management Practices all have a positive and significant relationship with Green Innovation. This finding also supports concepts from theory that internal strategic competencies like these are instrumental in a path toward sustainable innovation, because they make clear that SMEs effectively can pick up and implement eco-friendly practices. Results also support the natural resource-based view (NRBV) that contends that resources which are rare, valuable and hard to imitate provide a competitive advantage to firms.

The findings indicate that not only factors such as GEO, BDAC, and GMPs promote green innovation, but they are also essential to maintain a long-term sustainable competitive advantage. It is this internal factor that competitors often find hard to replicate, which can help SMEs to distinguish themselves in a greener market.

The study also complements dynamic capabilities theory that relates dynamic capability with SMEs' ability to adapt, integrate and reconfigure resources in green innovation, that enable higher performance achievement among SMEs. The study also reconfirms that the effective implementation of green innovation strategies is not only about the adoption of new technologies but about promoting a dynamic and evolutionary process towards sustainability. By utilising such strategic competencies, SMEs can enhance environmental sustainability as well as attain substantial competitive edge, thereby contributing to wider goals of sustainable development. Furthermore, the study uncovers useful recommendations for SMEs that a high green entrepreneurship orientation, supported by enhanced capabilities in Big Data Analytics, green absorptive capacity and green management practices, is an important determinant of green innovation. Managers and policymakers who are interested in promoting sustainable growth for SMEs, especially those in countries at earlier stages of development such as Bangladesh, should focus on these factors (Chen et al., 2024; Dantas et al., 2025; Yousaf, 2021).

IMPLICATION OF THE STUDY

Theoretical Implications

Theoretical implications of the study are also remarkable since RBV and DCT have been integrated to investigate the antecedents of green innovation in the SME segment within a developing country like Bangladesh. The presence of RBV can be explained with the internal strategic resources, such as green entrepreneurship orientation (GEO), big data analytics capability (BDAC) and green absorptive capacity (GAC), which form an innovation catalyst. These credentials are something valuable, rare, and inimitable for which support the RBV concentration on internal resources to be unique in to produce competitive advantage. Ultimately, this study contributes to dynamic capabilities theory by showing that GMPs serve as a mediating mechanism through which internal resources are turned into tangible sources of innovation. Empirical evidence suggests that some capabilities (green entrepreneurial orientation and data analytics) have direct impacts on innovation, whereas absorptive capacity should be operationalised by institutionalised practices (GMPs) to employ an effect. This is potentially a significant finding in that it also suggests the possible production or transformation of resources into true resources when effectively subsumed under formal management routines if collected as part of an integration process such as absorptive capacity.

Implications for SMEs

Bangladeshi SMEs may employ energy-saving processes, waste segregation, recycling and green procurement technologies to institutionalise the eco-innovation. Supplementary performance monitoring tools and the capacity to leverage big data analytics capability (BDAC) and green absorptive capacity (GAC) allow firms to pursue data-driven sustainability and effectively integrate external environmental knowledge. A combination of cost-effective analytics and staff training contributes to BDAC development, while associating environmental data with decisions increases its accuracy. The GAC can be empowered through these forms of global networking and knowledge exchange. Process innovations need to be applied across the board and be complemented with other initiatives, such as zero-waste projects, green supplier certifications. GMPs are essential in the translation of knowledge into practice as absorptive capacity alone is not an instigator for innovation but it must be enacted through formalised structures. By embedding foreign learning into operational practices, sustainable impact and local competitiveness achieved in emerging markets.

Implications for Policymakers

These findings can be taken advantage of by policymakers in less developed nations who would like their small and medium-sized enterprises to practise a structured green management. Tax breaks,

the provision to enjoy environmental systems management training programmes at a subsidised price and data infrastructure support to enable making things happen will make such a strategy feasible. Policies that promote green absorptive capacity should include provisions for creating platforms on which SMEs can share their experiences, guidelines adapted to local circumstances and research institutions involved in improving the coordination. Constructing standardised frameworks for SME sustainability reporting would take the next step in the organisational routines, enabling them to become more environmentally sensitive.

Limitations and Directions for Future Research

This study has limitations. The impact of absorptive capacity on green innovation is likely to be context-specific, e.g., formal GMP implementation in economies like Bangladesh. Alternative mediators and informal practices need to be explored in future studies, and generalisability across regions should be tested with longitudinal or comparative research. To enhance capability-based eco-innovation models, researchers might integrate constructs (e.g., green HRM, green organisational culture, and digital orientation), together with big data analytics capability and green absorptive capacity. Theories such as institutional theory could also help us to better understand the effects of external pressures on SMEs' green behaviour.

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REFERENCES

- Ahmad, A., Ikram, A., Rehan, M. F., & Ahmad, A. (2022). Going green: Impact of green supply chain management practices on sustainability performance. *Frontiers in Psychology*, 13, Article 973676. <https://doi.org/10.3389/fpsyg.2022.973676>
- Ajzen, I. (1991). The theory of planned behavior. *Organisational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Akhtar, S., Li, C., Sohu, J. M., Rasool, Y., Hassan, M. I. U., & Bilal, M. (2024). Unlocking green innovation and environmental performance: The mediated moderation of green absorptive capacity and green innovation climate. *Environmental Science and Pollution Research*, 31(3), 4547–4562.
- Al Koliby, I. S., Al-Swidi, A. K., Al-Hakimi, M. A., Mehat, N. A. B., Gelaidan, H. M., & Al-Hattami, H. M. (2025). From data to green innovation: The role of green organisational learning capability and total quality management. *Sustainable Futures*, 10, Article 101191.
- Al-Adwan, A.S., Yaseen, H. (2023). Solving the product uncertainty hurdle in social commerce: the mediating role of seller uncertainty. *Int. J. Inf. Manag. Data Insights* 3(1). <https://doi.org/10.1016/j.jjime.2023.100169>
- Alhumud, A.A., Elshaer, I.A. (2024). Social commerce and Customer-to-Customer value Co-Creation impact on sustainable customer relationships. *Sustainability (Switzerland)* 16(10), 1–16. <https://doi.org/10.3390/su16104237>
- Al-Husain, R. A., Jasim, T. A., Mathew, V., Al-Romeedy, B. S., Khairy, H. A., Mahmoud, H. A., ... Alsetoohy, O. (2025). Optimizing sustainability performance through digital dynamic capabilities, green knowledge management, and green technology innovation. *Scientific Reports*, 15(1), Article 24217.
- Alkhatib, A. W. (2024). Fostering green innovation: The roles of big data analytics capabilities and green supply chain integration. *European Journal of Innovation Management*, 27(8), 2818–2840.
- Al-Adwan, A.S., Yaseen, H. (2023). Solving the product uncertainty hurdle in social commerce: the mediating role of seller uncertainty. *Int. J. Inf. Manag. Data Insights* 3(1). <https://doi.org/10.1016/j.jjime.2023.100169>
- Al-Swidi, A. K., Al-Hakimi, M. A., Al-Sarraf, J., & Al Koliby, I. S. (2024). Innovate or perish: Can green entrepreneurial orientation foster green innovation by leveraging green manufacturing practices under different levels of green technology turbulence? *Journal of Manufacturing Technology Management*, 35(1), 74–94.
- Anin, E. K., Etse, D., Okyere, G. A., & Adanfo, D. B. Y. (2024). Green entrepreneurial orientation and firm performance: Do green purchasing and supply chain integration matter? *Cogent Business & Management*, 11(1), Article 237762.
- Aref, M. M. (2024). Unveiling the complexity of social commerce continuance intention: A fuzzy set qualitative comparative analysis. *Journal of Electronic Business and Digital Economics*, 3(3), 275–294. <https://doi.org/10.1108/jebde-02-2024-0005>
- Arslan, Z., Kausar, S., Kannaiah, D., Shabbir, M. S., Khan, G. Y., & Zamir, A. (2022). The mediating role of green creativity and the moderating role of green mindfulness in the relationship among clean environment, clean production, and sustainable growth. *Environmental Science and Pollution Research*, 29(9), 13238–13252.

- Baquero, A. (2024). Linking green entrepreneurial orientation and ambidextrous green innovation to stimulate green performance: A moderated mediation approach. *Business Process Management Journal*, 30(8), 71–98.
- Barón Dorado, A., Giménez Leal, G., & de Castro Vila, R. (2022). Environmental policy and corporate sustainability: The mediating role of environmental management systems in circular economy adoption. *Corporate Social Responsibility and Environmental Management*, 29(4), 830–842.
- Begum, S., Ashfaq, M., Asiaei, K., & Shahzad, K. (2023). Green intellectual capital and green business strategy: The role of green absorptive capacity. *Business Strategy and the Environment*, 32(7), 4907–4923.
- Bidmeshk, O. G., Woo, C., & Mehraeen, M. (2025). Managing operational alignment complexity: A recommender system approach. *Journal of Open Innovation: Technology, Market, and Complexity*, Article 100627.
- Bresciani, S., Rehman, S. U., Giovando, G., & Alam, G. M. (2023). The role of environmental management accounting and environmental knowledge management practices on environmental performance: A mediated-moderated model. *Journal of Knowledge Management*, 27(4), 896–918.
- Camisón, C., & Forés, B. (2010). Knowledge absorptive capacity: New insights for its conceptualisation and measurement. *Journal of Business Research*, 63(7), 707–715. <https://doi.org/10.1016/j.jbusres.2009.04.022>
- Çelik, A. K., Yildiz, T., Aykanat, Z., & Kazemzadeh, S. (2025). Green innovation adoption in Turkish and Iranian SMEs: The effect of dynamic capabilities and the mediating role of absorptive capacity. *Journal of the Knowledge Economy*, 16(1), 1824–1859.
- Chau, K. Y., Huang, T., Moslehpour, M., Khan, W., Nisar, Q. A., & Haris, M. (2024). Opening a new horizon in green HRM practices with big data analytics and its analogy to circular economy performance: An empirical evidence. *Environment, Development and Sustainability*, 26(5), 12133–12162.
- Chen, R., Espinosa Cristia, J. F., Marian, M. L., Alzuman, A., & Comite, U. (2025). Does green entrepreneurial orientation impact entrepreneurial success through green innovation capability in the manufacturing and services sector of emerging economies? *International Entrepreneurship and Management Journal*, 21, Article 51. <https://doi.org/10.1007/s11365-024-01059-0>
- Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, 67(4), 331–339. <https://doi.org/10.1007/s10551-006-9025-5>
- Chen, Y. S., Lin, M. J. J., & Chang, C. H. (2014). The positive effects of relationship learning and absorptive capacity on innovation performance and competitive advantage in industrial markets. *Industrial Marketing Management*, 43(1), 152–166. <https://doi.org/10.1016/j.indmarman.2013.08.027>
- Cheng, W., Li, Q., Wu, Q., Ye, F., & Jiang, Y. (2024). Digital capability and green innovation: The perspective of green supply chain collaboration and top management's environmental awareness. *Heliyon*, 10(11).
- Chin, W. W. (1998). The partial least squares approach to structural equation modelling. In E. E. Author (Ed.), *Modern methods for business research* (pp. 295–336). Psychology Press.
- Cohen, J. (1988). Set correlation and contingency tables. *Applied Psychological Measurement*, 12(4), 425–434.

- Dantas, D., Ferreira, J. J., & Jayantilal, S. (2025). Green absorptive capacity and environmental management: The main challenges, gaps and research agenda. *Management of Environmental Quality: An International Journal*. <https://doi.org/10.1108/MEQ-10-2024-0466>
- Dhaigude, A. S., & Kamath, G. B. (2025). Mapping responsible artificial intelligence in business and management: Trends, influence, and emerging research directions. *Journal of Open Innovation: Technology, Market, and Complexity*, Article 100640.
- Dong, Q., Wu, Y., Lin, H., Sun, Z., & Liang, R. (2024). Fostering green innovation for corporate competitive advantages in big data era: The role of institutional benefits. *Technology Analysis & Strategic Management*, 36(2), 181-194.
- El Manzani, Y., & El Idrissi, M. (2025). Big data analytics capabilities and green innovation: A meta-analysis and necessary condition analysis. *Management Review Quarterly*, 1–38.
- Fan, Q., Abbas, J., Zhong, Y., Pawar, P. S., Adam, N. A., & Alarif, G. B. (2023). Role of organisational and environmental factors in firm green innovation and sustainable development: Moderating role of knowledge absorptive capacity. *Journal of Cleaner Production*, 411, Article 137262.
- Fischer, D. G., & Fick, C. (1993). Measuring social desirability: Short forms of the Marlowe–Crowne social desirability scale. *Educational and Psychological Measurement*, 53(2), 417–424.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gupta, M., & George, J. F. (2016). Toward the development of a big data analytics capability. *Information & Management*, 53(8), 1049–1064. <https://doi.org/10.1016/j.im.2016.07.004>
- Haile, E. A. (2025). The nexus between green transformational leadership and financial performance of hotels: the mediating effect of environmental management practices. *Journal of Hospitality and Tourism Insights*, 8(4), 1416–1435.
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modelling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106–121.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24.
- Hair, J. F., Sarstedt, M., Matthews, L. M., & Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with FIMIX-PLS: Part I—method. *European Business Review*, 28(1), 63–76.
- Henseler, J. (2005). Einführung in die PLS-Pfadmodellierung. *Wirtschaftswissenschaftliches Studium*, 34(2), 70–75.
- Hong, J., Zheng, R., Deng, H., & Zhou, Y. (2019). Green supply chain collaborative innovation, absorptive capacity and innovation performance: Evidence from China. *Journal of Cleaner Production*, 241, Article 118377.
- Jell-Ojobor, M., & Raha, A. (2022). Being good at being good—The mediating role of an environmental management system in value-creating green supply chain management practices. *Business Strategy and the Environment*, 31(5), 1964–1984.
- Kalyar, M. N., Pierscieniak, A., & Shafique, M. (2024). Leveraging green innovation from big data analytics: Examining the role of resource orchestration and green dynamic capabilities. *Journal of Entrepreneurship, Management and Innovation*, 20(4), 73–87.
- Karim, R. A., Rabiul, M. K., & Kawser, S. (2024). Linking green supply chain management practices and behavioural intentions: The mediating role of customer satisfaction. *Journal of Hospitality and Tourism Insights*, 7(2), 1148–1168.

- Karmaker, C. L., Al Aziz, R., Ahmed, T., Misbaudhin, S. M., & Moktadir, M. A. (2023). Impact of industry 4.0 technologies on sustainable supply chain performance: The mediating role of green supply chain management practices and circular economy. *Journal of Cleaner Production*, 419, Article 138249.
- Khan, W., Nisar, Q. A., Roomi, M. A., Nasir, S., Awan, U., & Rafiq, M. (2024). Green human resources management, green innovation and circular economy performance: The role of big data analytics and data-driven culture. *Journal of Environmental Planning and Management*, 67(10), 2356–2381.
- Kim, J., Ali, M., & Roh, T. (2025). When do green absorptive capacity and ambidextrous open innovation foster sustainable performance? *Business Strategy and the Environment*. <https://doi.org/10.1002/bse.70075>
- Lee, M. J., Kim, Y., & Roh, T. (2024). Exploring the role of digital servitisation for green innovation: Absorptive capacity, transformative capacity, and environmental strategy. *Technological Forecasting and Social Change*, 207, Article 123614.
- Lin, C. Y., Alam, S. S., Ho, Y. H., Al-Shaikh, M. E., & Sultan, P. (2020). Adoption of green supply chain management among SMEs in Malaysia. *Sustainability*, 12(16), Article 6454.
- Lin, Y. H., Kulangara, N., Foster, K., & Shang, J. (2020). Improving green market orientation, green supply chain relationship quality, and green absorptive capacity to enhance green competitive advantage in the green supply chain. *Sustainability*, 12(18), 7251.
- Ma, J., Lin, C. Y., Altantsetseg, P., & Moslehpour, M. (2025a). Optimising sustainable performance through green entrepreneurial orientation, market orientation, green supply chain management practices, environmental dynamism, and resource capabilities: Evidence from technological firms. *International Entrepreneurship and Management Journal*, 21(1), Article 99.
- Ma, L., Ali, A., Shahzad, M., & Khan, A. (2025b). Factors of green innovation: The role of dynamic capabilities and knowledge sharing through green creativity. *Kybernetes*, 54(1), 54–70.
- Ma, Y., Liu, Y., Appolloni, A., & Liu, J. (2021). Does green public procurement encourage firm's environmental certification practice? The mediation role of top management support. *Corporate Social Responsibility and Environmental Management*, 28(3), 1002–1017.
- Makhloufi, L. (2024). Predicting the impact of big data analytics capability and green absorptive capacity on green entrepreneurship orientation and eco-innovation. *Journal of Enterprising Communities: People and Places in the Global Economy*, 18(4), 746–770.
- Makhloufi, L., Laghouag, A. A., Meirun, T., & Belaid, F. (2022). Impact of green entrepreneurship orientation on environmental performance: The natural resource-based view and environmental policy perspective. *Business Strategy and the Environment*, 31(1), 425–444.
- Mehmood, K., Kiani, A., & Rashid, M. D. (2025). Is data the key to sustainability? The roles of big data analytics, green innovation, and organisational identity in gaining green competitive advantage. *Technology Analysis & Strategic Management*, 37(5), 494–508.
- Mikalef, P., Pappas, I. O., Krogstie, J., & Giannakos, M. (2020). Big data analytics capabilities: A systematic literature review and research agenda. *Information Systems and e-Business Management*, 18(3), 547–578. <https://doi.org/10.1007/s10257-019-00419-0>
- Mishra, B. P., Biswal, B. B., Behera, A. K., & Das, H. C. (2021). Effect of big data analytics on improvement of corporate social/green performance. *Journal of Modelling in Management*, 16(3), 922–943.
- Momayez, A., Rasouli, N., Alimohammadirokni, M., & Rasoolimanesh, S. M. (2023). Green

- entrepreneurship orientation, green innovation and hotel performance: The moderating role of managerial environmental concern. *Journal of Hospitality Marketing & Management*, 32(8), 981–1004.
- Mondal, S., Singh, S., & Gupta, H. (2024). Exploring the impact of green entrepreneurial orientation on sustainable performance: Insights from CSR, policy and innovation. *Management Decision*, 62(12), 3946–3977.
- Nguyen, N. T., Ahmed, Z., Hassan, S., Khosa, M., Faqera, A. F. O., & Hashmi, A. (2025). Navigating green innovation in the manufacturing sector: The roles of green entrepreneurial orientation, digital transformation and international opportunities. *International Journal of Ethics and Systems*, 1–56.
- Qu, X., Khan, A., Yahya, S., Zafar, A. U., & Shahzad, M. (2022). Green core competencies to prompt green absorptive capacity and bolster green innovation: The moderating role of organisation's green culture. *Journal of Environmental Planning and Management*, 65(3), 536–561.
- Rahaman, M. M., Manik, M. M. T. G., Noman, I. R., Islam, M. R., Aziz, M. A., Bhuiyan, M. A., & Das, K. (2024). Data analytics for sustainable business: Practical insights for measuring and growing impact. *ICRRD Journal*, 5(4), 110–125.
- Rashid, A., Baloch, N., Rasheed, R., & Ngah, A. H. (2025). Big data analytics–artificial intelligence and sustainable performance through green supply chain practices in manufacturing firms of a developing country. *Journal of Science and Technology Policy Management*, 16(1), 42–67.
- Riaz, M., Jie, W., Sherani, Ali, S., & Chang, S. (2024). Assessing the role of organisational strategic factors in stimulating green innovation performance: moderating effects of green absorptive capacity. *Business Process Management Journal*, 30(4), 1013–1043.
- Roshid, M. M., Saiyed, S., Karim, R., Haque, T., Siddique, M. S. R., Haque, M. A., ... Habib, S. B. (2025). The role of green entrepreneurship in driving sustainable innovation in Bangladesh's startup ecosystem: Insights from a belt and road emerging market. *Environment, Innovation and Management*, 1, Article 2550010.
- Saeidi, S. P., Sofian, S., Saeidi, P., Saeidi, S. P., & Saeidi, S. A. (2018). How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction. *Journal of Business Research*, 68(2), 341–350. <https://doi.org/10.1016/j.jbusres.2014.06.024>
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Business strategy and the environment*, 20(4), 222–237.
- Shehzad, M. U., Jianhua, Z., Naveed, K., Zia, U., & Sherani, M. (2024a). Sustainable transformation: An interaction of green entrepreneurship, green innovation, and green absorptive capacity to redefine green competitive advantage. *Business Strategy and the Environment*, 33(7), 7041–7059.
- Shehzad, M. U., Zhang, J., Dost, M., Ahmad, M. S., & Alam, S. (2024b). Knowledge management enablers and knowledge management processes: A direct and configurational approach to stimulate green innovation. *European Journal of Innovation Management*, 27(1), 123–152.
- Siddiqi, R. A., Codini, A. P., Ishaq, M. I., Jamali, D. R., & Raza, A. (2025). Sustainable supply chain, dynamic capabilities, eco-innovation, and environmental performance in an emerging economy. *Business Strategy and the Environment*, 34(1), 338–350.
- Song, W., & Yu, H. (2018). Green innovation strategy and green innovation: The roles of green creativity and green organisational identity. *Corporate Social Responsibility and Environmental Management*, 25(2), 135–150. <https://doi.org/10.1002/csr.1445>

- Soomro, B. A., Moawad, N. F., Saraih, U. N., Abdelwahed, N. A. A., & Shah, N. (2024). Going green with the green market and green innovation: Building the connection between green entrepreneurship and sustainable development. *Kybernetes*, 53(4), 1484–1504.
- Tuan, L. T. (2023). Fostering green product innovation through green entrepreneurial orientation: The roles of employee green creativity, green role identity, and organisational transactive memory system. *Business Strategy and the Environment*, 32(1), 639–653.
- Wallace, R. S. O., & Cooke, T. E. (1990). Nonresponse bias in mail accounting surveys: A pedagogical extension. *The British Accounting Review*, 22(3), 283–288.
- Wamba, S. F., Gunasekaran, A., Akter, S., Ren, S. J. F., Dubey, R., & Childe, S. J. (2017). Big data analytics and firm performance: Effects of dynamic capabilities. *Journal of Business Research*, 70, 356–365. <https://doi.org/10.1016/j.jbusres.2016.08.009>
- Wang, N., Xie, W., Huang, Y., & Ma, Z. (2023). Big data capability and sustainability oriented innovation: The mediating role of intellectual capital. *Business Strategy and the Environment*, 32(8), 5702–5720.
- Wang, X., Gan, Y., Zhou, S., & Wang, X. (2024). Digital technology adoption, absorptive capacity, CEO green experience and the quality of green innovation: Evidence from China. *Finance Research Letters*, 63, Article 105271.
- Watto, W. A., Abubakar, M., Kouser, R., Quddus, A., & Fayaz, M. (2025). Green supply chain management practices and sustainable firm performance via green dynamic capacity and green entrepreneurial orientation (GEO): Mediation of green innovation. *International Journal of Innovation Science*.
- Wu, W., Li, X., & Ruan, G. (2025). How big data analytics capability promotes green radical innovation? The effect of corporate environment ethics in the digital era. *Systems*, 13(5), Article 370.
- Xie, X., Huo, J., & Zou, H. (2016). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research*, 69(2), 451–461. <https://doi.org/10.1016/j.jbusres.2015.06.042>
- Yin, C., Salmador, M. P., Li, D., & Lloria, M. B. (2022). Green entrepreneurship and SME performance: The moderating effect of firm age. *International Entrepreneurship and Management Journal*, 18(1), 255–275.
- Yousaf, Z. (2021). Go for green: Green innovation through green dynamic capabilities: Assessing the mediating role of green practices and green value co-creation. *Environmental Science and Pollution Research*, 28(39), 54863–54875.
- Yu, P., Hamid, R. A., Osman, L. H., & Liao, J. (2025). Bridging the digital gap: Empirical insights into agri-food supply chain transformation. *Sustainable Futures*, Article 100810.
- Yu, W., Chavez, R., Feng, M., Wong, C. Y., & Fynes, B. (2017). Green human resource management and environmental cooperation: An ability-motivation-opportunity and contingency perspective. *International Journal of Production Economics*, 181, 25–38. <https://doi.org/10.1016/j.ijpe.2016.11.003>
- Yusof, M., Asif, M., Abdikarimova, A., & Shahzad, M. F. (2024). Impact of innovation and sustainability on green entrepreneurship: A bibliometric exploration. *Environment, Development and Sustainability*. <https://doi.org/10.1007/s10668-024-05053-y>
- Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of management review*, 27(2), 185–203.

- Zahra, S. A., Petricevic, O., & Luo, Y. (2022). Toward an action-based view of dynamic capabilities for international business. *Journal of International Business Studies*, 53(4), 583-600.
- Zaid, A. A., & Sleimi, M. (2023). Effect of total quality management on business sustainability: the mediating role of green supply chain management practices. *Journal of Environmental Planning and Management*, 66(3), 524-548.
- Zhang, J., Liang, G., Feng, T., Yuan, C., & Jiang, W. (2020). Green innovation to respond to environmental regulation: How external knowledge adoption and green absorptive capacity matter? *Business Strategy and the Environment*, 29(1), 39-53.
- Zhang, W., Zhong, X., & Li, X. (2024). The impact of degree of internationalisation of MNEs on green innovation performance: The moderating role of absorptive capacity and global dynamic management capability. *Corporate Social Responsibility and Environmental Management*, 31(1), 659-675.
- Zhang, X. E., Wang, W., Teng, X., & Yang, L. (2025). Navigating competitive intensity: The role of digital orientation in SMEs' green innovations. *Journal of the Knowledge Economy*, 16(1), 2880-2908.
- Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*, 111(2), 261-273. <https://doi.org/10.1016/j.ijpe.2006.11.029>

APPENDIX

Measurement Items and Sources

Green Entrepreneurship Orientation (GEO) (Zhang et al., 2020; Song and Yu, 2018):

1. Our firm actively seeks business opportunities with environmental benefits.
2. We prioritize ecological responsibility in entrepreneurial decision-making.
3. Employees are encouraged to propose innovative green ideas.
4. Our firm proactively develops sustainable business models.
5. We emphasise long-term ecological sustainability over short-term gains.

Big Data Analytics Capability (BDAC) (Gupta and George, 2016; Wamba et al., 2017; Mikalef et al., 2020):

1. Our employees have strong analytical skills to interpret big data for decision-making.
2. We effectively integrate big data into our business processes.
3. Our firm uses big data insights to enhance environmental sustainability.
4. Employees utilise big data tools to identify eco-innovation opportunities.
5. We continuously improve our data-driven decision-making capability.

Green Absorptive Capacity (GAC) (Chen et al., 2014; Camisón and Forés, 2010):

1. Our firm quickly identifies and acquires new environmental knowledge.
2. Employees effectively share and disseminate green knowledge internally.
3. We regularly integrate external ecological knowledge into our processes.
4. Our employees have the ability to apply environmental knowledge to new contexts.
5. The firm continuously updates its practices with the latest sustainability insights.

Green Management Practices (GMP) (Zhu et al., 2008; Yu et al., 2017; Saeidi et al., 2018):

1. Our company implements eco-friendly operational practices.
2. Employees are trained regularly on green management systems.
3. We actively measure and monitor environmental performance indicators.
4. Green practices are embedded in our daily decision-making processes.
5. We collaborate with stakeholders to achieve sustainability goals.

Green Innovation (GI) (Chen et al., 2006; Xie et al., 2016; Song and Yu, 2018):

1. Our products are designed with environmentally friendly features.
2. We adopt innovative processes to reduce energy consumption.
3. Our firm invests in technologies that minimise environmental impact.
4. Employees actively contribute to the development of green products and processes.
5. We continuously improve our operations to align with environmental standards.

From Within: Catalysts of Volunteering Self-identity in Malaysian Youth

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ABSTRACT

Volunteer self-identity cultivation is of tremendous significance to Malaysian youths. As inheritors of the country, they must have a strong volunteer self-identity to contribute spiritually or physically to the development of society and the nation. In addition, having a solid volunteer self-identity can foster a productive generation that thinks positively, practices a healthy lifestyle, and avoids social problems. Examining internal factors is crucial for shaping the volunteer's self-identity. These factors can influence a person's desire to get involved in volunteer activities or vice versa. However, a previous study indicates that the youth's desire to internalise the spirit of volunteering remains fragile. Thus, this study will examine the internal factors that can encourage the formation and nurturing of a volunteering self-identity among Malaysian youth. Ten volunteer organisation activists from five Malaysian zones (north, south, central, east coast, and east) participated in this qualitative study through in-depth interviews. The interview data were thematically analysed. The findings indicated four factors that encourage the formation and nurturing of youth volunteer self-identity: internal values, self-awareness, religious beliefs, and self-motivation. The study's novelty lies in its holistic framework, which integrates all research findings to foster volunteer self-identity among Malaysian youth. It emphasises the central role of values like empathy, the impact of self-awareness and long-term perspective, and the influence of Islamic teachings while highlighting practical strategies for enhancing youth volunteerism.

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INTRODUCTION

As a developing nation, there is an urgent need for a younger generation with a strong sense of volunteerism to assist in

areas such as community development, knowledge advancement, and the promotion of unity among citizens. The presence of a volunteering self-identity reflects the youth's patriotism toward their country. Generally, their profound love for the nation and its elements, such as society, peace, ethnic diversity, religion, and culture, can be a primary catalyst for fostering a volunteering self-identity. In this context, cultivating a robust volunteer self-identity becomes crucial, as it demonstrates individuals' commitment to actively contributing to their country's and community's well-being (Ismail, 2021). However, developing this volunteering self-identity in today's increasingly complex world is challenging.

The rapid pace of technological change in today's borderless world has brought significant changes to society and the country. These changes have shifted society's values towards individualism and materialism (Oesterle et al., 2004) and led to a lack of concern for environmental conditions (Mohd Yusof, 2013). Such a situation can cause the tradition of volunteering to fade away (Abdullah, 2001). In this regard, Clary and Snyder (1999) also asserted that a person's involvement in volunteering activities and helping practices fades when society is individualistic. This can be proven by the Malaysian Youth Index (IBM) study by the Malaysian Youth Development Research Institute (IPPBM), which showed a decrease from 67.4 per cent in 2008 to 65.4 per cent in 2011. This study has served as a benchmark for measuring nine youth well-being domains using volunteer indicators

(Mohd Yusof, 2013). In the meantime, the 2019 Malaysian Youth Index Outcome Evaluation study, released by the Malaysian Youth Development Research Institute under the Identity domain, shows that the volunteer indicator remains at a moderate level, with a score of 60.93 per cent. In addition, the evaluation of the volunteering program, especially from the Non-Governmental Organisation (NGO), is at a level of 60 per cent, which is in the satisfactory category. Next, Syed Hussai and Yasin's (2016) study also showed that the youth's appreciation of the spirit of volunteerism is satisfactory. Regardless of the concept of feeling, their study reveals that the spirit of youth volunteering remains fragile.

Various efforts have been made by government agencies at both the federal and state levels, as well as NGOs to encourage community involvement in volunteering activities, especially among the youth, for example, through volunteer activity programmes organised by the Malaysian Association of Youth Clubs (MAYC), and the Malaysian Youth Council (MBM), Yayasan Salam, the Malaysian Relief Agency, and various other NGOs. The government also implements various other initiatives through the Community Service Module, such as *Rakan Muda* Volunteers, Young Volunteer Squad, Crime Awareness Team (CAT), *Anugerah Remaja Perdana*, MyCorps, Impact Malaysia, and the National Service Training Program (PLKN). Despite implementing numerous programmes and volunteering activities, the youth's involvement remains moderate

and satisfactory. The Malaysian Youth Development Institute (2020) has issued a report demonstrating that the Malaysian community has an adequate level of involvement in volunteering. Citizens who love their country should exhibit a high level of volunteerism, not just a satisfactory one. The report stated that 62.9 per cent of the 527 respondents were unaware of the volunteering activities around them, and 58.3 per cent needed to learn about the Malaysian Volunteer Day celebration. The youth's lack of sensitivity towards volunteering activities indicates a weak volunteer spirit. Therefore, as a strong volunteer spirit is crucial to the country's development and progress, this study aims to explore internal factors that can stimulate the cultivation and formation of a volunteering identity among Malaysian youth. In this scenario, internal factors are the foundation for igniting and shaping a person's values. This fact is consistent with Plato (2008), who asserts that examining our internal factors provides insight into our true nature, desires, and beliefs. This self-awareness allows us to align our values with our actions, promoting integrity and ethical conduct.

Conceptualising Volunteering Self-identity

Volunteering activity entails voluntary work, where individuals dedicate themselves or provide services and contributions to assist others, primarily without coercion and with sincere intentions (Bahari, 2003; Che Nawi & Asmuni, 2013), without anticipating any return or material reward,

and completely independent of any external influence (Musick & Wilson, 2003). Wilson (2000) defines volunteering as the act of individuals willingly and selflessly offering their time, skills, and services to various organisations, causes, or communities without expecting monetary compensation in return. It is a voluntary, altruistic activity aimed at improving society, addressing social issues, and building social capital. In this regard, Traeger et al. (2022) emphasise that volunteering is a form of societal engagement, where individuals or groups actively participate in activities that serve the common good, promote social cohesion, and build social capital. It embodies an altruistic commitment to society's welfare, often driven by a sense of social responsibility. Therefore, their involvement in volunteer activities typically lacks a selfish element because the service is provided solely for the good of all parties, thereby improving the quality of human life (Eyeler, 1999; Geiser et al., 2014).

According to Roberts (2006), volunteering is more about sharpening skills, socialising, and having fun with someone else. Meanwhile, Xu and Ngai (2011) noted that actual volunteers should be willing to help, contribute, and extend assistance to others without receiving tangible or intangible rewards. In this case, Musick and Wilson (2003) and Wilson (2000) define a volunteer as an individual or group of individuals who demonstrate exceptional personal characteristics and a sincere commitment to voluntary service, community work, or humanitarian

efforts. They engage in activities such as mutual aid, helping others, and relieving others' burdens.

Volunteering activities are critical to community development because volunteers can contribute expertise, skills, knowledge, and energy to the common good (Putnam, 2000). Without volunteer services, many activities in society and various other sectors cannot operate smoothly (Wu et al., 2009). In this context, such activity can encourage youth development and alleviate the burden on disaster victims. Moreover, it promotes healthy activities and prevents youth involvement in social problems. Many studies have confirmed that participation in volunteer activities has a positive effect on many aspects of youth development, such as social, cognitive, and psychological development (Kuperminc et al., 2001), the development of identity and political awareness (Youniss et al., 2001), the reduction of risk factors (Allen et al., 1994), and the development of autonomy and a sense of belonging together (Allen et al., 1994; McKinney, 2002). In addition, volunteering is also an opportunity for skill and curriculum development (Jardim & Da Silva, 2018).

In fostering the spirit of volunteerism, the element of individual identity is crucial in influencing a person's involvement in this community service activity. Self-identity is defined as unique and special traits or characteristics representing an individual's or a nation's personality (Mohamad et al., 2019). From there, the basis of identity encompasses an individual's personality or

character and self-identification. The essence of a person or a nation is shaped by the appreciation of values, viewpoints, thoughts, attitudes, lifestyles, and beliefs or principles, which, in turn, form its foundation. The self-identity that permeates the human self is a comprehensive formation, shaped by a person's life experiences and facts within the framework of their worldview. Individuals undergo a dynamic process of personality and identity formation, characterised by a structural aspect. The application of self-identity in humans demonstrates self-resilience in physical, emotional, spiritual, intellectual, and values domains (Mohd Yassin & Ahmad, 2018). These identity elements are believed to significantly influence individuals' participation in volunteer activities. In other words, when an individual regularly engages in volunteering activities, it gradually becomes a routine for them. As a result, virtuous practice will be assimilated within individuals and integrated into their core values and self-identity.

LITERATURE REVIEW

Researchers have conducted numerous studies on volunteer activities. Among them is a study by Mohd Yasin (2005) on student volunteering, which examined the relationship between students' levels of knowledge and their levels of involvement in community-level volunteer work. The findings showed that students' involvement in community volunteering activities is relatively low. She found that course load,

cumulative grade point average (CGPA), household income, and knowledge level are not determining factors for the level of student involvement in volunteer work.

Ahmad Salim's (2005) examined student involvement in volunteer activities through various organisations. The results showed that students' level of involvement and their awareness of making contributions to community service remain low. Meanwhile, Isak (2007) examined the influence of prosocial personality traits and motivation on students' current volunteering activities. It revealed a significant difference between involvement in volunteering activities and pro-social personality traits, as well as the influence of motivation. Some other evidence suggests that volunteering may reinforce a prosocial self-identity. He et al. (2023), who conducted a study among Chinese college volunteers, found that positive feedback and ethical reflection in service contribute to internalising moral content and enhancing moral identity. To put it another way, committed volunteers begin to view helping others as part of "who I am". This moral-identity boost is also reciprocal: those with high moral identity are more likely to maintain their volunteering, and volunteering, in turn, strengthens their moral self-concept. In this regard, volunteering appears to be an integral part of adolescent identity development. Service participation contributes to shaping individuals' life goals and self-concepts, according to empirical investigations. For example, in the Hong Kong context, Xu and Liu (2021) reported that secondary students

who participated more in the CS program showed better identity statuses (i.e., from "diffusion" to "achievement"), with this result being more pronounced for domains of occupation and lifestyle. They also found that longer duration of community services was associated with advanced identity statuses, particularly in occupational and lifestyle categories. Interviews from the project participants discovered that service experiences that were impactful and transformative were likely to have assisted students in forming career or self-goals, resulting in the ability to internalise a sense of service. Thus, one could contend that these studies support the notion that youth volunteering facilitates civic and moral identity, offering young people a sense of purpose in life, a sense of belonging to a community, and ethical values. However, in the international setting, more research across different domains is needed.

Apart from that, Mohd Kasim's study (2008) focused on students' levels of knowledge, types of volunteer work, and level of involvement in community volunteer work. He indicated that students have a high level of knowledge about volunteering activities; however, their level of involvement is low. In addition, his research also revealed that many students are involved in various types of volunteer work through special programmes such as Bakti Siswa, Adopted Village Program, Recycling Campaign, Donation Collection, and Blood Donation Campaign. Next, Johar's (2008) study examined the relationship between self-motivation and the level of involvement

in volunteering among students. Her research revealed a significant relationship between factors influencing volunteering activities, the type of activity, self-motivation, and student involvement levels. Meanwhile, current studies indicate that a combination of intrinsic and instrumental motivation underpins youth volunteerism. Nevertheless, recent syntheses stress the prevalence of internal (self-determined) determinants in maintaining engagement. Studies based on Self-Determination Theory show that while young people also often report making rational calculations (skills, career) of the natural goods of intrinsic motives, such as meaning, moral values and personal growth, better predict sustained participation (e.g., employability research urges that meaning and development of skills work in concert). Empirical studies and policy syntheses since 2020 also strengthen our conclusion that volunteering's motivational architecture is multidimensional: values and purpose ignite initial engagement, and tangible gains (skills, social capital) help keep the flames alight. This joint pattern also means that one-sided analyses restricted to "functionalistic" gains or to the pure altruistic dimension would not capture how motives intertwine when a sustainable volunteering orientation is created (Giancaspro & Manuti, 2021; IAVE, 2022).

In addition, Mohamed Alauddin and Muhamad (2013) studied the motives of volunteer involvement in sports-related activities. They discovered that understanding and moral values are the most motivating factors in sports volunteers' participation. Their study also revealed that

gender factors do not affect the motivation for sports volunteer involvement. There is a significant difference between male and female volunteers regarding value-motivated participation and understanding. Meanwhile, Che Nawi and Asmuni (2013) focused on studying volunteers' motivation for involvement in voluntary work. They found that volunteers are highly motivated by values, understanding, protection, career, social connections, and self-improvement (self-esteem). Similarly, Sharififar et al.'s (2011) research found a relationship between motivational factors and volunteers' interest and commitment. Motivational factors play an essential role in fostering a volunteer's interest and commitment. A sense of responsibility closely relates to commitment. Thus, volunteers often engage in charitable activities due to a sense of social responsibility and a desire to positively impact their communities. In the meantime, Lee Abdullah et al. (2006) found that male trainees showed higher values of patriotism, unity, and volunteering than female trainees. His study focused on the values of nationhood among the National Service Training Program (PLKN) trainees. Similarly, Ahmad Ibrahim (2004), who conducted a study on the recruitment of trainees for PLKN volunteering, found that participants' problems and personal development significantly affect the success of the volunteer spirit. Most 18-year-old trainees are still emotionally and intellectually immature, lead an independent social lifestyle, and prioritise fun over volunteer work.

A study by Caldwell et al. (2008) further substantiated this point, demonstrating that individuals are often too young to overlook the genuine significance of volunteering. Therefore, Schlegelmilch and Tynan (1989) believed that young people need to enhance their knowledge, as it forms the basis for self-development and social work potential.

In this regard, Syed Hussai and Yasin (2016) focused on studying volunteerism in the context of youth appreciation levels, based on six perceptions of appreciation: understanding, feeling, belief, practice, attitude, and motivation. The findings showed that the youth's appreciation of the spirit of volunteering is satisfactory, except for the feelings and motivation construct. Their study revealed that the spirit of volunteerism remains fragile in terms of the emotional construct. This is because the youth are unwilling to volunteer in areas that are diseased, dirty, and lack public facilities. Abdul Rahman's (2018) study found that a moderately high level of involvement among early adults in volunteering activities could affect their well-being. His study also proved that there is a significant relationship between the level of participation in voluntary activities and personal factors (religious beliefs, altruism, and compassion), social influence factors (parents and family influence, peer influence, and mass media influence), as well as characteristic factors of voluntary organisations (volunteer leadership and management, incentives, and reputation). Indeed, volunteering is only one facet of broader youth civic engagement, which includes community engagement, social

action, and democratic participation. Researchers stress the importance of civic engagement (including service) for a healthy democracy and for personal development among young people. Some research findings also established that civic and political engagement helped youth fulfil a “need to belong”, learn civic skills, and work on social issues in their communities (Biolik et al., 2025; Ku Samsu, 2022). The OECD (2024) has also observed that programmes of youth volunteering can facilitate the development of “confidence in other forms of civic engagement, skills building as well as identification with democratic institutions” as well as fostering solidarity, inclusion and societal resilience. In fact, engaging in volunteer service can assist young people in developing social capital and social trust, as well as cultivating a civic identity and practising being active citizens in the future. Thus, the literature treats youth volunteerism both as a product of civic-minded values and as a potential catalyst that enhances civic knowledge, engagement, empowerment and community connectedness (Mohd Nizah et al., 2015). Applying the value of volunteering awareness to individuals is one way to improve the sustained involvement of youth in volunteering activities. Their involvement must be appreciated (Tessier et al., 2006). Applying volunteer values will make a person more positive and help the youth develop leadership and decision-making skills. Their role is also crucial in helping prepare youth for future careers (Grant et al., 2020). In this regard,

volunteering has been associated with increased social capital, improved mental health, and enhanced overall well-being. Whether planned by the government, voluntary organisations, or NGOs, a country's successful implementation of youth development policies and agendas depends on volunteers at various levels (Bang & Ross, 2009). The activities of youth organisations are also challenging to move forward without volunteerism and support among these young people (Syed Hussai & Yasin, 2016). Furthermore, many recent studies have proven that individual willingness to volunteer depends more on personal interests and needs than traditional values such as serving others and a sense of responsibility to the local community (Jardim & Da Silva, 2018). As such, by using a qualitative design, this paper will explore factors within the individual that may promote, precipitate, or foster volunteer activity among youth. The qualitative method was considered a suitable method for enhancing insight into how internal values, self-reflection, religious belief, and individual motivation influence the volunteering self-identity of Malaysian youth. Qualitative in-depth interviews offer the depth and context sensitivity essential to uncover participants' subjective meanings and the subtle interaction of insight from internal factors that are hard to capture using standardised quantitative surveys.

METHODOLOGY

This study is grounded in an interpretivist paradigm. Interpretivism posits that there

are “multiple subjective realities, each of which is socially constructed by and between individuals” (Brown & Dueñas, 2019). In this view, volunteering self-identity is co-constructed through individual experiences and social context rather than a single objective trait. Knowledge is regarded as subjective and negotiated between people, so the study attempts to understand how participants make meaning of their own values, beliefs, and motivations. This research employed a qualitative design, drawing on both primary and secondary sources of data. Secondary information was obtained through a review of relevant literature, including books and scholarly journals, while primary data were collected through in-depth interviews with 10 selected informants. Before beginning the data collection, the study protocol was submitted to and approved by the Universiti Putra Malaysia Institutional Review Board. All participants provided written informed consent and were assured that their identities and responses would be kept confidential and anonymous. Purposive sampling techniques have been used to select informants who are the leading activists in volunteer organisations. The informants were selected from five zones in Malaysia, namely the central zone (Kuala Lumpur, Putrajaya, Selangor, and Perak), the eastern zone (Kelantan, Terengganu, and Pahang), the northern zone (Perlis, Kedah, and Penang), the southern zone (Negeri Sembilan, Johor, and Melaka), and the east Malaysia zone (Sabah and Sarawak). Each zone involves as many as two informants,

especially among the leaders of voluntary organisations, such as the president or chairman of the organisation. Determining the number of informants depends on the level of data saturation achieved (Guest et al., 2006). In this study, data saturation was reached by the tenth interview, when no new themes emerged in subsequent interviews, indicating that additional interviews were unlikely to yield new insights.

An interview protocol was prepared as a guide before each interview to ensure it was focused and systematic. Krueger (1994) suggested five parts of the protocol: opening, introductory, transition, key, and closing questions. The interview questions were constructed as semi-structured items, allowing the researcher to add questions as needed while addressing the research objectives. Experts in the field reviewed and validated the interview protocol. All interviews were audio-recorded.

After completing the interviews, the researcher reviewed the recordings by playing back the conversations. The recordings were transcribed verbatim by the researcher. The coding process was then carried out, which sought to establish the main themes and sub-themes to answer the research question (what are the internal factors that can stimulate the cultivation and formation of a volunteering identity among Malaysian youth?). Coding was performed manually by the researcher, without the use of qualitative software, to maintain close contact with the data. The author read the transcripts by herself and coded the texts. These codes were subsequently grouped

into higher-order themes for abstraction. Four internal factors have been successfully identified: internal values, self-concept, religious beliefs, and self-motivation, which contribute to the cultivation of a volunteering self-identity among Malaysian youth. The sub-themes identified include love, sacrifice, empathy, interest, and self-satisfaction.

FINDINGS AND DISCUSSION

According to the research findings, four internal factors contribute to the formation and nurturing of volunteer self-identity among Malaysian youth. Figure 1 integrates these four factors into a unified framework, showing how internal values, self-awareness, religious beliefs, and self-motivation interact to strengthen volunteering self-identity.

Internal Values

The good values in everyone are the main force that encourages them to help others in need voluntarily. Socialisation agents such as family, environment, peers, and educational institutions can nurture and instil these values from a young age. In this regard, the informants have listed values that can foster volunteerism among youth. Informant A explained that:

...love for community members is a great value that must be in us... We don't want them to be in trouble, so we need to help. With the help given, the love between the giver and recipient will create a good relationship in the community...

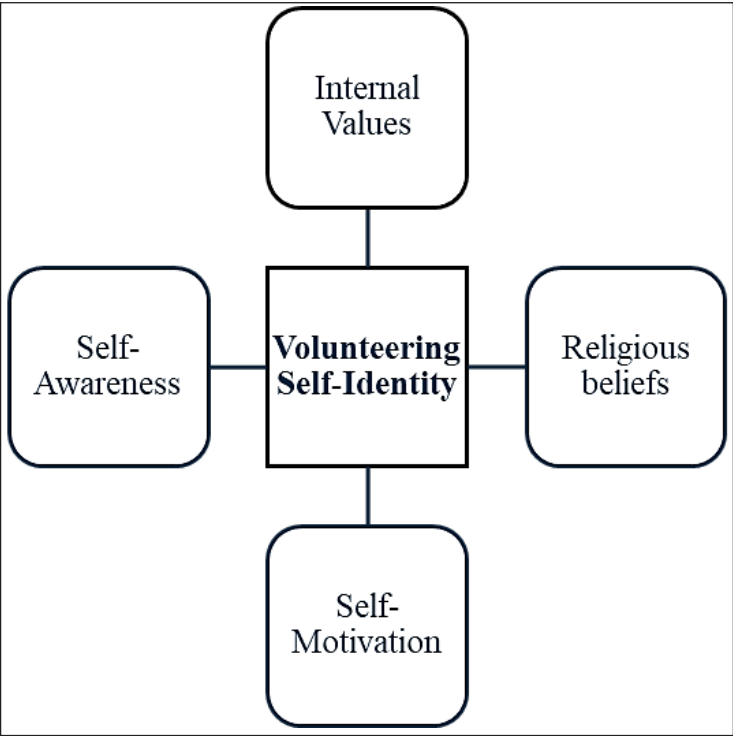


Figure 1. Internal factors contributing to the formation of volunteer self-identity

Informant A emphasised the value of love, which is necessary in a society. Practising these values will also positively affect long-term relationships among community members. This assertion aligns with Putnam’s explanation (2000).

Love, particularly within families and communities, creates strong social bonds and a sense of belonging. These bonds foster cooperation and mutual support, essential for building harmonious societies.

When this value of love exists, other related values, such as empathy, will also appear. Decety (2011) confirms this by explaining that love can foster empathy and

enable individuals to connect emotionally with others. This empathy can reduce prejudice and promote tolerance, crucial elements for peaceful coexistence (Batson et al., 2007; Mohd Nizah et al., 2015). In this regard, Informant A added:

...there needs to be empathy and sympathy...it starts with a feeling of love for the people around us. We watch through social media (other people's suffering), we feel sad and want to help and listen to their expressions.

The love factor also encourages youth to sacrifice time, energy, and money to participate in volunteer organisations.

Informant B's statement clearly illustrates this:

...yes, sacrifice, but not everyone is willing to do all that (volunteer activities), the willingness to sacrifice comes from oneself. After graduating, my first post was at the state youth council, especially at the Peninsular Malay Students Association (GPMS). People often say that knowledge is the foundation of love. When we get to know this youth organisation, we will start to like it, and at the same time, we will be willing to work together regardless of any situation... and face all the obstacles together...

This indicates that the value of love is a driving force that also brings to light other internal values, such as empathy and a willingness to sacrifice. Therefore, this factor plays a significant role in shaping the identity of youth volunteering, as these internal values stem directly from their hearts and manifest themselves through their involvement in volunteer organisations.

Volunteering awareness is fundamentally connected to one's internal values, and among Malaysian youth, these values are pivotal in shaping a robust volunteering self-identity. Internal values, including deep-seated principles and moral beliefs, serve as the cornerstone for youths' decisions about whether to engage in volunteer activities. The study reveals various facets of life, such as family upbringing, educational environments, cultural influences, and peer interaction. Youth are more likely to

volunteer if they are instilled with values that emphasise community, empathy, and helping others. These values are nurtured from early ages and can shape young people's continued engagement in civic life, such as promoting empathy. We are not suggesting that empathy can automatically lead to positive outcomes. However, understanding and sharing expressions and emotions among young people may foster an intention to take positive actions that improve conditions for oneself and others. Similarly, a spirit of sacrifice can lead the young to expend their time and talent for the community.

Essentially, it is the core values that guide decision-making processes to encourage volunteering among young people. Mokhzan et al. (2023) posit that internal values are important in encouraging youth volunteerism. Those values provide a robust framework for youth to evaluate their actions and potential contributions to society. The study concludes that nurturing positive internal values in youth is critical to developing a strong volunteer self-identity. This is instrumental not only in fostering a generation that actively contributes to society's betterment but also in encapsulating a collective spirit of volunteerism that transcends individual actions and shapes the nation's social fabric. In fact, a phenomenological study in Saudi Arabia reveals that internal values, such as love for their country, as reflected in university students' participation in voluntary activities (e.g., national service programmes), reinforce young people's civic

and national identity. Respondents felt that volunteering promoted a stronger sense of citizenship and patriotism and greater pride towards their nation, aligning personal engagement with Saudi societal goals. In practice, students viewed their service as contributions to the country's Vision 2030 agenda; thus, it reinforced their sense of belonging to the country (Alotaibi, 2025). This indicates that in specific situations, youth volunteerism is explicitly linked to the construction of national/cultural identity, and that the learning of service serves as a vehicle through which youth are enabled to internalise and verbalise collective values and patriotism.

By internalising these values in their behaviour, youth can construct a robust volunteering self-identity and express their community service as a commitment. In this way, when young people engage in volunteer work motivated by internal values, they feel a sense of responsibility and a spirit of goodwill. These values could, in turn, translate their sentiment into durable action and traction for building the nation through social trust, cross-group cohesion, civic networks, and leadership pipelines. In practice, these values may be fostered via service-learning, facilitated reflection, value-based recognition, and partnerships with a religious or cultural institution. It is a positive manifestation that investing in these self-internal values not only boosts volunteer numbers but can also produce sustainable citizens who would promote the long-term growth and expansion of the nation.

Self-awareness

If individuals are self-aware of the importance of engaging in voluntary activities, they will quickly form their volunteering self-identity. In this context, informant A made the following assertion:

...when we are at home, we don't see this thing, but when we join them, we can see people's hardships... we will feel sad and think of helping them...

Informant A noted that participating in volunteer activities allows individuals to witness hardships firsthand, fostering empathy and a desire to help. This self-awareness motivates youths to contribute to societal welfare to help those in need. Informant C added:

I want to do something for my generation and society. I don't want to see the mess happening in my old age in the future generation, and I regret that I didn't do anything then. At least I can tell my grandchildren later, "I've done this, I've done that." Therefore, now is the time to take your management skills to the next level.

He envisions a future where a lack of effort to assist the community today will disappoint him. For him, the current generation determines the future of the next generation. Therefore, this self-awareness will motivate him to volunteer to help the community. Self-awareness significantly contributes to the development of volunteer self-identity among youths by enabling

them to recognise the importance of their actions within the broader context of society and the future. Through self-awareness, young individuals recognise their capacity to contribute to societal welfare and development (Grönlund, 2011). They become aware of the potential long-term effects of their current actions, instilling a sense of responsibility to act in the present to ensure a more positive outcome for the community. This self-awareness transcends immediate gratification, directing youth towards actions that may require personal sacrifice but contribute to the greater good. An increased understanding of the community's needs and a vision for its future motivates youth to volunteer time, effort, and resources, framing their voluntary contributions as investments in societal well-being.

The study highlights how individual reflections on the self and the community motivate volunteers. Youths' awareness of their influence and role within their community reinforces their identity as volunteers, grounding their commitment to voluntary service in a strong sense of self and communal agency. The result is often a readiness to engage more deeply and meaningfully with volunteer opportunities, driven by an understanding that their actions are integral to the collective effort to foster a robust, thriving community for current and future generations. In this context, self-awareness allows individuals to perceive their role within the broader societal context. By recognising the long-term effects of their actions, youths develop a sense of agency

and moral responsibility, which shapes their identity as volunteers. This process involves reflecting on personal values and societal needs, leading to a deeper integration of volunteerism into their self-concept. Indeed, this can prevent volunteers' involvement from being episodic. This can be observed through a longitudinal study by Wakefield et al. (2022), which demonstrated that reflection and moral reasoning play a role in changing episodic participation into a sustained donor role identity. Results indicated that having been exposed to suffering, considering future commitments, and perceiving volunteering as an investment in a stable future role (as opposed to a transient behaviour) are associated with volunteering.

Moreover, self-knowledge could make a strategic contribution to nation-building through volunteering. When young people take time to consider their values, future impact, and civic roles, episodic helping is transformed into sustained civic engagement, resulting in leaders, problem solvers, and accountable citizens. In communities of high self-awareness, volunteers were more likely to pursue service for conscientious rather than egoistic reasons, to persist in long-term roles and to apply their service experiences to public problems, such as public policies, social entrepreneurship, local relationships and community institutions. These efforts might help develop social capital, civic capacity, and resilient leadership pipelines for the country. Policymakers and educators can hasten this outcome by integrating guided reflection, mentorship and civic

framing into volunteer programmes, so that service becomes not simply an activity but a conscious investment in national coherence and advancement.

Religious Beliefs

Religion has also been found to be a catalyst for the formation of youth volunteering identities. This is because religion teaches its followers to do good. Informant C asserted that:

...the religious factor is the main factor in how we are taught in Islam so that we are always virtuous and devoted to others, especially our parents and society. And the Prophet's hadith said that the best human beings are those who benefit others.

Informant D added:

...we have to think that this voluntary work is a form of worship ... Make it a form of worship where when we do it, we want good for those who are helped and for ourselves...

Since religious teachings are beneficial, they can even serve as a form of worship, and both informants agree they can play an essential role in fostering the spirit of volunteering among youth. Religious beliefs significantly influence Malaysian youth's volunteering activities because they are framed within the context of faith and spiritual fulfilment. The study emphasises how religion, particularly Islam in the Malaysian context, encourages a philosophy of benevolence and contribution to

community well-being. The teachings of the religion, which underscore the importance of virtue and devotion to others, resonate with young people, often motivating them to volunteer as an expression of their religious convictions. For many youths, aligning volunteer activities with religious teachings becomes a compelling aspect of their identity. Volunteering is not only a social or altruistic endeavour, but also a spiritual one, as individuals perceive their acts of service as extensions of their religious life. In this light, volunteering is perceived as a form of worship, an avenue through which they can practice their faith's principles, such as compassion and service to others, creating a strong link between their voluntary actions and their religious self-identity.

Given this, religious beliefs provide a potent impetus for volunteering among youth, shaping their motivations and reinforcing their commitment to service. Imbuing volunteer work with religious significance fulfils a social purpose and spiritual duty, enriching the volunteer experience. This integration of volunteering into the spiritual lives of individuals fosters a holistic approach to volunteerism, where helping others transcends the physical act and becomes part of a larger, divine narrative of living one's faith through service.

Substantially, religious beliefs play a crucial role in defining an individual's moral and spiritual identity. By aligning volunteer activities with religious teachings, youths could integrate their faith into their actions, creating a holistic approach to volunteerism that transcends physical acts and becomes

part of a larger, divine narrative. This integration enhances their sense of purpose and commitment, reinforcing their identity as volunteers who serve both societal and spiritual goals.

In this regard, religious convictions can be a powerful motivator for volunteerism that contributes to the nation's development. When service is defined as a spiritual act, it is experienced as a form of worship, compassion and ethical responsibility. It thus shifts from an optional civic activity to an act of identity and conscience. Because religious beliefs generally promote the values of generosity, caring for the needy, and collective responsibility, volunteers with a strong faith commitment can be expected to sustain long-term commitment and model prosocial norms that strengthen social ties and trust between neighbourhoods.

Self-motivation

Self-motivation also plays a vital role in encouraging youth to participate in volunteer activities, allowing them to shape their volunteering self-identity. This can be traced through informant E's statement:

...I am really interested in participating in volunteering activities....my soul is really in that direction. If I want to say that I'm chasing money, I will not participate in this activity...

In this regard, certain elements can increase their motivation to participate in volunteering activities, such as self-satisfaction. Informant A explained:

...satisfaction. I don't know about other people, but for me when I participated in volunteering work, I feel satisfied, and I want to do it again and feel satisfied again.

The next step is appreciation. Giving them gifts, praise, or money will encourage them to engage in voluntary work. The statements made by informants B and A illustrate this:

Next is the recognition, indeed, the Ministry of Youth and Sports holds the State and National Youth Premier Awards (APN) every year. Three categories are contested: men, women, and youth organisations. Today's young generation wants to be appreciated. I always praise the volunteers of my organisation excessively for all their efforts...they also expect tokens. Usually, if the area is far away, there must be a token of RM50 to RM100 for them to fill up with car fuel and food.

Thus, the elements of self-motivation that can form the identity of youth volunteering can be divided into intrinsic and extrinsic motivations. Intrinsic motivations, rooted in personal values, altruism, and a sense of purpose, are pivotal in propelling individuals toward engaging in volunteer activities (Deci & Ryan, 2000). When volunteering aligns with an individual's core values, it fosters a stronger sense of identity and commitment. In this sense, it leads individuals to engage in volunteer activities that resonate deeply with their

personal beliefs and a desire to fulfil a felt sense of responsibility towards others. This is often the most potent source of motivation, because it is based on the individual's personal values and the reward of helping themselves. External motivation is associated with extrinsic factors, such as recognition, rewards, and opportunities for skill development, that support the volunteer's continued survival (David et al., 2016). While this type of external reward may reinforce people's initial motivation to volunteer, it can complement other motivators to enhance the volunteer experience and ultimately sustain volunteer engagement.

Self-motivation is a complex interplay between the internal fulfilment that comes from contributing to a cause one values and the external recognition that reinforces one's social standing and sense of contribution. Intrinsic and extrinsic motives are both necessary for cultivating a volunteering self-identity among Malaysian youth. Programmes and policies that recognise and draw upon both types of motivation may be more successful in motivating youth to volunteer, not only as a single event but as a lifelong habit. By acknowledging the many reasons young people volunteer, campaigns to promote volunteering can help build a committed, sustainable generation of youth volunteers. Intrinsic and extrinsic motivations could contribute to the development of self-identity through volunteering, as individuals engage in activities that align with their personal values and receive social recognition. Additionally,

internally driven volunteering motivations, such as enjoyment, skill development, and recognition, can be seen as sources of self-motivation. They could contribute to nation-building by converting personal development into collective resources. This approach enables young people to acquire employable skills, engage in active citizenship, and develop leadership abilities.

In this sense, internal drives described in the theme of self-motivation are distinct from those related to internal values. Internal values are deeply rooted altruistic normative beliefs, such as empathy, compassion, love, and a sense of social duty, that underpin the moral basis of volunteering. On the other hand, self-motivation consists of the volunteer's objectives and motivations (i.e., development, self-improvement, and satisfaction) that force them into action. In this analysis, internal values were articulated by participants as love, sacrifice, and empathy for others. In contrast, self-motivation was characterised by the internal satisfaction and self-actualisation gained from helping. By separating these, it is highlighted that values give rise to the volunteer's sense of purpose, while self-motivation captures the drive to act on those values.

Theoretical Contribution

This study contributes to the development of a holistic framework that integrates internal factors to shape volunteering self-identity among Malaysian youth. The development of a framework that incorporates internal values, self-awareness, religious beliefs, and self-motivation is seen as improving

existing theories and addressing critical gaps in research on volunteering self-identity. In this context, this framework refines Identity Theory (Burke & Stets, 2009) by identifying internal mechanisms that can set standards for volunteering self-identity. Identity Theory emphasises the process of identity validation. However, role identity, one of the main foundations of shaping one's identity, is not linked to internal factors that sustain one's self-identity. Therefore, this framework is seen to fill this gap and thus expands identity theory beyond its mostly secular Western applications, especially those related to religious beliefs. In addition, this framework extends Self-Determination Theory (Deci & Ryan, 2000) by showing how internal values and religious beliefs provide the basis for autonomous motivation. It shows that both intrinsic motivation (inner satisfaction, genuine interest) and extrinsic motivation (recognition, appreciation) contribute to the development of volunteering self-identity. In fact, this framework also shows how volunteering fulfils the three basic needs of Self-Determination Theory: autonomy, competence and relatedness.

CONCLUSION

In the end, developing volunteer self-identity among Malaysian youth is a more holistic process that includes internal values, impact of self-awareness, religious perceptions and internal motivation. The interplay of these different determinants appears to shape young people's volunteer self-identity and, through this, lay the foundation for

their inclination towards volunteering and active community contribution. Intrinsic values, such as love, empathy, and sacrifice, are considered primary motivators for volunteering. Young people who care about their communities and their fellow citizens are more likely to volunteer. These intrinsic values need to be nurtured, as does the intrinsic sense of self in society and in relation to family, peer group, and school. Realising the deep connection between these values and volunteering behaviours is crucial for the instillation of social responsibility among the youth of Malaysia. Self-awareness and concern for the impact of one's behaviour on society, especially, are crucial. Youth who understand that they can contribute to their communities are more likely to volunteer. This awareness is also a prospect-oriented one, as young people consider their actions in the present and shape future generations. Ensuring young people understand the lifelong impact of their participation in volunteering can help them feel more purposeful and engaged.

The power of religious doctrine cannot be underestimated. Islam, the main religion in Malaysia, preaches kindness, compassion and helping people. These lessons in an educational and community setting can help to create an ethical culture of volunteering. Religious figures and institutions can also play a significant role in fostering volunteering as a religious obligation and encouraging active participation among young people. Both internal and external motivation contribute to volunteering engagement. Internal motivations, such as

personal values and the meaning of one's life, promote a strong sense of identity as a volunteer. External motivations, such as acknowledgement and incentives, act together as a reinforcement tool, recognising the commitment to volunteerism and encouraging volunteers to continue. Introducing reward systems for volunteer **programmes** can motivate volunteers, retain them over time, and motivate others to get involved in volunteering.

Policy makers, schools and NGOs also have to work together so that a positive environment for voluntary action can emerge. Through education, curricula that promote empathy, compassion, and taking responsibility for society can be introduced early in life to develop generations that will be responsible for others. In addition, NGO- and government-funded community projects can create opportunities for young people to engage in meaningful volunteer experiences. To complement these endeavours, future research should adopt a quantitative approach using a more representative sample to isolate the specific factors that promote volunteer self-identity among Malaysian youth. Hence, it could contribute to more focused and successful interventions to promote continued volunteer engagement.

To sum up, developing the volunteer self-identity among Malaysian youth requires a comprehensive strategy that incorporates their inner values, self-identification, and religious motivation. By establishing an ecosystem that supports these initiatives, Malaysia can proactively empower its young

generation to contribute to the community's overall development and, consequently, society's well-being, ultimately forming a more caring and understanding nation for the next generation.

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REFERENCES

- Abdul Rahman, N. (2018). *Tahap penglibatan dalam aktiviti sukarela dan kesannya terhadap kesejahteraan diri golongan awal dewasa di Kedah* [Unpublished master's thesis]. Universiti Sains Malaysia.
- Abdullah, S. (2001). *Gerakan kesukarelaan menjana perubahan bermakna*. Majlis Belia Malaysia, Yayasan Salam Malaysia, & Akademi Belia.
- Ahmad Salim, A. A.. (2005). *Penglibatan mahasiswa dalam aktiviti kesukarelawan: Satu kajian kes di Fakulti Ekologi Manusia, Universiti Putra Malaysia* [Unpublished final year project]. Universiti Putra Malaysia.
- Ahmad Ibrahim, M. A. (2004). *Kajian Program Latihan Khidmat Negara (kumpulan "hardcore")* [Research report]. Universiti Sains Islam Malaysia.
- Allen, J. P., Kuperminc, G., Philliber, S., & Herre, K. (1994). Programmatic prevention of adolescent problem behaviours: The role of autonomy, relatedness, and volunteer service in the Teen Outreach Program. *American Journal of Community Psychology*, 22(5), 617-638.

- Alotaibi, A. S. (2025). The role of volunteer work programmes in promoting national identity among university volunteers in achieving Saudi Vision 2030. *International Journal of Asia Pacific Studies*, 21(1), 95-121. <https://doi.org/10.21315/ijaps2025.21.1.4>
- Bahari, A. (2003). *Menghayati kerja sukarela*. Qarya Sdn. Bhd.
- Bang, H., & Ross, S. D. (2009). Volunteer motivation and satisfaction. *Journal of Venue and Event Management*, 11, 61-77.
- Batson, C. D., Ahmad, N., & Tsang, J. A. (2007). Four motives for community involvement. *Journal of Social Issues*, 63(3), 429-445.
- Biolik, E., Morón, M., Jach, Ł., & Atlas, K. (2025). Youth civic engagement during the COVID-19 pandemic: Promotive factors and correlations with mental health. *Current Psychology*, 40(3), 345-362. <https://doi.org/10.1007/s12144-025-08296-8>
- Brown, M. E. L., & Dueñas, A. N. (2019). A medical science educator's guide to selecting a research paradigm: Building a basis for better research. *Medical Science Educator*, 30(1), 545-553. <https://doi.org/10.1007/s40670-019-00898-9>
- Burke, P. J., & Stets, J. E. (2009). *Identity theory*. Oxford University Press.
- Caldwell, C., Hayes, L. A., Karri, R., & Bernal, P. (2008). Ethical stewardship: Implications for leadership and trust. *Journal of Business Ethics*, 78, 153-164.
- Che Nawi, N. A., & Asmuni, A. (2013). Motivasi sukarelawan terhadap penglibatan dalam kerja sukarela di Yayasan Salam Malaysia. In *Prosiding Seminar Pasca Siswazah dalam Pendidikan*. Fakulti Pengajian Pendidikan, Universiti Putra Malaysia.
- Clary, E. G., & Snyder, M. (1999). The motivations to volunteer: Theoretical and practical considerations. *Current Directions in Psychological Science*, 8, 156-159.
- David, H., Sardinha, B., Moldavanova, A., Dong, H.-K. D., Kassam, M., Lee, Y.-J., & Sillah, A. (2016). Conducive motivations and psychological influences on volunteering. In H. S. David, J. Grotz, & R. A. S. (Eds.), *The Palgrave handbook of volunteering, civic participation, and nonprofit associations* (pp. 702-751). Palgrave Macmillan.
- Decety, J. (2011). The neuroevolution of empathy. *Annals of the New York Academy of Sciences*, 1231(1), 35-45.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Dorsch, K. D., Riemer, H. A., Sluth, V., Paskevich, D. M., & Chelladurai, P. (2002). *What affects a volunteer's commitment?* Canadian Centre for Philanthropy.
- Eyler, J. (1999). *Where's the learning in service-learning?* Jossey-Bass.
- Geiser, C. H., Okun, M. A., & Grano, C. (2014). Who is motivated to volunteer? A latent profile analysis linking volunteer motivation to frequency of volunteering. *Psychological Test and Assessment Modeling*, 56(1), 3-24.
- Giancaspro, M. L., & Manuti, A. (2021). Learning to be employable through volunteering: A qualitative study on the development of employability capital of young people. *Frontiers in Psychology*, 12, Article 574232. <https://doi.org/10.3389/fpsyg.2021.574232>
- Grant, S., Maass, S., Vetter, R., Harrington, R., O'Neil, K., McGlaughlin, P., & Good, T. (2020). The impact of volunteering: A multi-state study of 4-H youth development volunteers. *Journal of Youth Development*, 15(4), 32-50.
- Grönlund, H. (2011). Identity and volunteering intertwined: Reflections on the values of young adults. *Voluntas*, 22, 852-874. <https://doi.org/10.1007/s11266-011-9184-6>

- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, 18(1), 59-82.
- He, X., Zhang, J., Yang, J., & Liu, D. (2023). Mediating role of self-efficacy and moral identity in volunteer service and public service motivation among Chinese college students. *Scientific Reports*, 15(1), Article 10676. <https://doi.org/10.1038/s41598-025-95266-6>
- International Association for Volunteer Effort (IAVE). (2022). *Youth volunteering and employability: Challenge paper (IAVE challenge papers)*. <https://www.iave.org>
- Isak, S. N. (2007). *Pengaruh ciri personaliti prososial dan motivasi terhadap penglibatan aktiviti kesukarelawanan di kalangan mahasiswa Universiti Putra Malaysia, Serdang, Selangor* [Unpublished final year project]. Universiti Putra Malaysia.
- Ismail, M. M., Hassan, N. A., Abdullah, A., Mak Din, H. A., Md Yunus, M., & Mohd Noor, M. (2021). Dimensions of national ethos among educated youths in Malaysia. *Pertanika Journal of Social Science & Humanities*, 29(3), 1783-1808.
- Jardim, C., & Da Silva, S. M. (2018). Young people engaging in volunteering: Questioning a generational trend in an individualised society. *Societies*, 8(8), 1-11.
- Johar, N. (2008). *Motivasi diri dan tahap penglibatan melakukan kerja-kerja kesukarelawanan di kalangan mahasiswa Universiti Putra Malaysia, Serdang* [Unpublished final year project]. Universiti Putra Malaysia.
- Krueger, R. V. (1994). *Focus groups: A practical guide for applied research*. SAGE Publications.
- Ku Samsu, K. H. (2022). Pematuhan undang-undang sebagai manifestasi patriotisme: Pengajaran daripada pengalaman Malaysia mengawal penularan pandemik COVID-19. In M. I. Mohd Zain, A. Ab Halim, & M. Mahadee Ismail (Eds.), *Politik, etnisiti & peradaban: Malaysia pasca 2020* (pp. 135-146). Penerbit UPM.
- Kuperminc, G. P., Holditch, P. T., & Allen, J. P. (2001). Volunteering and community service in adolescence. *Adolescent Medicine: State of the Art Reviews*, 12, 445-457.
- Lee Abdullah, M. A. I., Abdul Aziz, A. R., Ishak, M. S., & Brahim, M. (2006). *Laporan kajian nilai-nilai kenegaraan dalam kalangan pelatih-pelatih khidmat negara siri empat* [Research report]. Universiti Utara Malaysia.
- Malaysian Youth Development Institute. (2020). *Laporan tahunan dan penyata kewangan*. <https://iyres.gov.my/images/penerbitan/Laporan%20Tahunan/Laporan%20Tahunan%20dan%20Penyata%20Kewangan%20IYRES%20Tahun%202020.pdf>
- McKinney, K. G. (2002). Engagement in community service among college students: Is it affected by significant attachment relationships? *Journal of Adolescence*, 25, 139-154.
- Mohamad, A. S., Che Noh, N., & Jamsari, E. A. (2019, October 19). Jati diri kanak-kanak Melayu-Islam menerusi pendidikan awal [Conference paper]. *Seminar Tamadun, Etnik dan Turath Islami*, Universiti Sains Islam Malaysia. <https://ppt.usim.edu.my/wp-content/uploads/2019/11/eProsiding-i-STET-2019-latest.pdf>
- Mohamed Alauddin, A. N., & Muhamad, T. A. (2013). Motif penglibatan sukarelawan sukan institusi pengajian tinggi. In *Proceedings of the World Conference on Integration of Knowledge*, Langkawi, Malaysia (pp. 205-212). <https://eprints.upj.ac.id/id/eprint/4479/2/Cover%20daftar%20isi%20dan%20artikel%20pedagogical%20implications.pdf>
- Mohd Kasim, M. I. (2008). *Penglibatan mahasiswa institusi pengajian tinggi swasta dalam kerja-kerja kesukarelawanan komuniti: Satu kajian kes di kalangan mahasiswa Universiti Tenaga Nasional dan Kuala Lumpur Infrastruktur*

- Universiti Kolej* [Unpublished final year project]. Universiti Putra Malaysia.
- Mohd Nizah, M. A., Ku Samsu, K. H., Abdul Azzis, M. S., & Abu Bakar, A. R. (2015). Ethnic tolerance in urban Malaysia. *Advanced Science Letters*, 23(4), 2637-3816.
- Mohd Yasin, F. N. (2005). *Pengetahuan dan penglibatan dalam kerja-kerja kesukarelawanan komuniti: Satu kajian kes di kalangan mahasiswa UPM* [Unpublished final year project]. Universiti Putra Malaysia.
- Mohd Yassin, A., & Ahmad, M. R. W. (2018). Konsep jati diri Melayu dalam puisi catatan kembara "Nota kecil menyeberang usia". *Jurnal Melayu*, 17(2), 299-311.
- Mohd Yusof, W. (2013). Kesukarelaan. *Buletin Institut Penyelidikan Pembangunan Belia Malaysia*. Kementerian Belia dan Sukan.
- Mokhzan, N. S., Sutan, R., & Yasin, R. M. (2023). Motives for volunteering among youth in promoting healthy well-being. *International Journal of Advanced Research in Education and Society*, 5(3), 525-539. <https://myjms.mohe.gov.my/index.php/ijares/article/view/24575>
- Musick, M., & Wilson, J. (2003). Volunteering and depression: The role of psychological and social resources in different age groups. *Social Science & Medicine*, 56(2), 259-269.
- Oesterle, S., Johnson, M. K., & Mortimer, J. T. (2004). Volunteerism during the transition to adulthood: A life course perspective. *Social Forces*, 82(3), 1123-1149.
- Organisation for Economic Co-operation and Development (OECD). (2024). *Promoting youth volunteering and civic service engagement* (OECD Public Governance Policy Papers No. 20). OECD Publishing. <https://doi.org/10.1787/39659e6a-en>
- Plato. (2008). *Apology* (B. Jowett, Trans.). Princeton University Press. (Original work published 399 B.C.E.)
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon & Schuster.
- Roberts, M. (2006). Duffle bag medicine. *Journal of the American Medical Association*, 295, 1491-1492.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.
- Schlegelmilch, B., & Tynan, C. (1989). Who volunteers? An investigation into the characteristics of charity volunteers. *Journal of Marketing Management*, 5(2), 133-151.
- Sharififar, F., Jamalain, Z., Nikbakhsh, R., & Ramezani, Z. N. (2011). Influence of social factors and motives on commitment of sport events volunteers. *World Academy of Science, Engineering and Technology*, 77, 1078-1082.
- Syed Hussain, T. P. R., & Yasin, L. (2016). Belia dan program kesukarelawan di Malaysia: Satu kajian empirikal. *Geografia: Malaysian Journal of Society and Space*, 12(10), 183-194.
- Tessier, S., Nguyen Minh-Nguyet, & Gagnon, K. (2006). *Youth volunteerism* [Research report]. Imagine Canada, Knowledge Development Centre.
- Traeger, C., Mekonen, E., & Adarkwah, M. A. (2022). Towards a better understanding of volunteer engagement: Self-determined motivation and its implications for society. *Journal of Service Theory and Practice*. <https://doi.org/10.1108/JSTP-09-2022-0215>
- Wakefield, J. R. H., Bowe, M., & K llezi, B. (2022). Who helps and why? A longitudinal exploration of volunteer role identity, intergroup closeness, and community identification as predictors of coordinated helping during the COVID-19 pandemic. *British Journal of Social Psychology*, 61(3), 907-923. <https://doi.org/10.1111/bjso.12523>

- Wilson, J. (2000). Volunteering. *Annual Review of Sociology*, 26, 215-240.
- Wu, J., Lo, T. W., & Liu, E. S. C. (2009). Psychometric properties of the volunteer functions inventory with Chinese students. *Journal of Community Psychology*, 37(6), 769-780.
- Xu, H., & Liu, S. (2021). Exploring the association between community service participation and identity development among middle adolescents: A study in Hong Kong. *Self and Identity*, 21(7), 827-847. <https://doi.org/10.1080/15298868.2021.1961853>
- Xu, Y., & Ngai, N. P. (2011). Moral resources and political capital: Theorising the relationship between voluntary service organisations and the development of civil society in China. *Nonprofit and Voluntary Sector Quarterly*, 40(2), 247-269.
- Youniss, J., McLellan, J. A., & Mazer, B. (2001). Voluntary service, peer group orientation, and civic engagement. *Journal of Adolescent Research*, 16, 456-468.

Modernising without Westernising: The Educational Transformation of Pesantren Traditional into KMI *Mu'adalah*

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ABSTRACT

This study explores the transformation of pesantren, traditional Islamic boarding schools, as they transition from conventional educational models to modernised frameworks. Focusing on the shift from Kulliyatul Mu'allimin Islamiah (KMI) salafiyah to KMI *Mu'adalah*, this research employs Robert Stake's case study approach to examine how these institutions adapt to contemporary educational demands while preserving their religious and cultural heritage. The findings highlight three key challenges in this transition. First, communication gaps among administrators, teachers, students, and parents created significant obstacles to the acceptance and implementation of the *Mu'adalah* system, a pattern also reflected in the results of this study. Second, despite aspirations for a comprehensive transformation, most reforms were only successfully applied to lower-grade curricula. Third, modernisation efforts extended beyond administrative restructuring, incorporating innovative teaching methodologies and institutional management strategies that align with contemporary educational standards. The novelty of this study lies in its holistic examination of pesantren's modernisation, moving beyond previous research that has often focused solely on either curriculum

development or administrative changes. This study underscores the interconnection between leadership, stakeholder communication, and phased pedagogical transformation as critical factors in the success of educational reform. For a sustainable transition, Islamic boarding schools must prioritise three key strategies: fostering inclusive communication among stakeholders, implementing gradual curriculum adjustments, and enhancing teacher professional development to equip educators with the necessary skills for

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modern teaching practices. This research contributes to the broader discourse on Islamic education reform by offering a model for faith-based institutions, particularly pesantren, to engage with modernisation while safeguarding their ideological, cultural, and core values.

Keywords: Education transformation, Islamic education reform, KMI Muadala, pesantren modernisation, Stake's Evaluation Model

INTRODUCTION

“Modernisation without Westernisation” refers to an educational reform orientation within Indonesia Islamic boarding school (also known as pesantren). Its reform that integrates modern educational advancements while maintaining Islamic values and unique pesantren traditions. This concept is rooted in the historical role of pesantren as Indonesia’s oldest educational institution, like Java and Madura, long recognised as a centre for knowledge development and moral formation. As a firmly established Islamic educational institution since the 18th century, pesantren has played a crucial role in shaping the character and intellectuality of Indonesian Muslims (Budiharso et al., 2023; Dhofier, 2013; Mujahid, 2021; Ni’am, 2015; Rosyidin & Arifin, 2021). To this day, pPesantren institution has demonstrated remarkable resilience in adapting to changes while preserving its existence and identity amidst the dynamics of modernisation.

Pesantren’s resilience in adapting to change is embodied in the principle of *al-muhāfazatu’ ala al-qadīmi aṣ-ṣālīḥ wal-akhḍhu bi al-jadīdi al-aṣḥaḥ*—preserving valuable old traditions while adopting beneficial new practices. This measured approach allows them to integrate modern elements—whether in curriculum,

technology, or management—without compromising the spiritual and cultural foundations that define them. In practice, transformation within these institutions rarely happens overnight; instead, it unfolds gradually, shaped by reflection, community dialogue, and a persistent concern for preserving what truly matters amid shifting societal landscapes.

Pesantren's evolution can be analysed through two primary aspects: its societal function and its educational structure. Within society, pesantren maintain a significant presence, with the *kiai* acting as a source of moral guidance. Regarding education, pesantren have experienced various changes since its establishment. The modernisation of pesantren began in the early 20th century with the implementation of the *madrasah* system and the inclusion of secular subjects in the pesantren curriculum (Azra, 2012; Harits et al., 2016).

Lukens-Bull (2001, 2013) describes pesantren's adaptation to modernity as a dynamic process marked by tensions between preserving traditional values and addressing the demands for global competencies in education. This transformation highlights the challenges of balancing these dual priorities. Despite the tensions, innovative programmes have effectively bridged the gap between tradition and modernity.

One notable example is the Kulliyatul Muallimin Al Islamiyah (KMI) programme, developed at the Islamic boarding school (known as pesantren) Gontor, Ponorogo, East Java, by KH. Imam Zarkasyi. This programme integrates religious studies with general subjects in a six-year educational system. Through KMI, *santri* (students) study traditional Islamic books (kitab Kuning) while mastering general subjects like mathematics and language (Isbah, 2020; Jusubaidi et al., 2024). The programme has become a successful model of pesantren modernisation, widely adopted by pesantren and founded by Gontor alumni. Its main goal is to produce graduates with profound religious understanding and comprehensive general knowledge, equipping them to face global challenges without compromising their Islamic identity. With a cautious approach rooted in Islamic traditions, pesantren continues to transform into an adaptive educational institution, maintaining a balance between modernisation and its traditional heritage.

KMI, a crucial element of the pesantren system, encounters considerable difficulties in the context of globalisation. As a traditional Islamic educational institution, KMI must adjust to modern changes while preserving its fundamental Islamic principles. The educational standards of KMI have gained international acknowledgement, as demonstrated by the numerous pesantren alumni who have continued their education at prestigious universities in the Middle East, Europe,

and the United States. Furthermore, they participate in international collaborations through student exchange initiatives and contributions to global Islamic discussions, mirroring the actions of notable individuals like Ahmad Syafii Maarif, Nurcholish Madjid, and Din Syamsuddin.

The modernisation of pesantren education through the Kulliyat al-Mu'allimīn al-Islāmiyyah (KMI) programme has resulted in graduates proficient in both religious and general knowledge and formal recognition through the *Mu'adalah* programme. This recognition ensures the equivalence of pesantren graduates to general school alums, granting them opportunities in both higher education and the workforce. The synergy between KMI and *Mu'adalah* has strengthened pesantren's position as a modern educational institution aligned with national and global standards.

The Indonesian government's recognition of the *Mu'adalah* programme broadens opportunities for KMI graduates to pursue further studies or enter the job market. This recognition affirms that pesantren education meets national standards while opening pathways to international arenas. Integrating KMI with *mu'adalah*, pesantren graduates gain strong religious foundations and globally recognised academic competencies.

A notable example of this transformation is Pesantren Pabelan in Magelang. Since its inception, this pesantren has utilised the KMI programme by combining the national curriculum into its madrasah format.

However, a significant shift occurred in 2022 when pesantren Pabelan transitioned its educational system from madrasah to a unified *Mu'adalah* educational model across all class levels (grades 1 to 6). This transformation underscores pesantren's educational value on the national stage and demonstrates KMI's flexibility in adapting to changing times.

This study aims to analyse the transition of pesantren Pabelan from a madrasah-based KMI system to a fully integrated *Mu'adalah* model, focussing on the drivers, implementation process, and educational outcomes of this transformation. The alteration illustrates the evolution of pesantren education to maintain relevance while preserving its historic character. Moreover, it underscores that formal recognition enables pesantren to broaden their educational influence and effectiveness.

This research on Pesantren Pabelan's transition from a madrasah-based KMI programme to a *Mu'adalah* system is convincing, particularly in analysing its effectiveness. To systematically evaluate this transformation, the study adopts Stake's Countenance Evaluation Model, which assesses both descriptive and judgmental aspects of change. This allows for a comprehensive analysis of the antecedents, implementation process, and outcomes of *Mu'adalah* adoption. Through this technique, pesantren Pabelan's *Mu'adalah* transition will be assessed.

In contrast to previous studies on pesantren transformation that primarily

emphasise curriculum development or administrative management, this study adopts a broader analytical lens. It integrates leadership dynamics, stakeholder communication, and pedagogical adaptation as interrelated dimensions of institutional change. By doing so, this research presents a more holistic perspective on how pesantren modernisation operates in practice—revealing not only structural adjustments but also cultural negotiations within the educational ecosystem. This distinction marks the novelty of the present study in understanding pesantren reform as a multi-dimensional process rather than a mere curricular shift.

From a theoretical standpoint, this study contributes to the literature of Islamic education by introducing the concept of “local-value-based modernisation,” which strengthens the discourse of modernisation without Westernisation. It asserts that reform in Islamic education can evolve organically from within its own epistemological and socio-religious traditions. This perspective deepens the theoretical understanding of Islamic educational transformation, positioning pesantren as an active agent in shaping contextualised modernity rather than a passive recipient of external educational paradigms.

While the *Mu'adalah* programme and pesantren transformations have been widely studied, the reasons for varied adoption and implementation strategies across institutions remain unclear. Pesantren Pabelan accepts *Mu'adalah* despite opposition. A significant

question is how Indonesia can standardise the quality of education for *pesantren*. It investigates programme implementation and its consequences on the *pesantren* education systems. *Pesantren* Pabelan's transition is studied using four main questions. First, why go from madrasah-based KMI to *Mu'adalah*? Second, were the *pesantren* resources to support this transformation? Third, how did *Pesantren* Pabelan adopt *Mu'adalah*? What are the effects of this transition on learning and education quality?

The findings of this research are expected to provide deeper insights into how Islamic education in Indonesia, especially in *pesantren*, adapts to modernisation demands without compromising traditional values. While primarily relevant to *Pesantren* Pabelan, the study could also guide others facing similar challenges. Balancing tradition and modernity in Islamic education is a key takeaway from this research.

Nonetheless, this study has limitations. Stake's evaluation model requires subjective assessments of the transformation elements, potentially influencing the interpretation of findings and recommendations (Fitzpatrick et al., 2022). Data and method triangulation were employed throughout the research to mitigate bias and enhance the validity of the results. Despite these efforts, the limitations open avenues for further studies that refine evaluation approaches and expand the scope to other *pesantren*. Such studies could provide a more holistic understanding of the impact of the *Mu'adalah* system transformation on *pesantren* education across Indonesia.

LITERATURE REVIEW

Pesantren: The Evolving Legacy of Islamic Education Indonesia and Global Context

Since the 18th century, *pesantren* have served as a cornerstone of Islamic education in Indonesia, preserving Islamic knowledge while nurturing the character and intellectual development of Muslim generations in the archipelago (Budiharso et al., 2023; Dhofier, 2013; Ni'am, 2015; Rosyidin & Arifin, 2021). Their enduring relevance amidst shifting societal dynamics is rooted in the principle of *al-muhāfazatu' ala al-qadīmi aṣ-ṣāliḥ wal-akhḍhu bi al-jadīdi al-aṣlaḥ*, which emphasises maintaining beneficial traditions while embracing practical modern innovations. In this context, *pesantren* in Indonesia, particularly through the integration of the *Kullīyat al-Mu'allimīn al-Islāmiyyah* (KMI) and *Mu'adalah* models, demonstrate significant potential in addressing the challenges posed by modernity. However, understanding the global relevance of this approach requires comparison with similar institutions in other regions. Madrasahs in South Asia, particularly in Pakistan and India, for instance, have faced criticism for curricula seen as disconnected from contemporary societal needs and lacking balance between religious education and practical skills (Bano, 2014). Likewise, while *pesantren* in Malaysia share cultural and historical similarities with those in Indonesia, they are often perceived as less adaptable in aligning their curricula with both local and global demands (Munastiwi & Marfuah, 2019).

Similarly, traditional Islamic schools in West Africa, such as those in Nigeria, continue to struggle with modernising their curricula and teaching methodologies to meet present-day challenges (Hashim et al., 2011).

As the 20th century began, pesantren encountered significant challenges adapting to modernity. The rise of modern education compelled them to innovate to ensure that graduates could master religious sciences while competing globally (Azra, 2012; Harits et al., 2016). This transformation began with curriculum adjustments, integrating general subjects such as mathematics and foreign languages alongside traditional Islamic texts (*kitab Kuning*) studies.

A monumental innovation was the establishment of the Kulliyat al-Mu'allimīn al-Islāmiyyah (KMI) programme by KH. Imam Zarkasyi in pesantren Gontor. This six-year programme fused religious and general education, laying the foundation for what is now known as the "modern pesantren." The KMI model has since been adopted by numerous pesantren across Indonesia (Isbah, 2020; Jusubaidi et al., 2024; Samindjaya et al., 2024).

The KMI framework embodies a balanced educational approach encompassing traditional Islamic studies and modern disciplines such as science, foreign languages, and social sciences (K. Steenbrink, 1994). This approach equips students with the spiritual integrity and practical skills needed to navigate the modern world. KMI emphasises the holistic development of graduates, empowering them to contribute productively to society while maintaining their Islamic identity.

This model has proven effective in enhancing the quality of pesantren education and bolstering its relevance in globalisation. Graduates of KMI-equipped pesantren, such as Gontor, are recognised nationally and internationally, with many continuing their studies at esteemed universities in the Middle East, Europe, and the United States.

The successful integration of the KMI model has inspired further innovation through programmes like *Mu'adalah*. This programme secures formal recognition for pesantren graduates, equating their qualifications with those of general school graduates. The combination of KMI and *Mu'adalah* programmes underscores pesantren's ability to adapt to modern demands while retaining its traditional essence.

The *Mu'adalah* programme represents a groundbreaking effort to modernise traditional pesantren education by seamlessly integrating religious and general curricula in a balanced and future-oriented way. Although the *Mu'adalah* programme is an innovative step in pesantren education, the existing literature on it remains relatively limited. Nevertheless, a growing body of research strongly supports the effectiveness of this approach. Anam and Marsum (2022) describe it as "an innovation that combines religious and general curricula," while Manshuruddin et al. (2025) highlight its comprehensive framework that brings together subject-centred, learner-centred, and problem-centred learning approaches.

In a study by Muslih et al. (2020), the programme's implementation showed an

impressive 95.32% success rate across input, process, and outcome dimensions. Faricha (2024) traced the programme's key innovations include maintaining a balance between traditional Islamic scholarship and modern pedagogical practices, fostering globally competitive students, and establishing formal educational equivalence for pesantren institutions. These studies offer valuable insights into how the integration of KMI and *Mu'adalah* can support the modernisation of pesantren education without compromising its traditional Islamic values.

The *Mu'adalah* programme provides pesantren graduates with more opportunities to pursue higher education or enter the workforce with formally recognised qualifications. Pesantren Pabelan is a prime example of successfully implementing the *Mu'adalah* curriculum across all academic levels. This achievement represents a significant shift from traditional madrasah-based systems towards more formalised and progressive education models. Despite its success, implementing the KMI model is not without obstacles. Research by Lukens-Bull (2001, 2013a), and Yusuf and Taufiq (2020) highlights challenges such as resistance from conservative factions, infrastructural limitations, and the need for ongoing curriculum adjustments to align with contemporary demands.

Pesantren that have embraced these innovations exhibit improved educational quality, increased community interest, and better graduate preparedness for higher education and employment. Those adopting

the KMI and *Mu'adalah* models are key contributors to these advancements. These models are crucial in ensuring pesantren remain relevant in an ever-changing world.

The transformation of pesantren reflects its capacity to harmonise tradition and modernity. Institutions like Pesantren Gontor and Pabelan exemplify how Islamic education can remain socially relevant while upholding its core values. Integrating spiritual and secular knowledge fosters a unique educational model that addresses global societal needs and preserves the Islamic identity of its graduates.

This achievement underscores pesantren's adaptability to globalisation challenges. By innovating without compromising their essence, pesantren continue to serve as vital pillars of Islamic education in Indonesia. Their ongoing contribution to educational development highlights their importance as enduring and transformative institutions within the broader landscape of Islamic learning.

Transformation of Pesantren: A Continuous Journey

Over the past decade, pesantren in Indonesia have undergone a significant transformation, demonstrating their ability to adapt to changing times. Research by Hasan (2014) confirms that pesantren have successfully adopted modern educational models without compromising the traditional values that define their identity. Suharto (2018) further supports this view, highlighting how the KMI programme has enhanced the quality of graduates, although challenges such as

alignment with national education standards remain. Collectively, these findings reveal that pesantren modernisation is driven more by pedagogical innovation than ideological transformation, reflecting a conscious effort to balance continuity and change within Indonesia's Islamic education landscape.

Parallel to curricular reform, recent studies have also examined how pesantren are embracing digital transformation as part of their broader modernisation efforts. Rahman and Asrohah (2022) note that the use of online platforms, educational applications, and digital devices has moved beyond a supporting role to become an essential part of pesantren's adaptive strategy. The integration of technology has opened access to a wider range of learning resources and enriched both teaching and learning experiences. These findings suggest that the digital turn in pesantren education is not simply about adopting new tools, but about redefining what it means to remain relevant in the age of the Industrial Revolution 4.0. However, much of the existing research tends to focus on well-resourced or urban pesantren, leaving smaller and rural institutions largely absent from discussions of digital inclusion. This gap underscores the importance of examining how unequal access to resources continues to shape the uneven progress of educational modernisation across Indonesia.

The *Mu'adalah* programme has contributed significantly to this transformation. According to Yasid (2018), the programme provides opportunities for pesantren graduates to pursue higher

education or enter the workforce with qualifications equivalent to those of graduates from general schools. Rohman et al. (2023) observed that pesantren integrating the KMI and *Mu'adalah* curricula successfully maintained traditional pesantren values while improving students' competencies in both religious and general subjects. Demonstrates that curriculum integration as a modernisation can balance preserving tradition and embracing innovation. The implementation of *Mu'adalah* often involves negotiation between government regulations and the institutional autonomy of pesantren, an area that remains underexplored in current scholarship. Future research could therefore explore how these negotiations shape pesantren's identity and independence as non-formal educational institutions within Indonesia's broader educational landscape.

Previous research by Steenbrink (1986) highlighted the significance of the principle *al-muhāfazatu' ala al-qadīmi aṣ-ṣāliḥ wal-akhḍhu bi al-jadīdi al-aṣlah*—preserving valuable traditions while embracing beneficial innovations—as a cornerstone for the development of Islamic education. This principle has dramatically influenced the transformation of the education sector within pesantren. As a result, pesantren continue to uphold their identity as centres of Islamic education while remaining relevant and dynamic in contemporary society. Viewed through this philosophical lens, scholars suggest that pesantren reform represents both a continuation of long-held traditions and an adaptive response to global change.

On a global scale, Lukens-Bull (2013b) stated that the integration model of education in Indonesian Pesantren could inspire educational reform in other countries. The long-term impact of programmes such as KMI and *Mu'adalah* on the career paths of pesantren alums, both in education and professional fields, further highlights the importance of this transformation. Pesantren preserve their traditions and contribute to the global development of Islamic education. Nevertheless, while existing studies have highlighted pesantren's success in bringing together tradition and modernity, few have considered how local socio-economic realities shape the pace and direction of this transformation. This gap points to the continuing need to understand how processes of globalisation intersect with local religious cultures in shaping the future of Islamic education.

According to Yasid (2018), the *Mu'adalah* programme provides opportunities for pesantren graduates to continue their university studies or enter the workforce. Rohman et al. (2023), observed the dynamic interplay between tradition preservation and innovation in pesantren implementing the KMI Gontor curriculum. Integrating religious and general sciences through the *Mu'adalah* programme has enhanced student competence without sacrificing pesantren's distinctive values. The modernisation adaptation in pesantren's educational process has improved accessibility and education quality while preserving traditional Islamic values. Aligns with Steenbrink (1994) perspective, which emphasises the importance of balancing

tradition and modernity in the development of Islamic education following the pesantren principle of *al-muhāfazatu' ala al-qadīmi aṣ-ṣāliḥ wal-akhdhu bi al-jadīdi al-aṣlaḥ*. Therefore, the transformation of pesantren has not only impacted education but also reinforced their identity and contribution to society.

From a global perspective, Lukens-Bull (2013b) suggests that the educational integration model in Indonesian pesantren could inspire educational reforms worldwide. This model demonstrates how tradition and modernisation can coexist to foster effective education. The lasting influence of KMI and *Mu'adalah* on the careers of pesantren alums highlights the transformative potential of these principles.

Stake's Evaluation Model

The Stake Evaluation Model, developed by Robert E. Stake, provides a simple yet powerful conceptual framework for analysing evaluation processes, particularly in education. This model emphasises two key aspects of evaluation: description and judgment, known as the "countenances of evaluation." These aspects guide the evaluation of programmes by describing and assessing their components (Fitzpatrick et al., 2022; R. E. Stake, 2002; R. E. Stake & Munson, 2008; R. Stake & Visse, 2023).

The model has three main components: antecedents, transactions, and outcomes. Antecedents refer to initial conditions, such as the characteristics of learners and available resources, before the learning process begins. Transactions involve interactions during the learning process, such as class

discussions and assignment completion. At the same time, outcomes refer to the results achieved by learners, both short- and long-term, including achievements, attitudes, and aspirations (Fitzpatrick et al., 2022). The evaluation process compares actual conditions with expectations and observes the relationships between these components.

In this study, the Stake Evaluation Model is applied to assess the transformation of the Kullīyat al-Mu'allimīn al-Islāmiyyah (KMI) programme at Pesantren Pabelan into a *Mu'adalah* KMI programme. The evaluation focuses on the three main components: antecedents, transactions, and outcomes. Antecedents examine the initial condition of the pesantren and the readiness of available resources, while transactions involve implementing the KMI programme. The outcome will assess student achievement and the pesantren's preparedness to serve as a *Mu'adalah* school.

The evaluation is conducted using descriptive data and assessment against pre-established standards. The data obtained will offer valuable insights into the strengths and weaknesses of the KMI programme's implementation at Pesantren Pabelan. The findings aim to provide recommendations for programme improvement and support the sustainability of the KMI programme as a *Mu'adalah* school in the future.

METHODS

This study involved 18 participants drawn from Pabelan Islamic boarding school in Magelang, Indonesia. They included two

caregivers (kyai/nyai), four madrasah administrators, seven teachers (ustadz and ustadzah), and six students who were actively engaged in the institution's educational life. These individuals were selected because they represented the core stakeholders in the pesantren's ongoing transformation toward the KMI *Mu'adalah* model, reflecting a range of perspectives within the educational ecosystem.

Participants were purposively chosen based on their roles and involvement in the transformation process. The selection followed the logic of the Stake Evaluation Model, focussing on three analytical dimensions—antecedents (inputs), transactions (processes), and outcomes (results). This approach ensured that each participant contributed to understanding how institutional change was experienced and managed from multiple positions within the pesantren community.

The recruitment process began with the researcher formally contacting the pesantren's leader (kyai) through an official letter outlining the purpose and scope of the study. After obtaining consent, the kyai introduced the researcher to administrators, teachers, and a group of students who met the study's inclusion criteria. During this stage, the kyai also explained the pesantren's ethical openness to research and its commitment to supporting studies that contribute to institutional improvement.

Once formal permission was secured, the researcher conducted an orientation session with all selected participants. In this session, participants were informed

about the research objectives, confidentiality assurance, and their voluntary right to participate or withdraw at any time. They also received an interview information sheet that detailed the research title, ethical commitments, and the general themes to be discussed during data collection.

The interview schedules were designed to be flexible and adaptive to the participants' daily responsibilities within the pesantren. The researcher coordinated individually with caregivers, administrators, and teachers to ensure that the interviews did not interfere with teaching, prayer, or administrative duties. This flexible arrangement helped build trust and encouraged participants to speak more openly about their experiences

and perceptions of the transformation process.

A summary of participant demographics, including their age, educational background, and institutional roles, is presented in Table 1. This information provides an overview of the diverse yet interrelated perspectives that shaped the study's findings. Such diversity strengthens the credibility of the data and enriches the interpretation of the pesantren's transformation dynamics.

Research Design and Data Collection

This research employs a qualitative evaluation approach using the Stake Evaluation Model (countenance) to assess the transformation of the KMI programme at

Table 1
Participants in research

No.	Participant ID	Age	Education	Status
1	NA	61	Bachelor	Kyai (the leader of pesantren)
2	MZ	51	Magister	Director of KMI
3	MT	48	Bachelor	Head of senior high school
4	ZB	63	Bachelor	Head of junior high school
5	AZ	50	Bachelor	Head of <i>Mu'adalah</i>
6	NF	55	Bachelor	Nyai
7	ZB	53	Bachelor	Teacher 2
8	K	56	Bachelor	Teacher 3
9	KD	44	Bachelor	Teacher 4
10	AS	47	Bachelor	Teacher 5
11	AH	60	Bachelor	Teacher 6
12	CT	40	Bachelor	Teacher 7
13	AR	15	Junior high school	Student 1
14	IS	15	Junior high school	Student 2
15	NU	18	Senior high school	Student 3
16	PL	18	Senior high school	Student 4
17	ATH	20	Senior high school	Student 5
18	AT	18	Senior high school	Student 6

Pesantren Pabelan from a formal madrasah into a *Mu'adalah* institution. This approach is selected for its ability to provide an in-depth understanding of the programme's process and context (Stake, 2002; Stake & Munson, 2008; Stake & Visse, 2023) while considering the global dynamics of Islamic education.

The research was conducted from May to December 2023 through several structured stages, including feasibility assessment, instrument preparation, proposal seminar, data collection, and analysis. Each phase was designed to ensure continuity between design, implementation, and interpretation, as summarised in the research timeline.

The study aims to evaluate the rationale, readiness, process, and outcomes of the KMI programme transformation in the context of educational globalisation. The Stake Evaluation Model was chosen because of its emphasis on description and decision-making during the evaluation process. This approach is particularly relevant in addressing the challenges posed by globalisation (Fitzpatrick et al., 2022).

Data was collected through triangulation methods—structured interviews, observations, and document reviews—to strengthen validity and minimise bias (Denzin & Lincoln, 2014). Prior to fieldwork, the interview and observation guides were reviewed in a Focus Group Discussion (FGD) involving experts from the National Research and Innovation Agency (BRIN), Islamic education scholars, and pesantren leaders. Feedback from these sessions was used to refine the instruments for clarity and contextual accuracy.

The interview framework followed the logic of the Stake model, organised into four components: antecedents (inputs), transactions (processes), outcomes (results), and standards (criteria) (Creswell, 2010; Creswell & Poth, 2016). Primary data were obtained from the kyai, KMI administrators, teachers, and students, while secondary data included guardian insights, institutional archives, and comparative international literature.

Data analysis is performed through a qualitative descriptive method using a thematic analysis approach, following the Stake Evaluation Model by comparing antecedents, transactions, and outcomes in a descriptive matrix (Stake & Munson, 2008; Stake & Visse, 2023). The analysis process involves data collection, data reduction, conclusion drawing, verification, and adapting the interactive analysis model from Miles and Huberman.

This research also integrates a comparative international perspective, referencing global studies on the transformation of Islamic education (Hefner & Zaman, 2010). The method enables a more comprehensive analysis of the position of the KMI programme within the global landscape of Islamic education. Considering international education trends and challenges, it is expected to generate new insights into the KMI programme's transformation process worldwide and serve as a foundation for future programme development decisions.

Data analysis applied a thematic approach aligned with the Countenance

Evaluation Framework. The process began with familiarisation and open coding of transcripts, observation notes, and documents. Emerging codes were organised into broader themes that reflected transformation dynamics—such as leadership adaptation, curriculum alignment, and stakeholder communication. These themes were then interpreted by comparing intended goals with observed realities to assess congruence across the antecedent, transactional, and outcome stages.

This integrative approach provided both depth and transparency, revealing not only what changes occurred in the KMI transformation but also how and why they took place. The combination of thematic interpretation and evaluative comparison ensured that the findings were both empirically grounded and analytically meaningful within the broader context of Islamic education reform.

RESULTS

Antecedents (Initial Conditions)

Pesantren Pabelan, established by K.H. Hamam Dja'far on August 28, 1965, in Magelang, Central Java, has a long-standing history dating back to the 1800s. This pesantren implements the KMI curriculum, which integrates formal education intending to develop students who are virtuous, healthy, knowledgeable, and open-minded. The institution underwent a significant transformation, shifting from the KMI Madrasah system to the KMI *Mu'adalah*, following Law No. 18 of 2019 regarding

pesantren. This change aimed to offer greater flexibility in management and strengthen alums' positioning across various fields.

In discussing the institutional transformation toward KMI *Mu'adalah*, several key informants highlighted the growing sense of autonomy and legal recognition that pesantren now experience.

The government's recognition and affirmation of the unique character of pesantren education, along with the autonomy granted to manage each institution according to its distinct identity, have been highly encouraging...The enactment of the Indonesian Law on pesantren provides a fresh momentum to adopt the Sistem Pendidikan *Mu'adalah* (SPM), with its broad flexibility, including the authority to issue legally recognised diplomas. Such recognition is expected to further strengthen the position of pesantren graduates as they enter the fields of education, employment, or even politics. (Mz, Director of KMI, interview June 2023)

Similarly, HZ, Head of the *Mu'adalah* Division, emphasised a structural distinction between the two systems:

The content structure of the curriculum differs significantly. The KMI Madrasah must follow the government's required teaching hours, whereas the KMI *Mu'adalah* is not bound by such regulations. This independence grants

pesantren the freedom to manage their affairs and determine their own direction. (Interview June 2023)

These testimonies illustrate how regulatory recognition and curricular independence serve as key drivers in pesantren modernisation, allowing institutions like Pabelan to align religious authenticity with educational legitimacy.

Preparation for the transition toward the KMI *Mu'adalah* system was shaped by deliberate organisational readiness rather than ad hoc adjustment. The pesantren leadership initiated the process by forming a dedicated coordination team responsible for identifying institutional challenges, learning from benchmark pesantren, and ensuring compliance with administrative requirements. This preparatory phase also included efforts to strengthen human resources, particularly by supporting teachers in further academic training to enhance instructional quality. Despite the heterogeneous backgrounds of incoming students and the absence of selective admission mechanisms, the transformation remained anchored in improving pedagogical standards and learning support, including the provision of textbooks and instructional materials. As noted by the Director of KMI:

Institutional familiarity with the *Mu'adalah* system—previously implemented between 2005 and 2013—contributed to a shared sense of readiness across the educational community, easing the re-adoption of the system. (Interview June 2023)

The KMI *Mu'adalah* curriculum at Pesantren Pabelan offers a deeper integration of religious studies and language than the previous madrasah system. This transformation included intensive socialisation efforts with students, their guardians, and administrators, and administrative adjustments to support the changes. While the teaching method emphasises *Thoriqoh Mubasyaroh* and a language-rich environment, the classical teaching of traditional Islamic texts (known as *Kitab Kuning*) is still conducted in the mosque with a *sorogan* system. Language development became a primary focus, while student mentoring continued through the dormitory system and extracurricular activities designed to sharpen talents and interests and build strong character.

Transformation into KMI *Mu'adalah*

A key distinction between the KMI Madrasah and KMI *Mu'adalah* systems lies in the flexibility of the curriculum and management. Specialised subjects, such as *Mantiq* (Logic) and Islamic Inheritance Law, were introduced to the new curriculum, which was not a part of the previous system. Additionally, the *Mu'adalah* curriculum emphasises strengthening language proficiency and religious education, sorted by extracurricular activities such as scouting, martial arts, and *muhadara* (public speaking).

In the first-level classes, the teacher reads the text, and the students follow by repeating it. In the higher levels,

all religious subjects are delivered in Arabic, while English subjects are taught entirely in English. (Teacher 3, interview June 2023).

Teacher 6 added that language mastery depends heavily on continuous practice:

Language skills require frequent and consistent practice. For beginners, Arabic is introduced through direct or drill-based methods, although the level of linguistic discipline among students tends to fluctuate over time. (Interview June 2023)

The interviews indicate that curricular flexibility in the KMI *Mu'adalah* system is enacted primarily through differentiated language pedagogy rather than formal curriculum design alone. Instruction progresses from guided repetition at lower levels to full language immersion at higher levels, reflecting assumptions about students' linguistic readiness and learning discipline. However, fluctuations in students' language consistency highlight that the effectiveness of this approach depends largely on sustained teacher commitment and pedagogical rigour.

The transformation also enhanced learning facilities, including providing books and kitab from KMI Gontor, although occasional delays were encountered. Looking forward, Pesantren Pabelan aims to improve educational facilities such as laboratories and libraries. Furthermore, various extracurricular activities continue

to foster student character development, including international programmes such as The International Award for Young People (IAYP).

The transformation under the KMI *Mu'adalah* framework has also altered the way of classical Islamic texts are taught. As one teacher explained:

Instruction has shifted from the traditional *qawā'id-tarjamah* method toward lecture-based classroom delivery for syllabus-based materials, while texts outside the formal curriculum continue to be studied through evening *sorogan* sessions in the mosque. These instructional changes are supported by the availability of selected *Mu'adalah*-approved texts supplied from KMI Gontor, which generally meet curricular needs despite occasional delays in distribution. (Interview June-July 2023).

Within Stake's Countenance framework, the outcome component focuses on the observable results of institutional change in relation to its original intentions. At Pesantren Pabelan, the transformation toward the KMI *Mu'adalah* system has produced outcomes that are still emerging and uneven across levels, reflecting the gradual nature of implementation. The following section outlines these outcomes by examining curriculum application, stakeholder response, and early pedagogical effects of the transformation.

The Outcome of the Transformation to KMI *Mu'adalah*

In essence, the primary difference between the KMI Madrasah and KMI *Mu'adalah* curricula is the increased focus on religious subjects in the latter. The curriculum structure now aligns more closely with Education units *Mu'adalah*, under the Directorate of Education for Islamic Boarding Schools, offering greater flexibility in educational management while enhancing students' religious and academic competencies.

One challenge faced during this transformation was the decreased in new students, partly due to insufficient socialisation. Some prospective guardians have not fully understood the benefits of the KMI *Mu'adalah* system and have only received information that may seem less favourable, such as the obligation to stay at the pesantren for six years without the option to transfer. The declining public interest requires improved communication strategies to highlight better the advantages and benefits of the KMI *Mu'adalah* system.

Nevertheless, the transformation provides excellent potential to enhance the quality of education at Pesantren Pabelan. With the support of guardians and connections to other *mu'adalah* pesantren, Pesantren Pabelan is continuously adapting and refining its system. The networking opportunities through events like national gatherings also give Pesantren Pabelan a chance to further develop within the *mu'adalah*-based educational framework.

In the long term, the transformation to the KMI *Mu'adalah* system is expected

to strengthen students' religious understanding, language proficiency, and character formation. The more flexible curriculum structure, combined with gradual improvements in learning resources and instructional practices, provides a foundation for sustained educational development. Through this process, Pesantren Pabelan seeks to consolidate its role as a pesantren that integrates strong religious scholarship with adaptive institutional innovation.

Beyond limited socialisation efforts, the observed decline in new student enrolment points to a misalignment of understanding between institutional intentions and stakeholder perceptions. Core features of the KMI *Mu'adalah* system—such as the six-year residential commitment and the concentration of religious subjects—are designed to ensure curricular coherence and character formation, yet they are not consistently interpreted as such by prospective guardians. As a result, elements intended as educational strengths may be perceived externally as constraints, shaping enrolment outcomes during the transition period. These patterns suggest that the effectiveness of the transformation is closely linked to how institutional objectives are understood and negotiated by stakeholders; an issue examined more critically in the subsequent discussion.

Phased Implementation and Emerging Longitudinal Implications

The implementation of the KMI *Mu'adalah* curriculum at Pesantren Pabelan, which at the time of this study was limited to

entry-level classes (Grade VII), reflects a deliberate strategy of phased adoption rather than incomplete execution. Introducing the curriculum to new cohorts allowed the institution to assess organisational readiness, particularly in terms of teacher preparedness, pedagogical alignment, and administrative adjustment. From a risk management perspective, this gradual approach reduced the potential disruption to ongoing learning processes and minimised resistance among internal actors, while providing space to refine instructional practices before extending the system to higher grade levels.

This phased implementation also served as a mechanism for institutional learning. Early experiences at the initial level enabled the pesantren to identify practical challenges related to curriculum delivery, language immersion, and stakeholder communication. Rather than viewing partial implementation as a limitation, the leadership treated this stage as an adaptive period in which feedback from classroom practice and community response could inform subsequent expansion. Such an approach is consistent with changing processes in tradition-based educational institutions, where stability and continuity are considered essential to maintaining institutional legitimacy.

Looking toward the medium-term period (2024-2025), the outcomes of this gradual strategy are expected to become more visible. As cohorts progress and the *Mu'adalah* curriculum is extended to higher levels, greater consistency in pedagogical practices and clearer communication of

institutional objectives to guardians are anticipated. These developments are likely to strengthen alignment between curriculum design, teaching implementation, and stakeholder understanding, thereby providing a more robust basis for evaluating the longer-term effectiveness of the KMI *Mu'adalah* transformation.

DISCUSSION

This perspective becomes clearer when Pesantren Pabelan is viewed in comparison with established *Mu'adalah* institutions such as Pesantren Gontor, where the KMI system was developed organically as an original institutional model. Rather than replicating Gontor's institutional pathway, Pabelan selectively recontextualises core elements of the KMI *Mu'adalah* framework—particularly curriculum structure, language immersion, and residential discipline—while negotiating local constraints related to organisational readiness, stakeholder expectations, and historical educational practices. This comparison highlights that the outcomes of *Mu'adalah* adoption are shaped not solely by curriculum design, but by the institution's capacity to reinterpret and operationalise the model within its own socio-organisational context.

Institutional Ambidexterity in Pesantren Transformation

The transformation of Pesantren Pabelan toward the KMI *Mu'adalah* system illustrates a form of institutional ambidexterity, in which the pesantren simultaneously preserves established religious traditions while

adopting modern educational governance and curricular structures. Empirically, this dual orientation is evident in the retention of classical Islamic texts and residential discipline alongside increased curriculum flexibility, language immersion, and formal administrative alignment with *Mu'adalah* education units. Rather than signalling institutional inconsistency, this coexistence reflects a deliberate balancing strategy, allowing the pesantren to innovate without destabilising its normative foundations or religious authority.

This ambidextrous configuration also explains why the transformation was implemented gradually and selectively. The phased adoption of the *Mu'adalah* curriculum—initially applied to entry-level cohorts—can be understood as an organisational mechanism to managing the tension between continuity and change. By maintaining familiar pedagogical practices for existing students while experimenting with new structures among incoming cohorts, the pesantren reduced organisational risk and safeguarded institutional legitimacy. In this sense, ambidexterity operates not merely at the curricular level but as a broader governance strategy that shapes how reform is paced, communicated, and sustained.

“Modernising without Westernising” as an Epistemological Position

The findings further demonstrate that the transformation at Pesantren Pabelan embodies the epistemological stance of “Modernising without Westernising,” not

as an abstract slogan but as a practical orientation embedded in daily educational practices. Modernisation expressed through structured curriculum management, administrative compliance, and enhanced language instruction, while epistemic authority remains grounded in Islamic knowledge traditions and pesantren values. This is particularly visible in the continued centrality of kitab-based learning, religious discipline, and character formation as core educational outcomes.

Importantly, the observed tensions with prospective guardians during the transition period underscore that this epistemological position is not always immediately legible to external stakeholders. Features intended to protect epistemic coherence—such as a six-year residential commitment and intensified religious curriculum—may be misinterpreted as rigidity rather than as deliberate safeguards against epistemic dilution. These findings suggest that “Modernising without Westernising” functions not only as an internal institutional logic but also as a communicative challenge, requiring ongoing negotiation between pesantren identity, reform objectives, and public perception.

Congruence Transformation Analysis on the Antecedent Component

Stake’s Countenance framework provides a helpful basis for analysing how Pesantren Pabelan’s transition toward the KMI *Mu'adalah* system aligns with its intended objectives. By working through its four elements, observation, standards, and

judgment, the framework guides the examination of where the transformation is progressing as expected and where inconsistencies still emerge. Although it was introduced decades ago, this model continues to be relevant for evaluating gradual reforms within culturally rooted educational institutions, where change often moves in measured and layered ways (Frye & Hemmer, 2012).

The results indicate that the transactional components of the transformation are reflected through adjustments across several core activities within the pesantren. Shifts can be seen in teaching practices, language-development routines, administrative procedures, and student engagement systems. Activities such as muhadharah, muhadatsah, curriculum restructuring, and the gradual integration of digital administrative tools demonstrate how learning processes and organisational practices are beginning to adapt to the expectations of the *Mu'adalah* model.

In the intent's component, changes are observed in the qualifications of teachers (in pesantren known as *ustadz/ustadzah*) and the addition of new programmes. At the same time, elements such as infrastructure, the role of the Kyai, and the foundational curriculum have not undergone significant changes. Aligning with the concepts of change and stability reflects an institutional ambidexterity by O'Reilly and Tushman (2013), where the pesantren selectively explores new opportunities—particularly those mandated by national regulation—while exploiting long-standing strengths

embedded in its tradition. The stability of Kyai leadership underscores the continued importance of charismatic and moral authority in pesantren governance (Abdurrahman, 2016).

Observations show consistency in implementing several key elements in the pesantren, including infrastructure, the role of the Kyai, the guidance of students, and teaching duties. The curriculum in use still adheres to the guidelines set by the Directorate of Islamic Education, with no significant changes in its implementation. This consistency can be explained by the concept of "institutional persistence" (Muhtadin et al., 2023; Simsek et al., 2023). This concept describes how organisations tend to preserve their structures and practices, even in the face of pressures to change.

However, consistency does not imply that the pesantren are entirely static. The concept of "institutional work" by Lawrence and Suddaby (2006), explains that actors within an institution actively preserve, disrupt, or create institutions. In the case of Pabelan, leaders and teachers may perform "maintenance work" to sustain traditional elements. Hefner and Zaman (2010), explain that pesantren often adopts a "selective modernisation" approach, blending appropriate modern elements while preserving core values.

Although the pesantren retain traditional structures, changes in teaching methodologies and the gradual use of technology are beginning to emerge. This indicates that adaptation may be occurring

gradually behind the apparent consistency. Thus, this consistency reflects the interaction between tendencies to preserve tradition, the influence of organisational imprinting, and selective modernisation processes.

While appearing stable on the surface, pesantren, like Pabelan, may undergo more significant, gradual changes. The effects of this adaptation will become more apparent in the long term as the interaction between maintained traditions and cautiously integrated modernisation takes shape.

Congruence of Transformation in Transactional Components

The Countenance Theory developed by Robert Stake is an important foundation for evaluating the transformation of KMI Madrasah into KMI *Mu'adalah* at Pabelan Islamic Boarding School. This evaluation involves the analysis of context, input, process, and outcomes of the changes that have taken place (Stake & Visse, 2023). The transformation is driven by the need to align the educational institution with Indonesian government regulations, such as those outlined in Law No. 18 of 2019, PMA No. 30 of 2020, and Director-General's Decree No. 6842. This alignment aims for the pesantren to remain relevant and meet contemporary educational standards.

Globally, many educational institutions face similar challenges in adapting to new regulations and standards that emphasise the quality of education, accountability, and readiness for the 21st century (OECD, 2021). Countries like Finland and Singapore have adjusted their curricula to focus on

developing 21st-century competencies such as critical thinking, creativity, collaboration, and digital literacy (Schleicher, 2018). The transformation at Pabelan is not only an effort to comply with national standards but also a response to global educational trends that are more relevant and adaptive to the changes of the times.

The input in the transformation at Pabelan includes resources, regulations, and policies that have been implemented. One of the adjustments is the transition from the *Simpatika* system to EMIS and the socialisation of prospective students and their guardians (Direktorat Pendidikan Islam, 2023). On a global scale, educational input is increasingly focused on technology and digital resources, such as using advanced Learning Management Systems to support administrative processes and learning (UNESCO, 2021). Pabelan's adoption of this digital system demonstrates alignment with global trends, although further improvements are needed.

To clarify how these transactional inputs and practices align with the institution's stated goals, Figure 1 summarises the congruence between intent and observation in the transactional domain.

The transactional component shows that change at Pabelan is moving forward, but the pieces have not yet formed a cohesive whole. (Stake & Visse, 2023), remind us that real congruence appears when what institutions plan matches what happens in daily practice. In Pabelan's case, the transition reflects only partial alignment: teacher readiness varies, digital systems such as EMIS are adopted

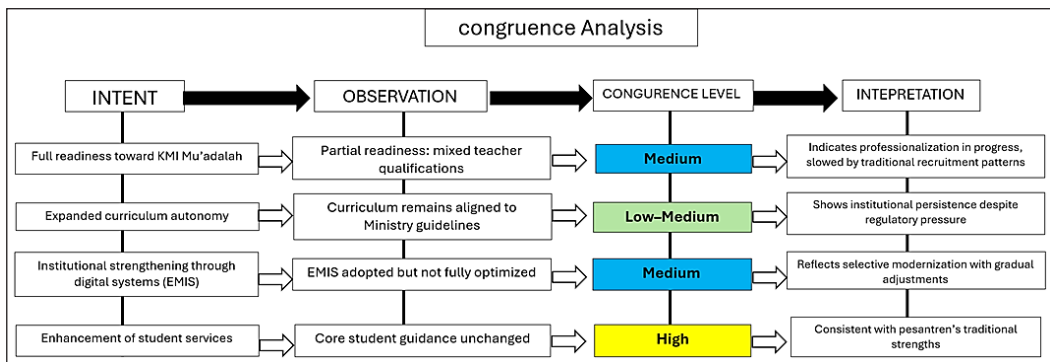


Figure 1. Congruence analysis of the educational transformation of pesantren traditional into KMI *Mu'adalah*

but not fully optimised, and communication with stakeholders still leaves important gaps. These mismatches become visible when the intended goals are compared with observable processes, revealing that improvements in teaching, curriculum execution, and administrative routines are progressing but remain uneven. Experiences from international reforms—such as Finland’s shift toward student-centred and problem-solving approaches (McCulloch, 2017), show that successful transformation requires coherence across inputs, processes, and engagement strategies. Pabelan’s journey is moving in that direction, but the alignment still needs to be strengthened to achieve the intended outcomes of the KMI *Mu'adalah* transformation.

This transformation is not solely focused on administrative alignment but also demands improved teaching quality and the engagement of all stakeholders. The socialisation process and communicating the transformation goals to student guardians is crucial for understanding the ongoing changes. With improvements in these

aspects, the KMI *Mu'adalah* transformation at Pabelan is expected to be more optimal, bringing significant benefits to the students and the institution.

Congruence of Transformation Outcomes Toward KMI *Mu'adalah*

The transformation of KMI Madrasah into KMI *Mu'adalah* at Pabelan Islamic Boarding School can be analysed using Robert Stake's Congruence Outcome Theory, which emphasises the alignment between initial goals and achieved results (R. E. Stake & Munson, 2008; Stake & Visse, 2023). Although this evaluation theory has been established for some time, Zhang et al. (2020) assert its continued relevance in education evaluation. The primary goal of this transformation is to comprehensively implement the KMI *Mu'adalah* curriculum following the standards set by the government, as outlined in Minister of Religious Affairs Regulation No. 18 of 2014 on *Mu'adalah* Education Units in Islamic Boarding Schools.

Observations indicate that the KMI *Mu'adalah* curriculum at Pabelan Islamic boarding school has been adopted only at the first-class levels, namely Grade VII, and has not been expanded to encompass other levels. This constraint underscores a disparity between the original goals and the actual execution, which, as noted by Stake, may impede the programme's overall efficacy (Stake & Munson, 2008). The incomplete implementation indicates difficulties in the curriculum adjustment process and associated policies, which need more refinement and extra time for complete optimisation and successful deployment across all educational levels.

The success of educational transformation dramatically depends on the alignment of context, input, process, and outcomes. At Pabelan, middle and upper-level challenges indicate that the adjustment process is not proceeding well. Rohman et al. (2023) highlight the importance of integrating traditional values with modern needs in transforming pesantren curricula. Ideally, such changes are implemented gradually with adequate support to ensure alignment between objectives and the desired results.

Compared to the curriculum transformations in other countries such as Finland, South Korea, and Singapore, success often depends on implementation flexibility and effective communication between schools and parents (Isozaki, 2019; McCulloch, 2017; Ng, 2017). At Pabelan, the decline in the number of students and insufficient socialisation

regarding the system change show a need for improved communication strategies. The strategy aligns with Rogers (2010) in Diffusion of Innovations Theory (2010), which emphasises the importance of communication in spreading and adopting new ideas.

Overall, the Stake's Countenance Theory evaluation provides crucial insights into aligning the KMI *Mu'adalah* transformation at Pabelan with global educational trends. This evaluation also highlights areas that require improvement, such as communication strategies and community engagement. Lukens-Bull (2013b), emphasises that pesantren leaders, such as Kyai, must be able to adapt to changes in the environment to ensure the relevance of pesantren in the modern era.

The shift from KMI Madrasah to KMI *Mu'adalah* at Pabelan captures the layered challenges of reforming Islamic education in Indonesia. On the one hand, the pesantren are expected to comply with national standards; on the other, they must uphold traditions that have shaped their identity for decades. The evaluation highlights several issues that influence the pace of this transition—ranging from gaps in communication to uneven levels of understanding among stakeholders and the gradual nature of adopting new procedures. Despite these hurdles, Pesantren Pabelan continues to work toward harmonising its internal system with contemporary educational expectations while protecting the cultural and spiritual values that define its character.

At a deeper level, this process shows how institutions must navigate between continuity and change. Lukens-Bull (2013b), points out that lasting reform in pesantren settings largely depends on the Kyai's ability to reinterpret inherited traditions in response to new demands. Pabelan's current efforts reflect this balancing act: adopting selected elements of modernisation, adjusting to regulatory requirements, and slowly aligning itself with broader educational trends, yet still anchoring its practices in long-standing pesantren principles.

CONCLUSION

This study shows that the transformation from KMI Madrasah to KMI *Mu'adalah* at Pabelan is a gradual and complex process shaped by the pesantren's effort to balance long-standing traditions with modern educational demands. The findings indicate three main points. First, communication gaps and uneven understanding, especially among parents, remain the main barrier to full alignment between institutional intentions and day-to-day practices. Second, curriculum implementation still falls short of initial plans, as it is currently applied only at early-grade levels. Third, the transition reflects Pabelan's broader attempt to stay relevant while protecting the cultural and spiritual identity that defines the pesantren.

The study contributes theoretically by showing how selective modernisation and institutional persistence influence educational reform in culturally rooted settings. Practically, it points to the need for

clearer communication, gradual curriculum expansion, stronger teacher preparation, and better use of digital administration systems.

Several limitations should be noted. The study focuses on a single pesantren, so its findings cannot be generalised without caution. The qualitative approach also limits the ability to measure broader patterns or long-term impacts. In addition, the reliance on interviews may reflect the perspectives of informants more strongly than institutional realities.

Based on these insights, several targeted actions are recommended. The pesantren should adopt a structured communication plan for parents, develop a phased roadmap for curriculum expansion, strengthen teacher capacity through continuous training, and improve administrative efficiency through full optimisation of EMIS and simple LMS tools. Future research should compare multiple *Mu'adalah* institutions, track changes over time, and combine qualitative insights with quantitative data to deepen understanding of this transformation.

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REFERENCES

- Abdurrahman, N. H. (2016). Character education in Islamic boarding school-based SMA Amanah. *Jurnal Pendidikan Islam*, 2(2), 287. <https://doi.org/10.15575/jpi.v2i2.791>
- Anam, S., & Marsum, M. (2022). Manajemen kurikulum pesantren *Mu'adalah* (Studi kasus di Dirosatul Muallimin Islamiyah Pondok Pesantren Al-Hamidy Banyuanyar Palengaan Pamekasan). *Ahsana Media: Jurnal Pemikiran, Pendidikan Dan Penelitian Ke-Islaman*, 8(2), 209-222. <https://doi.org/10.31102/ahsanamedia.8.2.2022.209-222>
- Azra, A. (2012). *Islamic education tradition and modernisation in the midst of the challenges of the third millennium (Pendidikan Islam tradisi dan modernisasi di tengah tantangan milenium III)*. Kencana Prenada Media Group.
- Bano, M. (2014). Madrasa reforms and Islamic modernism in Bangladesh. *Modern Asian Studies*, 48(4), 911-939. <https://doi.org/10.1017/S0026749X12000790>
- Budiharso, T., Bakri, S., & Sujito, S. (2023). Transformation of education system of the pesantren in Indonesia from the Dutch colony to democratic era. *Journal of Social Studies Education Research*, 14(4), 179-206. <https://jsser.org/index.php/jsser/article/view/5460/646>
- Creswell, J. W. (2010). *Research design: Qualitative, quantitative, and mixed methods approaches* (A. Fawaid, Trans.). Pustaka Pelajar.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.
- Denzin, N. K., & Lincoln, Y. S. (2014). *Qualitative methodology (including focus groups)*. Sage.
- Dhofier, Z. (2013). *Tradisi pesantren: Studi pandangan hidup kyai dan visinya mengenai masa depan Indonesia*. LP3ES.
- Direktorat Pendidikan Islam. (2023). *Data pendidikan Islam*. <http://www.pendis.kemenag.go.id/>
- Faricha, A. A. (2024). Sejarah sistem pendidikan *Mu'adalah* pondok pesantren Miftahul Muftadiin Krempyang Nganjuk. *Historia Islamica: Journal of Islamic History and Civilisation*, 3(1), 1-18. <https://doi.org/10.30984/historia.v3i1.702>
- Fitzpatrick, J. L., Sanders, J. R., & Worthen, B. R. (2022). *Programme evaluation: Alternative approach and practical guidelines*. Pearson Education.
- Frye, A. W., & Hemmer, P. A. (2012). Programme evaluation models and related theories: AMEE guide No. 67. *Medical Teacher*, 34(5), e288-e299. <https://doi.org/10.3109/0142159X.2012.668637>
- Harits, I. W., Chudy, S., Juvova, A., & Andrysova, P. (2016). Indonesia education today: Dating back its history of Islam and imparting European education system. *Asian Social Science*, 12(5), 179. <https://doi.org/10.5539/ass.v12n5p179>
- Hasan, N. (2014). Education, young Islamists and integrated Islamic schools in Indonesia. *Studia Islamika*, 19(1). <https://doi.org/10.15408/sdi.v19i1.370>
- Hashim, R., Rufai, S. A., & Nor, M. R. M. (2011). Traditional Islamic education in Asia and Africa: A comparative study of Malaysia's pondok, Indonesia's pesantren and Nigeria's traditional madrasah. *World Journal of Islamic History and Civilisation*, 1(2), 94-107. [https://www.idosi.org/wjihc/wjihc1\(2\)11/3.pdf](https://www.idosi.org/wjihc/wjihc1(2)11/3.pdf)
- Hefner, R. W., & Zaman, M. Q. (2010). *Schooling Islam: The culture and politics of modern Muslim education*. Princeton University Press.
- Isbah, M. F. (2020). Pesantren in the changing Indonesian context: History and current developments. *QIJIS (Qudus International Journal of Islamic Studies)*, 8(1), 65. <https://doi.org/10.21043/qijis.v8i1.5629>
- Isozaki, N. (2019). Education, development, and politics in South Korea. In *Education, development, and politics in South Korea* (pp. 209-229). https://doi.org/10.1007/978-981-13-2859-6_10

- Jusubaidi, J., Lindgren, T., Mujahidin, A., & Rofiq, A. C. (2024). A model of transformative religious education: Teaching and learning Islam in Pondok Modern Darussalam Gontor, Indonesia. *Millah: Journal of Religious Studies*, 23(1), 171-212. <https://doi.org/10.20885/millah.vol23.iss1.art6>
- Lawrence, T. B., & Suddaby, R. (2006). Institutions and institutional work. In S. R. Clegg, C. Hardy, T. B. Lawrence, & W. R. Nord (Eds.), *The SAGE handbook of organisation studies* (pp. 215-254). SAGE Publications Ltd. <https://doi.org/10.4135/9781848608030.n7>
- Lukens-Bull, R. A. (2001). Two sides of the same coin: Modernity and tradition in Islamic education in Indonesia. *Anthropology & Education Quarterly*, 32(3), 350-372. <https://doi.org/10.1525/aeq.2001.32.3.350>
- Lukens-Bull, R. A. (2013a). *Islamic higher education in Indonesia*. Palgrave Macmillan US. <https://doi.org/10.1057/9781137313416>
- Lukens-Bull, R. A. (2013b). Experiencing Islamic education in Indonesia. In G. Marranci (Ed.), *Studying Islam in practice*. Routledge. <https://doi.org/10.4324/9781315850955>
- Manshuruddin, M., Mardianto, M., & Halimah, S. (2025). Design and implementation of the *Mu'adalah* curriculum at Musthafawiyah Islamic boarding school: Balancing tradition and innovation. *Al-Ishlah: Jurnal Pendidikan*, 17(2). <https://doi.org/10.35445/alishlah.v17i2.6732>
- McCulloch, G. (2017). Finnish lessons 2.0: What can the world learn from educational change in Finland? By Pasi Sahlberg. The Finnish education mystery: Historical and sociological essays on schooling in Finland. By Hannu Simola. *British Journal of Educational Studies*, 65(2), 265-268. <https://doi.org/10.1080/00071005.2017.1312818>
- Muhtadin, M. A., Hendawi, M., Patoni, A., & Tanzeh, A. (2023). Student's persistence in the Pondok Lirboyo: A mixed methods study. *Nazhruna: Jurnal Pendidikan Islam*, 6(2), 207-225. <https://doi.org/10.31538/nzh.v6i2.3019>
- Mujahid, I. (2021). Islamic orthodoxy-based character education: Creating moderate Muslim in a modern pesantren in Indonesia. *Indonesian Journal of Islam and Muslim Societies*, 11(2), 185-212. <https://doi.org/10.18326/ijims.v11i2.185-212>
- Munastiwi, E., & Marfuah, M. (2019). Islamic education in Indonesia and Malaysia: Comparison of Islamic education learning management implementation. *Jurnal Pendidikan Islam*, 8(1), 1-26. <https://doi.org/10.14421/jpi.2019.81.1-26>
- Muslih, M., Mahmudi, I., & Samsirin, S. (2020). The evaluation of pesantren *Mu'adalah* programme by using the responsive model in pesantren (Islamic boarding school) Tremas Pacitan. *At-Ta'dib*, 15(2), 28. <https://doi.org/10.21111/at-tadib.v15i2.5225>
- Ng, P. T. (2017). *Learning from Singapore*. Routledge. <https://doi.org/10.4324/9781315682914>
- Ni'am, S. (2015). Pesantren: The miniature of moderate Islam in Indonesia. *Indonesian Journal of Islam and Muslim Societies*, 5(1), 111-134. <https://doi.org/10.18326/ijims.v5i1.111-134>
- O'Reilly, C. A., & Tushman, M. L. (2013). Organisational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, 27(4), 324-338. <https://doi.org/10.5465/amp.2013.0025>
- OECD. (2021). *Education at a glance 2021*. OECD. <https://doi.org/10.1787/b35a14e5-en>
- Rahman, M. R., & Asrohah, H. (2022). Virtual pesantren: Pesantren sustainability in facing the challenges of 4.0 era. *Jurnal Pendidikan Islam Indonesia*, 6(2), 63-73. <https://doi.org/10.35316/jpii.v6i2.403>
- Rogers, E. M. (2010). *Diffusion of innovations*. Simon & Schuster.

- Rohman, A., Muhtamiroh, S., Imron, A., & Miyono, N. (2023). Integrating traditional-modern education in madrasa to promote competitive graduates in the globalisation era. *Cogent Education*, 10(2). <https://doi.org/10.1080/2331186X.2023.2268456>
- Rosyidin, M., & Arifin, I. (2021). Integration of Islamic and Indonesian education in the perspective of KH. Salahuddin Wahid. *Jurnal Pendidikan Agama Islam*, 18(2), 227-256. <https://doi.org/10.14421/jpai.2021.182-02>
- Samindjaya, S. S., Laallam, A., Hudaefi, F. A., Issa, B. M., Ouassaf, S., & Oussedik, M. I. (2024). Imam Zarkasyi's contribution to Indonesia's modern waqf education system. *Journal of Islamic Thought and Civilisation*, 14(1), 74-91. <https://doi.org/10.32350/jitc.141.05>
- Schleicher, A. (2018). *World class: How to build a 21st-century school system*. OECD. <https://doi.org/10.1787/9789264300002-en>
- Simsek, Z., Fox, B., & Heavey, C. (2023). Systematicity in organisational research literature reviews: A framework and assessment. *Organisational Research Methods*, 26(2), 292-321. <https://doi.org/10.1177/10944281211008652>
- Stake, R. E. (2002). Teachers conceptualising student achievement. *Teachers and Teaching*, 8(3), 303-312. <https://doi.org/10.1080/135406002100000459>
- Stake, R. E., & Munson, A. (2008). Qualitative assessment of arts education. *Arts Education Policy Review*, 109(6), 13-22. <https://doi.org/10.3200/AEPR.109.6.13-22>
- Stake, R., & Visse, M. (2023). Case study research. In R. J. Tierney, F. Rizvi, & K. Ercikan (Eds.), *International encyclopedia of education* (4th ed., pp. 85-91). Elsevier. <https://doi.org/10.1016/B978-0-12-818630-5.11010-3>
- Steenbrink, K. (1994). *Islamic boarding schools, madrasas, schools: Islamic education in the modern era (Pesantren, madrasah, sekolah: Pendidikan Islam dalam kurun moden)*. LP3ES.
- Steenbrink, K. A. (1986). *Pesantren madrasah sekolah: Pendidikan Islam dalam kurun moden*. LP3ES.
- Suharto, T. (2018). Transnational Islamic education in Indonesia: An ideological perspective. *Contemporary Islam*, 12(2), 101-122. <https://doi.org/10.1007/s11562-017-0409-3>
- UNESCO. (2021). *Global education monitoring report 2021/2: Non-state actors in education: Who chooses? Who loses?* UNESCO. <https://doi.org/10.54676/XJFS2343>
- Yasid, A. (2018). *New paradigm of Islamic boarding schools towards integrated Islamic education*. IRCiSoD.
- Yusuf, M. A., & Taufiq, A. (2020). The dynamic views of kiais in response to the government regulations for the development of pesantren. *QJIS (Qudus International Journal of Islamic Studies)*, 8(1), 1. <https://doi.org/10.21043/qijis.v8i1.6716>
- Zhang, A., Olelewe, C. J., Orji, C. T., Ibezim, N. E., Sunday, N. H., Obichukwu, P. U., & Okanazu, O. O. (2020). Effects of innovative and traditional teaching methods on technical college students' achievement in computer craft practices. *SAGE Open*, 10(4), 215824402098298. <https://doi.org/10.1177/2158244020982986>

Integrating Bugis Local Wisdom with Social Pillars of Sustainable Development: A Model for Aligning Cultural Practices

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ABSTRACT

This study examines how Bugis local wisdom aligns with social goals in sustainable development, particularly the United Nations Sustainable Development Goals (SDGs) 1 to 5. It highlights how values embedded in Bugis culture—such as integrity in leadership, community responsibility, and resilience—can support social equity, environmental stewardship, and community well-being. By analysing the *Pangngajak Tomatoa*, a traditional Bugis text, and conducting interviews with cultural leaders in South Sulawesi. This study identifies cultural practices that contribute to sustainability in ways that are meaningful and effective at the community level. The findings suggest that Bugis wisdom offers a practical and culturally relevant approach to sustainable development, one that values fairness, shared decision-making, and inclusive leadership across genders. The study also provides a framework for integrating local cultural values into global sustainability goals. While its focus on the Bugis community may limit broader generalisation, future studies are encouraged to apply this model in diverse contexts and use quantitative methods for further validation.

Keywords: Bugis, cultural integration, local culture, sustainable development model

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INTRODUCTION

Sustainable Development Goals (SDGs) aim to balance economic growth, environmental protection, and social justice, reflecting a universal commitment to prosperity and sustainability. However, real-world implementation often encounters challenges,

particularly in harmonising global standards with local wisdom. For developing countries like Indonesia, integrating international frameworks with indigenous practices is crucial to ensuring the relevance, effectiveness, and long-term sustainability of development efforts. Indigenous values and traditional knowledge offer context-specific solutions to address the unique social, economic, and environmental challenges faced by local communities (Costanza et al., 1997; Sachs 2015).

In Indonesia, particularly within the Bugis community in South Sulawesi, a wealth of cultural wisdom supports sustainable development. Bugis local wisdom, captured in sources like *Pangngajak Tomatoa*, offers principles and practices of social, economic, and environmental stewardship that have sustained the community for generations. These practices, including collective farming, traditional irrigation, and community-based resource management, align with the sustainable development goals by promoting collective welfare, environmental conservation, and social equity (Nur et al., 2023; Slikkerveer, 2019; Warren, 2013). Such indigenous knowledge systems provide models for sustainable resource management that respect ecological limits, thereby enriching both national and global development strategies (Costanza et al., 2014; Leach et al., 1999).

Pangngajak Tomatoa, literally “the call of the enlightened,” is a classical Bugis compendium from South Sulawesi that systematically codifies leadership conduct, resource allocation, social obligations, and

conflict-resolution protocols—traditionally used to mediate village disputes and guide collective decisions—making it an ideal cultural lens for aligning Bugis communal wisdom with the social pillars of sustainable development and filling a gap in Bugis textual studies to inform community-based policy and practice (Pelras, 1996; Saleh, 2024).

This study employs two key sociological theories to integrate Bugis wisdom with the sustainable development goals: Anthony Giddens' Structuration Theory and Pierre Bourdieu's Habitus Theory. Giddens' Structuration Theory highlights how social structures both constrain and enable individual agency, suggesting that local traditions can act as supportive frameworks within global sustainability efforts (Giddens, 1984). Meanwhile, Bourdieu's Habitus Theory emphasises that enduring cultural practices shape community interactions with their environment and social systems, positioning them as active participants in sustainability (Bourdieu, 1990; Pelras, 1996). Together, these theories offer a robust framework to demonstrate how Bugis wisdom can be harmonised with global sustainable development goals, creating a synergy between traditional practices and international standards.

Recent studies highlight the importance of integrating local wisdom into development policy, demonstrating enhanced effectiveness and sustainability when efforts align with community values. Prasetyo et al. (2021) emphasise that development initiatives grounded in

indigenous customs gain greater community acceptance, leading to more sustainable outcomes. Harris and Nowverl (2000) further illustrate that the interaction between local knowledge and modern scientific approaches fosters innovation and resilience, creating mutually reinforcing strategies. (Lasaiba, 2022) underscores that indigenous participation in sustainability policies ensures culturally resonant approaches, promoting local ownership and long-term success in development efforts.

While existing research highlights the value of indigenous knowledge, gaps remain in understanding how to systematically integrate it into sustainable development frameworks. This study addresses this gap by proposing a model that aligns Bugis local wisdom with the social pillars of sustainable development. By harmonising traditional values with modern development strategies, the study demonstrates how such integration can create more inclusive and sustainable outcomes while preserving and leveraging local cultural heritage.

LITERATURE REVIEW

Sustainable Development Model

The concept of sustainable development, central to global strategies since the WCED's Brundtland Report in 1987, introduced a three-pillar model integrating economic growth, environmental protection, and social equity (Pertiwi, 2017; Sachs, 2012). This model underpins the United Nations Sustainable Development Goals (SDGs), which aim for balanced, long-term sustainability. However, scholars often

Forsyth (2004) critique the SDGs' universal framework for often overlooking culturally specific needs in regions with unique socio-environmental contexts.

The SDGs' social pillar is crucial for community-level sustainability, focusing on five key goals: ending poverty (SDG 1), eradicating hunger (SDG 2), promoting health and well-being (SDG 3), providing quality education (SDG 4), and ensuring gender equality (SDG 5). These goals prioritise reducing disparities and fostering equity. The economic and environmental pillars focus on resource preservation and ecological balance for future generations (Costanza et al., 1997; Keiner, 2005; Munasinghe, 1993). However, Martinez-Alier (2002) argues that achieving these pillars simultaneously is difficult in developing regions, where economic growth often conflicts with environmental protection.

The WCED framework outlines seven requirements for sustainable development: participatory governance, economic growth, social stability, responsible production, technological advancement, international cooperation, and adaptive administration (Meadows & Randers, 2004; Pertiwi, 2017). However, developing nations face challenges like structural inequality and environmental degradation, complicating implementation. Amin (1990) critiques dominant development models, noting that local populations in the Global South bear the environmental and economic costs with little benefit. This aligns with Leach et al. (1999), who stress the need to

incorporate community-specific practices and knowledge for effective and inclusive development strategies.

Research by Forsyth (2004) emphasises the importance of integrating local knowledge into sustainable frameworks to improve their relevance and effectiveness. Agrawal (2002) highlights the role of indigenous knowledge in addressing specific environmental and social challenges, while Forsyth (2004) stresses the importance of community resilience. Leach et al. (1999) advocate for a community-based approach that considers environmental entitlements and the influence of local institutions on resource management. Together, these studies suggest that ignoring local wisdom in sustainable development risks overlooking unique socio-environmental dynamics.

Mattulada (Tenri Rawe & Darwis, 2020) positions *siri'*—honour and shame—as Bugis society's core moral code, enforcing communal cohesion, while Pelras (1993, 1996) shows how *pesse*—compassion and reciprocal obligation—operationalises these ethics through everyday support networks. Jubba (Jubba, 2019; Jubba et al., 2018) offers a hermeneutic reading of *Pangngajak Tomatoa's pappaseng*, revealing its dialogic proverbs as centuries-old prescriptions for leadership, resource sharing, and dispute resolution. Finally, Maarif (2015) bridges these indigenous norms with modern development discourse, arguing that Bugis stewardship and mutual aid can guide community-based governance aligned with social-development goals. Together, these works form the theoretical

scaffold—linking moral codes (*siri'*), practices (*pesse*), textual authority (*Pangngajak Tomatoa*), and development applications—that underpins our five-pillar analysis of Bugis values and their relevance to the social dimensions of the SDGs.

Bugis Local Culture

The Bugis people of South Sulawesi have a rich cultural heritage rooted in social, economic, and environmental practices. Their local wisdom, termed local genius by Koentjaraningrat (1985) reflects collective knowledge and adaptive strategies developed to address community needs and environmental challenges. Preserved through traditions like *Pangngajak Tomatoa*, these moral teachings emphasise responsibility, social cohesion, and community resilience (Hakim, 1992).

Key dimensions of Bugis wisdom, as identified by Puspawati et al. (2019), include environmental knowledge, resource management, decision-making, and group solidarity. These align with sustainable practices like community-based water management and forest conservation, supporting environmental conservation and social equity (Lewerissa et al., 2018; Pelras, 1996). The *pabbicara* governance model, emphasising balanced decision-making and integrity, ensures community welfare and equitable resource distribution (Hakim, 1992).

The *pabbicara* leadership promotes consensus-building, social cohesion, and shared responsibility essential for sustainable resource management.

Scholars, Koentjaraningrat (1985) and Nur et al. (2023) stress that Bugis cooperation forms a strong foundation for sustainability, while Pelras (1996) highlighting how traditions of reciprocity strengthen resilience and integrate social stability with environmental awareness.

The Bugis cultural framework integrates spiritual beliefs, positioning humans as stewards of the earth, aligning with sustainable development by linking social equity, environmental sustainability, and ethical stewardship (Nanlohy et al., 2019; Pelras, 1996). Empirical evidence supports the relevance of Bugis wisdom in addressing social, economic, and environmental challenges. Sharma (2024) argue that development policies rooted in local contexts are more sustainable, with Agrawal (2002) and Leach et al. (1999) advocating for community-driven, indigenous knowledge-based solutions for inclusive and effective development strategies.

Theories Supporting the Integration of Local Wisdom with Sustainable Development Models

The integration of local wisdom into sustainable development is explained through Giddens' Structuration Theory and Bourdieu's concepts of Habitus and Social Capital. Giddens highlights how social structures both constrain and enable agency, as seen in Bugis governance practices promoting collective decision-making (Giddens, 1984). Bourdieu's Habitus theory shows how cultural practices shape values like social responsibility and environmental

stewardship, while his Social Capital theory emphasises the role of social networks in sustainability, exemplified by the Bugis tradition of *gotong royong* (mutual aid) (Nur et al., 2023; Pelras, 1996).

Comparing indigenous knowledge systems shows the universal relevance of local wisdom in achieving SDGs. The Maori of New Zealand incorporate *kaitiakitanga* (land guardianship) into policies aligning with SDG stewardship goals (McAllister et al., 2023), while the Sami of northern Europe adapt reindeer herding and land use traditions for sustainable livelihoods (Salomaa et al., 2013). These examples underscore the importance of context-specific knowledge Agrawal (2002) and Leach et al. (1999) argue that community-driven solutions enhance inclusivity and resilience, while Sharma (2024) emphasise that aligning development policies with local wisdom ensures long-term sustainability.

METHODS

This study adopts a qualitative approach using Reflexive Thematic Analysis (RTA) to explore the alignment of Bugis local wisdom with the social pillars of sustainable development. Developed by Braun et al. (2022) RTA is well-suited for in-depth examination of cultural and social phenomena, enabling nuanced interpretations of cultural values. Braun et al. (2022), further highlight RTA's flexibility and iterative nature, making it an effective method for analysing culturally embedded practices.

Research Design

The study employs a qualitative exploratory design, offering flexibility to thoroughly investigate how Bugis cultural values and practices contribute to sustainable development. This design enables a comprehensive analysis of thematic elements and their alignment with global development goals (Creswell & Poth, 2016).

Data Topology

Primary data includes *Pangngajak Tomatoa*, a Bugis text with 313 teachings on ethics and social responsibilities. Supplementary data consists of semi-structured interviews with cultural leaders and community members, providing context on the application of these teachings in modern Bugis society.

Data Collection Methods

Data was collected using document analysis and semi-structured interviews:

Document Analysis: The *Pangngajak Tomatoa* text was reviewed systematically to identify core values and principles relevant to sustainable development.

We used a semi-structured interview guide (Patton et al., 2015) with three sections: (1) Background and social roles (e.g., “Describe your position in the community”); (2) Cultural texts and norms (e.g., “How do you apply Pangngajak Tomatoa in decision-making?”); and (3) SDG alignment (e.g., “How do these practices support social welfare, education, or gender equality?”). Interviews (60-90 min) were conducted in Bahasa Indonesia or Bugis, audio-recorded,

and transcribed verbatim. All participants gave written informed consent.

Data Analysis

The Reflexive Thematic Analysis (RTA) was conducted in the following stages, guided by Braun et al. (2022) an iterative framework as shown in Figure 1:

Familiarisation with the Data: Extensive reading of *Pangngajak Tomatoa* and interview transcripts helped identify recurring themes and values.

Initial Noting: Key cultural values such as leadership, social responsibility, and environmental stewardship were highlighted.

Developing Emergent Themes: Core themes like leadership integrity, social obligations, environmental care, and resilience were linked to sustainable development pillars.

Searching for Connections Across Themes: Relationships between themes were explored to see how they support sustainable development.

Moving to the Next Cases: Similar processes were applied to all interviews to identify patterns and validate themes from *Pangngajak Tomatoa*.

Looking for Patterns Across Cases: Common patterns across datasets helped create a model that integrates Bugis wisdom with sustainable development.

Our Reflexive Thematic Analysis (Braun et al., 2022) builds an integrated framework rather than merely mapping concepts. We began by familiarising



Figure 1. Reflexive thematic Analysis

Source: Braun et al. (2022)

ourselves with the *Pangngajak Tomatoa* text and interview transcripts, then coded key values (*siri*, *pesse*) during Initial Noting. In Developing Emergent Themes, codes were grouped into SDG-aligned themes. Searching for Connections revealed inter-theme links (e.g., *siri*'s role in leadership integrity and resilience), and Moving to Next Cases validated these codes across informants. Finally, Looking for Patterns Across Cases synthesised these findings into a cohesive model of Bugis wisdom and SDG integration. This reflexive process yields novel analytical insights.

Sampling and Participants

Purposive sampling was used to select participants with expertise in Bugis culture:

Cultural Leaders: As key figures in preserving Bugis traditions, they provided insights into the application of traditional values.

Elders and Community Members: Participants were chosen based on their roles in community decision-making and experience in traditional practices aligned with sustainable goals.

Participants (N= 10 - 3 cultural leaders, 3 elders [≥50 years], and 4 community members)

were purposively sampled based on three criteria— ≥ 10 years' continuous residence in a Bugis village, recognised status as a cultural leader, elder, or knowledgeable community member, and active engagement with *Pangngajak Tomatoa* in decision-making—via nominations from village councils and adat institutions.

Trustworthiness and Reflexivity

The study's trustworthiness was ensured through triangulation of document analysis, interviews, and participant observations, enhancing the credibility of findings (Zamili, 2015). Reflexivity was maintained by actively reflecting on the researcher's biases and assumptions to ensure that interpretations faithfully represent Bugis values. To strengthen analytic validity, we triangulated three data sources: (1) textual analysis of the *Pangngajak Tomatoa* manuscript; (2) interview transcripts; and (3) relevant secondary literature on Bugis social norms. First, codes generated from the text were compared against themes emerging from interviews. Second, discrepancies between textual prescriptions and lived practice were resolved by revisiting both the text and participant comments. Third, we cross-checked our thematic interpretations against existing studies. This iterative process ensured that our final themes reflect both the canonical text and contemporary community enactment.

Data Visualisation

Themes were visualised through thematic maps, illustrating the relationship between

Bugis cultural values and sustainable development goals. These maps provide a visual representation, helping readers understand the integration of cultural themes within a global framework (Hashimov, 2015).

RESULTS

Verbatim excerpts from ten purposively selected informants—three Cultural Leaders (CL1-CL3), three Elders (E1-E3), and four Community Members (CM1-CM4)—support the themes below. Each quote is labelled by source, ensuring diverse community perspectives. All excerpts are translated into English.

The analysis of *Pangngajak Tomatoa* and interviews with cultural leaders highlight five key themes in Bugis wisdom that align with the Social Pillars of the Sustainable Development Goals (SDGs 1-5): leadership integrity, social responsibility, environmental stewardship, collective decision-making, and courage in social resilience.

Leadership Integrity

In Bugis society, leadership integrity is highly regarded, as seen in both *Pangngajak Tomatoa* and interview data. The Bugis concept of leadership, embodied by the *pabbicara* (traditional leader), emphasises qualities like honesty, responsibility, and wisdom, which align with: SDG 1: No Poverty and SDG 5: Gender Equality.

Issue Statement: Bugis local wisdom assigns a central role to integrity in

leadership, yet how this value translates into community practice remains under-examined.

Textual Evidence: *Pangngajak Tomatoa* underscores that:

Four principles that cement a ruler's authority: honesty; a sincere effort to uplift the people; refraining from commanding what cannot be done; and a profound reverence for God.

This statement highlights the essential role of ethical leadership in supporting community welfare and equity.

Interview Excerpt:

Apabbicara must place their community first; all decisions should be guided by the pursuit of the collective welfare. (CL1)

During preparations for the customary ceremony, I convened a meeting with the village head; although I was initially apprehensive about facing criticism, I remained firm for the sake of the public good. (CL1)

Analytical Insight: This illustrates the cultural expectation for leaders to prioritise the common good.

Social Responsibility and Collective Obligations

Social responsibility and collective obligations are integral to Bugis culture, where individuals are expected to contribute to community welfare. This aligns with:

SDG 1: No Poverty, SDG 2: Zero Hunger, and SDG 3: Good Health and Well-Being.

Issue Statement: While gotong royong is celebrated conceptually, its role in mitigating poverty and hunger via communal safety nets requires empirical substantiation.

Textual Evidence: *Pangngajak Tomatoa* highlights collective duties:

Four obligations that demand immediate attention: interring the deceased; arranging children's marriages; hosting guests; and settling outstanding debts.

These obligations ensure that significant social events are supported by the community.

Interview Excerpt:

Gotong royong is a cornerstone of our culture, especially when it comes to helping those in need. Every member of the community is expected to take part. (CM1)

Pangngajak Tomatoa teaches that a leader's integrity resides in steadfastness rooted in the values of collective welfare. (CL3)

"My duty to uphold *siri* ' means I cannot absent myself from communal tasks; failing to join would shame my family's name" (E2)

Analytical Insight: This demonstrates the enduring practice of mutual aid in Bugis society.

Environmental Stewardship

Bugis local wisdom emphasises sustainable use of natural resources, aligning with: SDG 2: Zero Hunger and SDG 3: Good Health and Well-Being.

Issue Statement: Traditional environmental practices shape resource management, but their alignment with contemporary sustainability goals merits clarification.

Textual Evidence: *Pangngajak Tomatoa* advises moderation:

Local wisdom teaches us to remain ever grateful for the gifts bestowed by nature and to refrain from desiring more than our necessities.

This statement emphasises the importance of using natural resources responsibly to ensure sustainability.

Interview Excerpt:

We manage water with meticulous care to ensure there is enough for every farmer. This is how we preserve the sustainability of our water resources. (E1)

I was hesitant to reprimand my neighbour for felling trees and burning refuse indiscriminately, but for the sake of the environment, I mustered the courage to speak up. (CM4)

Analytical Insight: This reflects the Bugis approach to resource management, particularly in agriculture.

Collective Decision-making

The practice of collective decision-making ensures inclusive involvement in decisions impacting resource management and social obligations, aligning with: SDG 4: Quality Education and SDG 5: Gender Equality.

Issue Statement: The mechanisms through which Bugis communities ensure inclusive governance, especially gender inclusion, require systematic exploration.

Textual Evidence: *Pangngajak Tomatoa* promotes collective involvement:

Decisions must be made collectively, ensuring that everyone's voice is heard so that no one feels left behind.

This highlights the value of inclusivity in decision-making.

Interview Excerpt:

Every major decision is made only after gathering input from everyone in the community. This approach ensures that all members feel valued and involved. (CM2)

Analytical Insight: This reinforces that collective decision-making is a central value in Bugis society.

Courage and Social Resilience

In Bugis culture, courage and social resilience are often championed by women, who actively participate in social and cultural leadership, particularly in traditional rituals. This theme aligns with: SDG 5: Gender Equality, emphasising women's roles in leadership.

Issue Statement: Courage—a key dimension of resilience—is often described abstractly; its concrete manifestations in Bugis communal life need specification.

Textual Evidence, *pangngajak tomatoa* advice:

Women in Bugis society often preside over traditional rituals and play a pivotal role in social decision-making.

This underscores how gender equality is deeply rooted in Bugis traditions, with women actively contributing to community leadership.

During preparations for the customary ceremony, I convened a meeting with the village head; although I was initially apprehensive about facing criticism, I remained firm for the sake of the public good. (CL2)

While preparing for the traditional event, we worked together in collective mutual aid to assemble the necessary equipment; through this, we learned to depend on one another to recover and move forward. (CM3)

We relay stories of our elders' sacrifices as exemplars of courage, so that younger generations remain undaunted when confronted with challenges. (E3)

Analytical Insight: These passages demonstrate that Bugis traditions institutionalise gender-inclusive leadership and collective resilience. The *Pangngajak*

Tomatoa's endorsement of women's roles in ritual and decision-making, CL2's account of steadfast leadership, CM3's mutual aid, and E3's storytelling of ancestral courage together show how *siri*' and *pesse* foster participatory governance and strengthen community solidarity and adaptability.

DISCUSSION

Interpretation of Findings Based on the Social Pillars of Sustainable Development

The social pillar of sustainable development focuses on justice, community welfare, and harmonious interactions with the environment. Bugis local wisdom aligns closely with these principles, particularly supporting SDGs 1 to 5, which emphasise the social aspects of sustainability.

Leadership Integrity and Social Pillars (SDG 1: No Poverty, SDG 5: Gender Equality)

Leadership integrity, a central value in Bugis culture, supports fair resource distribution and community welfare. Ethical leadership enhances public trust and social cohesion by promoting transparency, accountability, and inclusive decision-making (Rusdiono et al., 2024).

SDG 1: No Poverty - Leadership integrity in Bugis society ensures fair resource distribution, aligning with SDG 1 to reduce poverty through equitable access. Bugis leaders, especially traditional *pabbicara*, prioritise community welfare over personal gain, reflecting governance research that links ethical leadership to

poverty reduction through resource equity (Sharma, 2024). Giddens' Structuration Theory (1984) further explains how structured leadership roles reinforce collective welfare, creating a community-centred resource allocation system that supports vulnerable members.

SDG 5: Gender Equality - Bugis culture prioritises gender-inclusive leadership, supporting SDG 5 by encouraging both men and women to participate in decision-making, particularly in family and community contexts. Koentjaraningrat (1985) notes that Indonesian societies, including the Bugis, integrate significant female leadership roles, fostering respect and gender representation. This inclusivity is evident in community gatherings and forums where women actively contribute to decisions on resource distribution, social initiatives, and conflict resolution.

Applying Bugis leadership integrity to broader contexts could include governance training programmes emphasising honesty, responsibility, and inclusivity for community leaders across Indonesia. Such programmes would strengthen leadership effectiveness, public trust, and equitable resource management. The gender inclusivity inherent in Bugis principles can also serve as a model for balanced leadership in rural governance, promoting equal opportunities for men and women in decision-making. Similar initiatives in Kenya and Uganda demonstrate that integrity-driven and gender-inclusive leadership enhances

community trust and welfare (Salomaa et al., 2013).

Social Responsibility and Collective Obligations (SDG 1: No Poverty, SDG 2: Zero Hunger, SDG 3: Good Health and Well-being)

Social responsibility and collective obligations are fundamental in Bugis culture, exemplified by *gotong royong* (mutual aid).

SDG 1: No Poverty - In Bugis society, *gotong royong* functions as a social safety net, providing support during hardships. Forsyth (2004) highlights that collective action, like *gotong royong*, can address gaps in formal social services by pooling resources to assist individuals and families, reducing poverty through resource redistribution. This aligns with Giddens' Structuration Theory (1984), which explains how social structures like *gotong royong* empower individuals by offering a support system that lessens dependency on external aid.

SDG 2: Zero Hunger - Food sharing during cultural and religious events supports food security in Bugis communities, aligning with SDG 2's focus on sustainable and equitable food systems. This grassroots food distribution ensures that no one lacks essential nutrition. Warren (2013) highlights that such traditional practices, rooted in generosity and collective welfare, are vital for building sustainable and culturally relevant food systems.

SDG 3: Good Health and Well-Being - In Bugis society, mutual aid extends to healthcare, with community members offering physical, emotional, and financial support to those facing health challenges. This practice promotes communal health and aligns with SDG 3's goal of ensuring healthy lives and well-being for all. Giddens' Structuration Theory (1984) explains how mutual aid networks foster shared responsibility, creating an environment of communal care and resilience (Pelras, 1996).

Broader Applications and Hypothetical Scenarios - Bugis principles of social responsibility can guide community development programmes to strengthen social support systems. For example, rural areas in Indonesia could establish community funds where members contribute to assist those facing illness or financial hardship. Similar shared healthcare models in Bangladesh and India have reduced financial strain and promoted collective well-being (Agrawal, 2002; Leach et al., 1999).

Bugis gotong royong is uniquely grounded in *siri'* (/shame) and *pesse* (compassion/reciprocity). *Siri'* obliges individuals to protect their family's honour—making collective labour a moral necessity—while *pesse* fosters an authentic drive to ease neighbours' burdens. By contrast, Malay *malu* centres on avoiding personal embarrassment (*Malaysian - Core Concepts — Cultural Atlas*, n.d.; Subandi & Good, 2018), and Javanese *rukun* promotes voluntary harmony—suppressing conflict

for “pseudo-harmony” before nurturing “essential harmony” (Zhang & Andreychik, 2013). Mandar *sipa'pa* and *sipa'bati* likewise encourage solidarity and respect through kinship ties (Awaru et al., 2024; Latief & Rahhman, 2025).

Applying Giddens' (1984) structuration, we see that these cultural codes both enable and shape villagers' agency: *siri'* and *pesse* guide mutual aid practices, while community actions—such as adapting rituals for flood relief or extending aid to marginalised households—continuously reproduce and refine those norms.

Environmental Stewardship (SDG 2: Zero Hunger, SDG 3: Good Health and Well-being)

Environmental stewardship is a core element of Bugis local wisdom, which emphasises the responsible and sustainable use of natural resources.

SDG 2: Zero Hunger - Traditional Bugis practices, like community-based water management, enhance food security through sustainable agriculture. Agrawal (2002) highlights that indigenous knowledge systems provide effective, culturally relevant resource management frameworks. Bugis culture emphasises fair water distribution and resource conservation to sustain agricultural productivity, as taught in *Pangngajak Tomatoa* (Hakim, 1992). These practices align with SDG 2's goal of ensuring food security and achieving zero hunger.

SDG 3: Good Health and Well-Being - A healthy ecosystem is vital for community health. Bugis environmental stewardship, including forest conservation and water preservation, fosters a clean and balanced environment, aligning with SDG 3's goal of promoting well-being. Forsyth (2004) emphasises that environmental health underpins human welfare by ensuring access to clean water, air, and ecosystems. In the Bugis context, conservation efforts protect local flora and fauna, contributing to ecosystem resilience and mitigating environmental hazards, thereby supporting community health.

Broader Applications and Hypothetical Scenarios - The Bugis model of environmental stewardship provides guidance for resource management in various contexts. For example, adapting Bugis water management principles to agricultural communities in arid sub-Saharan Africa could enhance sustainability through community-managed irrigation systems. Similarly, community-led conservation projects in India have alleviated water scarcity and improved food security (Salomaa et al., 2013).

Bugis forest conservation practices can also serve as a model for community-driven efforts. In Indonesia's peatland areas, adopting Bugis-inspired regulated resource use could protect ecosystems while supporting sustainable livelihoods. These initiatives promote local ownership and long-term environmental stewardship (Warren, 2013).

Environmental stewardship, a central Bugis principle, champions sustainable resource use—from traditional irrigation systems that bolster ecosystem resilience (Forsyth, 2004) to indigenous Sulawesi beliefs that extend personhood to forests and impose ritual sanctions for conservation (Maarif, 2015)—paralleling Bugis water-management and environmental customs to support sustainable agriculture (SDG 2: Zero Hunger) and safeguard the natural resources essential for community health (SDG 3: Good Health and Well-Being).

Collective Decision-making (SDG 4: Quality Education, SDG 5: Gender Equality)

The Bugis practice of collective decision-making highlights inclusivity in governance, ensuring decisions reflect the needs of all members.

SDG 4: Quality Education - Bugis inclusive decision-making fosters a social learning environment where knowledge and values are shared across generations, aligning with SDG 4's focus on equitable access to quality education. Through collective discussions, the Bugis governance system supports informal education, imparting social norms, cultural knowledge, and practical skills. Bourdieu's concept of habitus (1990) explains how such social learning shapes individual dispositions and access to resources, enabling younger members to learn cultural values, civic responsibility, and community resilience, essential for social and educational development.

SDG 5: Gender Equality - Bugis inclusion of women in decision-making demonstrates a strong commitment to gender equality, aligning with SDG 5. Traditional governance structures, as noted by Koentjaraningrat (1985), actively involve women in family and community-level decisions, fostering respect for their leadership. This gender-inclusive practice creates a balanced and representative governance system, ensuring both men and women are valued contributors, consistent with cultural values and global standards.

The Bugis model of collective decision-making offers a useful framework for diverse cultural and organisational contexts. Rural development projects in Southeast Asia, for example, could adopt Bugis-inspired inclusive decision-making to engage both men and women, fostering community buy-in and improving programme effectiveness. Similar initiatives in Nepal show that inclusive decision-making enhances engagement and equitable resource distribution (Sondaal et al., 2019).

This model also promotes gender equality in governance, as NGOs can adopt Bugis practices by involving both genders in decision-making councils, supporting diverse perspectives and alignment with SDG 5. Efforts in Kenya and Uganda have strengthened welfare and gender equality in leadership (Salomaa et al., 2013). By integrating Bugis inclusivity, organisations can enhance education and gender balance, supporting SDG 4 and SDG 5 for sustainable development.

Bugis collective decision-making illustrates Giddens' structuration: enduring norms of *siri* and *pesse* form the structure, while community agency enacts and refines these norms through deliberation. This recursive process fosters social learning (SDG 4) by valuing every voice and institutionalises gender equality (SDG 5) as women engage actively. Over time, these practices adapt and reinforce the very cultural codes that guide them, demonstrating how structure and agency co-produce resilient, equitable governance.

Courage and Social Resilience (SDG 5: Gender Equality)

Courage and resilience are integral to Bugis society, with women taking prominent roles in social and cultural leadership. Their active participation in rituals and community gatherings underscores their impact on decision-making and cultural preservation.

SDG 5: Gender Equality - Bugis culture reflects a strong commitment to gender equality through women's active roles in leadership, particularly in social resilience efforts. Women contribute significantly to community decision-making, conflict resolution, and ritual leadership, maintaining social harmony and resilience. Koentjaraningrat (1985) highlights that women in Indonesian societies, including the Bugis, hold influential positions in social and family structures, fostering balanced and inclusive governance. This inclusion ensures equal leadership opportunities, where both men and women are respected and engaged in sustaining cultural and social stability.

The Bugis model of gender-inclusive resilience provides valuable insights for broader applications. In Southeast Asia, post-disaster recovery programmes could adopt Bugis principles by establishing female-led community response teams that leverage local practices to rebuild and strengthen social cohesion. Similar initiatives in Nepal have demonstrated that women’s leadership enhances resilience and recovery effectiveness (Sharma, 2024). Comparable efforts in Kenya’s women-led cooperatives have successfully improved social resilience and economic stability (Salomaa et al., 2013).

Courage is the willingness to act in the presence of fear, based on a balanced

awareness of personal capabilities and the perceived importance of the goal (Santisi et al., 2020). Social resilience refers to the collective capacity of a community to utilise available resources, social networks, and shared norms to adapt to and recover from stressors (Tchounwou et al., 2022). Table 1 summarises how Bugis local wisdom aligns with the social pillars of the sustainable development goals.

As shown in Table 1, leadership integrity—honesty and responsibility—underpins SDG 1 (No Poverty) and SDG 5 (Gender Equality). Gotong royong creates safety nets that alleviate poverty (SDG 1), hunger (SDG 2), and improve health (SDG 3).

Table 1
Alignment of Bugis local wisdom with the social pillars of sustainable development goals

Theme	SDG	Key findings and relevance
Leadership Integrity	SDG 1: No Poverty SDG 5: Gender Equality	- Bugis leadership values of honesty, responsibility, and wisdom ensure equitable resource distribution, supporting SDG 1 (Rusdiono et al., 2024). - Gender-inclusive decision-making aligns with SDG 5, where both men and women participate in leadership roles , Giddens, 1984, Koentjaraningrat, 1985).
Social Responsibility and Collective Obligations	SDG 1: No Poverty SDG 2: Zero Hunger SDG 3: Good Health and Well-Being	- <i>Gotong royong</i> (mutual aid) supports SDG 1 by creating social safety nets for vulnerable community members. - Community food sharing promotes food security (SDG 2) and enhances community health (SDG 3) (Forsyth, 2004; Warren, 2013).
Environmental Stewardship	SDG 2: Zero Hunger SDG 3: Good Health and Well-Being	- Bugis wisdom on sustainable resource use, such as water management, supports sustainable agriculture and food security (SDG 2). - Environmental practices like conservation promote community health, aligning with SDG 3 (Agrawal, 2002; Forsyth, 2004).
Collective Decision-Making	SDG 4: Quality Education SDG 5: Gender Equality	- Inclusive decision-making processes support social learning (SDG 4) and ensure gender equality in leadership roles (SDG 5) (Bourdieu, 1990; Koentjaraningrat, 1985).
Courage and Social Resilience	SDG 5: Gender Equality	- Women's leadership in rituals and social roles highlights gender equality in governance, supporting SDG 5 (Koentjaraningrat, 1985).

Environmental stewardship—particularly water management—sustains agriculture (SDG 2) and community well-being (SDG 3). Participatory decision-making advances social learning (SDG 4) and gender-inclusive governance (SDG 5). Finally, courage and social resilience—embodied in women’s ritual leadership and mutual support—reinforce SDG 5 and strengthen community adaptability. Together, these linkages showcase the comprehensive contribution of Bugis values to social sustainability.

Model of Social Pillar Integration in Sustainable Development Based on Bugis Local Wisdom

Building on the findings, this model integrates Bugis local values with the social pillars of sustainable development, highlighting the potential of Bugis cultural practices to support SDGs 1 to 5.

Leadership Integrity as a Pillar of Sustainable Development

Ethical leadership in Bugis culture, emphasised by values of honesty and responsibility, fosters equitable resource distribution, crucial for social sustainability. This aligns with Giddens (1984) Structuration Theory, supporting empowerment and community trust. The inclusion of both men and women in decision-making, as Koentjaraningrat (1985) noted, strengthens the model’s commitment to gender equality and inclusivity.

Social Responsibility and Collective Obligations for Social Equity

Recent scholarship portrays Bugis local wisdom as a cohesive cultural system grounded in reciprocal moral codes and communal practices: *siri’*—an ethic of honour and shame—regulates individual and kinship conduct to uphold social order Mattulada (1993), while *pesse*—compassion and reciprocity—sustains daily support networks (Pelras, 1993, 1996). Built upon these foundations, *gotong royong* (mutual aid) functions as a social safety net that mitigates inequality and advances SDG 1 (No Poverty) and SDG 2 (Zero Hunger) (Agrawal, 2002), and the spiritual and identity-based dimensions of Bugis communal cohesion further reinforce these practices, amplifying their impact on poverty alleviation and social inclusion (Jubba et al., 2018).

Environmental Stewardship as a Foundation for Sustainability

Environmental stewardship, a central Bugis principle, champions sustainable resource use—from traditional irrigation systems that bolster ecosystem resilience (Forsyth, 2004) to indigenous Sulawesi beliefs that extend personhood to forests and impose ritual sanctions for conservation (Maarif, 2015)—paralleling Bugis water-management and environmental customs to support sustainable agriculture (SDG 2: Zero Hunger) and safeguard the natural resources essential for community health (SDG 3: Good Health and Well-Being).

Collective Decision-making for Inclusive Governance

Bugis collective decision-making fosters inclusive governance—mirroring Bourdieu’s concept of social capital—through the dialogic ethos of the Lontara’ Latoa texts (Kajao Laliddong and Arummpone), whose pappaseng proverbs mandate that every voice be heard in village deliberations (Tenri Rawe & Darwis, 2020), while women’s active participation further bolsters gender equality, social cohesion, and broad community engagement (Koentjaraningrat, 1985).

Courage and Social Resilience as a Pillar for Gender Equality

Courage and resilience, particularly demonstrated by women in Bugis society, support SDG 5: Gender Equality. Women’s roles in cultural leadership reflect a deep commitment to gender equality, ensuring equal opportunities for both genders in social and cultural resilience.

Table 2 illustrates a model that fuses Bugis local wisdom with the social pillars of the SDGs: “Leadership Integrity” stresses ethical leadership—honesty, accountability and fair resource sharing—

Table 2
Model of integrating Bugis local wisdom with the social pillars of sustainable development goals

Pillar of Bugis local wisdom	Description	Aligned SDGs
Leadership Integrity	Ethical leadership, emphasising honesty, responsibility, and equitable resource distribution. Bugis leadership includes men and women in decision-making roles, fostering inclusivity.	SDG 1: No Poverty SDG 5: Gender Equality
Social Responsibility and Collective Obligations	<i>Gotong royong</i> (mutual aid) creates a social safety net, reducing inequality and promoting shared community welfare.	SDG 1: No Poverty SDG 2: Zero Hunger SDG 3: Good Health and Well-Being
Environmental Stewardship	Sustainable use of natural resources, including traditional irrigation and forest conservation, ensuring environmental health for future generations.	SDG 2: Zero Hunger SDG 3: Good Health and Well-Being
Collective Decision-Making	Inclusive governance that values community input, with emphasis on social cohesion and gender equality in decision-making processes.	SDG 4: Quality Education SDG 5: Gender Equality
Courage and Social Resilience	Women's active roles in cultural and social leadership, showcasing resilience and supporting equal gender participation in governance.	SDG 5: Gender Equality

to advance SDG 1 (No Poverty) and SDG 5 (Gender Equality) through inclusive decision making. “Social Responsibility” (*gotong royong*) serves as a communal safety net, reducing poverty (SDG 1), fighting hunger via shared food resources (SDG 2) and enhancing health through mutual care (SDG 3). “Environmental Stewardship”—from irrigation management to forest conservation—sustains agricultural yields (SDG 2) and community well-being (SDG 3). “Collective Decision-Making” promotes participatory governance, bolstering lifelong learning (SDG 4) and gender parity (SDG 5). Finally, “Courage and Social Resilience,” exemplified by women’s leadership in rituals, reinforces gender-inclusive governance (SDG 5). Together, these pillars show how Bugis values embed multiple social-development goals in a unified cultural framework.

CONCLUSION

Our findings show that Bugis local wisdom functions through five interdependent pillars—Leadership Integrity (*siri*), Social Responsibility (*pesse*), Environmental Stewardship, Participatory Decision-Making, and Courage-Anchored Resilience—each reinforcing and amplifying the social dimensions of the SDGs. Rather than discrete traits, these pillars form a dynamic system: *siri* underpins ethical leadership that sustains mutual-aid networks, while participatory governance embeds gender equity and collective learning. This culturally grounded model validates Bugis values’ relevance to SDGs 1-5 and provides

a blueprint for integrating indigenous practices into policy and programming. Future studies should test its applicability to other domains—such as clean water (SDG 6), livelihood diversification (SDG 8) and justice (SDG 16)—across Southeast Asia.

Implications of the Study

This study offers significant theoretical and practical contributions to the integration of local wisdom with the social pillars of sustainable development.

Theoretically, the findings expand the application of social theories, such as Anthony Giddens’ Structuration Theory and Pierre Bourdieu’s Habitus Theory, to demonstrate how local cultural values can support global development frameworks. Bugis cultural values like *gotong royong* (mutual aid) and inclusive leadership exemplify how traditional practices reinforce these theories, particularly in community-driven development. Furthermore, the study highlights the relevance and adaptability of traditional knowledge in addressing contemporary global challenges, particularly those aligned with SDG 1-5. Integrate *Siri*’ and *Pesse* Modules into Village Leadership Training. Development agencies and local government should co-design capacity-building curricula that incorporate the moral frameworks of *siri*’ (honour/shame) and *pesse* (compassion/reciprocity). By using case studies and role-plays drawn from Pangngajak Tomatoa, these modules can strengthen ethical decision-making and foster empathetic leadership among desa officials and community facilitators.

Practically, the proposed integration model provides a roadmap for local governments and NGOs to incorporate culturally grounded approaches into development programmes. By leveraging local wisdom, such programmes can enhance community participation, foster a sense of ownership, and improve the sustainability of initiatives. Specifically, in the Bugis context, the model encourages greater inclusion of women in leadership and decision-making roles, aligning with SDG 5 on gender equality. Establish Cross-Cultural Collaboration Guidelines for Local SDG Programmes. NGOs and regional planners should develop best-practice protocols that leverage Bugis communal practices—such as gotong royong and participatory deliberation—as templates for multi-ethnic SDG implementation. These guidelines would standardise inclusive consultation processes, ensure gender-balanced participation, and promote mutual-aid mechanisms across diverse village contexts.

In terms of policy implications, the study advocates for policymakers to integrate local cultural values into development planning. Recognising the contributions of indigenous communities in resource management, education, and poverty alleviation ensures policies are more adaptive and responsive to specific community needs, increasing their chances of long-term success.

Socially, this research emphasises the importance of Bugis cultural values as a social asset that strengthens solidarity, social justice, and environmental sustainability.

By highlighting these values, the study underscores that preserving cultural heritage is not only vital for identity but also serves as a foundation for social innovation in development.

At a global level, the study demonstrates that development models respecting local wisdom can have broader applications in diverse contexts. For instance, the Bugis approach to collective resource management provides inspiration for community-led initiatives in other developing countries, showcasing the universal relevance of culturally sensitive solutions.

In summary, this study underscores the potential of Bugis local wisdom to contribute significantly to sustainable development at both local and global levels. By bridging traditional values and international standards, it offers a culturally resonant pathway to create inclusive and sustainable societies.

Limitation and Recommendation for Future Research

This study has several limitations that must be acknowledged. First, the research focuses on the Bugis community in South Sulawesi, Indonesia, which may limit the generalisability of the findings to other cultural contexts. While the values identified are deeply rooted in Bugis traditions, their applicability to other communities with different cultural frameworks remains uncertain. Second, the study predominantly employs qualitative methods, relying on interviews and textual analysis, which may

limit its ability to quantify the impacts of Bugis local wisdom on sustainable development goals (SDGs). Third, the research primarily examines the alignment of local wisdom with SDGs 1-5, leaving other SDGs less explored, which could offer additional insights into the broader applicability of Bugis cultural practices.

Future studies should address these limitations by exploring the following areas. First, comparative ethnographic studies. Applying the integrative framework to other Indonesian ethnic groups (e.g., Makassar, Toraja, Minangkabau) would test its transferability and identify shared versus unique cultural drivers of social sustainability. Second, researchers could employ mixed-methods approaches, combining qualitative and quantitative methods, to provide a more comprehensive analysis of the relationship between local wisdom and sustainable development. Quantitative validation, such as measuring community-level impacts on poverty reduction or gender equality, could strengthen the study's findings. Third, expanding thematic analysis to additional SDG domains. Future studies should investigate how Bugis wisdom informs management of clean water (SDG 6), justice and institutional trust (SDG 16), and livelihood diversification (SDG 8). Lastly, longitudinal studies tracking the implementation of the proposed model over time would offer valuable insights into its practical effectiveness and adaptability in real-world scenarios.

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REFERENCES

- Agrawal, A. (2002). Indigenous knowledge and the politics of classification. *International Social Science Journal*, 54(173), 287-297. <https://doi.org/10.1111/1468-2451.00382>
- Amin, S. (1990). *Maldevelopment: Anatomy of a global failure*. Zed Books.
- Awaru, A. O. T., Jumadi, J., & Sadriani, A. (2024). Sibaliparriq local wisdom as a model for children's education in coastal families of Polewali Mandar. *Komunitas: International Journal of Indonesian Society and Culture*, 16(1), 78-91. <https://doi.org/10.15294/komunitas.v16i1.2980>
- Bourdieu, P. (1990). *The logic of practice*. Stanford University Press. <https://doi.org/10.1515/9781503621749>
- Braun, V., Clarke, V., & Hayfield, N. (2022). 'A starting point for your journey, not a map': Nikki Hayfield in conversation with Virginia Braun and Victoria Clarke about thematic analysis. *Qualitative Research in Psychology*, 19(2), 424-445. <https://doi.org/10.1080/14780887.2019.1670765>

- Costanza, R., D'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. V., Paruelo, J., Raskin, R. G., Sutton, P., & Van den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*, 387(6630), 253-260. <https://doi.org/10.1038/387253a0>
- Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S. J., Kubiszewski, I., Farber, S., & Turner, R. K. (2014). Changes in the global value of ecosystem services. *Global Environmental Change*, 26, 152-158. <https://doi.org/10.1016/j.gloenvcha.2014.04.002>
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Escobar, A. (2011). *Encountering development: The making and unmaking of the Third World*. Princeton University Press.
- Forsyth, T. (2004). *Critical political ecology: The politics of environmental science*. Routledge. <https://doi.org/10.4324/9780203017562>
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. University of California Press.
- Hakim, Z. (1992). *Pangngajak Tomatoa*. Departemen Pendidikan dan Kebudayaan.
- Harris, E. W., & Nowverl, A. (2000). What's happening to soul food? Regional and income differences in the African American diet. *Ecology of Food and Nutrition*, 38(6), 587-603. <https://doi.org/10.1080/03670244.2000.9991598>
- Hashimov, E. (2015). Qualitative data analysis: A methods sourcebook and *The coding manual for qualitative researchers*. *Technical Communication Quarterly*, 24(1), 109-112. <https://doi.org/10.1080/10572252.2015.975966>
- Jubba, H. (2019). *Kontestasi identitas agama: Lokalitas spiritual* (M. P. M. Hidayati, Ed.). The Phinisi Press.
- Jubba, H., Rustan, A. S., & Juhansar. (2018). Kompromi Islam dan adat pada praktik keagamaan Muslim Bugis di Sulawesi Selatan. *JSW (Jurnal Sosiologi Walisongo)*, 2(2), 137-148. <https://doi.org/10.21580/jsw.2018.2.2.2865>
- Keiner, M. (2005). History, definition(s) and models of sustainable development. ETH Zurich. <https://doi.org/10.3929/ethz-a-004995678>
- Koentjaraningrat, K. (1985). *Mentalitas dan pembangunan*. Gramedia.
- Lasaiba, M. A. (2022). Integrasi kearifan lokal dalam pengelolaan ekowisata berkelanjutan dari perspektif masyarakat adat. *Jendela Pengetahuan*, 15(2), 84-91.
- Latief, A., & Rahlman, A. (2025). The role of civic education in local wisdom caring in Tanah Mandar. In *Proceedings of the conference* (pp. xx-xx). Atlantis Press. https://doi.org/10.2991/978-2-38476-372-6_7
- Leach, M., Mearns, R., & Scoones, I. (1999). Environmental entitlements: Dynamics and institutions in community-based natural resource management. *World Development*, 27(2), 225-247. [https://doi.org/10.1016/S0305-750X\(98\)00141-7](https://doi.org/10.1016/S0305-750X(98)00141-7)
- Lewerissa, Y. A., Sangaji, M., & Latumahina, M. B. (2018). Pengelolaan mangrove berdasarkan tipe substrat di perairan Negeri Ihamahu Pulau Saparua. *Triton: Jurnal Manajemen Sumberdaya Perairan*, 14(1), 1-9.
- Maarif, S. (2015). Ammatoan indigenous religion and forest conservation. *Worldviews*, 19(2), 144-160. <https://doi.org/10.1163/15685357-01902005>
- Malaysian culture: Core concepts. (n.d.). Retrieved July 9, 2025, from <https://culturalatlas.sbs.com.au/malaysian-culture/malaysian-culture-core-concepts>
- Martinez-Alier, J. (2002). Ecological debt and property rights on carbon sinks and reservoirs. *Capitalism Nature Socialism*, 13(1), 115-119.

- <https://doi.org/10.1080/104557502101245404>
- McAllister, T., Hikuroa, D., & Macinnis-Ng, C. (2023). Connecting science to Indigenous knowledge. *New Zealand Journal of Ecology*, 47(1), 1-13. <https://doi.org/10.20417/nzjecol.47.3521>
- Meadows, D., & Randers, J. (2004). *Limits to growth: The 30-year update*. Chelsea Green Publishing.
- Munasinghe, M. (1993). *Environmental economics and sustainable development* (Vol. 3). World Bank Publications.
- Nanlohy, H., Timisela, N. R., & Estradivari, E. (2019). Tradisi lokal masyarakat dalam pengelolaan kawasan konservasi Pulau Yamdena Kabupaten Maluku Tenggara Barat. *PAPALELE (Jurnal Penelitian Sosial Ekonomi Perikanan dan Kelautan)*, 3(2), 52-60. <https://doi.org/10.30598/papalele.2019.3.2.52>
- Nur, R. J., Wildan, D., & Komariah, S. (2023). Kekuatan budaya lokal: Menjelajahi 3S (sipakatau, sipakalebbi, dan sipakainge') sebagai simbol kearifan lokal. *MIMESIS*, 4(2), 166-179. <https://doi.org/10.12928/mms.v4i2.8105>
- Patton, C. V., Sawicki, D. S., & Clark, J. J. (2015). *Basic methods of policy analysis and planning*. Routledge. <https://doi.org/10.4324/9781315664736>
- Pelras, C. (1993). Religion, tradition, and the dynamics of Islamisation in South Sulawesi. *Indonesia*, 57, 133-154. <https://doi.org/10.2307/3351245>
- Pelras, C. (1996). *The Bugis*. Blackwell Publishers.
- Pertiwi, N. (2017). *Implementasi sustainable development di Indonesia*. Global Research and Consulting Institute (GlobalRCI).
- Prasetyo, B., Utami, S., Abdusshomad, A., Wijaya, M., & Kalbuana, N. (2021). Effect of company value, leverage, and company size on profit persistence in Jakarta Islamic Index (JII) listed companies. *International Journal of Economics, Business and Accounting Research (IJEBAR)*, 5(1), 143-151. <https://doi.org/10.29040/ijebar.v5i1.2164>
- Puspadewi, I., Soetjipto, B. W., Wahyuni, S., & Wijayanto, S. H. (2019). Managing paradox for the sustainability of social enterprises: An empirical study of forestry community cooperatives in Indonesia. *Journal of Social Entrepreneurship*, 10(2), 177-192. <https://doi.org/10.1080/19420676.2018.1541008>
- Rusdiono, Sudagung, A. D., Linando, J. A., & Ningtias, K. (2024). Problems of good governance in managing Indonesia's borderland: The case of Entikong Subdistrict. *Jurnal Ilmu Sosial dan Ilmu Politik*, 28(1), 1-16. <https://doi.org/10.22146/jsp.90704>
- Sachs, J. D. (2012). From millennium development goals to sustainable development goals. *The Lancet*, 379(9832), 2206-2211. [https://doi.org/10.1016/S0140-6736\(12\)60685-0](https://doi.org/10.1016/S0140-6736(12)60685-0)
- Sachs, W. (2015). *Planet dialectics*. Zed Books. <https://doi.org/10.5040/9781350221765>
- Saleh, A. S. A. S. H. M. A. N. M. S. (2024). [Title of paper]. In *Proceedings of the World Conference on Governance and Social Sciences (WCGSS)* (pp. xx-xx). Atlantis Press. https://doi.org/10.2991/978-2-38476-236-1_23
- Salomaa, V., Havulinna, A. S., Koukkunen, H., Kärjä-Koskenkari, P., Pietilä, A., Mustonen, J., Ketonen, M., Lehtonen, A., Immonen-Räihä, P., & Lehto, S. (2013). Aging of the population may not lead to an increase in the numbers of acute coronary events: A community surveillance study and modelled forecast of the future. *Heart*, 99(13), 954-959. <https://doi.org/10.1136/heartjnl-2012-303216>
- Santisi, G., Lodi, E., Magnano, P., Zarbo, R., & Zammitti, A. (2020). Relationship between psychological capital and quality of life: The role of courage. *Sustainability*, 12(13), 5238. <https://doi.org/10.3390/su12135238>
- Sharma, J. (2024). Sustainability through people, mindset, and culture. *Social Development Issues*, 46(3). <https://doi.org/10.3998/sdi.6770>

- Slikkerveer, L. J. (2019). Gotong royong: An indigenous institution of communality and mutual assistance in Indonesia. In *Integrated community-managed development: Strategising indigenous knowledge and institutions for poverty reduction and sustainable community development in Indonesia* (pp. 307-320). Springer. https://doi.org/10.1007/978-3-030-05423-6_14
- Sondaal, A. E. C., Tumbahangphe, K. M., Neupane, R., Manandhar, D. S., Costello, A., & Morrison, J. (2019). Sustainability of community-based women's groups: Reflections from a participatory intervention for newborn and maternal health in Nepal. *Community Development Journal*, 54(4), 731-749. <https://doi.org/10.1093/cdj/bsy017>
- Subandi, M. A., & Good, B. J. (2018). Shame as a cultural index of illness and recovery from psychotic illness in Java. *Asian Journal of Psychiatry*, 34, 33-37. <https://doi.org/10.1016/j.ajp.2018.04.005>
- Tchounwou, P. B., Murrell, A. J., Moya, J., & Goenechea, M. (2022). An approach to the unified conceptualisation, definition, and characterisation of social resilience. *International Journal of Environmental Research and Public Health*, 19(9), 5746. <https://doi.org/10.3390/ijerph19095746>
- Tenri Rawe, B., & Darwis, M. (2020). Makna dan nilai pappaseng dalam lontara' Latoa Kajao Laliddong dengan Arumpone: Analisis hermeneutika. *Jurnal Ilmu Budaya*, 8(1), 15-23. <http://journal-old.unhas.ac.id/index.php/jib/article/view/8094>
- Warren, K. (2013). Sustainable development and sustainable development education: An eco-feminist philosophical perspective on the importance of gender. In *The sustainability curriculum* (pp. xx-xx). Routledge.
- Zamili, M. (2015). Menghindar dari bias: Praktik triangulasi dan kesahihan riset kualitatif. *Lisan al-Hal: Jurnal Pengembangan Pemikiran dan Kebudayaan*, 9(2), 283-304. <https://doi.org/10.35316/lisanalhal.v9i2.97>
- Zhang, Q., & Andreychik, M. (2013). Relational closeness in conflict: Effects on interaction goals, emotion, and conflict styles. *Journal of International Communication*, 19(1), 107-116. <https://doi.org/10.1080/13216597.2013.775069>



An Analysis of the Vietnamese Dictionary from a Computational Linguistics Perspective

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ABSTRACT

Dictionaries are essential resources for exploring a language's lexicon, providing insights into word formation, usage, and linguistic relationships. With the advancement of computational linguistics, applying statistical methods to dictionary data enables researchers to discover the lexical characteristics of a language. This study explored the *Vietnamese Dictionary* from a computational linguistics perspective, applying statistical techniques like frequency analysis, part-of-speech (POS) distribution analysis, multi-POS (words that can function as more than one part of speech) coefficient analysis, and polysemy coefficient analysis to investigate letter distribution, POS characteristics, and polysemy levels. The findings indicate that the most frequently occurring letters are *n*, *h*, *a*, *i*, *t*, *g*, *c*, and *u*, while letters like *q*, *x*, *d*, *v*, *e*, *s*, *ã*, *k*, and *r* occur less frequently.

Letters like *t*, *c*, *n*, *đ*, *b*, *l*, and *h* occur most often in initial positions. Nouns account for the largest proportion of lexical entries (44.7%), followed by verbs (31.58%) and adjectives (21.22%). The multi-POS coefficient analysis shows that 90.11% of words have one part of speech, 8.84% can function in two, and fewer than 1% span three or more, highlighting the low syntactic flexibility of the Vietnamese lexicon in terms of POS variation. Polysemy coefficient analysis indicates that particles, pronouns, and verbs exhibit the highest degrees of polysemy. These findings reveal the distributional characteristics

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of the Vietnamese lexicon through statistical analysis, providing a valuable foundation for further research in lexical semantics, electronic dictionaries, part-of-speech tagging tools, and natural language processing applications.

Keywords: Computational linguistics, letter distribution, part-of-speech distribution, polysemy coefficient, Vietnamese dictionary.

INTRODUCTION

A dictionary is an essential resource for systematising lexical information, supporting both linguistic research and language teaching (Carstens, 1995; Cote González & Tejedor Martínez, 2011; Ezeh et al., 2022). Each dictionary entry not only provides information on phonetics, grammar, and semantics but also reflects a language's cultural and historical characteristics. Among the lexicographic works in Vietnam, the *Vietnamese Dictionary* compiled by the Institute of Linguistics and edited by Hoàng Phê (Hoàng, 2020), is a widely used resource in Vietnamese language research and education. However, previous uses of this dictionary have mostly been manual, without taking advantage of computational linguistic tools for systematic analysis.

Computational linguistics is an interdisciplinary field that combines computer science and linguistics, offering a new approach to dictionary analysis (Church & Liberman, 2021; Yang, 2023). This approach integrates automatic word form recognition, frequency analysis, and corpus-based research to enhance the development of linguistic resources (Hausser, 2001). With the support of modern tools, large-scale linguistic data can be processed with high precision,

broadening the scope of observation and allowing for data-driven conclusions. However, in Vietnam, few studies have utilised natural language processing (NLP) techniques to systematically analyse the characteristics of Vietnamese vocabulary (Huynh et al., 2022; Thin et al., 2023, 2024). To address this gap, this study employed computational linguistic methods to analyse the *Vietnamese Dictionary* using the *Python* programming language and tools such as *NumPy* and *pandas* for statistical analysis, and *matplotlib* for data visualisation. Specifically, this research investigated the following questions:

1. What is the frequency distribution of letters and initial letters in Vietnamese lexical entries?
2. How are parts of speech distributed in the Vietnamese Dictionary?
3. What is the average multi-POS coefficient in the Vietnamese Dictionary, and which part-of-speech combinations are the most and least common in Vietnamese lexical entries?
4. What is the average polysemy coefficient of parts of speech in the Vietnamese Dictionary, and how is polysemy distributed within each part of speech?

By addressing these questions, this research not only helps identify distinctive linguistic features of Vietnamese but also contributes to the digitisation of Vietnamese linguistic data, particularly dictionary information, within the context of globalisation and international integration. The findings will provide insights into the Vietnamese lexicon and highlight the potential of computational linguistics in advancing lexicographic studies.

MATERIALS AND METHODS

The research process consists of four main stages: (1) collecting linguistic data and converting it into a tabular format, (2) preprocessing and cleaning the data, (3) creating the survey dataset, and (4) conducting statistical analysis and visualising the results (see Figure 1).

Data Collection and Tabular Conversion

The primary data source used in this study is the *Vietnamese Dictionary*, edited by

Hoàng Phê and issued in the 2020 reprinted edition (Hoàng, 2020). The structure of the *Vietnamese Dictionary* includes various fields, such as *word (mục từ)*, *Hanzi (Hán tự)*, *part of speech (từ loại)*, *definition (định nghĩa)*, *usage example (ví dụ sử dụng)*, *reference words (từ liên kết)*, *synonyms (từ đồng nghĩa)*, and *antonyms (từ trái nghĩa)*. Although the dictionary was originally published in print, it was later digitised and organised into a structured, field-based format suitable for computational analysis. In the digitised version, each lexical entry is encoded as an XML structure with explicit tags for its lexical components (see Figure 2). A sample of the digitised *Vietnamese Dictionary* in XML format is available from CLC (2026).

The part-of-speech system is encoded using the following abbreviations: *noun (d: danh từ)*, *verb (đg: động từ)*, *adjective (t: tính từ)*, *pronoun (đ: đại từ)*, *adjunct (p: phụ từ)*, *conjunction (k: kết từ)*, *particle (tr: trợ từ)*, and *interjection (c: cảm từ)*. Finally, all entries were converted into

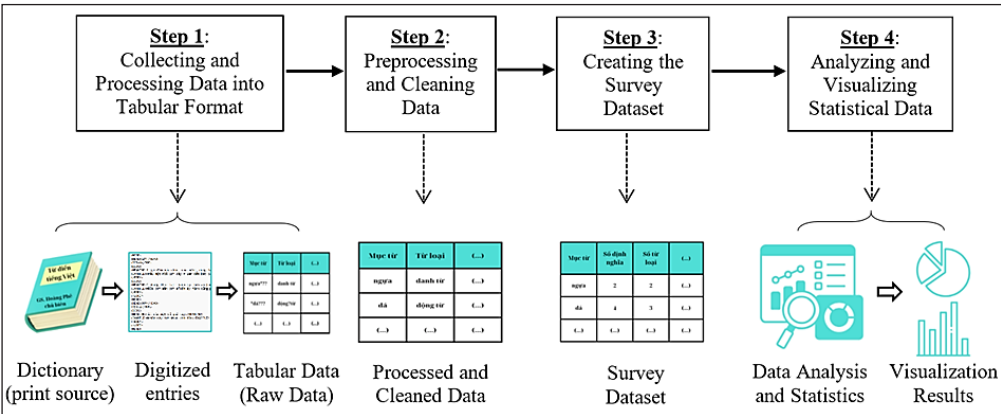


Figure 1. Overview diagram of the processing workflow

```
<WORD>
<HEAD>sách</HEAD>
<KANJI>冊</KANJI>
<POS>d</POS>
<BODY>
<MEANING>tập hợp một số lượng nhất định những tờ giấy có chữ in, đóng gộp lại thành quyển</MEANING>
<EXAMPLE>#sách tham khảo #đọc sách tới khuya #hiệu sách</EXAMPLE>
</BODY>
</WORD>
```

Figure 2. Sample digitised dictionary entry with tagged fields
Source: Hoàng (2020) and CLC (2026)

a tabular dataset (*csv* or *xlsx*) to support automated processing and quantitative analysis.

Data Preprocessing and Cleaning

Data preprocessing is performed to ensure the accuracy of statistical analysis. The preprocessing steps include:

Step 1. Field Selection for Analysis

This step involves filtering the dataset to retain only the fields required for the statistical analyses within the scope of this paper, specifically the *headword* and *part-of-speech (POS)* information. Other fields are not deleted from the original dataset but are excluded from the analytical subset to maintain focus and ensure the accuracy of the reported results.

Step 2. Exclusion of Invalid or Out-of-Scope Entries

Entries that are not suitable for analysis in this study are excluded from the analytical subset. These include:

- Linguistic units larger than words such as idioms or proverbs (e.g., the idiom *sách gối đầu giường*)

- Non-lexical items such as symbols or special characters
- Entries with missing essential fields (e.g., missing *headword* or *definition*)

Since the present study focuses exclusively on the word as the basic unit of analysis, such entries fall outside the scope of processing and are therefore excluded from further analysis.

Step 3. Filtering Non-native Vietnamese Words

Applying the phonetic structure rules of Vietnamese syllables (Đoàn, 2007; Mai et al., 2008) (Table 1) along with the algorithm for verifying Vietnamese syllables based on their structural rules (Định & Lương, 2004) to identify and retain native Vietnamese words. The entire dataset was then manually reviewed to ensure accuracy.

Step 4. Standardising Lexical Morphology

This process includes unifying cases where *i* and *y* are interchangeable by Standardising them to *i* and adjusting the placement of diacritical marks to align with standard conventions.

Table 1
Vietnamese syllable structure

Tone (Thanh điệu)			
Onset (Âm đầu)	Rhyme (Vần)		
	Glide (Âm đệm)	Nucleus (Âm chính)	Coda (Âm cuối)

Source: Đoàn (2007) and Mai et al. (2008)

Step 5. Storing Clean Data

Once the cleaning process is complete, the refined data is stored in *csv* or *xlsx* format for further analysis. A sample dataset in Excel format can be accessed via CLC (2026).

Survey Dataset Creation

The research team constructs a survey dataset consisting of a list of lexical entries, focusing on analysing letter distribution, part-of-speech characteristics, and polysemy levels.

Statistical Data Analysis and Visualisation

The data is analysed using *Python* (McKinney, 2017), with support from the *NumPy* and *pandas* libraries for efficient data processing and computation, as well as *matplotlib* for result visualisation.

Frequency Analysis

Lexical frequency distribution (Everitt & Skrondal, 2010) is calculated as the percentage ratio of an element’s occurrences to the total number of elements in the dataset:

$$f(x) = \frac{N(x)}{N_{total}} \tag{1}$$

Where:

- $f(x)$ is the frequency of the analysed element
- $N(x)$ is the number of occurrences of the analysed element
- N_{total} is the total number of elements in the dataset

Part-of-Speech Distribution Analysis

In this statistical analysis, alongside the frequency statistics method, the research team also incorporated the combinatorial statistics method. Since each lexical entry may belong to one or more parts of speech, all parts of speech for each lexical entry were grouped into a single set, with duplicate combinations removed. Each unique part-of-speech combination was then listed and arranged according to its frequency of occurrence.

Multi-POS Coefficient Analysis

In order to examine the multi-POS coefficient (Everitt & Skrondal, 2010), the study determined the number of different parts of speech that each lexical entry possesses. The coefficient is calculated using the following formula:

$$Coeff = \frac{\sum_x^N pos(x)}{N} \tag{2}$$

Where:

- $Coeff$ is the multi-POS coefficient
- x represents a lexical entry
- $pos(x)$ is the number of parts of speech associated with a lexical entry
- N is the total number of lexical entries in the dataset

Polysemy Coefficient Analysis

To analyse the polysemy coefficient (Everitt & Skrondal, 2010), the study filtered data based on parts of speech, then determined the number of meanings each lexical entry has and calculated it using the following formula:

$$Coeff_{pos} = \frac{\sum_x^{N_{pos}} meaning_{pos}(x)}{N_{pos}} \quad [3]$$

Where:

- $Coeff_{pos}$ is the polysemy coefficient based on part of speech
- Pos is the part of speech being analysed
- N_{pos} is the set of lexical entries categorized under the given part of speech
- $meaning_{pos}(x)$ is the number of definitions of a lexical entry for the specified part of speech (pos)

RESULTS AND DISCUSSION

Based on the applied methods, the data were collected, processed, and analysed, providing the following statistical results on lexical entries.

Distribution of Letters in the Vietnamese Dictionary

Frequency Distribution of Letters in Lexical Entries

The frequency analysis of letters across all lexical entries in the *Vietnamese Dictionary* (Hoàng, 2020) reveals that the most frequently occurring letters include: n (29,356 times), h (24,262 times), a (18,456 times), i (17,391 times), t (17,333 times), g (13,729 times), c (13,085 times), and u (12,402 times) (Figure 3). Collectively, these eight letters account for approximately 60.6% of all letter occurrences in the dataset.

The high frequency of letters such as n and h is largely due to their broad grapheme distribution and frequent participation in multi-letter graphemes (i.e., some graphemes are composed of two or more letters), including nh / n , η /, ng / η /, ngh / η /, th / t^h /, ph / f /, kh / χ /, and gh / y / . These letters can be found in initial or final positions, and each occurrence of a multi-letter grapheme contributes to the counts of its component letters, increasing overall frequency. For instance, n appears at the beginning ($n\grave{a}y$, $n\grave{a}m$, $n\acute{e}u$), at the end ($b\grave{a}n$, $n\grave{h}a\grave{n}$, con), and in multi-letter graphemes like ng and ngh (same phoneme / η /). Similarly, h occurs in words such as $h\grave{a}nh$, hoa , $h\grave{o}c$, $h\grave{o}i$, $h\grave{i}\grave{e}u$, and frequently in multi-letter graphemes such as nh in $n\grave{h}\grave{a}$, th in $th\acute{o}$, ph in $ph\acute{o}$, and kh in $kh\acute{o}e$. This observation aligns with the findings of Đinh and Đỗ (2015), who noted that n and h occur in multiple initial consonant positions (n -, nh -, ng -, ngh -) and final positions ($-n$, $-ng$, $-nh$), resulting in their high frequency of occurrence.

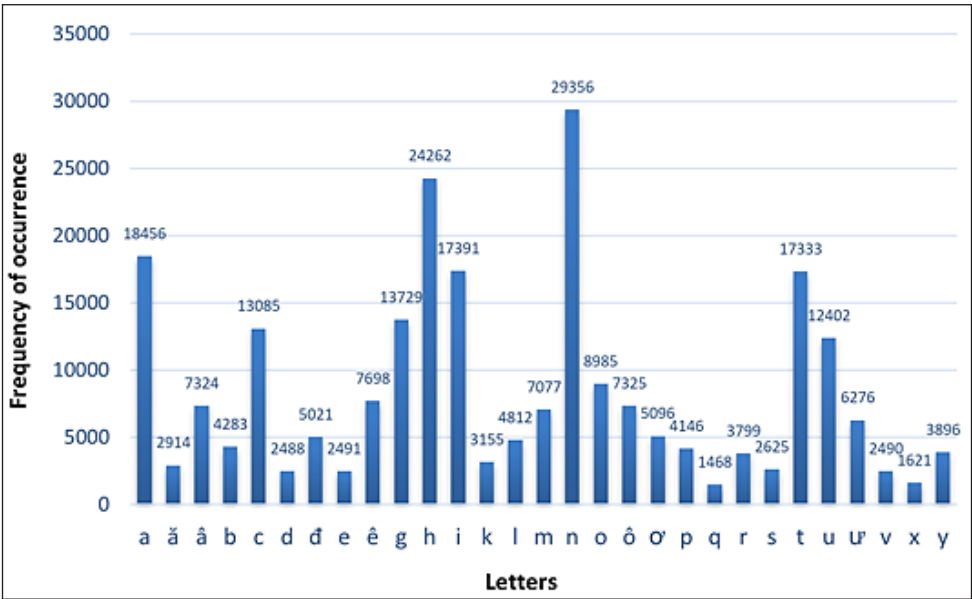


Figure 3. Frequency distribution of letters in Lexical Entries

Other high-frequency letters, including *t*, *g*, and *c*, also show high counts due to their occurrence in various word positions and common multi-letter graphemes. For instance, *t* appears at the beginning (*ta*, *tôi*, *tên*) and at the end of words (*bắt*, *đặt*, *viết*). The letter *g* is rarely found at word endings; its high frequency mainly comes from initial positions (*gạo*, *gà*, *gan*, *gấp*) and multi-letter graphemes like *ng* and *ng* (*ngày*, *người*, *nghèo*). The letter *c* occurs both at the beginning (*cá*, *cây*, *cổ*, *con*, *cơm*, *cười*) and at the end of words (*bác*, *bọc*, *nhạc*, *lục*, *tóc*), and frequently in multi-letter graphemes such as *ch* (*cháu*, *chị*, *chó*, *chuối*).

The letters *a*, *i*, and *u* are widely distributed because they appear in many common words and frequently participate in multi-letter graphemes. For instance, *a* occurs in words like *anh*, *ai*, *áo*, *ba*, *bà*, *cha*, *cá*, *nhà*; *i* appears in *in*, *ít*, *tin*, *sinh*; and *u*

is found in *út*, *thu*, *cung*, *lũ*, *trúc*. They also frequently form multi-letter graphemes such as *ai*, *ui*, and *iu*. This finding aligns with the analysis of Đinh and Đỗ (2015), who showed that *a*, *i*, and *u* can function as either nuclear vowels or final vowel elements, which contributes to their higher frequency of occurrence.

Conversely, lower-frequency letters such as *q* (1,468 times), *x* (1,621 times), *d* (2,488 times), *v* (2,490 times), *e* (2,491 times), *s* (2,625 times), *ă* (2,914 times), *k* (3,155 times), and *r* (3,799 times) are constrained by orthographic rules and positional restrictions. For instance, *q* appears almost exclusively in the multi-letter grapheme *qu* (e.g., *quan*, *quân*, *quốc*, *quý*), whereas *k* occurs mainly before *i* or *e* (e.g., *kiến*, *kẹo*). The letter *ă* appears in relatively few words compared with *a* (e.g., *ăn*, *mặc*, *bắt*, *trắng*), which makes

it much less frequent than *a*. Similarly, *e* is often replaced by *ê* in many common words (*bên, lên, tên, mền*), which limits the number of words in which *e* itself occurs. The letters *x, s, d, v*, and *r* mostly appear at the beginning of words (e.g., *xâm; sáng, sông; dạy; vào, vui; rau, rìng*) and rarely participate in multi-letter graphemes. These orthographic and positional constraints collectively account for the lower frequency of these letters compared with more widely distributed ones.

Frequency Distribution of the Initial Letter in Lexical Entries

In addition to analysing the frequency of letters across all lexical entries, the study also examines the frequency of the first letter in each entry (Figure 4). The results indicate that the most common initial letters are *t* (6,353 words), *c* (4,314 words), *n* (3,005 words), *đ* (2,564 words), *b* (2,451 words), *l* (2,193 words), and *h* (2,127 words). From a grapheme perspective, these figures indicate that dictionary headwords are unevenly distributed across initial letters, with a small number of initials occurring much more frequently than others. However, it should be noted that the statistics in Figure 4 consider only the first letter of each headword according to the Vietnamese alphabetical order. Therefore, the data reflect the distribution of initial letters used for dictionary indexing, rather than the actual distribution of multi-letter graphemes at the beginning of words. The high frequency of certain initials is partly due to the fact that common multi-letter graphemes are grouped under a single initial. For instance,

headwords beginning with *th-* or *tr-* are counted under *t*; those beginning with *ch-* are counted under *c*; *gi-* and *gh-* are counted under *g*; *kh-* under *k*; *nh-*, *ng-*, and *ngh-* under *n*; and *ph-* under *p*.

The study further disaggregates several high-frequency initial-letter categories into their corresponding word-initial multi-letter graphemes (i.e., sequences of two or more letters appearing at the beginning of a word) (Table 2). In the *c* category (4,314 entries), the two word-initial units *c-* and *ch-* are relatively balanced, with *c-* accounting for 2,436 entries (56.47%) and *ch-* for 1,878 entries (43.53%). The *g* category (1,334 entries) shows a markedly uneven distribution: *gi-* dominates with 818 entries (61.32%), while *g-* accounts for 437 entries (32.76%) and *gh-* is rare with only 79 entries (5.92%). In the *k* category (1,630 entries), *kh-* represents the majority with 918 entries (56.32%), compared with 712 entries for *k-* (43.68%). The *n* category (3,005 entries) consists of four word-initial units. The single-letter unit *n-* accounts for 911 entries (30.32%). Multi-letter graphemes make up the majority with 2,094 entries (69.68%), including *nh-* with 1,027 entries (34.17%), *ng-* with 850 entries (28.29%), and *ngh-* with 217 entries (7.22%). A particularly skewed distribution is observed in the *p* category (1,083 entries), in which *p-* appears in only 4 entries (0.37%) and *ph-* accounts for almost all cases (1,079 entries, 99.63%). Finally, in the *t* category (6,353 entries), *t-* is most frequent with 2,888 entries (45.46%), followed by *th-* (2,250 entries, 35.42%) and *tr-* (1,215 entries, 19.12%).

In the lower-frequency portion of the distribution (Figure 4), vowel letters occur much less frequently as the initial letter of words. Letters such as *ê* (40 words), *ơ* (40 words), *e* (52 words), and *i* (70 words) rarely appear in the initial position, indicating that vowel-initial headwords constitute only a small proportion of the dictionary. This distribution reflects the general pattern in Vietnamese orthography, in which an initial consonant letter or consonant cluster is predominant (Đinh & Đỗ, 2015), whereas vowel-initial headwords occur less frequently.

In addition, vowel letters with diacritics (e.g. *ê*, *ơ*) appear less frequently at the beginning of words than more common vowels, which further reduces their frequency in the initial position. Most words beginning with these vowels are either monosyllabic or onomatopoeic, such as *ơ* (*kìa*), *ê* (*ê a*), *e* (*em*, *eo*), and *im* (*lặng*).

Distribution of Part of Speech in the Vietnamese Dictionary

The distribution of part of speech in the *Vietnamese Dictionary* reflects the characteristics of an isolating language, where syntactic relationships rely primarily on word order and context rather than morphological inflection. The statistical results show a total of 49,438 definitions classified into major parts of speech (Table 3), in which nouns account for the highest proportion at 44.7% (22,098 definitions), followed by verbs at 31.58% (15,613 definitions) and adjectives at 21.22% (10,488 definitions). However, it should be noted that the relatively high proportion of nouns is not unique to Vietnamese; it is also a common outcome of general-purpose dictionary compilation, which aims to provide broad coverage of nameable entities and concepts (e.g., objects, institutions, proper names, etc.) that are typically listed

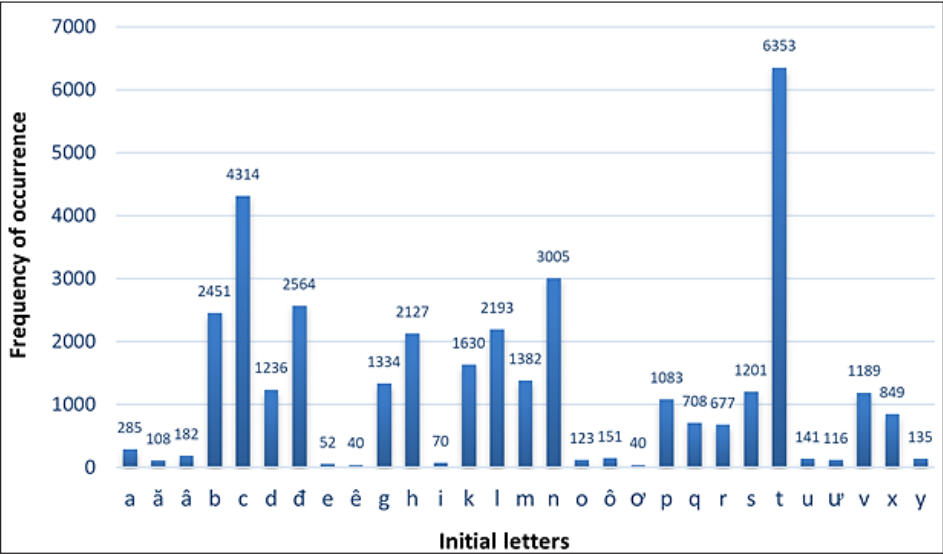


Figure 4. Frequency distribution of the initial letters in Lexical Entries

Table 2
Distribution of Vietnamese word-initial multi-letter Graphemes (*ch, gh/gi, kh, ng/ngh/nh, ph, th/tr*)

Alphabetic initial letter	Total count	Word-initial Multi-Letter Graphemes	Count	Percentage
c	4314	c	2436	56.47%
		ch	1878	43.53%
g	1334	g	437	32.76%
		gh	79	5.92%
		gi	818	61.32%
k	1630	k	712	43.68%
		kh	918	56.32%
n	3005	n	911	30.32%
		ng	850	28.29%
		ngh	217	7.22%
		nh	1027	34.17%
p	1083	p	4	0.37%
		ph	1079	99.63%
t	6353	t	2888	45.46%
		th	2250	35.42%
		tr	1215	19.12%

and indexed as nouns. Comparable evidence can be observed in the Kaikki-derived multilingual lexicon (machine-readable dictionaries extracted from Wiktionary using Wiktextextract) (Ylönen, 2022), where nouns constitute the largest category in several languages, including English (934,609 noun senses), Russian (235,389 noun senses), Chinese (106,048 noun senses), Japanese (78,948 noun senses), Indonesian (32,723 noun senses), and Vietnamese (20,763).

Table 3
Number of definitions for each part of speech in the Vietnamese Dictionary

Part of Speech	Number of Definitions	Distribution Percentage (%)
Noun (<i>Danh từ</i>)	22,098	44.70%
Verb (<i>Động từ</i>)	15,613	31.58%
Adjective (<i>Tính từ</i>)	10,488	21.22%
Adjunct (<i>Phụ từ</i>)	587	1.19%
Conjunction (<i>Kết từ</i>)	233	0.47%
Pronoun (<i>Đại từ</i>)	180	0.36%
Particle (<i>Trợ từ</i>)	138	0.28%
Interjection (<i>Cảm từ</i>)	101	0.20%

Turning to the remaining major classes in Hoàng (2020), verbs make up 31.58% (15,613 definitions), demonstrating a rich verbal system. However, Vietnamese verbs do not inflect for tense, aspect, or mood as in inflectional languages. Instead, verb meanings depend on context, word order, and auxiliary words, such as *đã đi* (past) or *sẽ đi* (future). Adjectives account for a lower proportion at 21.22% (10,488 definitions) and are often accompanied by degree markers such as *rất* (very), *khá* (quite), or *hơi* (slightly), as in *rất đẹp* (very beautiful), *khá cao* (quite tall), *hơi lạnh* (slightly cold).

Auxiliary parts of speech, including adjuncts (1.19%), conjunctions (0.47%), pronouns (0.36%), particles (0.28%), and interjections (0.2%), occur at a lower frequency but play an essential role in syntax organisation, meaning expression, and communication. *Adjuncts* modify the degree, time, or direction of verbs and adjectives, such as *đã, đang, sẽ* indicating verb tense, or *rất, khá, hơi* modifying the intensity of adjectives. Conjunctions (*và, nhưng, bởi vì*) function as sentence connectors. Pronouns, including personal pronouns (*tôi, mình,*

chúng tôi), demonstrative pronouns (*này, kia*), and indefinite pronouns (*ai, người ta*), refer to participants or entities, show social relationships such as hierarchy, familiarity, and politeness, and maintain cohesion and coherence in discourse. *Particles* (*mà, nhé, chứ*) add modal meanings, emphasis, or speaker attitudes. Interjections (*ôi, chao, ồ*) express emotions.

Multi-POS Coefficient in the Vietnamese Dictionary

Statistical analysis of the *Vietnamese Dictionary* indicates a total of 35,739 distinct lexical entries. An examination of the multi-POS coefficient reveals that, on average, each entry has 1.11 parts of speech. Specifically, 32,204 entries (90.11%) belong to only one part of speech; 3,160 entries (8.84%) function as two parts of speech; 340 entries (0.95%) have three parts of speech; 32 entries (0.09%) exhibit four parts of speech; and only 3 entries (0.01%) possess five parts of speech (Table 4 and Figure 5).

The data indicate that although the Vietnamese lexicon allows for part-of-speech conversion, its flexibility remains

Table 4
Number of entries in the multi-POS distribution of the Vietnamese Dictionary

Number of parts of speech	Number of Lexical Entries
1	32,204
2	3,160
3	340
4	32
5	3
Total Lexical Entries	35,739
Multi-POS Coefficient	1.110

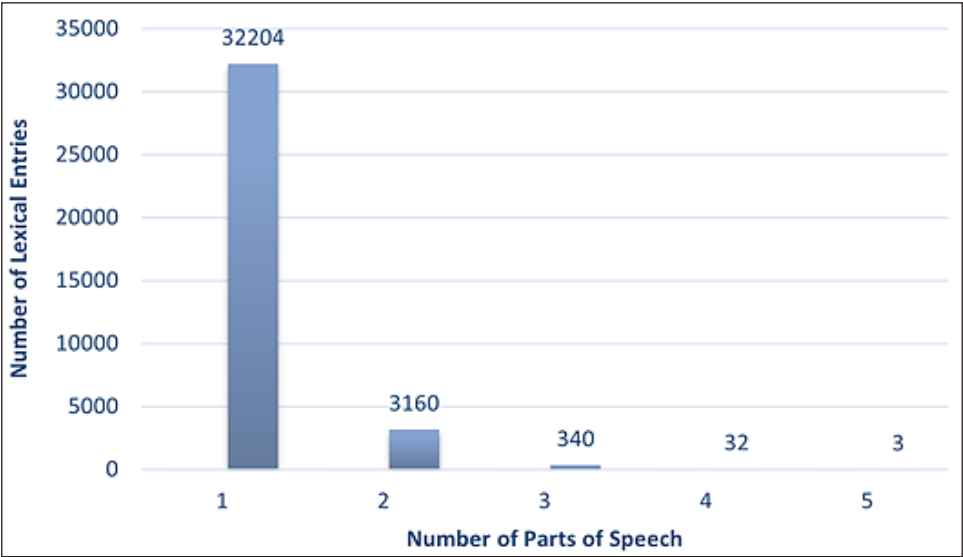


Figure 5. Distribution of Multi-POS in the Vietnamese Dictionary

relatively moderate. Vietnamese grammar primarily relies on context and word combinations to determine parts of speech. The limited number of lexical entries with three or more parts of speech reflects the stability of the word classification system in Vietnamese, which aligns with the characteristics of an isolating language, where grammatical relationships depend on word order rather than inflection. Part-

of-speech conversion in Vietnamese mainly occurs between nouns, verbs, and adjectives. For example, the verb *ăn* in the sentence *Tôi ăn cơm* (I have a meal) can be nominalised as *bữa ăn* in *Một bữa ăn ngon* (A delicious meal), or the adjective *đẹp* in *Cô ấy đẹp* (She is beautiful) can function as a noun in *cái đẹp* (beauty). In contrast, English exhibits a higher degree of part-of-speech conversion. For instance, *run* can function as a verb

(I run every day), a noun (go for a run), or an adjective (a run-down building).

Additionally, a statistical analysis of part-of-speech combinations was conducted. The chart in Figure 6 shows that the group of words functioning as both nouns and verbs (*d, đg*) accounts for the highest proportion at 38.78%, indicating that many verbs in Vietnamese can be nominalised, such as *học* (study)→ *việc học* (the act of studying). Following this, the noun-adjective group (*d, t*) constitutes 22.74%, demonstrating the nominalisation potential of adjectives, such as *tốt* (good) → *điều tốt* (a good thing). The verb-adjective group (*đg, t*) makes up 21.33%, illustrating that some adjectives can function as verbs to express actions. For instance, the adjective *lạnh* (cold) can act as a verb in the sentence *Nước lạnh đi* (The water gets colder). Only 5.8% of lexical entries assume all three roles (*d, đg, t*) - noun, verb, and adjective. Other less

common combinations, including those involving primary parts of speech with auxiliary parts of speech, account for a total of 11.35%.

A detailed analysis (Table 5) reveals several notable characteristics of part-of-speech combinations in Vietnamese. First, rare combinations tend to appear only once or twice across the dataset, such as (*đ, t*), (*p, k, tr*), or (*c, đg, tr, d*). This pattern suggests that not all parts of speech in Vietnamese can combine freely. In particular, auxiliary categories, including *adjunct* (*p*), *conjunction* (*k*), and *interjection* (*c*), exhibit very low combination frequency. The primary reason for this limitation lies in their syntactic properties. *Adjuncts* (*p*) primarily accompany verbs or adjectives to modify meaning, rather than forming independent lexical units. *Conjunctions* (*k*) function as connectors, linking clauses or phrases but lacking independent lexical

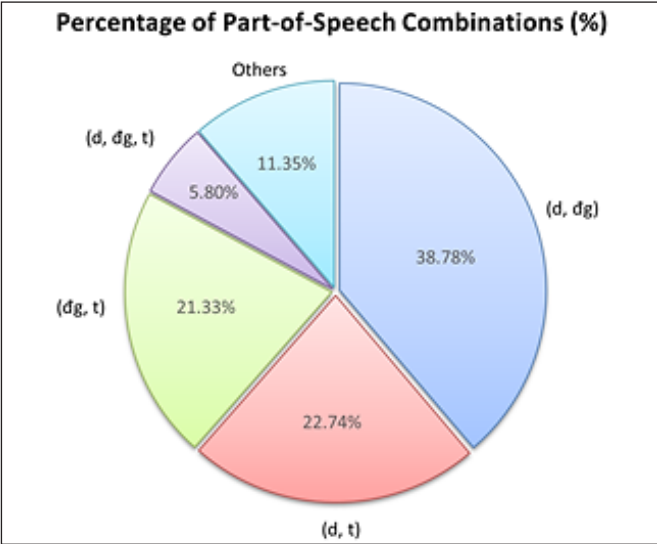


Figure 6. Distribution of part-of-speech combinations

Table 5
Distribution of part-of-speech combinations in the Vietnamese Dictionary

No.	Part-of-Speech Combination	Quantity	Percentage (%)	No.	Part-of-Speech Combination	Quantity	Percentage (%)
1	(d, đg)	1,371	38.78	38	(đg, t, tr)	4	0.11
2	(d, t)	804	22.74	39	(đ, đg, t)	3	0.08
3	(đg, t)	754	21.33	40	(c, đg, d)	3	0.08
4	(p, t)	51	1.44	41	(d, đ, tr)	2	0.06
5	(p, đg)	49	1.39	42	(c, đ, tr)	2	0.06
6	(d, p)	26	0.74	43	(d, p, tr)	2	0.06
7	(k, đg)	17	0.48	44	(d, k, tr)	2	0.06
8	(d, đ)	14	0.4	45	(d, p, đ)	2	0.06
9	(d, k)	11	0.31	46	(d, k, t)	2	0.06
10	(c, đg)	11	0.31	47	(c, t, d)	2	0.06
11	(đg, tr)	8	0.23	48	(đ, t, tr)	1	0.03
12	(d, tr)	7	0.2	49	(c, tr, d)	1	0.03
13	(k, t)	5	0.14	50	(d, đ, k)	1	0.03
14	(đ, đg)	5	0.14	51	(p, k, tr)	1	0.03
15	(đ, tr)	4	0.11	52	(c, đ, d)	1	0.03
16	(c, t)	4	0.11	53	(d, p, k)	1	0.03
17	(p, tr)	4	0.11	54	(c, đg, t)	1	0.03
18	(t, tr)	4	0.11	55	(p, k, đg)	1	0.03
19	(c, d)	3	0.08	56	(p, k, t)	1	0.03
20	(c, tr)	2	0.06	57	(c, p, đg)	1	0.03
21	(p, k)	2	0.06	58	(d, p, đg, t)	4	0.11
22	(đ, t)	1	0.03	59	(d, đg, k, t)	4	0.11
23	(c, đ)	1	0.03	60	(d, đ, đg, tr)	2	0.06
24	(đ, p)	1	0.03	61	(c, đg, tr, d)	2	0.06
25	(k, tr)	1	0.03	62	(d, p, đg, đ)	2	0.06
26	(d, đg, t)	205	5.8	63	(d, đg, k, tr)	2	0.06
27	(d, p, t)	25	0.71	64	(p, đg, t, tr)	2	0.06
28	(d, p, đg)	20	0.57	65	(d, p, k, đg)	2	0.06
29	(p, đg, t)	14	0.4	66	(đ, p, t, tr)	1	0.03
30	(d, k, đg)	9	0.25	67	(d, k, t, tr)	1	0.03
31	(d, đ, đg)	5	0.14	68	(d, p, t, tr)	1	0.03
32	(đg, k, t)	5	0.14	69	(d, đg, t, tr)	1	0.03
33	(d, đg, tr)	4	0.11	70	(d, đ, k, đg)	1	0.03
34	(p, t, tr)	4	0.11	71	(đ, p, đg, tr)	1	0.03
35	(d, t, tr)	4	0.11	72	(c, p, đg, t)	1	0.03
36	(d, đ, t)	4	0.11	73	(đg, k, t, tr)	1	0.03
37	(đg, k, tr)	4	0.11	74	(d, p, đg, tr)	1	0.03

Table 5 (continued)

No.	Part-of-Speech Combination	Quantity	Percentage (%)	No.	Part-of-Speech Combination	Quantity	Percentage (%)
75	(c, p, tr, đ)	1	0.03	78	(đg, t, p, tr, d)	1	0.03
76	(p, k, t, tr)	1	0.03	79	(k, đg, p, tr, đ)	1	0.03
77	(đg, p, k, t)	1	0.03	80	(k, đg, t, p, tr)	1	0.03

Note. Abbreviations: d = noun; đg = verb; t = adjective; đ = pronoun; p = adjunct; k = conjunction; tr = particle; c = interjection

meaning outside their relational role. Interjections (*c*) are expressive words that mainly convey emotions, reactions, or exclamations, rather than participating in grammatical structures or undergoing part-of-speech conversion. As a result, combinations such as (*p, k, tr*), (*c, đ, d*), and (*c, p, đg, t*) appear only once (0.03%), illustrating the restrictions on their ability to function across multiple parts of speech.

A notable pattern in the dataset is the sharp decline in frequency as the number of parts of speech in a combination increases. For instance, the three-part combination (*d, đg, t*) appears relatively frequently (5.8%), but when an additional category is added (*d, đg, t, tr*), its occurrence drops dramatically to just one instance (0.03%). Further analysis reveals that five-part-of-speech combinations are extremely rare in the *Vietnamese Dictionary*. Only three words exhibit such classifications: *có* (*đg, t, p, tr, d*), *qua* (*k, đg, p, tr, đ*), and *rồi* (*k, đg, t, p, tr*). The rarity of these combinations suggests that Vietnamese does not favour excessive grammatical complexity. This trend can be explained by the minimalist structure of Vietnamese grammar. As an isolating language, Vietnamese relies on word

order rather than inflectional morphology. Nouns, verbs, and adjectives serve as the core elements of sentence structure, while other parts of speech (such as adjuncts, particles, conjunctions, and interjections) function mainly as modifiers rather than forming complex multi-category roles. The distribution of part-of-speech combinations reflects linguistic habits in Vietnamese, emphasising structural simplicity in word classification.

Polysemy Coefficient in the Vietnamese Dictionary

The polysemy coefficient is an important indicator that reflects the degree of polysemy in Vietnamese. Since computers cannot distinguish between polysemy and homography, these two types of relationships are grouped. Therefore, in this paper, the term *polysemy* refers to both. Research results show that, on average, each lexical entry in the *Vietnamese dictionary* has 1.245 meanings, indicating a moderate level of polysemy in Vietnamese lexical entries (Table 6). Among the different parts of speech, particles (1.394) exhibit the highest polysemy coefficient due to their dependency on context. Pronouns (1.353)

Table 6
Polysemy coefficient by part of speech

Part of Speech	Number of Lexical Entries	Polysemy Coefficient
Noun (<i>Danh từ</i>)	17,831	1.239
Verb (<i>Động từ</i>)	12,088	1.291
Adjective (<i>Tính từ</i>)	8,749	1.199
Pronoun (<i>Đại từ</i>)	133	1.353
Particle (<i>Trợ từ</i>)	99	1.394
Interjection (<i>Cảm từ</i>)	92	1.098
Conjunction (<i>Kết từ</i>)	186	1.253
Adjunct (<i>Phụ từ</i>)	509	1.153
Entire Dictionary	49,438	1.245

also demonstrate high polysemy compared to other parts of speech, reflecting their contextual flexibility and socially influenced usage.

For instance, the pronoun *nó* can refer to a person, an animal, or an object, depending on context and social relationships, contributing to its semantic ambiguity. Verbs (1.291) rank third in terms of polysemy, highlighting their semantic adaptability in a non-inflectional language. In Vietnamese, meaning shifts in verbs primarily occur through syntactic combinations rather than morphological changes. For example, the verb *chạy* can convey different meanings: denoting physical movement, as in *Anh ấy chạy rất nhanh* (He runs very fast), expressing urgency in task completion, as in *chạy dự án* (rush a project), or describing machine functionality, as in *Máy chạy tốt* (The machine runs well). Conjunctions (1.253) exhibit polysemy, reflecting their role in connecting clauses within varied semantic and logical relationships. Nouns (1.239) demonstrate a moderate level of polysemy, primarily through metaphorical and metonymic extension. Adjectives

(1.199) have a relatively lower polysemy coefficient, suggesting that descriptive words tend to retain more stable meanings than nouns and verbs. Adjuncts (1.153) have a low polysemy coefficient and mainly function as modifiers, providing additional detail or emphasis rather than undergoing semantic shifts. Interjections (1.098) show the lowest polysemy coefficient. As they express emotions or reactions, their meanings remain fixed and do not change much across different contexts.

CONCLUSION

This study analysed lexical entries in the *Vietnamese Dictionary* (Hoàng, 2020) from a computational linguistics perspective, focusing on letter and part-of-speech distribution, multi-POS coefficient, polysemy coefficient analysis to explore the organisational patterns of Vietnamese lexicon. The results indicate that Vietnamese frequently uses certain initial consonants such as *n*, *h*, *t*, *g*, *c* and vowels like *a*, *i*, *u*, reflecting the structural characteristics of syllables and the flexibility

of phoneme combinations. In terms of part-of-speech distribution, *nouns*, *verbs*, and *adjectives* account for the largest proportions among word classes. The multi-POS coefficient suggests that part-of-speech conversion occurs at a relatively low rate, primarily between *nouns*, *verbs*, and *adjectives*. Additionally, polysemy analysis identifies particles and pronouns as the most polysemous parts of speech, indicating their greater semantic flexibility in various linguistic contexts. These findings contribute to a clearer understanding of the structural characteristics of Vietnamese lexicon and provide valuable data for applied linguistics research and language resource digitisation. However, this study is limited by its reliance on a single dictionary source. Future research could expand by incorporating more diverse linguistic data sources and applying modern language models to analyse lexical entries.

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REFERENCES

- Carstens, A. (1995). Language teaching and dictionary use: An overview. *Lexikos*, 5(1). <https://doi.org/10.5788/5-1-1059>
- Church, K., & Liberman, M. (2021). The future of computational linguistics: On beyond alchemy. *Frontiers in Artificial Intelligence*, 4. <https://doi.org/10.3389/frai.2021.625341>
- Computational Linguistics Center (CLC). (2026). *Dictionaries: CLC_VietDict – Vietnamese dictionary (download samples in Excel and XML)*. Retrieved January 4, 2026, from https://www.clc.hcmus.edu.vn/?page_id=469&lang=en
- Cote González, M., & Tejedor Martínez, C. (2011). The effect of dictionary training in the teaching of English as a foreign language. *Alicante Journal of English Studies / Revista Alicantina de Estudios Ingleses*, 24, 31–52. <https://doi.org/10.14198/raei.2011.24.02>
- Đinh, Đ., & Đỗ, Đ. H. (2015, October). Chữ quốc ngữ hiện nay qua các con số thống kê [Current national Vietnamese language through statistics]. In *Hội thảo cấp quốc gia về chữ quốc ngữ: Sự hình thành, phát triển và những đóng góp vào văn hoá Việt Nam* (National workshop on Vietnamese language: Formation, development and contributions to Vietnamese culture).
- Định, N. G., & Lương, T. T. (2004). Thuật toán kiểm tra âm tiết tiếng Việt dựa trên luật cấu tạo âm tiết [An algorithm for Vietnamese syllable checking based on syllable-structure rules]. *Tạp chí khoa học, Đại học Huế*, 25.
- Đoàn, T. T. (2007). *Ngữ âm tiếng Việt* (4th ed.). Nhà xuất bản Đại học Quốc gia Hà Nội.
- Everitt, B., & Skrondal, A. (2010). *The Cambridge dictionary of statistics*. Cambridge University Press.
- Ezeh, N. G., Anyanwu, E. C., & Onunkwo, C. M. (2022). Dictionary as an effective resource in teaching and learning of English as a second language: Complementing instructions. *English Language Teaching*, 15(4), Article 108. <https://doi.org/10.5539/elt.v15n4p108>

- Hausser, R. (2001). *Foundations of computational linguistics: Human-computer communication in natural language*. Springer.
- Hoàng, P. (2020). *Từ điển tiếng Việt* (9th ed.). Nhà xuất bản Đà Nẵng – Trung tâm Từ điển học.
- Huynh, T. V., Nguyen, K. V., & Nguyen, N. L. T. (2022). ViNLI: A Vietnamese corpus for studies on open-domain natural language inference. In *Proceedings of the 29th International Conference on Computational Linguistics* (pp. 3858–3872). International Committee on Computational Linguistics. <https://aclanthology.org/2022.coling-1.339>
- Mai, N. C., Vũ, Đ. N., & Hoàng, T. P. (2008). *Cơ sở ngôn ngữ và tiếng Việt* (9th ed.). Nhà xuất bản Giáo dục.
- McKinney, W. (2017). *Python for data analysis: Data wrangling with pandas, NumPy, and IPython* (2nd ed.). O'Reilly Media.
- Thin, D. V., Hao, D. N., & Nguyen, N. L. T. (2023). Vietnamese sentiment analysis: An overview and comparative study of fine-tuning pretrained language models. *ACM Transactions on Asian and Low-Resource Language Information Processing*, 22(6), 1-27. <https://doi.org/10.1145/3589131>
- Thin, D. V., Hao, D. N., & Nguyen, N. L. T. (2024). A study of Vietnamese sentiment classification with ensemble pre-trained language models. *Vietnam Journal of Computer Science*, 11(1), 137-165. <https://doi.org/10.1142/s2196888823500173>
- Yang, F. (2023). A computational linguistic approach to English lexicography. *Transactions on Computer Science and Intelligent Systems Research*, 2, 39-44. <https://doi.org/10.62051/wepk6t89>
- Ylönen, T. (2022). Wiktextextract: Wiktionary as machine-readable structured data. In *Proceedings of the 13th Conference on Language Resources and Evaluation (LREC 2022)* (pp. 1317–1325).

Visual Thinking in Fractions: Exploring Elementary Students' Conceptual Understanding through Representation Strategies

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ABSTRACT

This study explores fifth-grade students' use of visual representations in their understanding of fraction operations and what their drawings show us about their underlying conceptual understanding. A new and comprehensive exploratory qualitative collective case study was carried out with 15 students from three public elementary schools in Makassar, Indonesia. Data were obtained through a visual fraction addition representation task, think-aloud problem-solving, and semi-structured student and teacher interviews. Based on a thematic analysis by interactive methods, the study discovered various strategies of representation, including area diagrams, number lines, bar models, and hybrids of the diagrams and bars. Students made good use of visual representations consistently and in numbers, especially area diagrams and combined representations and had a strong concept

for fraction equivalence, common denominators, and magnitude and had a higher flexibility in transitioning between representations. Students who could not keep the unit consistent or scale proportionally consistently often resulted in critical conceptual errors, on the contrary. The results imply that visual representation is not something we can just use to decorate a diagram when reasoning about fractions, but rather it needs to form an intrinsic part of students' brains' thinking toolkit to help students interpret and apply fractions. The research thus suggests a need for targeted teacher professional

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development that is focussed on the design, interpretation, and scaffolding of visual models for fraction instruction, which allows teachers to scaffold deeper conceptual understanding and support students' overall mathematical literacy.

Keywords: Conceptual understanding, elementary mathematics, fraction operations, visual representation

INTRODUCTION

Students' understanding of fractions is one of the biggest challenges of primary mathematics education. A fraction asks children to work out several ideas at once: to see numbers as parts of a whole; to develop a sense of proportion; to interpret symbols; and to construct mental images. There is a wealth of evidence indicating that difficulties with fraction operations represent a significant barrier to math learning later (Lamon, 2012; Siegler et al., 2011) and to problem solving in upper grades (Dyson et al., 2018; Gersten et al., 2017). Moreover, a well-known "natural number bias" may prevent students from judging the magnitudes of fractions (Van Hoof et al., 2018). Such persistent misconceptions require pedagogically designed solutions that blend procedural knowledge with conceptual significance. One hopeful avenue is to incorporate visual tools such as area diagrams, number lines, or bar models that link abstract symbolic expressions with concrete images (Soni & Okamoto, 2020). Recent meta-analytic findings suggest that visual-based interventions possess at least a moderate effect on mathematics achievements, especially for fractioning tasks (Braithwaite & Siegler, 2020).

Visual thinking is not just a way to have something nice to look at, but a primary way of thinking about and working with ideas in mathematics. Visual representation (e.g., area diagrams and number lines, fraction pieces, bar models) enables children to create a mental representation of what fractions are and assists them in reasoning while solving math (Cramer et al., 2002). When quantities are visible in something tangible (that is, concrete and contextual), visualisation allows learners to perform procedures while following the rational construction of each stage of them. The National Council of Teachers of Mathematics (NCTM, 2020) considers representations as "absolutely vital" for the development of mathematical concepts and relationships. However, the pedagogical potential of visual representation is still underused in many classrooms, particularly in developing countries where instruction tends to emphasise rote memorisation over conceptual understanding.

Recent studies indicate that representational instruction yields better results in procedural and conceptual fraction tasks than peers taught exclusively in symbols (Fazio & Siegler, 2011; Van de Walle et al., 2019). Strong visual models (such as the two-dimensional number lines,

the dynamic bar model and triple number lines) also reinforce students' learning (Reinhold et al., 2020; Wortha et al., 2020). For instance, Susanti et al. (2022) conducted studies in Indonesia; they confirmed that elementary students using number lines and circle diagrams in addition to and subtraction of fractions had a better understanding than students with symbolic procedures only. Context-based mathematics education that uses visual aids and interactive media has also been empirically supported as facilitating fraction sense as a matter of life (Kamberi et al., 2022; Pramudiani & Dolk, 2022). Collectively, these findings suggest the trend in favour of instruction that relies on visualisation-based meaning making. Yet, we do not yet see much empirical evidence on how students build, use and understand visual models of fractions when working with fractions in their Indonesian classrooms. Addressing this gap is the focus of the present study.

Even when visual learners are present in the classroom, they may struggle to follow rapid symbolic explanations on the board (Ramsden, 1992). Several studies indicate that teachers often possess only limited knowledge of how to integrate visual representations effectively. For example, Putra et al. (2020) reported that many teachers view pictures and models merely as illustrations rather than mathematical tools that can support reasoning. A large-scale survey of 350 primary teachers likewise found that images were typically used as decorative elements rather than as resources for mathematical

discussion (Gencturk & Doleck, 2021). Other research stresses that visual models serve specific purposes: number lines are well suited for ordering fractions and comparing magnitudes, whereas circle diagrams may better communicate part-whole relationships (Wilkie et al., 2022). At the same time, many teachers report low confidence in using more complex visual tools such as number lines for fraction instruction (Putra et al., 2020). These findings underline the need to strengthen teachers' representational competence through professional development that links theoretical understanding of models with practical classroom use.

International curriculum analyses show that visual representations play a central role in mathematics textbooks and teaching in many high-performing education systems. Charalambous et al. (2022) reported that countries such as Singapore, Finland, and the United States routinely include diverse visual models for fractions and encourage students to transition from concrete images to more abstract representations. Finnish textbooks, for instance, integrate exploratory activities with visual aids rather than relying solely on static pictures. Curriculum documents in Canada focus on the unit fractions and number lines used for representational flexibility (Bruce et al., 2023), and a six-year mixed-methods study involving more than 2,000 students and 86 teachers observed large improvements when instruction was explicitly designed to bridge concrete experiences with abstraction (Bruce et al., 2022). The implications for

mathematics teaching in practice from these international trends are clear: Visual representation is not a bolt-on, but an essential aspect of effective mathematics learning. They also underscore the need to think about how visual strategies are used to teach in Indonesia's specific educational setting.

The importance of visual representation is also supported by cognitive and sociocultural theories of learning. Paivio's (1990) dual-coding theory proposes that verbal information and visual imagery are processed in parallel systems, leading to stronger memory and deeper comprehension. In fraction learning, for example, students who can connect the symbolic expression $\frac{3}{4}$ with an area model and the verbal description "three parts out of four equal parts" are likely to form richer mental representations than those who encounter only symbols. Furthermore, recent neuroimaging studies have shown that number and spatial representations in mathematical tasks activate brain regions related to quantitative reasoning, and that continued exposure to visual models over time can facilitate neurofunctional changes related to mathematical thinking (De Smedt et al., 2011; Hwang et al., 2019; Lenz & Wittmann, 2020; Tian et al., 2021; Wortha et al., 2020). Visual models can help democratise access to meaning from a sociocultural and critical-education perspective by enabling diverse students to "see" mathematical structures before dealing with more abstract forms (Prediger et al., 2018; Karamarkovich

& Rutherford, 2019). At the same time, different models of visual representation offer different kinds of understanding: area diagrams are used successfully to model part-whole relations, but may prove more challenging for operations that require unlike denominators, whereas number lines provide visual representation of order and magnitude but can be misleading for learners who don't yet view fractions as points on a continuum (Barbieri et al., 2020; Clarke & Roche, 2018). As a result, teachers and curriculum designers will need to assess which visual models are appropriate for the purposes if representations are to function as tools for deep understanding rather than superficial decoration.

Building on this theoretical and empirical background, the present research is guided by the view that visual representations can serve not only as instructional aids but also as analytic windows into students' conceptual understanding of fractions. Rather than focusing solely on the effectiveness of particular interventions, this study examines how students themselves construct and use visual models when solving fraction problems, and what their drawings reveal about their reasoning with equivalence, common denominators, and magnitude. More specifically, we adopt a collective case study design to investigate fifth-grade students' representational strategies with number lines, area diagrams, bar models, and combinations of these. From a practical perspective, the study aims (1) to describe the kinds of visual images students produce when calculating fractions and (2) to

identify the conceptual understandings and misconceptions embodied in these representations, with reference to teachers' views of classroom practice. By examining these dimensions, the research seeks to contribute to curriculum design and instructional approaches that prioritise conceptual understanding over rote procedures and to support Indonesian students' mathematical literacy. Consistent with Goldin's (2002) notion of representational flexibility, we emphasise how students move between images and symbols when working with fractions. Accordingly, this study addresses the following research questions: (RQ1) How do fifth-grade students represent fraction operations using visual models such as area diagrams, number lines, and bar models? (RQ2) What do these visual representations reveal about students' conceptual understanding and misconceptions related to fraction operations? (RQ3) How can the patterns in students' visual representations inform teachers' use of visual models in classroom instruction?

LITERATURE REVIEW

Theoretical Foundations of Visual Representation

Doing mathematics requires students to both understand and represent mathematical ideas. Theoretical work in mathematics teaching asserts that representations are not marginal but crucial to understanding. According to Duval's (1999) semiotic representation theory, understanding mathematics is dependent on the processing of information

as it is directed across various semiotic systems, those systems being symbolic, verbal, graphical, and figural. In a similar vein, Goldin (2002) highlights internal and external representation systems that mediate cognitive processes associated with solving problems. Ainsworth's (2006) Design, Functions, Tasks (DeFT) framework outlines how multiple representations function in learning: a complementary function, where representations highlight different aspects of a concept (a process); a constraining function, where specific representations minimise potential misreading; and a constructing function, where learners create deeper structures by coordinating representations. In combination, these viewpoints indicate that students learn best when they can easily adapt symbols, pictures, and verbal descriptions, using representations to articulate and develop their mathematical thinking.

Visual Representations and Conceptual Understanding of Fractions

There is empirical evidence that visual modalities like area diagrams, number lines, fraction bars, and circle models can enhance students' reasoning regarding part-whole relationships and proportionality (Cramer et al., 2002; Soni & Okamoto, 2020). Meta-analyses report medium-to-large effects of visual-based instruction on mathematics learning outcomes, particularly in the domain of fractions (Braithwaite & Siegler, 2020). More fine-grained studies suggest that a dynamic bar model can enhance both procedural and conceptual fluency

(Reinhold et al., 2020), while the engagement with visual tasks activates regions of the brain that are directly responsible for reasoning and memory (Wortha et al., 2020). Neuroimaging evidence also indicates that long-term visual modelling can build neurofunctional plasticity, so students can reason about the magnitudes of fractions (Tian et al., 2021). Taken together, these results situate visualisation as a fundamental cognitive mechanism for fraction learning rather than as a surface or optional teaching tool.

Challenges in the Use of Visual Representations

Even though there is a wealth of evidence that supporting the effectiveness of visual representations, significant challenges remain in their classroom use. Research suggests that many teachers are not confident or knowledgeable about how to effectively integrate visual tools, and diagrams often do so with little pedagogical focus on them as aids of reasoning. Instead, many treat the diagrams as decorative pictures (Putra et al., 2020; Gencturk & Doleck, 2021). Wilkie et al. (2022) point out that model choice needs to be in relation to the learning intentions; number lines are particularly appropriate for modelling fractions, and area diagrams are beneficial for part-whole relationships. In addition, if visual models are not consistent in their scale or are not linked to symbolic notation, they can block comprehension and result in systematic conceptual misunderstandings

(Barbieri et al., 2020; Clarke & Roche, 2018). These findings highlight the need for targeted teacher professional development that builds representational competence allowing teachers to select, format, and interpret visual models in a manner that actively supports students' understanding of concepts.

International and Indonesian Contexts

Visual representation is an important element of many mathematics curricula around the world. International analyses demonstrates that high-performing systems such as Singapore and Finland systematically employ visual models to assist students in moving from concrete situations to more abstract ideas. In the Indonesian context, studies by Susanti et al. (2003) and Kamberi et al. (2004) report that activities involving number lines and circle diagrams can help students better understand fractions. However, many barriers remain in their implementation, such as limited resources in the classroom and a strong bias towards teaching students step by step. Pramudiani and Dolk (2005) argue that connecting Realistic Mathematics Education (RME) with visual strategies can help bridge the gap between informal, context-based reasoning and formal symbolic representations. This raises a specific need for detailed classroom evidence regarding the process of constructing and utilising visual representations among Indonesian learners using fractions, which is what this study endeavours to address.

METHODOLOGY

Research Design

This exploratory qualitative study employed a collective case study design to explore how elementary school students build and manipulate pictures to understand fraction operations. The tool was selected with the aim of providing a contextualised understanding of students' mathematical thoughts with the use of visual representations (number lines, area diagrams, and bar models). A collective case study design allowed researchers to investigate various single cases (individual students from different schools) to identify trends and differences in representational strategies (Creswell & Poth, 2018). In such a framework, each student was conceived of as “a bounded case, situated inside a particular school context and thus enabled specific investigation of visual productions, but encouraged comparison among cases. Given the focus on in-depth understanding, a small sample of 15 students was considered appropriate to address the research questions, prioritising rich description over statistical generalisation. The research emphasised depth of understanding rather than statistical generalisation, focusing on how students constructed conceptual meaning through visualisation (Goldin, 2002).

Participant Selection

The participants consisted of 15 fifth-grade students from three elementary schools in Makassar, South Sulawesi, Indonesia: five from SD Inpres Andi Tonro, five from SDN Manuruki, and five from SDN Minasaupa.

Participants were selected through purposive sampling based on diagnostic test results and teacher recommendations, with the following criteria: (1) prior exposure to fraction operations, (2) representation of diverse mathematical ability levels (low, medium, high), and (3) willingness to engage in visual exploration activities. Selecting students from three different schools within the same city provided variation in classroom environments while maintaining a shared curricular and cultural context. In addition, three mathematics teachers participated as triangulative informants to enrich and validate data interpretation. This purposive sampling approach aligns with the qualitative paradigm, which prioritises information richness over population representativeness (Moleong, 2021).

Data Collection

Data were gathered using three complementary techniques: Visual Representation Task (VRT), a written task requiring students to solve fraction problems visually. For instance, they were asked: “What is the result of $\frac{2}{3} + \frac{1}{4}$? Solve it using a picture and explain your reasoning! Think-Aloud Protocol (TAP), students verbalised their reasoning while performing the tasks. Audio and video recordings captured their thought processes and strategies (Ericsson & Simon, 1993). Semi-Structured Interviews, guided by Janvier's (1987) representational framework, these interviews explored students' reasoning for representation choices, their challenges, and the conceptual meanings constructed.

Interviews with teachers were also conducted to gather pedagogical insights about classroom implementation of visual representations. These three techniques provided complementary perspectives on students' visual strategies and underlying reasoning, thereby directly addressing the research questions.

Data Analysis

Data was analysed using interactive thematic analysis (Miles et al., 2014). First, all visual representations, think-aloud transcripts, and interview recordings were transcribed and organised. Second, the researchers conducted open coding to identify initial categories related to types of representations, unit consistency, equivalence reasoning, and representational flexibility. Third, these codes were grouped into broader themes through constant comparison within and across cases, with particular attention to similarities and differences among students and schools. Coding decisions were discussed among the research team, and discrepancies were resolved through peer debriefing to enhance credibility. The resulting themes were iteratively refined through repeated reading of the data and were then used to construct a cross-case narrative that addressed the research questions.

Trustworthiness

Credibility and dependability were established through methodological triangulation, data-source triangulation, member checking, and peer debriefing

Audit trails were maintained throughout the process to ensure transparency and confirmability.

Ethical Considerations

Ethical clearance was acquired before data collection took place at Institute for Research Development, Community Service (LP3M) Muhammadiyah University Makassar. School principals, teachers and parents of participant students gave written informed consent. All participants received assurance from both their teacher and the researcher that participation is confidential, anonymous, and voluntary.

Research Procedure

The study was implemented in five stages: (1) instrument preparation, (2) participant selection, (3) administration of the VRT and TAP, (4) in-depth interviews, and (5) data analysis and reporting.

RESULTS

This section presents the results based on data collected from 15 fifth-grade students and three mathematics teachers through a Visual Representation Task (VRT), Think-Aloud Protocol (TAP), and semi-structured interviews. The findings are organised by themes to provide an overview of how students used visual strategies, the typical features of their representations, and indications of their conceptual understanding of fraction operations. Where relevant, figures and tables are included to illustrate key patterns in the data.

Types of Visual Representations Used by Students

Analysis of the VRT showed that students employed a variety of representations when solving fraction addition problems, particularly for the question $\frac{2}{3} + \frac{1}{4}$. Among the 15 students, five used number lines (S1-S5), four used area diagrams such as circles or rectangles (S6, S7, S9, S10), and three used bar models (S12, S14, S15). Three students (S8, S11, S13) combined more than one type of visual model, most often number lines and area diagrams. Figure 1 presents the distribution of representation types. This variation suggests that students did not rely on a single dominant model but chose representations that were familiar or accessible to them, with some students drawing more than one model within the same task.

During interviews, students explained their preferences for particular models. S1 noted, *"I often see number lines in the textbook, so I used that because I thought it was the correct way,"* indicating reliance on familiar textbook formats. In contrast, S13 explained, *"I used boxes to help me see how many parts each fraction has, but the line helped me add them better,"* describing a deliberate use of both area diagrams and a number line within the same solution.

Number Line Representation: Accuracy and Challenges

Number lines, although commonly chosen, reveal both accurate and inaccurate reasoning. Students such as S2 and S5

partitioned the number line correctly and plotted the two fractions in appropriate positions. However, others, including S4, made notable errors. Figure 2 shows S4's work for $\frac{2}{3} + \frac{1}{4}$. S4 divided the interval from 0 to 1 into three equal parts to represent $\frac{2}{3}$, but did not maintain a consistent unit when adding $\frac{1}{4}$. Instead of partitioning the next segment into four equal parts, S4 marked an additional point without adjusting the scale, leading to an incorrect location for the final result.

In the think-aloud session, S4 stated: *"I started from zero this is one I divided it into three parts two steps, that's two-thirds then from there I added one-fourth uh, I'm confused about how many parts this should be?"* When asked in the interview why the second part of the number line was not divided into four equal sections, S4 explained, *"I thought I could just keep going, because one-fourth is small. But I didn't know whether the sizes had to be the same or not."* These comments show that S4 recognised the need to mark both fractions on the line but was unsure how to maintain equal partitioning when adding $\frac{1}{4}$.

Area Diagram Representations: Supporting Conceptual Reasoning

Area diagrams appeared particularly helpful for some students in solving the fraction of addition problem. Student S7, for example, produced a representation that showed attention to equivalence and common denominators. As shown in Figure 3, S7 drew two identical rectangles and divided each into 12 equal parts, corresponding to

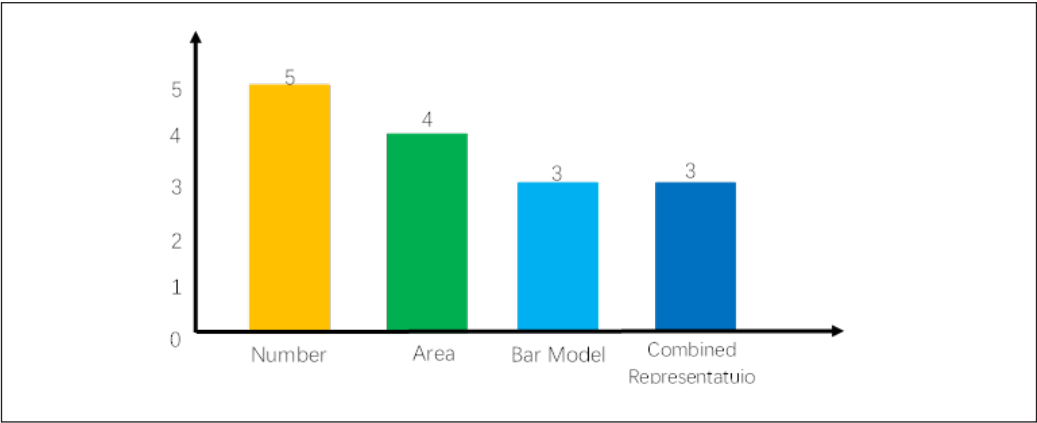


Figure 1. Distribution of visual representation types used by students

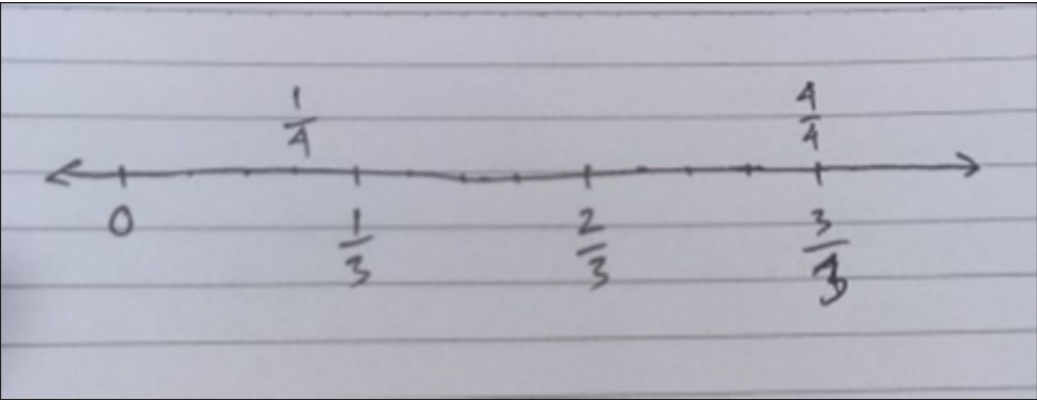


Figure 2. Results of the solution using S4 visualisation

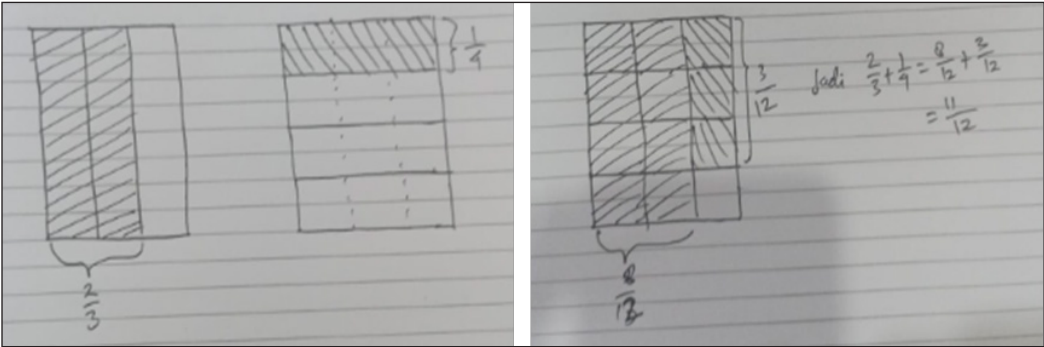


Figure 3. Results of the solution using S7 visualisation

the least common multiple of 3 and 4. The student shaded 8 parts to represent $\frac{2}{3}$ and 3 parts to represent $\frac{1}{4}$, and recorded the sum as $\frac{11}{12}$.

During the TAP, S7 explained: *"I made two equal boxes, then divided them into 12 because that works for three and four. Two-thirds means eight, because three parts of twelve is four; times two make eight. One-fourth is three. So, the total is eleven out of twelve."* This explanation shows that S7 coordinated the symbolic fractions with their equivalent twelfths in the diagram. In the interview, the teacher commented, *"This student really likes to draw. They often ask for graph paper or make their own shapes to understand fractions."* Together, the drawing and explanation indicate that S7 used the area model to organise the conversion to a common denominator and to determine the final sum.

Combined Representations: Indicators of Thinking Flexibility

Some students demonstrated the ability to transition between different representation types. Student S13, for instance, began with an area diagram to determine common denominators and then used a number of lines to finalise the solution. Figure 4 depicts S13's work, which includes two visual phases: the first showing two rectangles partitioned into twelfths and labelled with fractional values; the second, a number line equally divided into 12 segments with the final point marked at $\frac{11}{12}$. An area diagram showing the conversion of $\frac{2}{3}$ and $\frac{1}{4}$ into $\frac{8}{12}$ and

$\frac{3}{12}$. A number line divided into 12 segments from 0 to 1, with a final marker at $\frac{11}{12}$.

During the think-aloud, S13 explained: *"I drew two boxes first so I could figure out the parts, then I thought 12 would work. After that, I used the number line because it looked clearer."* This case illustrates representational flexibility with the ability to coordinate and transition between visual models to enhance understanding. S13's process reflects a growing mathematical maturity, emphasising conceptual over procedural thinking. When asked why they switched to a number line, S13 noted, *"Because I was already sure about the answer and just wanted to see where it lands."* Such transitions are part of the interrepresentational transformation framework that emphasises representational competence as the foundation of mathematical reasoning.

Patterns and Variations Across Representational Strategies

Table 1 summarises the types of representations used, the associated conceptual accuracy, and key observations across all participants. Students who made use of area diagrams and combined models more frequently gave answers that followed common denominator reasoning, whereas those relying solely on number lines or bar models showed more frequent errors, especially related to unit scaling and conversion of denominators.

Interviews with teachers offered further perspective on these patterns. One teacher noted, *"Most students can draw the models,*

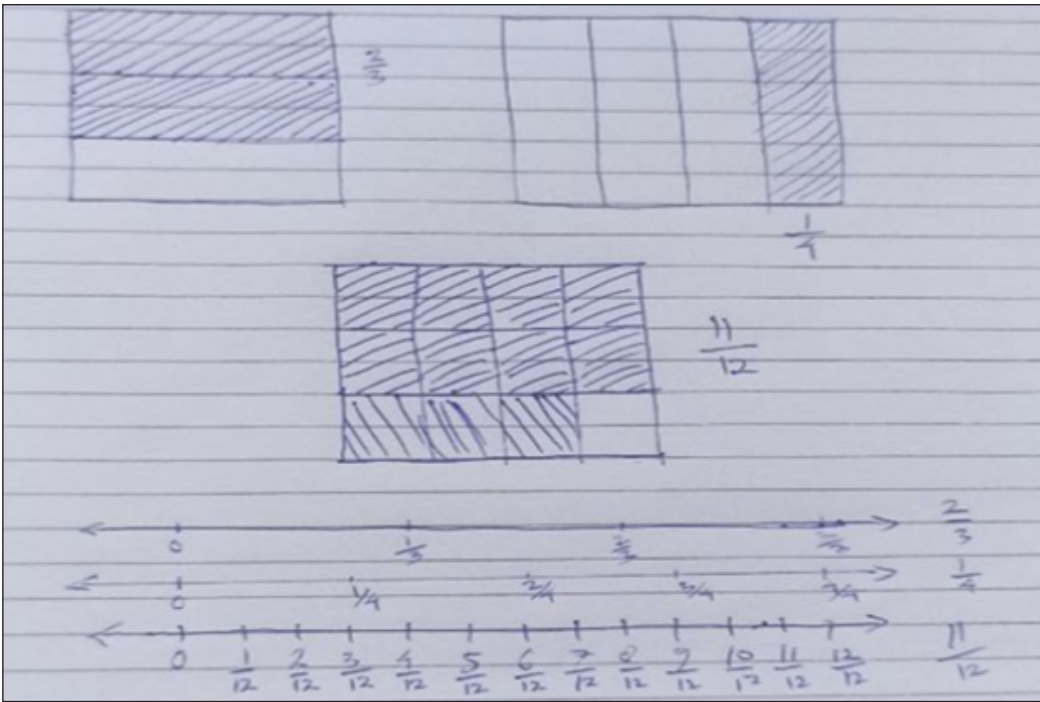


Figure 4. Results of the solution using S13 visualisation

Table 1
Summary of students' approaches in solving fraction problems

Student(s)	Approach Used	Representation	Conceptual Success
S4, S5	Number Line	Inconsistent unit size	Partial
S7	Area Diagram	Correct conversion	High
S13	Area + Number Line	Model transformation	High
S12, S14, S15	Bar Model	Missed the common denominator	Partial
S8, S11	Combined	Accurate integration	High
S1, S2, S3	Number Line	Mixed success	Mixed
S6, S9, S10	Area Diagram	Accurate and proportional	High

but they don't always know what they mean mathematically." Another commented, "We need more training to not just show students how to draw, but how to think with the pictures." These comments demonstrate that teachers noticed a disconnect between students' capacity to produce visual models

and their ability to utilise the visual models to communicate mathematical ideas.

Misconceptions and Pedagogical Implications

Several students displayed misconceptions even when they used visual models.

For example, S12 used a bar model by drawing separate bars for $\frac{2}{3}$ and $\frac{1}{4}$ and then simply counting all the segments together without adjusting to a common denominator. When asked about this solution, S12 stated, *“I just counted the pieces. It looks like ten parts total.* In interviews, teachers acknowledged similar issues. One teacher noted, *We were trained how to use these models but not how to connect them with concepts such as common denominators and equivalent fractions.* These findings show that some students treated the segments in their drawings as unrelated pieces rather than as parts of a single whole, and that teachers themselves felt a need for further support in helping students interpret visual models conceptually.

Summary of Key Findings

In general, the results suggest that students who presented the visual representations in a consistent and proportional manner had a better understanding of fraction operations. Area diagrams were the best predictors of correct reasoning relating to common denominators and equivalent fractions, whereas number lines were supportive for showing fraction magnitudes but more susceptible to errors in unit consistency. Students who combined different models, such as area diagrams and number lines, tended to produce more complete and coherent solutions. These key patterns from the results provide the basis for the interpretation and implications discussed in the following section.

DISCUSSION

This study discovered that students' understanding of fraction operations was primarily determined by the manner of use of pictures. The students who were able to use an area diagram/bar model which followed a uniform partitioning presented a better understanding of common denominator reasoning and the relations of part and whole. These themes echo the prior findings (Cramer et al., 2002) that area-based models are good for connecting our symbolic and visual thinking. When students employed figures such as these, they were able to obtain not only correct answers but to explain their reasoning, indicating that visualisation facilitated a reliable cognitive hierarchy of fraction concepts. This argument is in line with Duval's (1999) semiotic theory of representation and Ainsworth's (2006) DeFT framework, which underscores how multiple representations facilitate gaining depth in understanding. It is also consistent with general evidence support that visual-based interventions in fraction learning provide medium-to-large effect sizes (Braithwaite & Siegler, 2020; Soni & Okamoto, 2020) and that number-line techniques can strengthen students' sense of fraction magnitude (Teoh et al., 2021).

The results also highlight the importance of students' ability to move between different representations, for example, from area diagrams to number lines, as an indicator of representational competence. Cases such as S13, who coordinated area models and number lines within a single solution, illustrate what

Goldin (2002) describes as flexibility of representation, a key prerequisite for robust mathematical understanding. This flexibility echoes Janvier's (1987) notion of inter-representational transformation and Duval's (1999) account of coordinating several sign systems in mathematical cognition. External evidence points in the same direction: Wilkie et al. (2022) showed that tasks involving multiple visual representations of the same fraction concept can deepen understanding, while Teoh et al. (2021) reported that students who worked with number lines and intervals showed improved transitions between representations. Taken together, these findings underline that, even in the early stages of fraction learning, fluency in multiple representational forms is not optional but central to developing more abstract reasoning.

At the same time, recurring errors in students' drawings, such as inconsistent scales, mismatched units, and failure to coordinate models with symbolic notation, show that the presence of a visual representation does not guarantee conceptual understanding. The findings suggest that explicit instruction is needed to help students interpret, construct, and check their representations. This is consistent with work by Putra et al. (2020), who reported that Indonesian teachers recognise the potential of visual tools but often lack the pedagogical content knowledge to use them effectively. International studies echo these concerns: Clarke and Roche (2018) found that students misinterpret number lines when unit partitioning is not made explicit,

and Barbieri et al. (2020) showed that natural number bias continues to influence fraction magnitude judgments even in the presence of visual aids. Accordingly, teacher professional development should focus not only on introducing visual tools but also on cultivating representational thinking, helping teachers and students to connect different visual models and to symbolic expressions.

Overall, this research supports the view that visual representations are not "pretty pictures but pragmatic tools for cognition. In classrooms that aim for idea-rich teaching and learning, teacher explanations, textbook examples, and student tasks all need to position visual models as integral to mathematical reasoning. This perspective is consistent with the NCTM (2020) standards, which argue that deep understanding rests on connections among visual representations, symbolic expressions, and contextual problem situations. For teachers, curriculum developers, and policymakers, this implies a responsibility to design materials and professional learning opportunities that link visual models explicitly to conceptual goals. Future instructional resources should therefore include guidance on how to design, sequence, and connect visual tasks so that visual thinking contributes directly to numeracy and critical reasoning. Recent meta-analytic work (Schoenherr et al., 2024) further suggests that when external representations are integrated thoughtfully, they can support both memory and higher-order reasoning. The present findings reinforce this claim and point to the need

for visual representation to be treated as an everyday way of thinking in fraction instruction, rather than as a peripheral or incidental feature of lessons.

CONCLUSION

This study demonstrated how visual representations are critical to students' ability to conceptualise fraction operations, and how they create, practice, and bring together area diagrams, number lines, and bar models in relation to the research questions. Students who used area diagrams, number lines, or bar models with skill and continuity displayed greater representational flexibility, a better understanding of common denominators, and stronger reasoning to explain their math. Visual deviations like inappropriate scaling or unit mismatches frequently contributed to conceptual blunders; however, underscoring the need to connect visual models explicitly to the underlying structure of fractions. These findings highlight that visualisation is far more than an ornamental enhancement; it is a cognitive activity. As a result, teachers should be trained not only to use the visual tool but also to interpret students' drawings and to help steer students to think mathematically while working with it. The study also stressed the importance of curriculum designs which encourage meaningful and systematic employment of visual models rather than mere incidental exposure. On a theoretical level, this research enriches our understanding of the role which visualisation plays in mathematical learning, particularly within an Indonesian

classroom context. Future research could extend this work through longitudinal studies that trace the development of students' visual strategies over time, design-based interventions that foreground visual representations in fraction instruction, and teacher-focused studies that examine how professional development can strengthen teachers' representational competence. Appropriate visual strategies can bridge the gap between procedural fluency and conceptual depth, enabling students to develop mathematical literacy and critical thinking skills that are relevant to real-world problem solving.

CONFLICT OF INTEREST

The authors declare that no financial, professional, or personal conflict of interest could influence the conduct, analysis, or reporting of this research. All research procedures were conducted independently and objectively, and the funding received did not influence data interpretation or conclusions. Additionally, this article is an original work that has not been previously published and is not under review or consideration by any other academic journal.

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REFERENCES

- Ainsworth, S. (2006). DeFT: A conceptual framework for considering learning with multiple representations. *Learning and Instruction*, 16(3), 183-198. <https://doi.org/10.1016/j.learninstruc.2006.03.001>
- Barbieri, C., Hofer, S. I., & Reichel, M. (2020). The natural number bias in fraction magnitude comparison: A review. *Educational Psychology Review*, 32(2), 469-498. <https://doi.org/10.1007/s10648-019-09491-2>
- Braithwaite, D. W., & Siegler, R. S. (2020). Fraction learning and the multiplication of improvement effects from combining instructional interventions. *Psychological Science*, 31(8), 952-963. <https://doi.org/10.1177/0956797620925033>
- Bruce, C. D., Flynn, T., Bennett, S., & Moss, J. (2023). *How Canadians do fractions: National scan of curriculum and practice*. Ontario Ministry of Education.
- Bruce, C. D., Flynn, T., Moss, J., & O'Leary, K. (2022). *Re-thinking math instruction: Insights from six years of design-based research*. Ontario Ministry of Education.
- Charalambous, C. Y., Delaney, S., Hino, K., & Mesa, V. (2022). *International perspectives on mathematics curricula*. Springer.
- Clarke, D. M., & Roche, A. (2018). Using number lines to teach fractions: Addressing the challenges. *Australian Primary Mathematics Classroom*, 23(1), 3-8.
- Cramer, K. A., Post, T. R., & delMas, R. C. (2002). Initial fraction learning by fourth- and fifth-grade students: A comparison of the effects of using commercial curricula with the effects of using the Rational Number Project curriculum. *Journal for Research in Mathematics Education*, 33(2), 111-144. <https://doi.org/10.2307/749646>
- De Smedt, B., Holloway, I. D., & Ansari, D. (2011). Effects of problem size and arithmetic operation on brain activation during calculation in children with varying levels of arithmetical fluency. *NeuroImage*, 57(3), 771-781. <https://doi.org/10.1016/j.neuroimage.2011.05.019>
- Duval, R. (1999). Representation, vision, and visualisation: Cognitive functions in mathematical thinking. *Basic Issues for Learning in Mathematics*, 26-36.
- Dyson, N. I., Jordan, N. C., & Glutting, J. (2018). A number sense intervention for low-income kindergartners at risk for mathematics difficulties. *Journal of Learning Disabilities*, 51(5), 454-465. <https://doi.org/10.1177/0022219417714516>
- Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data* (Rev. ed.). MIT Press.
- Fazio, L. K., & Siegler, R. S. (2011). Teaching fractions. In V. F. Reyna, S. B. Chapman, M. R. Dougherty, & J. Confrey (Eds.), *The adolescent brain: Learning, reasoning, and decision making* (pp. 173-190). American Psychological Association. <https://doi.org/10.1037/12300-008>
- Gencturk, Y. E., & Doleck, T. (2021). Elementary teachers' use of representations in mathematics instruction. *Education and Information Technologies*, 26(5), 5989-6003. <https://doi.org/10.1007/s10639-021-10586-9>
- Gersten, R., Schumacher, R. F., & Jordan, N. C. (2017). Fraction instruction for struggling learners: Research-based strategies. *Teaching Exceptional Children*, 49(4), 236-244. <https://doi.org/10.1177/0040059917697260>

- Goldin, G. A. (2002). Representation in mathematical learning and problem solving. In L. D. English (Ed.), *Handbook of international research in mathematics education* (pp. 197-218). Lawrence Erlbaum Associates.
- Hwang, G. J., Sung, H. Y., Chang, H. Y., & Huang, I. (2019). A brainwave-based cognitive learning system for supporting cognitive development in mathematics learning. *Educational Technology & Society*, 22(1), 17-29.
- Janvier, C. (1987). Translation processes in mathematics education. In C. Janvier (Ed.), *Problems of representation in the teaching and learning of mathematics* (pp. 27-32). Lawrence Erlbaum Associates.
- Kamberi, L., Suryadi, D., & Darhim. (2022). Enhancing students' conceptual understanding of fractions through realistic mathematics education. *Journal on Mathematics Education*, 13(1), 91-106. <https://doi.org/10.22342/jme.v13i1.13499>
- Karamarkovich, S. M., & Rutherford, T. (2019). Equity and access in mathematics education through visualisation. *Educational Studies in Mathematics*, 100(1), 19-35.
- Lamon, S. J. (2012). *Teaching fractions and ratios for understanding: Essential content knowledge and instructional strategies for teachers* (3rd ed.). Routledge.
- Lenz, L., & Wittmann, W. (2020). Neurocognitive perspectives on number line training. *Frontiers in Psychology*, 11, Article 1005. <https://doi.org/10.3389/fpsyg.2020.01005>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.
- Moleong, L. J. (2021). *Metodologi penelitian kualitatif* (Edisi revisi). Remaja Rosdakarya.
- National Council of Teachers of Mathematics. (2020). *Catalyzing change in early childhood and elementary mathematics: Initiating critical conversations*. NCTM.
- Paivio, A. (1990). *Mental representations: A dual coding approach*. Oxford University Press.
- Prediger, S., Gravemeijer, K., & Confrey, J. (2018). Design research with a focus on learning processes: An overview on achievements and challenges. *ZDM Mathematics Education*, 47, 1-12.
- Pramudiani, P., & Dolk, M. (2025). Integrating context-based visual strategies in Indonesian mathematics classrooms. *Journal of Mathematics Education in Southeast Asia*, 15(2), 40-59.
- Putra, Z. A., Wahyudi, & Marsigit. (2020). Teachers' use of visual representations in teaching fractions: A case study in Indonesia. *Journal on Mathematics Education*, 11(2), 245-258. <https://doi.org/10.22342/jme.11.2.10084.245-258>
- Reinhold, F., Hoch, S., & Reiss, K. (2020). The impact of dynamic visualisations on fraction learning: A meta-analysis. *Educational Psychology Review*, 32(2), 469-497.
- Schoenherr, J. R., Strohmaier, A., & Schukajlow, S. (2024). External visualisations and mathematical reasoning: A meta-analytic review. *Educational Psychology Review*, 36(1), 145-168.
- Siegler, R. S., Thompson, C. A., & Schneider, M. (2011). An integrated theory of whole number and fractions development. *Cognitive Psychology*, 62(4), 273-296. <https://doi.org/10.1016/j.cogpsych.2011.03.001>
- Soni, A., & Okamoto, Y. (2020). The effectiveness of visual models in teaching fractions: A meta-analysis. *Journal of Educational Research*, 113(1), 1-11. <https://doi.org/10.1080/00220671.2019.1614516>
- Susanti, Y., Purnomo, Y. W., & Subanji. (2022). Enhancing students' understanding of fraction through number lines and circle diagrams. *Journal of Mathematics Education*, 13(2), 157-168.

- Teoh, S. H., Narayanan, S. R., & Singh, P. (2021). Effects of number line activities on Malaysian students' understanding of fractions. *Pertanika Journal of Social Sciences & Humanities*, 29(1), 285-302.
- Tian, J., Zhao, H., & Siegler, R. S. (2021). Neural correlates of fraction processing in children. *Developmental Science*, 24(2), Article e13024. <https://doi.org/10.1111/desc.13024>
- Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2019). *Elementary and middle school mathematics: Teaching developmentally* (10th ed.). Pearson.
- Van Hoof, J., Verschaffel, L., & Van Dooren, W. (2018). In search for the natural number bias in non-symbolic fractions: The case of comparing fractions of area. *Learning and Instruction*, 56, 5-11. <https://doi.org/10.1016/j.learninstruc.2017.10.007>
- Wilkie, K. J., Roche, A., & Giannopoulos, A. (2022). Supporting students' understanding of fractions using different visual models: A classroom-based study. *Mathematics Education Research Journal*, 34, 267-287. <https://doi.org/10.1007/s13394-021-00381-y>
- Wortha, F., Sander, A., & Nagy, G. (2020). Visual representations and cognitive activation in fraction learning. *Journal of Educational Psychology*, 112(4), 715-729.

Workforce Creativity Beyond Mood: A Strategic Framework of Vitality, Mindfulness, and Psychological Safety

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ABSTRACT

Professionals are being pressurised to deliver unusual and helpful solutions within tight time constraints in the fast-moving creative economy. This paper explores the correlation of Proactive Vitality Management (PVM) with individual creativity, with the cross-level moderator of Psychological Safety (PS) and mindfulness as a mediating factor. Despite the fact that the role of PS and energy regulation as independent factors is well-established, empirical information about their combative, bottom-up effects in daily working environments is still limited. To fill this gap, a five-day diary study was conducted on 183 workers in the creative industries of Indonesia, including marketing, Information Technology (IT), and design. The experiment breaks down these interactions between these variables at various levels of inquiry by applying Multilevel Structural Equation Modelling (MSEM). The results showed that PVM significantly predicted both creativity and mindfulness. However, mindfulness did not mediate the relationship between PVM and creativity. PS moderated the relationship between PVM and mindfulness. At the within-person and between-person levels, PVM and PS consistently enhanced daily mindfulness and creativity, respectively. These results suggested the practical value of helping employees manage energy proactively and improving psychologically safe work environments to increase daily creative performance. The literature was enhanced by integrating proactive energy management and PS into a cross-level framework, offering new insights into the mechanisms required to improve workplace creativity.

Keywords: Creativity, creative industries, mindfulness, proactive vitality management, psychological safety

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INTRODUCTION

Creativity is a necessity, serving as the key to sustained success (Herkert, 2021). This concept plays a crucial role in achieving success at the individual and organisational levels. Based on the responses from over 500

global business leaders, a study conducted by Harvard Business Review Analytic Services (2024), in collaboration with Canva found that 96% creative ideas were essential for long-term success. Furthermore, 94% stated that creative organisations achieve greater strategic growth. This urgency is directly related to Indonesia's national aim of shifting to a creative economy. This is now a major economic reality rather than only a policy objective. According to data from the Ministry of Tourism and Creative Economy (Ministry of Tourism and Creative Economy, 2024), the industry employs more than 24 million people and contributes roughly 7.28% of the country's GDP, or Rp1,611.2 trillion. Refer to Law No. 59 of 2024, which creates the National Long-Term Development (RPJPN) 2025-2045, which serves as the legal foundation for this course. The 'Golden Indonesia 2045' vision, which comprises human capital development and innovation-led transformation as the key pillars for national progress, is outlined in this paper and will serve as the major guideline for the following 20 years (Bappenas, 2024).

In today's environment, workplace innovation serves as a crucial stimulant for competitive advantage and organisational resilience. This demand is crucial for the creative industries, which are essentially defined by the combination of human skill and the creation of creative assets (Huang & Jia, 2022). Particularly in Indonesia, the industry is currently negotiating the upheaval of disruptive innovation (Gularso et al., 2020), which is requiring both

new and old businesses to require their employees to constantly come up with ideas. Working in fields where creativity has become a "industrialised" daily expectation, millennials and Gen Z workers in IT, design, and digital marketing are leading this change (Amabile & Pratt, 2016). These positions, in contrast to more traditional ones, are based on high-frequency feedback loops and non-routine cognitive labour, a person's daily vitality plays a crucial but varying role in how well they function (Amabile & Pratt, 2016). The emphasis on these high-velocity subsectors is therefore motivated by their innate requirement for radical innovation under ongoing time limitations (Op den Kamp et al., 2023). However, a significant paradox arises: whereas these digital spaces provide a sense of autonomy, they frequently ensnare workers in a never-ending cycle (Mazmanian et al., 2013). This issue is exacerbated by the fact that in the Indonesian context, a culture of hustle is widespread, with the need to create harmony in the group frequently manifesting itself as the need to keep the apparent level of constant productivity (Mazmanian et al., 2013; Minkov et al., 2017).

To be able to navigate these volatile settings, Proactive Vitality Management (PVM) is required, which is operationalised as a set of goal-focused, self-regulatory strategies to balance physical and mental energy (Op den Kamp et al., 2018). PVM is based on the Proactive Motivation Theory (PMT) because this strategic antecedent exclusively triggers the energised-to-do pathway (Parker et al., 2010). This form of

energy management is no longer a luxury but an essential survival tool in demanding creative scenarios, which allows workers to replenish the energies required to be able to continue with their day-long work (Tisu et al., 2023). The actual empirical evidence on the way that professionals actually navigate and cope with their daily energy variations on an autonomous basis is, however, decisively deficient, even though the theoretical importance of PVM is substantial (Op den Kamp et al., 2023).

In essence, PVM is a vital internal process that provokes creative performance with the focus on attention. Whether in terms of the Conservation of Resources (COR) theory, PVM is a strategic resource-replenishment process (Hobfoll et al., 2018). By actively focusing on their energy, employees will be able to keep the scarce reserves of self-regulation needed to sustain mindfulness or awareness of the present despite the constant digital intrusion (Hülshager et al., 2018; Op den Kamp, 2023). The energised-to-do route is also entrenched within the PMT framework through mindfulness, which prevents the involvement of cognitive abilities becoming disengaged. Despite the fact that mindfulness has been proved as an effective mediator, its significance is in particular to the creative workforce of Indonesia that is becoming more and more demanded to deliver unique outcomes having to deal with the always-on pressure of the modern workplace.

Applying these tactics in Indonesia requires taking into consideration cultural

systems that value harmony within the group (Minkov et al., 2017). This implies that the path of psychological safety (PS) (Edmondson, 1999) may not be linear; in particular, this study examines the 'too-much-of-a-good-thing' effect, which argues that too much PS may unintentionally encourage creative complacency (Pierce & Aguinis, 2013). Current domestic research, while it has strategic significance, is still too Western-centric and cross-sectional, missing the everyday, within-person microdynamics of how energy and mindfulness change. Since the creative outputs in IT, design, and marketing arise through spontaneous daily tasks and rapid feedback loops, the variables are best examined using a multilevel daily diary design (Amabile, 2012; Binnewies et al., 2009). Therefore, this study aims to bridge the gaps by investigating the sustenance of daily creativity through the mediating lens of mindfulness, and the moderating effect of PS amidst the demanding, collectivist landscape of Indonesia's creative industries toward Indonesia Emas 2045.

Study Purpose and Objectives

This study investigates the relationship between the proactive regulation of energy through PVM and the daily creative performance of employees within the Indonesian creative industries. Drawing on PMT, the daily fluctuations in PVM serve as a strategic antecedent that fuels the 'energised-to-do' pathway required for innovation (Parker, Bindl, & Strauss, 2010; Op den Kamp et al., 2018).

The investigation is focused on high-velocity Indonesian subsectors, including IT, Design, and Digital Marketing. The roles are characterised by 'prescribed creativity', where novel and impactful solutions are an industrialised daily requirement rather than a voluntary act (Amabile & Pratt, 2016; Unsworth, 2001). This study captures the within-person micro-dynamics (Level 1) nested within employees (Level 2) by using a multilevel daily diary design over five consecutive working days, providing a robust framework to understand the effects of individual self-regulation on creativity amidst the "always-on" pressures of the Indonesian digital landscape (Binnewies et al., 2009; Mazmanian et al., 2013). Based on the description, this study examines whether the relationship is mediated by day-level mindfulness, defined as a receptive attention and awareness of present-moment experiences (Brown & Ryan, 2003). Even though mindfulness is theorised to enhance the cognitive resources needed for creativity, the role as a mediator is investigated within a unique cultural and occupational context where constant digital connectivity may scatter attention (Hülshager et al., 2018; Op den Kamp, 2023). PS is examined as a crucial individual-level boundary condition (Edmondson, 1999). From traditional Western-centric perspectives, this study tests for a potential 'negative moderation' or 'too-much-of-a-good-thing' effect (Pierce & Aguinis, 2013). In a collectivist setting, the effects of excessive levels of PS on creative complacency are investigated, reducing the "productive tension" or "creative urgency"

required to convert managed vitality (PVM) into innovative output (Pearsall & Ellis, 2011).

The primary objective of this study includes 1) to examine the intraindividual relationship between daily PVM and creativity within the Indonesian creative workforce, 2) to assess whether day-level mindfulness mediates the relationship while exploring potential discrepancies with existing Western-centric literature regarding the significance of the variable in high-pressure creative roles, and 3) to test whether PS at the individual level moderates the direct and indirect effects of PVM on creativity, investigating the potential weakening of the relationship when safety levels are high. The integration of daily data through multilevel modelling aims to bridge the relationship between individual self-regulatory behaviour and the organisational context. This provides new insights for maintaining the sustainability of the "new growth engine" to fulfill the Golden Indonesia 2045 vision. This is a national transformation agenda to realise Indonesia as a developed nation with global competitiveness by strengthening the quality of human resources (Bappenas, 2024).

LITERATURE REVIEW

The paper is based on the PMT that describes how changes are initiated to meet organisational objectives (Parker et al., 2010). Recent trends in PMT indicate that the need to be proactive in the digital-heavy industries is no longer a choice, but a necessity to survive in the current high-

velocity settings (Zhang et al., 2023). In the case of Indonesian workers in the IT, Design, and Digital Marketing, this is translated into prescribed creativity- an industrialised, day-to-day requirement of innovation (Amabile and Pratt, 2016; Unsworth, 2001). Managing this terrain puts a sharp demand on the energised-to pathway, since people have to protect the mental resources needed to produce creative output at the same time as they work within a culture of the so-called always-on ethos (Mazmanian et al., 2013; Zhang et al., 2023).

PVM is a goal-directed, self-initiated plan to maintain physical and mental energy as well as facilitate effective work performance. This concept is a behaviour that fits the "energised to" pathway in PMT (Op den Kamp et al., 2018). PVM includes intentional task planning, micro-breaks, or light fun activities to maintain energy levels during the day (Trogakos & Hideg, 2009). Sonnentag and Niessen (2020) found that performance was positively related to psychological detachment and micro-recovery during the workday, mainly through energy restoration. The role of PVM in promoting creativity in everyday life has not been analysed extensively. However, previous studies have identified associations between PVM, work engagement, and psychological well-being (Ye et al., 2021; Tisu et al., 2023). Employees replenish the energy needed for divergent thinking by engaging in micro-recovery and strategic task planning (Ni et al., 2022). In the context of the Indonesian workforce, PVM acts as a self-starting mechanism to sustain

innovativeness day-to-day. Therefore, the following hypothesis was formulated to guide this study.

H1: Daily PVM Positively Predicts Daily Creativity

PVM acts as a resource-replenishment strategy that facilitates mindfulness, characterised by sustained, non-judgmental awareness of the present moment (Brown & Ryan, 2003). The current study suggests that managing energy reserves is essential for protecting the self-regulatory resources required for mindful attention, specifically in digital-intensive workspaces where attention is frequently scattered (Hülshager et al., 2018; Op den Kamp, 2023). In PMT framework, PVM ensures that the employee remains in an "energised" state of awareness, preventing cognitive fatigue from diminishing present-moment focus (Zhang et al., 2022). When applied to the Indonesian workforce, the positive organisational behaviour approach to human capital optimisation has been revealed to be an important factor in enhancing organisational performance (Ampuh et al., 2018). Thus, this research will suggest PVM as a type of active personal action that is essential in the evocation of cognitive resources and creative behaviour in the creative sector.

H2: Daily PVM Positively Predicts Daily Mindfulness

Brown and Ryan (2003) define mindfulness as a psychological theory that is characterised by the continuous

presence of the present moment, conscious focus, and the lack of judgmental analysis. Thoughtful attention was associated with greater concentrative stability, reduced vulnerability to disruption and greater openness to ideas in creative sectors, where the work environment was characterised by a high degree of cognitive activity and mobility (Jones, 2019). It has been shown that mindfulness practitioners are more flexible and reflective of themselves, which is directly connected to solid, original problem-solving. This efficacy is caused by better experiential integration, which is one of the features of the ideation process of mindful cognition (Hülshager et al., 2013; Zhang et al., 2022). But this relationship is not always straightforward in the fast-paced marketing and IT sector in Indonesia. The fast cycle of decisions and the feedback loops that these businesses demand can occasionally be incompatible with the presence inherent in mindfulness (Montani et al., 2020; Op den Kamp, 2023). This potential conflict brings out the necessity of cognitive control to manage the internal attentive states and the external states of urgent work.

H3: Daily Mindfulness Positively Predicts Daily Creativity

Professionals can develop the flexibility of thought required to generate different ideas by training their ability to be mindful of the present moment by avoiding the use of the usual cognitive shortcuts. This state of consciousness is an active facilitator of the creative process that involves the experience

of merging various ideas, as opposed to being a mere focus (Hülshager et al., 2013; Zhang et al., 2022). By being present here and now, employees are able to cope with high-velocity work without having to lose the cognitive openness required to be innovative. This continuous state of clarity of mind suggests that mindfulness is a direct stimulant to generate innovative solutions in the course of work.

H4: Daily Mindfulness Mediates the Relationship Between Daily PVM and Daily Creativity

When assessing the effectiveness of such proactive practices as PVM, the bigger picture of the workplace should be taken into consideration. PMT shows that situational factors such as corporate climate and social reinforcement can either support or constrain the outcome of proactive behaviour and motivation. PS is a highly relevant contextual aspect in creative work settings. According to Edmondson (1999), PS was defined as the perception of an individual that he or she is risking interpersonal consequences without being afraid of the adverse effects of the action. This idea can affect the interactions of the employees with the mental states. Recent evidence indicates the existence of the so-called too-much-of-a-good-thing effect (Pierce & Aguinis, 2013). High PS can cause creative complacency in collectivist societies, such as Indonesia, where social comfort causes less urgency to apply managed vitality (PVM) to heighten awareness (mindfulness), and the association between energy control and clarity of mind.

H5: PS is a Cross-level Moderator that Strengthens the Relationship Between Daily PVM and Daily Mindfulness

The relationship between mindfulness and creativity is strengthened by the presence of PS. Even though individuals in a mindful state tend to exhibit high awareness and cognitive openness, the absence of a psychologically safe environment can inhibit the willingness to share or act on ideas. Therefore, a lack of emotional security may impede the full realisation of creative potential when the cognitive conditions for creativity are present. A work environment characterised by emotional support supports an atmosphere in which individuals feel comfortable sharing ideas without fear of criticism or social disapproval. Previous studies reported that PS promotes the expression and acceptance of creative ideas from the mindfulness process (Carmeli et al., 2014; Henriksen et al., 2020). A lack of "productive tension" in environments with excessive PS can inhibit the drive to act on creative ideas (Pearsall & Ellis, 2011). Therefore, high PS serves as a "negative moderator" that dampens the conversion of mindful cognition into actual creative output, as employees prioritise maintaining group harmony over disruptive innovation.

H6: PS As a Cross-Level Moderator That Strengthens the Relationship Between Daily Mindfulness and Daily Creativity

Studies integrating PVM, mindfulness, and PS into a unified multilevel framework remain remarkably limited. Despite the

evidence that creativity and self-regulatory behaviours fluctuate significantly on a day-to-day basis (Liu et al., 2021), most extant studies have centred on general populations in Western contexts, failing to show the unique socio-cultural dynamics of developing creative economies, such as Indonesia. This is a significant omission since the Indonesian creative sector, particularly in high-velocity subsectors, contributes approximately 7.28% to the national GDP and is a central pillar of the 'Indonesia Emas 2045' strategic roadmap (Bappenas, 2024; Ministry of Tourism and Creative Economy, 2024). To address the gaps, a multilevel daily diary design is adopted to explore the intra-individual relationships between PVM, mindfulness, and creativity. Furthermore, this study extends the literature by examining the moderating role of PS at the individual level, specifically investigating the potential 'too-much-of-a-good-thing' effect (Pierce & Aguinis, 2013). An overabundance of emotional security may lead to creative complacency within a collectivist work environment, offering an understanding of the boundaries of proactive behaviour in non-Western settings.

METHODS

A quantitative multilevel design was adopted, grounded in PMT (Parker et al., 2010), to investigate the daily dynamics of PVM, Mindfulness, Creativity, and PS. This study used a daily diary method over five consecutive working days to capture intra-individual fluctuations.

On the morning of the first day, participants completed a baseline questionnaire including demographic information and PS (Level 2). This was followed by the first of five daily surveys assessing PVM, mindfulness, and creativity (Level 1) distributed each afternoon. We chose a five-day consecutive period to mirror the standard temporal boundary of a typical workweek in Indonesia. This duration effectively captures the complete cycle of idea-intensive sprints, rapid feedback loops and energy depletion and recovery dynamics that typically unfold from Monday to Friday in these fast-paced creative sectors, while avoiding excessive survey fatigue for participants (Binnewies et al., 2009; Ohly et al., 2010).

In order to reduce the possible Common Method Bias (CMB), there were a number of procedural remedies that were used in this study based on the recommendations of Podsakoff et al. (2003). Ensuring that the measures of stable traits, including psychological safety, were put in a block of survey independent of the state-based daily variables was one of the major steps towards procedural separation. Further, the design of the survey made the respondents separate their direct day-to-day experiences in the workplace from their general perceptions of the workplace. To enhance further the protection of data integrity as well as to minimise social desirability bias, anonymity was provided to all the respondents in the process of data collection.

The recruitment process was focused on Indonesian creative talents, especially

those who operate in the subsectors of IT, design, and digital marketing. The research increased access to several companies within the digital ecosystem and full-time employees in idea-intensive jobs using an ingenious blend of purposive and snowball sampling. The data were processed through Multilevel Structural Equation Modelling (MSEM) to undertake the analytical phase to evaluate direct, mediating and moderating pathways. This multilevel framework was validated using Multilevel Confirmatory Factor Analysis (MCFA) to ensure that construct validity was at the within-person and between-person level and the rigorous requirements of MSEM-based modelling.

Study Participants

The participant recruitment was based on the high-velocity regions of the Indonesian creative industry, specifically, the subsectors of digital marketing, design, and information technology. These sectors were prioritised because they depend heavily on non-routine activities of a cognitive nature and rapid iterative feedback loops. To successfully manoeuvre this professional environment, the study employed a hybrid sampling approach that incorporated purposive sampling and snowball sampling approaches to ensure that the study was both precision-based and broad-based to access a larger number of organisations. Although snowballing allowed access to a very broad range of people working in the digital ecosystem, purposive sampling ensured that each of the participants met the criteria to be included. To examine the familiarity

with the dynamics of organisational work, to make sure that only participants with the same level of familiarity were included, the inclusion criteria were that the participants must be at least 18 years old and that they had at least one year of experience in their current positions.

After the first screening, 183 employees ($N = 183$) volunteered to make 915 daily observations during five consecutive working days to be used in Level-1 analysis. The initial day was dedicated to the creation of the baseline measures of PS at Level 2 and demographic profiling. The last sample consisted of 72% females, with most of them being in the hybrid or on-site environment. The given composition of the workforce reflects the picture of the Indonesian creative industry, providing a relevant background to the discussion of the proactive cognitive-affective processes in the contemporary, idea-intensive contexts (Grant & Ashford, 2008).

Measuring Instruments

To maintain a high level of validity and reliability, the research utilised the available measurement scales that were modified to use a daily diary format. The evaluation of all constructs was done on a 5-point Likert scale, with anchors of 1 (strongly disagree) to 5 (strongly agree). In particular, PVM was operationalised as a four-item shortened variant of the scale that was created by Op den Kamp et al. (2018), which is aimed at capturing the proactive behaviour of an individual to maintain or enhance the level of energy. An example item of this scale

was, today, I did something proactive to increase my energy in the workplace.

In measuring the mindfulness (MI) daily, the researchers used a short version of the Mindful Attention Awareness Scale (MAAS) consisting of five items, the original version of which was created by Brown and Ryan (2003). This adaptation was aimed at capturing the moment-to-moment awareness and involved a reverse-coded item as a certain precaution against response bias.

Equally, daily creativity (IC) was measured using a four-item index proposed by Hahn et al. (2015), which is based on the groundbreaking research of creativity by Zhou and George (2001). These items particularly tested the ability of the participants to come up with novel ideas that were practically useful in the context of their professional activities. One of the representative ones was: today, I formulated original and practical ideas to enhance my performance at work.

PS was measured using Edmondson's (1999) seven-item scale, which captured individuals' perceptions of interpersonal risk-taking within the work environment. This scale was extensively used in organisational studies and was well-suited for assessing perceived emotional safety in professional interactions. The scale was conceptualised as an intra-individual variable, as shown by the following concept: "Members of this team can bring up problems and tough issues." The scales showed robust psychometric properties in previous studies and were subjected to MCFA to ensure validity and reliability.

Study Procedure

The study used a daily diary method over five consecutive working days to capture the intra-individual fluctuations of energy regulation and creativity. To ensure the linguistic and cultural equivalence of the measuring instruments, the scales were subjected to a rigorous back-translation process by independent bilingual experts. Data collection followed a two-phase procedural separation to mitigate CMB (Podsakoff et al., 2003). On the morning of the first day, participants accessed a landing page through Google Forms to complete a baseline survey consisting of informed consent, demographic profiles, and the Level-2 measure of PS. Subsequently, participants received daily Level-1 surveys each afternoon for five days to report the state levels of PVM, mindfulness, and creativity. To ensure data integrity, optional daily reminders were disseminated through WhatsApp, and two attention-check items were embedded within the surveys. The study adhered to ethical protocols, maintaining participant anonymity, and ensuring voluntary participation as per the approved ethical clearance.

Statistical Analysis

Given the nested data structure, Multilevel Structural Equation Modelling (MSEM) was utilised to distinguish Level-1 daily fluctuations from Level-2 inter-individual differences in PS. Analyses were executed in RStudio using the lavaan and semTools packages. Prior to Modelling, the dataset was cleaned by removing responses that failed attention checks or fell below completion thresholds.

An MCFA was performed before hypothesis testing to satisfy the requirement for MSEM-based construct validity. The measurement model reported an excellent fit: CFI = 0.937, TLI = 0.926, RMSEA = 0.053, and SRMR within = 0.041 / SRMR between = 0.048. Reliability was assessed through Cronbach's alpha, with all values exceeding 0.70. Meanwhile, Average Variance Extracted (AVE) exceeded 0.40, confirming convergent validity. Intraclass correlation coefficients (ICCs) for key variables exceeded 0.60, justifying the necessity of a multilevel method. Enders and Tofighi (2007) stated that Level-1 predictors were person-mean centred to isolate within-person variance, while the Level-2 moderator was grand-mean centred. Hypothesis testing, including direct, indirect, and cross-level interaction effects (H1–H6), was conducted using moderated mediation procedures to investigate the potentially non-linear boundaries of PS.

RESULTS

The measurement instruments exhibited strong internal consistency following minor revisions. An item from PS scale was removed to enhance the psychometric properties of the scale. The Composite Reliability (CR) values were 0.96 for PVM and mindfulness, 0.94 for creativity, and 0.80 for PS, confirming reliability. MCFA supported model fit (CFI=0.937; TLI=0.926; RMSEA = 0.053; SRMR = 0.041/0.048), validating the measurement model. The details of construct reliability and validity are presented in Table 1.

Table 1
Construct reliability and validity

Construct	Level	CR	AVE
Creativity	Within	0.84	0.45
	Between	0.94	0.95
PVM	Within	0.84	0.44
	Between	0.96	0.91
Mindfulness	Within	0.86	0.54
	Between	0.96	0.95
Psychological Safety	Between	0.80	0.44

On the daily (within-person) level, the CR values of all the variables were higher than the standard (0.70). The AVE scores of PVM (0.44), Creativity (0.45) and PS (0.44) were lower than the score of 0.50, but were regarded as good enough. Based on the criteria of Fornell and Larcker (1981), convergent validity of a construct is acceptable when the value of CR is greater than 0.60 despite the lower AVE value (which is below 0.50). The small AVE values that are present at the daily level depict a reported pattern of diary studies, in which temporal changes tend to increase error variance relative to individual-level values that are stable (Geldhof et al., 2014). The correlation analysis further showed that the coefficient had a maximum of 0.831, which was between PVM and Creativity. Since no correlation was above the 0.85 level, the data do not indicate any cases of multicollinearity or semantic redundancy. Accordingly, these findings support the fact that every construction has an adequate level of discriminant validity (Kline, 2016).

CR values of all constructs at the within-person level exceeded the 0.70 mark. In spite of the fact that AVE values of PVM (0.44),

Creativity (0.45), and PS (0.44) are less than 0.50, convergent validity is not weak, as their respective CR values are greater than 0.60 (Fornell and Larcker, 1981). These lower AVE scores are typical of diary studies, in which the error variance is frequently overstated by short-term changes in the variability of the scores daily (Geldhof et al., 2014). Besides, the maximum correlations among latent variables were 0.83 between PVM and Creativity. The fact that all the coefficients were less than the 0.85 threshold indicates that the data does not indicate multicollinearity or redundancy and, hence, has a high discriminant validity of each construct (Kline, 2016).

After testing the measurement model, the study tested the relationships between the main constructs, which are presented in Table 2. Correlation analysis showed that there is a strong and statistically significant correlation between PVM and creativity ($r = 0.78, p < 0.01$). This close relationship indicates that there is a high level of congruence between proactive energy management and creative output in the sample that is being observed.

Table 2
Correlation matrix

Variable	1	2	3	4
1. PVM	-			
2. MI	0.36**	-		
3. PS	0.54**	0.55**	-	
4. IC	0.78**	0.25**	0.36**	-

Additionally, a moderate association was observed between PVM and mindfulness ($r = 0.36, p < 0.01$), as well as PVM and PS ($r = 0.54, p < 0.01$). Mindfulness showed a significant correlation with creativity ($r = 0.25, p < 0.01$) and PS ($r = 0.55, p < 0.01$). These results implied a reciprocal relationship between the constructions, suggesting that mindfulness improved creativity and PS.

The results suggested that the psychological constructs examined were mutually reinforcing. Individuals showing high levels of proactive vitality were also found to report greater mindfulness, a stronger sense of PS, and enhanced creativity. These consistent associations showed the integral role of vitality, mindfulness, PS, and creativity in promoting psychological well-being and occupational performance.

Null model analysis confirmed significant variance within and between individuals for the key constructs. ICCs showed that the majority of the variance occurred at the inter-individual level for PVM ($ICC = 0.70$), mindfulness ($ICC = 0.67$), and creativity ($ICC = 0.82$), validating the use of multilevel analysis. Even though the ICC value for creativity was relatively high (0.82), the use of multilevel analysis

remained an important methodological necessity. A large ICC value confirms the existence of strong data dependencies in a hierarchical structure, where observations at lower levels are not independent of each other. Hox (2017) argued that when this dependency is ignored using standard statistical methods, the estimation of standard errors would be biased and significantly increase the risk of Type I error.

Despite the high ICC value of 0.82 for creativity, the implementation of multilevel analysis is still an important methodological need. The elevated ICC value shows a robust data reliance within the hierarchical structure, where observations at lower levels exhibit interdependence. Neglecting these nested relationships through conventional statistical methods often leads to biased standard error estimations and significantly inflates the likelihood of Type I errors (Hox, 2002). Consequently, this study adopts a daily diary approach to accurately capture the fluid dynamics of within-individual processes. This method is essential because, as Ohly et al. (2010) suggest, many work behaviours are volatile and highly dependent on situational conditions that cross-sectional designs frequently overlook. While the variance at the daily level is typically

smaller than inter-individual differences, these fluctuations offer critical insights into how energy management strategies (EMS) influence performance in real-world settings. Furthermore, the substantial variance at Level 2 facilitates cross-level interaction testing, allowing for a deeper exploration of how stable work environment characteristics moderate daily motivational pathways.

Based on the description, this study reports the dynamics of short-term processes and daily changes in individuals (within-person process), rather than focusing on the variance. Ohly et al. (2010) stated that the daily methodology was crucial since numerous work behaviours, including creativity, exhibit variability and were significantly influenced by situational factors undetectable through cross-sectional designs. Despite the daily variance being less substantial than the differences across individuals, the changes remain practically relevant for comprehending the impact of PVM on performance in a natural work environment. Furthermore, the elevated variation at Level 2 facilitates the examination of cross-level interactions to

show the effect of stable elements of the work environment on the link between daily motivation.

After substantiating a significant discrepancy with the null model, a main effects model was estimated to examine the direct paths among the constructs. At the intra-individual level, PVM significantly predicted MI ($\beta = 0.33$, $p < 0.001$) and IC ($\beta = 0.63$, $p < 0.001$). However, the pathway from MI to IC was not statistically significant ($\beta = -0.03$, $p = 0.45$). Similar patterns were observed at the inter-individual level. PVM model showed significant predictive capacity for MI ($\beta = 0.32$, $p < 0.001$) and IC ($\beta = 0.83$, $p < 0.001$), but the MI model had limited predictive capacity for IC ($\beta = -0.04$, $p = 0.43$). The complete results of the structural path testing without moderators are detailed in Table 3.

A full model to empirical testing was carried out to examine the moderating role of PS. The analysis suggested that PS strengthened the effect of PVM on mindfulness ($\beta = 0.07$, $p = 0.002$) but did not moderate the relationship between mindfulness and creativity ($\beta = 0.02$, $p = 0.348$).

Table 3
Structural path testing results - without moderators

Regression	Estimate (β)	Std. Error	z-value	p-value	Level	Remarks
MI ~ PVM	0.33	0.09	6.858	<0.001	Within	Significant
IC ~ MI	-0.03	0.02	-0.762	0.446	Within	Not significant
IC ~ PVM	0.63	0.07	9.898	<0.001	Within	Significant
MI ~ PVM	0.32	0.15	3.952	<0.001	Between	Significant
IC ~ MI	-0.04	0.04	-0.793	0.428	Between	Not significant
IC ~ PVM	0.83	0.10	12.296	<0.001	Between	Significant

Even though psychologically safe environments enhanced proactive engagement, the variables did not amplify the impact of mindfulness on creative outcomes. Table 4 summarises the findings from the moderation analysis.

The multilevel results confirmed that PVM had a strong, direct influence on creativity within and between individuals. The relationship between PVM and creativity was stronger in environments characterised by high PS. Conditional effects analysis also showed additional

distinct results. The influence of PVM on mindfulness increased with higher PS ($\beta = 0.73$ to 0.82) but declined on creativity ($\beta = 0.20$ to 0.07), suggesting negative moderation. A possible explanation was that high PS reduced the situational demands, activating creativity through mindfulness. This interaction is visually represented in the conditional direct effect plot in Figure 1.

The conditional indirect effect of PVM on creativity through mindfulness was marginally significant at low levels of PS ($\beta = 0.15$, $p = 0.051$), but not significant at higher levels.

Table 4
Moderation test result

Interaction Pathway	β	SE	p-value	Remarks
PVM $\rightarrow$ MI	0.25	0.13	< 0.001	Significant
PS $\rightarrow$ MI	-0.30	0.21	0.001	Negative significant
PVM $\times$ PS $\rightarrow$ MI	0.07	0.02	0.002	Accepted
MI $\rightarrow$ IC	-0.09	0.07	0.485	Not Significant
PS $\rightarrow$ IC	0.12	0.11	0.156	Not Significant
MI $\times$ PS $\rightarrow$ IC	0.02	0.01	0.348	Not Accepted
PVM $\rightarrow$ IC	0.57	0.08	< 0.001	Significant

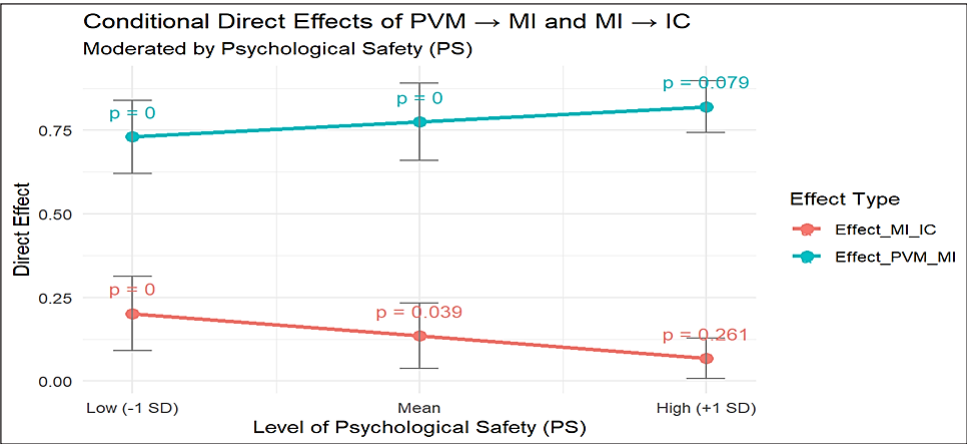


Figure 1. Conditional direct effect plot

These results suggested that mindfulness was more effective as a mediator in less secure settings. Even though PS promotes vitality and awareness, the variable may reduce the creative benefits of mindfulness under certain conditions. Figure 2 illustrates the conditional indirect effect of PVM on creativity through mindfulness across different levels of PS.

Johnson-Neyman (JN) was applied to explore the moderating effects beyond conventional point-selection methods. This method was used to identify specific ranges of PS values, where the relationship between mindfulness and creativity remained statistically significant, providing a more precise image of the conditional boundaries of the moderating variables. JN was used to investigate moderation effects beyond

the traditional pick-a-point method. This identified certain ranges of PS values where the association between mindfulness and creativity was statistically significant, showing the conditional boundaries of the moderator variable with greater precision. JN analysis reported a broad region of significance, even though the global interaction test showed marginal results. The results show that the positive effect of mindfulness on daily creativity is significant in the range of PS scores between 1.64 and 5.57 (Figure 3). Since the observed data range is 2.40 to 6.00, the driving effect of mindfulness works effectively across approximately 88.6% of the spectrum of employee experience and only loses significance at very extreme levels of PS (scores > 5.57).

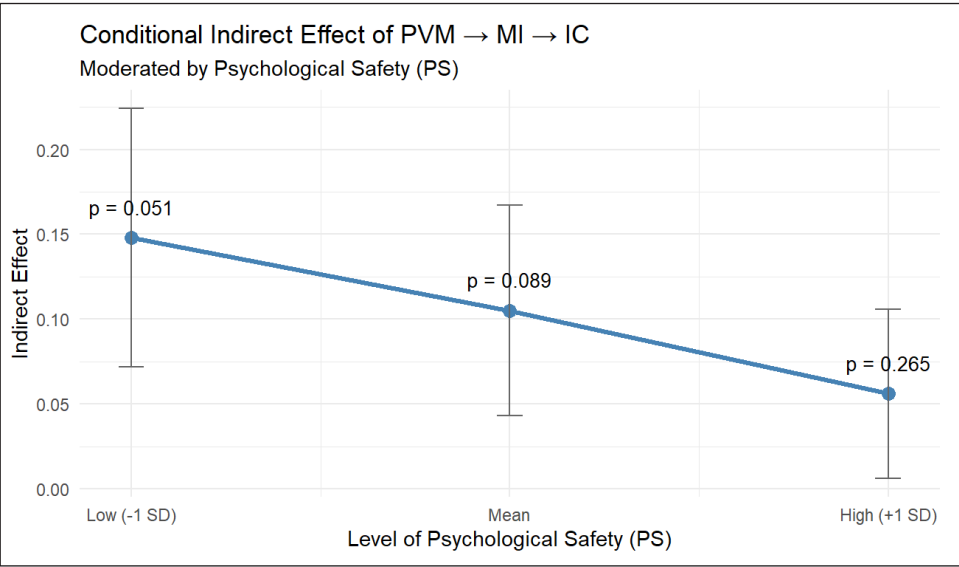


Figure 2. Conditional indirect effect plot

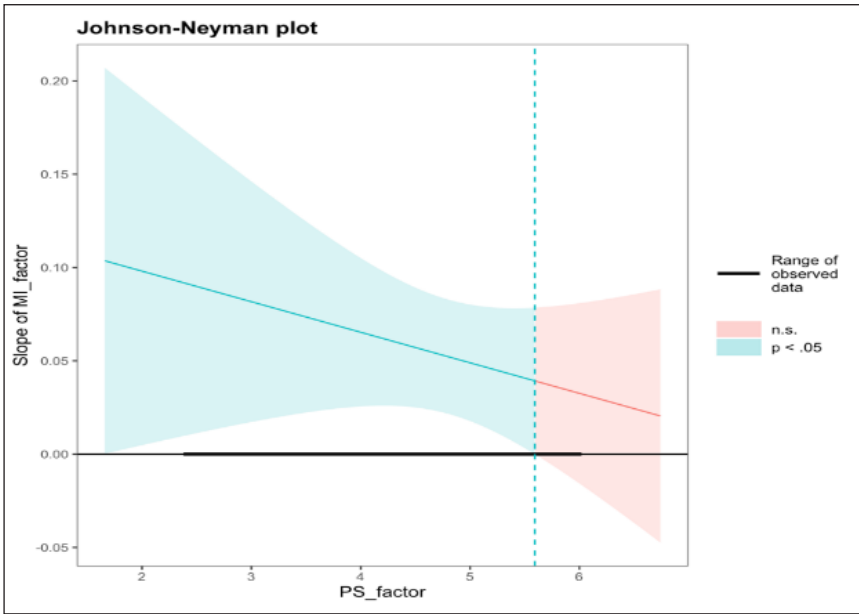


Figure 3. Johnson-Neyman plot

RESULTS AND DISCUSSION

Multilevel SEM (MSEM) analysis confirms that PVM is a robust predictor of employee creativity at the within-person ($\beta = 0.63$, $p < .001$) and between-person levels ($\beta = 0.83$, $p < .001$), providing strong support for Hypothesis 1. This is consistent with PMT, suggesting that the management of energy proactively fuels the "energised-to-do" pathway necessary for innovative output. PVM significantly predicted mindfulness (H2 supported; β within = 0.33, $p < .001$), confirming that energy regulation is a foundational requirement for maintaining present-moment awareness. However, the pathway from mindfulness to creativity was not statistically significant at the intra-individual ($\beta = -0.03$, $p = .45$) or inter-individual level ($\beta = -0.04$, $p = .43$), leading to the conclusion that Hypothesis 3 was not

supported. The mediation pathway proposed in Hypothesis 4 was also not supported. In the high-velocity Indonesian creative sectors such as IT and Digital Marketing, the "slowing down" or non-judgmental awareness typical of mindfulness conflicts with the rapid-fire decision-making and divergent thinking cycles required for daily "prescribed creativity".

The insignificant relationship between mindfulness and creativity is considered to result from the application of a broad MAAS scale. According to Lippelt et al. (2014), failure to achieve results often comes from a lack of differentiation between dissociative and divergent mindfulness processes. Divergent creativity requires Open Monitoring conditions that reduce top-down control to allow for ideational flexibility. This dimension is not specifically

mapped by the MAAS, which focuses more on general mindfulness over time. The lack of significance in the relationship between mindfulness and creativity is attributable to the utilisation of the broad MAAS scale. Lippelt et al. (2014) stated that the inadequacy of results frequently arose from an insufficient distinction between dissociative mindfulness activities. Divergent creativity necessitates Open Monitoring settings that decrease top-down control, facilitating idea flexibility. This facet is not explicitly addressed by MAAS, which primarily emphasises moment-to-moment awareness.

As to the boundary conditions, Hypothesis 5 was supported because PS had a significant positive impact on the relationship between PVM and mindfulness ($\beta = 0.074$, $p = 0.00$). This demonstrates that when there is a safe interpersonal environment, then the employees are capable of more easily converting energy under management into cognitive awareness. On the other hand, Hypothesis 6 was rejected because PS did not mediate the mindfulness-creativity relationship ($\beta = 0.025$, $p = .348$).

One of the key results of the conditional effects analysis was the existence of a specific phenomenon of too much of a good thing. Although psychological safety plays a beneficial role in creating awareness, it moderates the direct relationship between PVM and creativity negatively, and the effect size is reduced to 0.07 to 0.20. In a collectivist environment like the one in Indonesia, over-interpersonal security seems to support the development of creative

complacency since employees would value social peace more than the turbulent character of new ideas (Gelfand et al., 2011; Pierce & Aguinis, 2013). This implies that managed vitality is to be transformed into radical innovation with some sort of productive tension or situational urgency (Pearsall & Ellis, 2011), which may also be unintentionally defused in areas that seem to be too secure (Gong et al., 2012).

Further analysis with the help of Johnson Neyman gave more effective results, although hypothesis 6 was not proved with the help of the global interaction test ($p = 0.35$). Mindfulness was also a strong predictor of creativity when PS levels were within the low to high range (1.64 - 5.57). Employees in places where there is no interpersonal safety are willing to use the internal resources to sustain creative performance. The role of mindfulness just reduces when PS is extreme, and the environment's support replaces that of motivational creativity.

Although the global interaction test of Hypothesis 6 was not significant ($p = .35$), a more detailed analysis through Johnson-Neyman (JN) reveals a less obvious relationship. Mindfulness is also a significant predictor of creativity in each PS range of 1.64 to 5.57, indicating that under less secure conditions of interpersonal relationships, employees turn to internal resources in order to maintain their creative output. Nevertheless, the importance of mindfulness may decline in proportion to the high levels of PS, where it seems that excessive environmental aid dominates

personal mental activities. All these findings are pointing to one conclusion that PS is not linear, but there is an optimal threshold beyond which the feeling of safety can unwillingly suppress the need to innovate. This duality of PS creates the emphasis of a multifaceted phenomenon in the Indonesian workforce, where the high degree of safety may not provide the productive contradiction needed to create the innovation. These results are consistent with the theory of cultural rigidity, which suggests that excessive security may weaken the proactive relationship between vitality and radical creativity, which may exist in some cultural backgrounds (Gelfand et al., 2011).

Too much psychological safety may work against the intent to encourage group cohesion at the cost of the so-called deviant behaviours required to facilitate radical innovation in societies with high social standards, such as Indonesia. This is in line with the information exchange perspective, which argues that although high PS can enhance creative satisfaction, it does not provide constructive pressure to make disruptive ideas dominant over interpersonal stability (Gong et al., 2012). These data suggest that PS does not directly and linearly influence creativity, but instead, there is an optimal level where excessive security begins to suppress individual initiative.

This complexity also adds to the fact that PS did not mediate the connection between mindfulness and creativity (H6) because mindful awareness must be accompanied by a sense of urgency in order to turn

into creative output. Moreover, the fact that the direct connection between PVM and creativity is negatively moderated is an indication of the cultural tightness hypothesis by Gelfand et al. (2011). The extreme security in the Indonesian setting can work as a driver of conformity in effect nullifying the proactive energy needed to confront the status quo and bring radical change. According to the information exchange perspective (Gong et al., 2012), high PS can result in creative passivity due to the lack of productive pressure because people prefer interpersonal stability to disruptive innovations.

CONCLUSION

In conclusion, PVM is an important factor that consistently drives employee creativity within the Indonesian creative industry. The ability to proactively manage energy is essential for sustaining daily innovative performance and enhancing levels of mindfulness during work. However, increased mindfulness does not automatically translate into creative outcomes within the context of high-velocity industries characterised by rapid decision-making and repetitive creative cycles. The role of mindfulness as a mediating mechanism between energy management and creativity was not supported. This study shows a complex role for PS as a boundary condition. A secure interpersonal environment strengthened the translation of managed energy into higher cognitive awareness and simultaneously exhibited a weakening effect on the direct relationship

between vitality and creativity. These results suggest a 'too-much-of-a-good-thing' effect, where excessive levels of PS in a collectivist work environment led to creative complacency. The condition implies that overabundant safety decreases the productive tension required to drive disruptive innovation. The hypothesis predicting that PS would strengthen the link between mindfulness and creativity was not supported.

Theoretical Implication

This study extends the framework of PMT (Parker et al., 2010) by focusing on the role of the “energised-to” pathway in predicting creative outcomes through PVM. Even though previous studies have predominantly focused on the “can do” and “reason to” components of proactive behaviour, the present results report the importance of energy regulation as a central mechanism for sustaining proactive functioning within dynamic and unpredictable work environments. A more distinct understanding of motivational asymmetry is offered within PMT framework by showing that PVM significantly predicts creativity in the absence of mindfulness as a mediating variable. Therefore, the energised-to pathway can operate independently and have a significant impact. The non-significant relationship between mindfulness and creativity challenges the assumption that mindful awareness is a universal facilitator of innovation. This suggests that the impact of self-regulation is task-contingent. In rapid-cycle creative sectors, such as IT

and Design, the deliberative nature of mindfulness may conflict with the need for divergent spontaneity. This study advances the understanding of boundary conditions by identifying a “too-much-of-a-good-thing” (TMGT) effect regarding PS (Pierce & Aguinis, 2013). A better perspective is offered on the interaction of contextual affordances with internal motivation since excessive safety can weaken the relationship between vitality and creativity. In collectivist cultures, such as Indonesia, proactive processes are enabled by a safe climate and are sensitive to the level of “productive tension” within the work ecosystem.

Practical Implication

Critical guidance is provided to organisations that work in the high-velocity creative economy in a pragmatic way. To begin with, since PVM is intended to be a more timely and consistent source of innovation than mindfulness, energy-based interventions should be prioritised above generic mindfulness training by businesses. It is possible to establish micro-recovery processes that would assist organisations to transition to frameworks that facilitate autonomy. Through the introduction of flexible work hours and specific breaks, employees can be able to systematically replenish the cognitive resources required to support long-term creative output. In addition, developmental programmes should enable professionals in jobs that require idea intensity to strategically devote energy to deep-focus activities. In learning these techniques in energy management,

workers will be able to sustain the increased vigilance required in driving disruptive innovation without falling into the traps that come with cognitive exhaustion.

The identified too-much-of-a-good-thing effect makes managers negotiate a Safety Paradox. Although interpersonal security is important, an excess of it leads to a comfort zone that kills creativity, particularly in the Indonesian workplace, where collectivism leads to a lack of productive tension. Instead of the mindset of more is better, leaders are advised to balance between the psychological safety and a productive challenge. To sustain long-term innovation, organisations have to strike a balance between high levels of support and definite performance requirements, as well as a sense of creative urgency.

Psychological safety can be used together with active team learning (such as open communication about mistakes and constant feedback) to reduce the impact of the too-much-of-a-good-thing effect (Kim et al., 2020). These actions contribute to the creation of the required productive tension of turning controlled energy into dramatic, creative outcomes. By maintaining such a balance, organisations can ensure that an environment of high-impact innovation and not complacency is created.

Limitations and Recommendations

This research has a number of limitations despite its contribution. First, the five-day diary design is an effective method of capturing short-term variations but could miss longer-term motivational variations

and the development of proactivity fatigue. Second, although procedural safeguards are used, the use of self-reports is still a limitation, especially in the area of creativity, where social desirability or self-perception bias may affect results.

Third, the MAAS was a single measure and, therefore, it may not have been able to achieve a fine level of cognitive dynamics. The MAAS is mainly used to measure moment-to-moment awareness related to Focused Attention (FA), but divergent creativity is better addressed by Open Monitoring (OM), which enables attentional flexibility (Colzato et al., 2012). This insignificance is probably the reason why the mediating effect of mindfulness in this study is not significant.

Fourth, even though the majority of respondents had hybrid work experience, the lack of subgroup analyses based on work location fails to reveal how such factors as professional isolation or work-family boundaries may have a specific effect on energy management (Allen et al., 2015). Fifth, ICC values greater than 70 percent suggest that the stability of inter-individual or inter-organisational factors takes preeminence over creativity and PVM in spite of the existence of significant daily variability. Lastly, this research lacks the element of experimentalism, which would have allowed for determining causal absoluteness. Although PMT provides a solid theoretical framework, the possibility of mutual effects is the source of longitudinal research in the future.

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REFERENCES

- Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How effective is telecommuting? Assessing the status of our scientific findings. *Psychological Science in the Public Interest*, 16(2), 40–68. <https://doi.org/10.1177/1529100615593273>
- Amabile, T. M. (2012). *Componential theory of creativity*. Harvard Business School.
- Amabile, T. M., & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organisations: Making progress, making meaning. *Research in Organisational Behavior*, 36, 157–183. <https://doi.org/10.1016/j.riob.2016.10.001>
- Ampuh, S. A., Tindas, A., Anindyo Widhoyoko, S., Indrianti, Y., & Doktor, P. (2018). Optimising human capital via positive organisational behaviour: A case study of Indonesia's textile industry. *Pertanika Journal of Social Sciences & Humanities*. <http://www.pertanika.upm.edu.my/>
- Bappenas. (2024). *National long-term development plan (RPJPN) 2025-2045*. <https://indonesiaemas2045.go.id/>
- Binnewies, C., Sonnentag, S., & Mojza, E. J. (2009). Daily performance at work: Feeling recovered in the morning as a predictor of day-level job performance. *Journal of Organisational Behaviour*, 30(1), 67–93. <https://doi.org/10.1002/job.541>
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822–848. <https://doi.org/10.1037/0022-3514.84.4.822>
- Carmeli, A., Sheaffer, Z., Binyamin, G., Reiter-Palmon, R., & Shimoni, T. (2014). Transformational leadership and creative problem-solving: The mediating role of psychological safety and reflexivity. *The Journal of Creative Behaviour*, 48(2), 115–135. <https://doi.org/10.1002/jocb.43>
- Colzato, L. S., Ozturk, A., & Hommel, B. (2012). Meditate to create: The impact of focused-attention and open-monitoring training on convergent and divergent thinking. *Frontiers in Psychology*, 3, Article 116. <https://doi.org/10.3389/fpsyg.2012.00116>
- Edmondson, A. (1999). Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly*, 44(2), 350–383. <https://doi.org/10.2307/2666999>
- Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, 12(2), 121–138. <https://doi.org/10.1037/1082-989X.12.2.121>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Geldhof, G. J., Preacher, K. J., & Zyphur, M. J. (2014). Reliability estimation in a multilevel confirmatory factor analysis framework. *Psychological Methods*. <https://doi.org/10.1037/a0032138>
- Gelfand, M. J., Raver, J. L., Nishii, L., Leslie, L. M., Lun, L., Lim, B. C., Duan, L., Almaliach, A., Ward, C., & Yamaguchi, S. (2011). Differences between tight and loose cultures: A 33-nation study. *Science*, 332(6033), 1100–1104.

- Gong, Y., Cheung, S. Y., Wang, M., & Huang, J. C. (2012). Unfolding the proactive process for creativity: Integration of the employee proactivity, information exchange, and psychological safety perspectives. *Journal of Management*, 38(5), 1611–1633. <https://doi.org/10.1177/0149206310380250>
- Grant, A. M., & Ashford, S. J. (2008). The dynamics of proactivity at work. *Research in Organisational Behaviour*, 28, 3–34. <https://doi.org/10.1016/j.riob.2008.04.002>
- Gularso, K., Nugraha Mursitama, T., Heriyati, P., & Simatupang, B. (2020). Disruptive business model innovation in Indonesia digital startups. *Pertanika Journal of Social Sciences & Humanities*, 28(2), 847–865.
- Hahn, M. H., Lee, K. C., & Jo, N. Y. (2015). Scenario-based management of individual creativity. *Computers in Human Behaviour*, 42, 36–46. <https://doi.org/10.1016/j.chb.2013.07.058>
- Harvard Business Review Analytic Services. (2024). *Creativity as a catalyst for business growth* [Research report]. Harvard Business School Publishing. <https://www.canva.com/resources/creativity-for-business-growth-report/>
- Henriksen, D., Richardson, C., & Shack, K. (2020). Mindfulness and creativity: Implications for thinking and learning. *Thinking Skills and Creativity*, 37, Article 100689. <https://doi.org/10.1016/j.tsc.2020.100689>
- Herkert, J. (2021). Creativity: Option or necessity? *Truscribe*.
- Hobfoll, S. E., Halbesleben, J., Neveu, J. P., & Westman, M. (2018). Conservation of resources in the organisational context: The reality of resources and their consequences. *Annual Review of Organisational Psychology and Organisational Behaviour*, 5(1), 103–128.
- Hox, J. J. (2002). *Multilevel analysis: Techniques and applications*. Lawrence Erlbaum Associates.
- Hox, J. J., Moerbeek, M., & van de Schoot, R. (2017). *Multilevel analysis*. Routledge. <https://doi.org/10.4324/9781315650982>
- Huang, L., & Jia, Y. (2022). Innovation and development of cultural and creative industries based on big data for Industry 5.0. *Scientific Programming*, 2022, Article 2490033. <https://doi.org/10.1155/2022/2490033>
- Hülsheger, U. R., Alberts, H. J. E. M., Feinholdt, A., & Lang, J. W. B. (2013). Benefits of mindfulness at work: The role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, 98(2), 310–325. <https://doi.org/10.1037/a0031313>
- Hülsheger, U. R., Walkowiak, A., & Thommes, M. S. (2018). How can mindfulness be promoted? Workload and recovery experiences as antecedents of daily fluctuations in mindfulness. *Journal of Occupational and Organisational Psychology*, 91(2), 261–284. <https://doi.org/10.1111/joop.12206>
- Jones, P. (2019). Mindfulness training: Can it create superheroes? *Frontiers in Psychology*, 10, Article 613. <https://doi.org/10.3389/fpsyg.2019.00613>
- Kim, S., Lee, H., & Connerton, T. P. (2020). How psychological safety affects team performance: Mediating role of efficacy and learning behaviour. *Frontiers in Psychology*, 11, Article 1581. <https://doi.org/10.3389/fpsyg.2020.01581>
- Kline, R. B. (2016). *Principles and practice of structural equation modelling* (4th ed.). The Guilford Press.
- Lippelt, D. P., Hommel, B., & Colzato, L. S. (2014). Focused attention, open monitoring, and loving-kindness meditation: Effects on attention, conflict monitoring, and creativity—A review. *Frontiers in Psychology*, 5, Article 1083. <https://doi.org/10.3389/fpsyg.2014.01083>

- Liu, C., Wang, C., & Wang, H. (2021). How do leaders' positive emotions improve followers' person–job fit in China? The effects of organisational identification and psychological safety. *Leadership & Organisation Development Journal*, 42(2), 161–177. <https://doi.org/10.1108/LODJ-09-2019-0388>
- Mazmanian, M., Orlikowski, W. J., & Yates, J. (2013). The autonomy paradox: The implications of mobile devices for knowledge work. *Organization Science*, 24(5), 1337–1357. <https://doi.org/10.1287/orsc.1120.0806>
- Minkov, M., Dutt, P., Schachner, M., Morales, O., Sanchez, C., Jandosova, J., Khassenbekov, Y., & Muddassar, V. (2017). A revision of Hofstede's model of national culture: Old factors and new dynamics. *Cross Cultural & Strategic Management*, 24(3), 386–404. <https://doi.org/10.1108/CCSM-03-2017-0033>
- Ministry of Tourism and Creative Economy. (2024). *Creative economy statistics 2024*. <https://pustaka.kemenparekraf.go.id/>
- Montani, F., Vandenberghe, C., Khedhaouria, A., & Courcy, F. (2020). Examining the inverted U-shaped relationship between workload and innovative work behaviour: The role of work engagement and mindfulness. *Human Relations*, 73(1), 59–93.
- Ni, Y. L., Kuo, C. C., Wu, C. H., Chang, W. H., & Chen, L. H. (2022). How can we cope with self-control demands and enhance proactive vitality management? The role of leisure crafting and supervisor recreational sports support. *Journal of Happiness Studies*, 23(8), 3961–3980. <https://doi.org/10.1007/s10902-022-00572-9>
- Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organisational research: An introduction and some practical recommendations. *Journal of Personnel Psychology*, 9(2), 79–93. <https://doi.org/10.1027/1866-5888/a000009>
- Op den Kamp, E. M., Tims, M., Bakker, A. B., & Demerouti, E. (2018). Proactive vitality management in the work context: Development and validation of a new instrument. *European Journal of Work and Organisational Psychology*, 27(4), 493–505. <https://doi.org/10.1080/1359432X.2018.1483915>
- Op den Kamp, E. M., Tims, M., Bakker, A. B., & Demerouti, E. (2023). Creating a creative state of mind: Promoting creativity through proactive vitality management and mindfulness. *Applied Psychology*, 72(2), 743–768. <https://doi.org/10.1111/apps.12399>
- Parker, S. K., Bindl, U. K., & Strauss, K. (2010). Making things happen: A model of proactive motivation. *Journal of Management*, 36(4), 827–856. <https://doi.org/10.1177/0149206310363732>
- Pearsall, M. J., & Ellis, A. P. J. (2011). Thick as thieves: The effects of ethical orientation and psychological safety on unethical team behaviour. *Journal of Applied Psychology*, 96(2), 401–411. <https://doi.org/10.1037/a0021503>
- Pierce, J. R., & Aguinis, H. (2013). The too-much-of-a-good-thing effect in management. *Journal of Management*, 39(2), 313–338. <https://doi.org/10.1177/0149206311410060>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioural research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Sonnentag, S., & Niessen, C. (2020). To detach or not to detach? Two experimental studies on the affective consequences of detaching from work during non-work time. *Frontiers in Psychology*, 11, Article 560156. <https://doi.org/10.3389/fpsyg.2020.560156>

- Tisu, L., Virgă, D., & Mermeze, I. (2023). Autonomy and performance: Proactive vitality management and work engagement as sequential mediators of the relationship. *Psychological Reports*, 126(1), 411–433. <https://doi.org/10.1177/00332941211048470>
- Trougakos, J. P., & Hideg, I. (2009). Momentary work recovery: The role of within-day work breaks. In S. Sonnentag, P. L. Perrewé, & D. C. Ganster (Eds.), *Current perspectives on job-stress recovery* (pp. 37–84). Emerald Group Publishing. [https://doi.org/10.1108/S1479-3555\(2009\)0000007005](https://doi.org/10.1108/S1479-3555(2009)0000007005)
- Unsworth, K. (2001). Unpacking creativity. *Academy of Management Review*, 26(2), 289–297. <https://doi.org/10.2307/259123>
- Zhang, Y., Qu, H., Walter, F., Liu, W., & Wang, M. (2023). A new perspective on time pressure and creativity: Distinguishing employees' radical versus incremental creativity. *Journal of Organisational Behaviour*, 44(9), 1400–1418. <https://doi.org/10.1002/job.2742>
- Zhou, J., & George, J. M. (2001). When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Academy of Management Journal*, 44(4), 682–696. <https://doi.org/10.5465/3069410>

Gen-Z Reaction towards Telemedicine: Measurement on Self-efficacy as Psychological Quantitative Mediator

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ABSTRACT

Telemedicine has consistently reported low adoption among Malaysian citizens, especially among University Gen-Z. Therefore, this study aims to investigate telemedicine adoption among Malaysian Gen Z consumers and how self-efficacy mediates the relationship between consumer perceptions. A questionnaire was distributed to 408 Malaysian University Gen Z respondents aged 18 and above living in the Kuala Lumpur urban area via face-to-face survey. After data screening for straight lining and incomplete responses, 395 valid cases were retained for analysis. Smart PLS was then employed to examine the direct association between the variables, including the mediator. The results showed that performance expectancy and trust have no direct relationship with telemedicine adoption among Gen-Z; however, when self-efficacy was used as a mediator, it showed a positive mediating effect on all tested independent variables and telemedicine adoption. The telemedicine framework in this study may offer a deeper understanding of the issues faced in telemedicine adoption

in Malaysian urban areas. This study concludes that the psychological bridge that self-efficacy posits has a positive effect on the adoption of telemedicine among urbanites. In addition, the right mechanisms are provided to healthcare providers and policymakers to enhance future adoption of telemedicine.

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INTRODUCTION

The issues of an ageing population and healthcare accessibility have placed a strain on the current healthcare system worldwide (Tan et al., 2024). A report by the World Health Organisation highlighted that global healthcare spending has doubled over the past two decades, reaching USD 9 trillion and 10.8% of GDP in 2020 (an increase from 8.5% in 2000). Looking at the Malaysian ageing population as reported by the Department of Statistics Malaysia, it is expected that by 2023, the number will exceed by 15% from the total population, making the use of telemedicine in Malaysia's healthcare system crucial (Lawrence et al., 2022). This trend will create a significant burden on the Malaysian healthcare system in the long run (Tan et al., 2024). Therefore, the introduction to the telemedicine concept is considered critical in bridging the gap. According to Thabet et al. (2024), telemedicine is the delivery of health care services in which distance is the critical factor. Despite the quick growth in telemedicine research, the field remains underexplored, creating gaps in adoption rates (Lei et al., 2025). Added that the healthcare workforce faces critical shortages, exacerbated by "brain drain," issues faced with approximately 20% of trained healthcare professionals migrating annually to other countries, had further strained the system's capacity (Ibrahim & Kunjuraman, 2025). In today's age, the global telemedicine market has demonstrated substantial growth potential with the digital medicine showing great improvement

in health screening by addressing global problems (e.g., which include screening diseases, diabetes, epidemics, ageing, mental illness, and addictions (Vidal-Silva et al., 2024). Researchers have highlighted a trend in telemedicine adoption among Gen X compared to Gen Z, leaving a significant gap in understanding the mechanisms underlying adoption among younger consumers (Jawad et al., 2023). According to Slepian et al. (2024), Gen Z is defined as those born between 1997 and 2012, representing a critical demographic for sustainable telemedicine implementation due to their digital nativity and future healthcare consumption patterns. If this is not tapped now, it is believed that the future healthcare system in Malaysia will be further strained and downgraded. Despite the performance expectancy, which has long been discussed as a factor affecting telemedicine adoption, self-efficacy is seldom seen as an important psychological factor that would further enhance the telemedicine adoption among Gen Z consumers (Yin et al., 2024). Moreover, confidence in addressing technological and service quality factors in healthcare services to enhance telemedicine adoption rates was often left out. For example, building consumer confidence among University Gen Z consumers should be seen as a crucial factor in the adoption rate of telemedicine in urban areas. This is because a simple psychological change can lead to greater adoption of the telemedicine concept, which could further improve overall healthcare

operations in Malaysia (Jawad et al., 2023). A study done by Loo et al. (2023) has enhanced the understanding of the telemedicine concept. They have defined it as a complex behavioural phenomenon which is influenced by several factors. This includes technological, individual, and contextual factors. The current scenario of Malaysian telemedicine adoption shows varying patterns across demographic groups. A greater openness to adopt digital health solutions is shown by a younger group. The remaining are still influenced by perceptions of the system itself (Jawad et al., 2023; Tan et al., 2024). The initiatives by Malaysian towards telemedicine development can be clearly seen through several initiatives. This includes the Telemedicine Blueprint and the Malaysia Digital Health Blueprint (Yin et al., 2024). Despite the government's efforts to foster greater telemedicine services, the implementation remains hampered. There are several factors associated, including regulatory barriers, technological limitations, and varying levels of consumer adoption (Bouziane et al., 2022). Apart from that, factors like price value were also further discussed as a salient factor affecting the adoption of telemedicine (Amin et al., 2022). The construction reflects consumers' assessment of whether the benefits derived from telemedicine services justify the associated costs, including direct fees, time investments, and opportunity costs. Apart from that, the trust elements in telemedicine, which encompass multiple dimensions, including

trust in healthcare providers, technology platforms, and data security measures, were also discussed as an influential factor in the telemedicine adoption (Malati et al., 2024). According to Yin et al. (2024), due to the scarcity of studies that have focussed on the phenomenon of how Malaysian consumer behaviour, especially among the Gen Z in Malaysian universities, reacts towards the telemedicine adoption, with the mediating factor of self-efficacy, there is an urgent need to study these issues to further understand the effect of the psychological perspectives. In addition, the recent study on the adoption of telemedicine was carried out among the old citizens (Jawad et al., 2023), leaving the gaps on understanding the Gen Z behaviour where their digital nativity is receptive to telemedicine but also demanding of seamless, secure and user-friendly experience, has created both opportunities and barriers for adoption (Bouziane et al., 2022). Synthesising across these streams, three primary gaps emerge. First, no published study has simultaneously examined all four consumer perception constructs (PE, PV, PR, and Trust) with self-efficacy as a mediator in the Malaysian telemedicine context. Second, Gen Z's digital nativity fundamentally alters the theoretical predictions derived from older adult or mixed-age samples. Third, the mediation mechanism linking perceptions to adoption remains underspecified in the Malaysian literature. The present study addresses all three gaps within a unified DOI-SCT framework.

LITERATURE REVIEW

Theoretical Framework

The key frameworks that enhance understanding of adoption and the relationship between performance expectancy, price value, trust, perceived risks, and self-efficacy are Diffusion of Innovation (DOI) theory and Social Cognitive Theory (SCT).

Diffusion of Innovation (DOI)

According to the DOI theory, developed by Rogers (1962), people are grouped into five categories, namely, innovators, early adopters, early majority, late majority and laggards. Rogers (2003), further developed the theory that explains how innovations spread through social systems, identifying five key attributes that influence adoption and highlighting the elements of relative advantage, compatibility, complexity, trialability, and observability most likely to affect adoption.

This paradigm underscores the need to address the adoption movement, especially when the theory seeks to explain how and why it can be sustained over a long period. One of the key aspects of the theory's adoption was its use in the public health area to encourage the population to adopt new or healthy behaviours.

Social Cognitive Theory

SCT, developed by Bandura (1986), explains human behaviour through the interaction of personal, behavioural, and environmental factors. A central discussion

on the predictor, as discussed by Bandura (1997) in social cognitive theory, is self-efficacy, which has consistently emerged as a significant predictor of health behaviour adoption. Therefore, integrating SCT and DOI in this study would prepare a universal understanding of the adoption mechanism by addressing both innovation characteristics and individual behavioural factors.

In addition, the theoretical integration in this study poses several advantages over traditional technology acceptance models. Although it is widely known that TAM and UTAUT2 provide a robust framework for technology adoption (Harris et al., 2025), both models still lack emphasis on the innovation life cycle and psychological readiness. Thus, by integrating the DOI and SCT, these gaps are addressed by combining innovation-diffusion attributes like trialability and observability with behavioural constructs. Factors like self-efficacy were believed to offer a more holistic explanation of Gen Z's adoption behaviour.

Telemedicine Adoption in the Malaysian Context

Adoption trends of Telemedicine in Malaysia differ greatly among demographic groups, with younger users showing a greater openness to digital health solutions while still being impacted by factors such as confidence in digital engagement, cost considerations, perceptions of system utility, and data security concerns (Jawad et al., 2023; Tan et al., 2024).

Through programmes like the Malaysia Digital Health Blueprint in 2021 (Malaysia Healthcare Travel Council, 2021) and Telemedicine Blueprint, which started in 1997, had shown some efforts to improve the digital health strategies accessibility of digital service efficiency by the Malaysian government (Ministry of Health, 1997). This is merely a reflection of the commitment to the development of telemedicine in Malaysia (Wahab et al., 2023). However, differing degrees of consumer adoption, technological constraints, and regulatory impediments have made implementation of telemedicine difficult (Bouziane et al., 2022). To better forecast adoption behaviour, recent empirical research has started to concentrate on combining behavioural characteristics with classic innovation theory. In addition, Yin et al. (2024) discussed the issues. They had focussed on several factors that may affect telemedicine adoption. In conclusion, they found that one of the strongest factors contributing to telemedicine adoption is performance expectancy.

Performance Expectancy and Telemedicine Adoption

Performance expectancy is considered a key element in shaping the adoption in each context (Alam et al., 2020). Generally, the definition agrees with what an individual believes that using a specific technology will improve their performance (Suzuki et al., 2020). In conclusion, this construct has emerged as a constant predictor of telemedicine adoption across diverse cultural contexts. In a normal healthcare setting,

this construct is based on the beliefs about improved health outcomes. In addition, it also provides access to care and more efficient well-being management (Bouziane et al., 2022). The conclusion established that greater performance expectancy will improve the adoption of telemedicine. Thus, in turn, it affects the country's improved healthcare system. A study conducted by Kaium et al. (2024) stated that performance expectancy demonstrated a significant positive relationship with adoption intentions. This empirical study provides support for the significance of performance expectancy in telemedicine adoption among consumers abroad. Another study by Diet et al. (2023) also found the similarity in their findings, where a set of physicians were interviewed and gave their agreement on the performance expectancy and the adoption of telemedicine possesses a strong correlation. Thus, this study assumes the following:

H1: The adoption of telemedicine among Malaysian Gen Z consumers is influenced by performance expectancy

Price Value and Telemedicine Adoption

According to Vidal-Silva et al. (2024), price value is the cognitive trade-off between the monetary costs of utilising a technology and its perceived benefits. In healthcare contexts where cost considerations significantly influence consumer decisions or adoption of new methods, price value becomes particularly salient for adoption behaviour (Amin et al., 2022). The construct reflects

consumers' assessment of the telemedicine services they used. The justification was associated with costs, including direct fees, time investments, and opportunity costs.

While Vidal-Silva et al. (2024) support a positive price value–adoption relationship, Brahmayudha & Legowo (2024) find no such effect in the Indonesian context. This empirical inconsistency underscores the need to examine whether price sensitivity manifests differently among a Gen Z cohort with distinct cost structures and consumption expectations. Given the debate over the price value, this study considers this factor to further examine the relevance of the construct in the Malaysian context. Thus, the following hypothesis was proposed:

H2: The adoption of telemedicine among Malaysian Gen Z consumers is influenced by price value

Perceived Risk and Telemedicine Adoption

Perceived risk has always been discussed as affecting the uncertainty and adoption of telemedicine (Klaver et al., 2021). Perceived risks in healthcare settings include privacy risks (data security issues), technology risks (system reliability issues), and performance risks (concerns about the efficacy of services) (Cocosila & Turel, 2022). Empirical studies consistently show that perceived risk negatively affects the uptake of telemedicine. Bakshi and Tandon (2021) found that perceived risk had a significantly reduced adoption rate. In addition, the study also revealed that

higher levels of risk perception among participants had consistently shown reduced telemedicine adoption. Wu and Ho (2024) also examined several risk factors. This includes risks to one's health and privacy as barriers to telemedicine adoption. They found that individuals with lower levels of education are more likely to reject telemedicine services. Hence, the following hypothesis was anticipated:

H3: The adoption of telemedicine among Malaysian Gen Z consumers is influenced by perceived risks

Trust and Telemedicine Adoption

The concept of trust in the context of telemedicine often encompasses multiple dimensions. This includes trust in healthcare providers, technology platforms, and data security measures (Harris et al., 1995; Malati et al., 2024). Trust is also defined as the readiness to be vulnerable. This includes several expectations regarding service provision. In healthcare, vulnerability is evident when medical information and service failure are projected. Past research has highlighted that the element of trust always plays a critical role in influencing telemedicine adoption (Kuen et al, 2023). This was further supported by a study conducted in Indonesia by Alviani et al. (2023), who investigated telemedicine adoption and trust factors and found a positive association between telemedicine service adoption. Their study clearly showed that individuals with strong faith in the reliability of healthcare services are more

likely to adopt telemedicine services. This was further supported by a recent study by Ekaimi et al. (2024), which highlighted a positive relationship between the teleconsultation adoption and the effect of trust on adoption behaviour. The research emphasised that patients who express greater trust in the telemedicine system are more likely to use it because they believe it maintains confidentiality, even in remote delivery contexts. Trust dimension is critical to telemedicine implementation, and supported by Kuen et al. (2023), who had demonstrated that trust in the technology and healthcare providers positively influenced adoption decisions. Therefore, the following hypothesis was proposed:

H4: The adoption of telemedicine among Malaysian Gen Z consumers is influenced by trust

Testing the Self-efficacy as a Mediating Effect in Telemedicine Adoption

In this study, testing self-efficacy as a key mediating factor (Baron & Kenny, 1986) in the adoption of health technology is rooted in Social Cognitive Theory developed by Bandura (1997), who defined self-efficacy as the conviction that one can successfully carry out the actions necessary to achieve particular goals. Self-efficacy in telemedicine contexts refers to users' confidence in their ability to use digital health platforms effectively and efficiently (Liu et al., 2020). Confidence in this research aligns with Bandura's framework, which refers to an individual's belief in their

capability to execute tasks effectively, as it relates to navigating telemedicine platforms.

Self-efficacy was selected as a sole mediator due to its strong empirical support as a predictor of health technology adoption (Bandura, 1997; Wang et al., 2022). Constructs like perceived behaviour control overlap conceptually with self-efficacy, while health anxiety is a context-specific construct and thus is seen as less relevant for a digitally native Gen Z (Pramudita et al., 2023). The mediating role of self-efficacy is strongly supported by recent empirical research (Wang et al., 2022), which summarises the mediating effect of self-efficacy on the association between eHealth literacy and health-promoting behaviours among Chinese older adults living in the community. Zhao et al. (2024) highlighted the significance of eHealth literacy in educational settings by finding that among nursing students, perceived social support only led to higher eHealth literacy when mediated by self-efficacy. According to An et al. (2024), among older adults who suffer from technology anxiety, the adoption of digital public services was impacted by anxiety in an indirect way through self-efficacy, where a decrease in confidence brought on by anxiety led to a decreased intention to use technology. When Liu et al. (2023) found that adults with higher self-efficacy in using mobile apps were more satisfied with and preferred online health services over in-person visits, they demonstrated the clinical relevance of self-efficacy mediation. This result suggests that in healthcare settings, confidence has

a direct impact on behavioural preferences and adoption. Thus, this study hypothesises the following:

- H5: Self-efficacy mediates the relationship between performance expectancy and telemedicine adoption among Malaysian Gen Z consumers
- H6: Self-efficacy mediates the relationship between price value and telemedicine adoption among Malaysian Gen Z consumers
- H7: Self-efficacy mediates the relationship between trust and telemedicine adoption among Malaysian Gen Z consumers
- H8: Self-efficacy mediates the relationship between perceived risk and telemedicine adoption among Malaysian Gen Z consumers

Conceptual Framework

The discussion in the literature review section supports the association between all independent variables (Bakshi & Tandon, 2021; Cocosila & Turel, 2022; Wu & Ho,2024) tested in this study towards the dependent variable (Bouziane et al., 2022), including the mediating effect (Wang et al., 2022). However, in the Malaysian context, very few investigations have been conducted on the influence of all the variables mentioned on the adoption of telemedicine practice. It is important to note that individuals staying in different areas might respond differently to telemedicine adoption practices. Therefore, the psychological aspects of self-efficacy as a mediator, measuring the relationship between the stated factor that could possibly affect telemedicine adoption, are deemed important. The conceptual framework of the current study is presented in Figure 1.

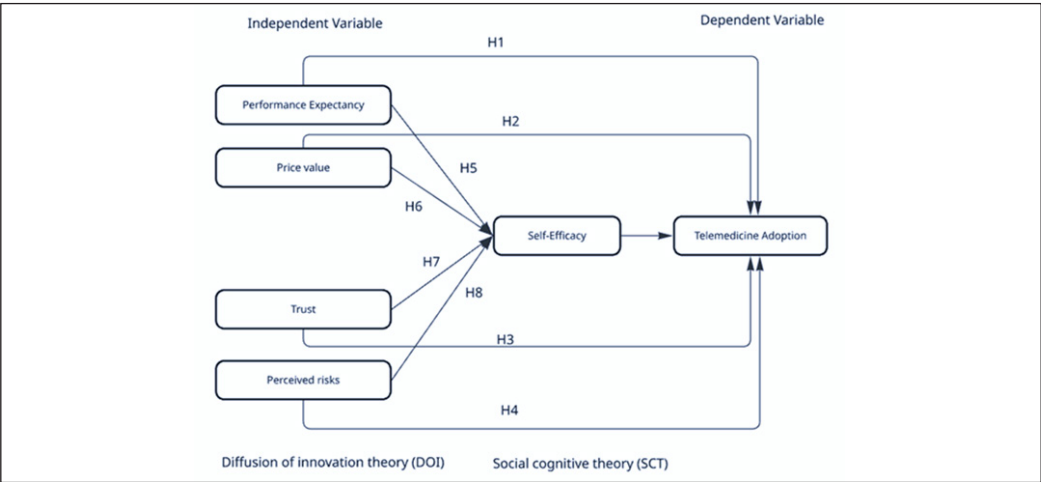


Figure 1. Research framework

METHODOLOGY

Research Design

A quantitative research design was used to facilitate the testing of the objective of the study in a systematic manner, thus elucidating the anticipated correlations among variables and measuring the mediating effect (Alviani et al., 2023). Quantitative study is deemed as most suitable for the current study because it can facilitate the collection of accurate data, and that could further enhance the representativeness of the population through the response received (Vidal-Silva et al., 2024). Therefore, the study adopts a similar approach to the quantitative method to measure its objective and test the hypotheses. The study was conducted among the 395 Klang Valley University students who live and study in Klang Valley, aged 18 years and above. Convenience sampling was chosen due to feasibility and cost constraints (Alam et al., 2020), targeting Gen Z in Malaysian urban universities where telemedicine exposure is higher. Stratified sampling was impractical given resource limitations in the current study context (Thabet, 2024). Given the study nature, targeting the sample, which consists of Malaysian university Gen Z consumers aged 18 and above residing and studying in urban areas, with or without prior telemedicine experience, allows for a more realistic exploration of their readiness and experience regarding the issue of investigating. While a formal external verification was beyond the scope of the current study design, the questionnaire did include a screener item regarding prior telemedicine experience.

The decision to sample from urban universities reflects the higher telemedicine exposure and digital infrastructure availability in the Klang Valley, but this necessarily limits the generalisability of findings to urban-dwelling, university-enrolled Gen Z individuals. The experiences of rural, vocationally trained, or economically disadvantaged Gen Z cohorts may differ substantially and warrant dedicated investigation. Based on the demographic information of the respondents reached in this study, the number of males was 258 (65.3%) compared to 137 females (34.7%). From the total respondents, 42.3% aged between 18 and 20 years old and above, 38.2% aged 21-23 years, 15.4% aged 24-26 years, and 4.1% aged 27-28 years. Most respondents were full-time students (67.3%), followed by part-time workers (15.4%) and self-employed (3.5%). The exclusion of responses with straight-lining patterns or insufficient data reduced possible bias but may have limited representativeness.

The sample for this study was surveyed using a face-to-face platform where the questionnaire was distributed through the university campus in public and private universities in the Kuala Lumpur area. This method allows data collection within a suitable time frame (Alam, 2020) for the study. To mitigate common method bias, questionnaire items were randomised, and anonymity was assured (Dang et al., 2025). Data collection for this study was completed in 3 months, which started in early April to June 2025 with 395 valid responses.

Although the sample size was determined using the Krejcie and Morgan table (Krejcie & Morgan, 1970), a post-hoc power analysis using G*Power confirmed that $n = 395$ achieves statistical power exceeding 0.99 ($f^2 = 0.15$, $\alpha = 0.05$, five predictors), satisfying requirements for robust structural model estimation. After data screening from 408 responses received, 395 responses were considered valid and proceeded to data analysis, as this exceeded the minimum value recommended by Krejcie & Morgan (1970) and met the PLS-SEM requirements for complex models (Hair et al., 2021). Data screening involved the removal of 13 cases exhibiting straight-lining patterns (identical responses across all items) and incomplete questionnaires. No imputation was required as excluded cases represented <4% of the total dataset, below the 5% threshold that would necessitate formal missing data treatment (Hair et al., 2021).

An item for each construct was adapted from an established scale (Thabet, 2024; Vidal-Silva et al., 2024) and further modified to better align with the Malaysian cognitive context. Adaptation involved minor wording changes, after the expert review, which did not alter the conceptual meaning. Content validity was conducted and verified through five academics and a clinical psychologist, ensuring that construct validity was not compromised.

Beyond the expert review, back translation (Hair et al., 2021) was also employed to ensure semantic equivalence between the English and Bahasa Malaysia versions. Each construction used in this study was conceptualised in accordance with

the local context and the study population. A scale for measuring telemedicine adoption, developed by Thabet (2024), was adapted in this study.

Measurements

This study measures telemedicine adoption from behavioural intention rather than actual usage, as the survey measured respondents' willingness and confidence to adopt the telemedicine services. A total of 26 questions were used to evaluate telemedicine adoption in this study. A scale developed by Thabet (2024) was employed in this study. Five items were constructed under the performance expectancy to measure adoption, with participants scoring from 1 (i.e., "strongly disagree") to 5 (i.e., "strongly agree"). A Cronbach alpha value for the scale was above 0.8, indicating reliability. Another five items were constructed under the Perceived Risk (PR) with the same 1 to 5 scale, yielding a score of 0.80 for Cronbach's alpha, indicating reliability of the questionnaire. Measurement of Price Value (PV) in this study consisted of 3 items, of which 1 item was dropped due to a score below 0.7 (Hair et al., 2021). The item PV4 ("Using telemedicine saves me significant money compared to traditional healthcare") was dropped because its outer loading (0.58) fell below the accepted threshold of 0.70 (Hair et al., 2021). Conceptually, this item captured direct monetary savings, a dimension that may be less salient to Gen Z students who are often covered under parental or institutional healthcare plans. Removal of PV4 did not alter the

conceptual scope of Price Value, as the remaining three items adequately captured the trade-off between perceived benefits and indirect costs (time and convenience). The Cronbach's Alpha for overall perceived value exceeded 0.8. The items under Self-Efficacy (SE) comprise four items with a Cronbach's value of above 0.8 as well. Five items were then constructed under the Trust (T) elements to measure telemedicine adoption, and the Cronbach's alpha for these items is above the threshold. This indicates that a good reliability has been shown.

Ethical Considerations

Ethical measures were strictly followed during the data collection. All respondents were informed of their consent requirements before their involvement, confirming their understanding of the research objectives, their voluntary participation, and their right to withdraw at any time (Resnik, 2020). In addition, confidentiality was maintained by ensuring that anonymisation was secure throughout data collection. A brief introduction video was also distributed to all participants. This serves as the first stage of support to ease their participation throughout the survey.

Data Analyses

Normality was assessed using skewness and kurtosis in SPSS. The non-normality justified the use of Smart PLS-SEM version 4, which is seen as robust to distributional assumptions (Hair et al., 2016). In addition, using SmartPLS is deemed more suitable for measuring the

predictive-oriented research and theory development. This is mainly due to its primary strength in measuring a variance-based approach to research. On the other hand, AMOS and Mplus are primarily designed for theory confirmation using covariance-based SEM (Hair et al., 2025). Given the nature of the research, which focuses on predicting urban behaviour towards telemedicine adoption, Smart PLS was used.

RESULTS AND DISCUSSION

Reliability and Validity

The measurement model was first assessed for internal consistency reliability, convergent validity, and discriminant validity, following Hair's (2016) guidelines. This was done before the hypothesis was evaluated. In assessing construct reliability, both Cronbach's Alpha (CA) and Composite Reliability (CR) were calculated as shown in Table 1. Though Cronbach's Alpha values in this study exceeded 0.8, this indicates strong internal consistency among the variables measured rather than item redundancy. Factor loadings values had further (all > 0.75), and AVE (> 0.50) confirmed that each item contributed uniquely to its construction, mitigating concerns about multicollinearity. The measurement model in PLS-SEM, which serves as a confirmatory factor analysis, was used to evaluate dimensionality. Before structural testing, construct validity was verified using outer loadings, AVE, and discriminant validity (Fornell-Larcker and HTMT).

Table 1

Reliability and validity statistics for all constructs: Cronbach's Alpha, composite reliability, and Average Variance Extracted (AVE)

	Item	Cronbach's Alpha	Composite Reliability (rho a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Performance Expectancy	5	0.886	0.888	0.916	0.689
Perceived Risk	4	0.891	0.894	0.920	0.698
Perceived Value	3	0.839	0.841	0.903	0.756
Self Efficacy	4	0.832	0.840	0.888	0.665
Trust	5	0.882	0.885	0.914	0.681
Telemedicine Adoption	4	0.889	0.890	0.923	0.751

Coefficient of Determination, Effect Size, and Collinearity Statistics of Measurement

Table 2 and Figure 2 presents the discriminant validity assessed using the Fornell-Larcker criterion and the HTMT ratio. All HTMT values below 0.85 confirm that the constructions were distinct (Henseler et al., 2015).

Following is the R^2 (Telemedicine Adoption) value reported = 0.621; R^2 (Self-Efficacy) = 0.543, with an Adjusted R^2 (TA) = 0.617; moreover, the Adjusted R^2 (SE) had indicated a value of 0.538. Where as the f^2 values: PE→SE = 0.11 (small-medium); PR→SE = 0.09; PV→SE = 0.06; T→SE = 0.10; SE→TA = 0.38 (large). The Q^2 value (Stone-Geisser): TA = 0.451; SE = 0.347 (both >0, confirming predictive relevance). Whereas the VIF values for all constructs ranged from 1.82 to 2.71, well below the threshold of 5.0 (Hair et al., 2021), confirming no multicollinearity concern.

Structural Model

Smart PLS shown in Table 3 was used to test the results on hypothesis testing. Performance expectancy's lack of significance may be due to Gen Z's innate belief that digital technologies are helpful, which makes psychological preparedness a more important element. This is consistent with research indicating that confidence and perceived risk are more important to digital natives than performance factors. Rather than model misspecification, contextual circumstances are probably responsible for the negligible trust-adoption route in this study. The apparent requirement for more trust in telemedicine platforms may be diminished by Malaysia's well-established healthcare credibility.

Mediation Effects

In accordance with Hair et al. (2021), mediation effects were evaluated using bootstrapping with 5,000 resamples and 95% confidence intervals.

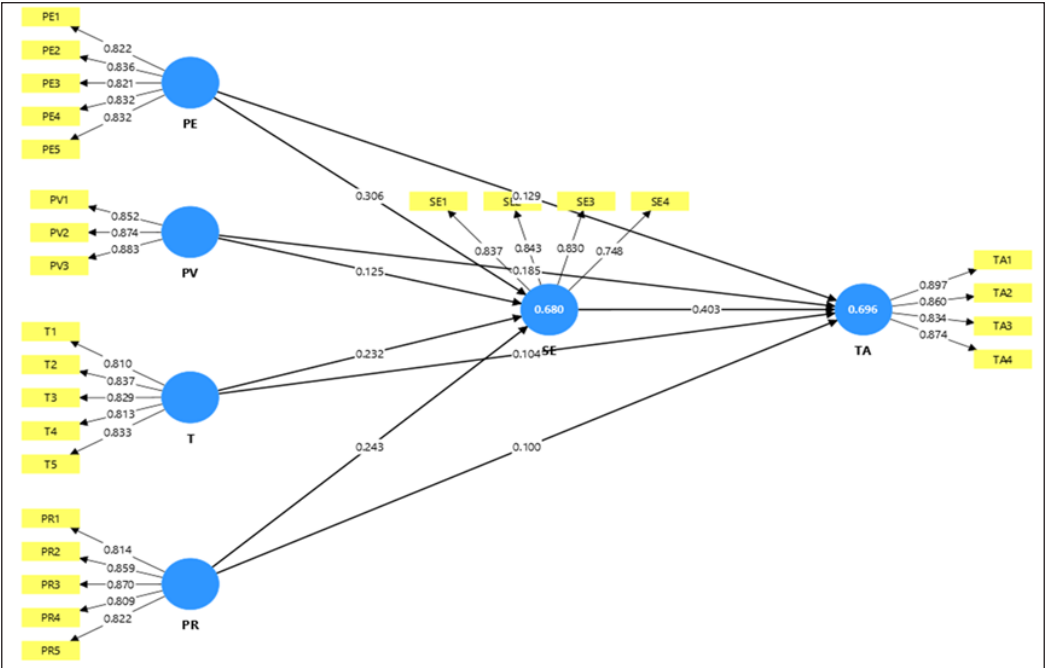


Figure 2. Measurement model (outer loadings)

Table 2
Discriminant validity using the Fornell-Larcker criterion

	PE	PR	PV	SE	T	TA
Performance Expectancy	0.829					
Perceived Risk	0.741	0.835				
Perceived Value	0.792	0.724	0.87			
Self-Efficacy	0.772	0.731	0.728	0.815		
Trust	0.809	0.738	0.8	0.758	0.825	
Telemedicine Adoption	0.745	0.7	0.736	0.789	0.735	0.866

Table 3
Hypothesis testing result for a direct relationship between the independent variable towards the telemedicine adoption

	Path Coefficient (β)	Standard Deviation	T statistics	P Values	Decision
(H1) PE -> TA	0.129	0.084	1.540	0.062	Unsupported
(H2) PV -> TA	0.100	0.058	1.716	0.043	Supported
(H3) PR -> TA	0.185	0.063	2.944	0.002	Supported
(H4) T -> TA	0.104	0.070	1.476	0.070	Unsupported

The Smart PLS shown in Table 4 was used to test all H5-H8, which showed a positive result. Despite the small size of some β values, their statistical significance indicates minor but significant impacts. In practical terms, this means that price-value and risk-reduction-focused interventions can still result in quantifiable increases in adoption.

The research results show small mediation effects in β values for H7 (PV $\rightarrow$ SE $\rightarrow$ TA; $\beta = 0.050$) and H6 (PR $\rightarrow$ SE $\rightarrow$ TA; $\beta = 0.098$), which are modest in magnitude. Even modest indirect effects have practical significance when designing targeted adoption interventions.

DISCUSSION

Overall, the study's findings show that most of the hypotheses tested were supported (Bakshi & Tandon,2021; Hidayah et al., 2024; Loo et al., 2023; Pramudita et al., 2023), except for a direct test of the relationship between Performance Expectancy and Trust towards the Telemedicine Adoption scenario in Malaysia. The non-significant direct effect of performance expectancy

(H1) carries a meaningful implication that extends beyond the statistical result. For Gen Z, a cohort that has grown up with smartphones, social media, and on-demand digital services, the utility of technology is a baseline assumption rather than a differentiating factor. This implies that while Malaysia’s current trusted healthcare system may reduce perceived need for trust in telemedicine platforms, it explains the non-significant direct effect of trust found in this study. However, this finding also indicates that a digital trust remains critical for data security and platform reliability.

Contrary to the results reported in the current study, few early scholars have found that the elements of trust are an important factor in the adoption of telemedicine (Alviani et al., 2023; Ekaimi et al., 2024; Kuen et al., 2023). The findings from the current study have produced a new, remarkable outcome compared with the trust-based conventional wisdom from the previous study. While prior literature consistently supports performance expectancy as an adoption driver (Alam et al., 2020; Yin et al., 2024), the present findings suggest that this relationship does

Table 4
Hypothesis-testing result for the mediating effect of the independent variable towards telemedicine adoption

	Path Coefficient (β)	Standard Deviation	T Statistics	P Values	Decision
(H5) PE -> SE -> TA	0.123	0.041	3.015	0.001	Supported
(H6) PR -> SE -> TA	0.098	0.036	2.685	0.004	Supported
(H7) PV -> SE -> TA	0.050	0.030	1.673	0.047	Supported
(H8) T -> SE -> TA	0.093	0.034	2.749	0.003	Supported

not hold for a cohort that already assumes digital utility by default. This is not a refutation of prior evidence but a boundary condition finding. This is very consistent with the empirical research done by Garavand et al. (2024), who had stated that their likelihood of adopting telemedicine may rely more heavily on confidence in their own ability to use it, which is measured through the psychological aspect known as Self-Efficacy, which, true enough, shows influence on telemedicine adoption behaviour in urban Malaysia. This study provides a deeper analysis of the role of price in supporting the evidence from Cocosila & Turel, 2022, Klaver et al., 2021, Bakshi and Tandon, 2021, Vidal-Silva et al., 2024, and Brahmayudha and Legowo (2024) in the conclusion of the role of price value and perceived risk in influencing the higher or lower adoption of telemedicine services. Even modest indirect effects have practical significance when designing targeted adoption interventions.

The study concludes that the context of Malaysian urban-area Gen Z consumers can be explained by the element of self-efficacy. These elements were seen as further mediating the relationships among all the constructs tested and adoption. The result shows that the foundation of telemedicine adoption lies in confidence in the health care system operation (Harris et al., 2025). Liu et al. (2022), on the other hand, further showed that self-belief influenced younger consumers' acceptance of digital health services.

CONCLUSION

Major findings from the research offer valuable guidance to multiple stakeholder groups involved in telemedicine implementation and governance. This is especially true regarding the influential factors influencing telemedicine adoption. For healthcare providers, the findings emphasised the importance of comprehensive adoption strategies that address both technological capabilities and users' psychological readiness before telemedicine adoption.

Theoretical Implications

The study found no substantial evidence on performance expectancy and trust in the adoption of telemedicine in the Malaysian context. This startling conclusion may be due to Gen Z's current behaviour towards established digitalisation practices in the Malaysian health care system. Future studies should explore additional behavioural theory. It should include factors like social cognitive factors, habit formation, and emotional responses to promote broader adoption among urban consumers.

Theoretically, testing the mediating role of self-efficacy across diverse perception-adoption relationships among Gen Z suggests the new potential to investigate the mediating role of self-efficacy in other health technology contexts, such as mobile health applications, wearable devices, or electronic health records. Such investigations could help develop general principles for the implementation of health technologies.

Limitations of the Study and Recommendations for Future Research

The current study did not explicitly report on cultural or religious attitudes towards digital health consultations or telemedicine services, which may influence adoption among Malaysia's diverse population. Other than that, the multigroup analysis (MGA) for gender or income was not conducted in the current study, which limits insights into potential moderating effects. Future studies should apply measurement invariance testing followed by MGA using SmartPLS or AMOS to examine whether the self-efficacy mediation pathways differ significantly by gender, income bracket, or prior telemedicine experience, which would substantially refine the prescriptive model for targeted policy interventions. Healthcare providers and digital health platform developers should design self-efficacy-enhancing onboarding experiences calibrated to Gen Z's media consumption norms. Apart from that, digital literacy might also moderate or mediate the effect of self-efficacy on adoption, which future studies need to incorporate to refine the predictive telemedicine adoption model. Including the qualitative method could also be utilised in future to uncover nuanced psychological barriers, complementing the quantitative findings and enhancing model depth. The predictive model should be extended to rural and low-income populations as well, where technological readiness and access differ significantly.

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REFERENCES

- Alam, M. Z., Hu, W., Hoque, M. R., & Kaium, M. A. (2020). Adoption intention and usage behaviour of mHealth services in Bangladesh and China. *International Journal of Pharmaceutical and Healthcare Marketing*, 14(1), 37-60. <https://doi.org/10.1108/ijphm-03-2019-0023>
- Alviani, R., Purwandari, B., Eitiveni, I., & Purwaningsih, M. (2023). Factors affecting adoption of telemedicine for virtual healthcare services in Indonesia. *Journal of Information Systems Engineering and Business Intelligence*, 9(1), 47-69. <https://doi.org/10.20473/jisebi.9.1.47-69>
- Amin, R., Hossain, M. A., Uddin, M. M., Jony, M. T. I., & Kim, M. (2022). Stimuli influencing engagement, satisfaction, and intention to use telemedicine services: An integrative model. *Healthcare*, 10(7), Article 1327. <https://doi.org/10.3390/healthcare10071327>
- An, J., Zhu, X., Wan, K., Xiang, Z., Shi, Z., & Huang, W. (2024). Older adults' self-perception, technology anxiety, and intention to use digital public services. *BMC Public Health*, 24(1), Article 3533. <https://doi.org/10.1186/s12889-024-21088-2>
- Bakshi, S., & Tandon, U. (2021). Understanding barriers of telemedicine adoption: A study in North India. *Systems Research and Behavioural Science*, 39(1), 128-142. <https://doi.org/10.1002/sres.2774>
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman and Company.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Bouziane, F., Laallam, A., & Hassan, A. (2022). Technology application in medical tourism in Malaysia. In A. Hassan (Ed.), *Handbook of technology application in tourism in Asia* (pp. 669–680). Springer. https://doi.org/10.1007/978-981-16-2210-6_31
- Brahmayudha, R. A., & Legowo, N. (2024). Examining the drivers of sustained telemedicine utilisation in Indonesia: An extended UTAUT perspective. *Journal of Logistics, Informatics, and Service Science*, 11(10), 135–152. <https://doi.org/10.33168/JLISS.2024.1008>
- Chin, A. G., Harris, M. A., & Brookshire, R. (2022). An empirical investigation of intent to adopt mobile payment systems using a trust-based extended valence framework. *Information Systems Frontiers*, 24(1), 329–347. <https://doi.org/10.1007/s10796-020-10080-x>
- Cocosila, M., & Turel, O. (2022). Consumer risk perceptions in mobile health services adoption: Do they matter? *E-Health Telecommunication Systems and Networks*, 11, 67–84. <https://doi.org/10.4236/etsn.2022.1120>
- Dang, S., Quach, S., & Roberts, R. E. (2025). How time fuels AI device adoption: A contextual model enriched by machine learning. *Technological Forecasting and Social Change*, 212, Article 123975. <https://doi.org/10.1016/j.techfore.2025.123975>
- Diel, S., Doctor, E., Reith, R., Buck, C., & Eymann, T. (2023). Examining supporting and constraining factors of physicians' acceptance of telemedical online consultations: A survey study. *Research Square*. <https://doi.org/10.21203/rs.3.rs-3129155/v1>
- Ekaimi, S., Utomo, P., Gunawan, D., Jimmy, S. Y., & Christian, M. (2024). Examining the factors influencing teleconsultation adoption during the pandemic using the TAM model. *Global Business & Finance Review*, 29(3), 149–160. <https://doi.org/10.17549/gbfr.2024.29.3.149>
- Garavand, A., Aslani, N., Nadri, H., Abedini, S., & Dehghan, S. (2022). Acceptance of telemedicine technology among physicians: A systematic review. *Informatics in Medicine Unlocked*, 30, Article 100943. <https://doi.org/10.1016/j.imu.2022.100943>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modelling (PLS-SEM)* (3rd ed.). Sage Publications.
- Hair, J. F., Babin, B. J., Ringle, C. M., Sarstedt, M., & Moisesescu, O. I. (2025). Covariance-based structural equation modelling (CB-SEM): A SmartPLS 4 software tutorial. *Journal of Marketing Analytics*, 13, 709–724. <https://doi.org/10.1057/s41270-025-00414-6>
- Harris, M. A., Chin, A. G., Smith, J. W., & Baxi, C. (2025). A trust-based theoretical model to determine adoption of telemedicine services. *Journal of Computer Information Systems*, 1–15. <https://doi.org/10.1080/08874417.2025.2551576>
- Hidayah, N., Utami, M., & Rizki, I. (2024). Behavioural intentions of Gen Z and millennial users of telemedicine: A UTAUT 2 analysis from the Halodoc user perspective. *Journal of Information Systems and Informatics*, 6(3), 1373–1399. <https://doi.org/10.51519/journalisi.v6i3.786>
- Ibrahim, N. I., & Kunjuraman, V. (2025, January 19). Health system sustainability in Malaysia: Mitigating the brain drain phenomenon. *Malay Mail*. <https://www.malaymail.com/news/>

- what-you-think/2025/01/19/health-system-sustainability-in-malaysia-mitigating-the-brain-drain-phenomenon-nurul-izyan-husna-ibrahim-and-velan-kunjuraman/163777
- Jawad, H. H. M., Hassan, Z. B., & Zaidan, B. B. (2023). Factors influencing the behavioural intention of patients with chronic diseases to adopt IoT-healthcare services in Malaysia. *Journal of Hunan University Natural Sciences*, 50(1), Article 27. <https://doi.org/10.55463/issn.1674-2974.50.1.4>
- Kaium, M. A., Zahan, I., Rahman, M. S., & Al Masud, A. (2024). Towards sustainably driven telemedicine: Understanding the determinants affecting elderly's behavioural intentions and usage behaviour. *Journal of Sustainability Research*, 6(4), Article e240067. <https://doi.org/10.20900/jsr20240067>
- Klaver, N. S., van de Klundert, J., van den Broek, R. J. G. M., & Askari, M. (2021). Relationship between perceived risks of using health applications and the intention to use them among older adults in the Netherlands: Cross-sectional study. *JMIR mHealth and uHealth*, 9(8), Article e26845. <https://doi.org/10.2196/26845>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610. <https://doi.org/10.1177/001316447003000308>
- Kuen, F. R., Lim, S. P., & Ong, K. J. (2023). Trust in telehealth technology and outcomes: A study on patient adoption of telemedicine. *Journal of Medical Internet Research*, 25(3), Article e26891. <https://doi.org/10.2196/26891>
- Lawrence, K., Nov, O., Mann, D., Mandal, S., Iturrate, E., & Wiesenfeld, B. (2022). The impact of telemedicine on physicians' after-hours electronic health record "work outside work" during the COVID-19 pandemic: Retrospective cohort study. *JMIR Medical Informatics*, 10(7), Article e34826. <https://doi.org/10.2196/34826>
- Lei, J., Li, D., Zhang, Y., & Zhao, Y. (2025). Analysing influencing factors of low-carbon technology adoption in hospital construction projects based on the TAM–TOE framework. *Buildings*, 15(15), Article 2703. <https://doi.org/10.3390/buildings15152703>
- Liu, Y., Lu, X., Zhao, G., Li, C., & Shi, J. (2022). Adoption of mobile health services using the unified theory of acceptance and use of technology model: Self-efficacy and privacy concerns. *Frontiers in Psychology*, 13, Article 877144. <https://doi.org/10.3389/fpsyg.2022.877144>
- Loo, J. S., Yow, H.-Y., Ten, Y. Y., Govindaraju, K., Zubairi, M. H. M. M., Oui, H. C., & Rahim, N. A. (2023). Exploring the rise of telehealth services in Malaysia: A retrospective study. *Digital Health*, 9. <https://doi.org/10.1177/20552076231216275>
- Malatji, K. J., Sonhera, N., & Zuva, T. (2025). A review of adoption of telemedicine. In *System design in software engineering* (pp. 300-311). Springer. https://doi.org/10.1007/978-3-031-94770-4_23
- Malaysia Healthcare Travel Council. (2021). *Malaysia healthcare travel industry blueprint 2021–2025*. <https://www.mhtc.org.my/malaysia-healthcare-travel-industry-blueprint/>
- Ministry of Health Malaysia. (1997). *Malaysia's telemedicine blueprint: Leading healthcare into the information age*. <https://moh.gov.my/moh/resources/autodownloadimages/5ca1b20928065.pdf>
- Pramudita, E., Achmadi, H., & Nurhaida, H. (2023). Determinants of behavioural intention toward telemedicine services among Indonesian Gen Z and millennials: A PLS–SEM study on Alodokter application. *Journal of Innovation and Entrepreneurship*, 12, Article 68. <https://doi.org/10.1186/s13731-023-00336-6>
- Resnik, D. B. (2020). What is ethics in research & why is it important? *National Institute of Environmental Health Sciences*. <https://www.>

- niehs.nih.gov/research/resources/bioethics/whatis/index.cfm
- Rogers, E. M. (1962). *Diffusion of innovations*. Free Press.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Slepian, R. C., Vincent, A. C., Patterson, H., & Furman, H. (2024). Social media, wearables, telemedicine and digital health: A Gen Y and Z perspective. In K. S. Ramos (Ed.), *Comprehensive toxicology* (4th ed., pp. 1-15). Elsevier. <https://doi.org/10.1016/B978-0-12-824010-6.00072-1>
- Suzuki, T., Hotta, J., Kuwabara, T., Yamashina, H., Ishikawa, T., Tani, Y., & Ogasawara, K. (2020). Possibility of introducing telemedicine services in Asian and African countries. *Health Policy and Technology*, 9(1), 11-16. <https://doi.org/10.1016/j.hlpt.2020.01.006>
- Tan, S. H., Wong, C. K., Yap, Y. Y., & Tan, S.-K. (2024). Factors influencing telemedicine adoption among physicians in the Malaysian healthcare system: A revisit. *Digital Health*, 10. <https://doi.org/10.1177/20552076241257050>
- Thabet, Z., Albashtawi, S., Ansari, H., Al-Emran, M., Al-Sharafi, M. A., & AlQudah, A. A. (2024). Exploring the factors affecting telemedicine adoption by integrating UTAUT2 and IS success model: A hybrid SEM-ANN approach. *IEEE Transactions on Engineering Management*, 71, 8938-8950. <https://doi.org/10.1109/TEM.2023.3271464>
- Vidal-Silva, C., Sánchez-Ortiz, A., Serrano-Malebrán, J., Arriagada, V., Flores, M., Godoy, M., & Vargas, C. (2024). Social influence, performance expectancy, and price value as determinants of telemedicine services acceptance in Chile. *Heliyon*, 10(5), Article e27067. <https://doi.org/10.1016/j.heliyon.2024.e27067>
- Wahab, S. N., Singh, J., & Subramaniam, N. (2023). Telemedicine implementation framework for Malaysia: An integrated SWOT-MCDM approach. *Health Policy and Technology*, 12(4), Article 100818. <https://doi.org/10.1016/j.hlpt.2023.100818>
- Wang, Y., Song, Y., Zhu, Y., Ji, H., & Wang, A. (2022). Association of eHealth literacy with health promotion behaviours of community-dwelling older people: The chain mediating role of self-efficacy and self-care ability. *International Journal of Environmental Research and Public Health*, 19(10), Article 6092. <https://doi.org/10.3390/ijerph19106092>
- Wu, T., & Ho, C. (2024). Reconstructing risk dimensions in telemedicine: Investigating technology adoption and barriers during the COVID-19 pandemic in Taiwan. *Journal of Medical Internet Research*, 27, Article e53306. <https://doi.org/10.2196/53306>
- Yin, M. H. S., Balakrishnan, R., Vasudevan, A., Ramachandran, S., Fan, H., & Rusuli, M. S. C. (2024). Factors influencing telehealth adoption among consumers in Malaysia. *Journal of Infrastructure, Policy and Development*, 8(13), Article 6114. <https://doi.org/10.24294/jipd6114>
- Zhao, Y., Huang, X., Deng, H., Wang, X., Xu, X., Li, M., & He, Q. (2024). The mediating effects of self-efficacy, family health, and perceived stress on the relationship between perceived social support and eHealth literacy in nursing students: A structural equation model. *BMC Nursing*, 23, Article 868. <https://doi.org/10.1186/s12912-024-02546-z>

Poetic Silence and Aesthetic Disruption in Clifton Gachagua's *Madman at Kilifi*

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ABSTRACT

This paper discusses how Clifton Gachagua's *Madman at Kilifi* employs poetic silence and fragmented form to represent psychological trauma in postcolonial Kenya. The collection defies conventional lyric coherence, accentuating minimalism, ellipsis, and syntactic rupture to represent the fractured interiority of its speaker. The disjointed structure and sparse language of Gachagua's work mirror the emotional disorientation and epistemic instability that mark postcolonial disillusionment, symptomatic of the emotional and intellectual dislocation of urban alienation, memory loss and unresolved personal and collective histories. Instead of representing trauma as a narratable event, the poems perform trauma as an ongoing state, as a condition that interrupts temporal continuity and emotional presence. This study draws on trauma theory and postcolonial aesthetics to argue that Gachagua's aesthetic disruption is both a means of resisting and a mode of representation. The silence in the poems is not merely the space, but a space of meaning, signifying the end of language on the cusp of internal and societal collapse. *Madman at Kilifi's* poetic minimalism constitutes a unique act of intervention in contemporary Kenyan poetry, foregrounding affective disintegration and epistemological uncertainty. Ultimately, the collection forces the reader to comprehend trauma not through exposition but through the rub of language and form's fragmentation.

Keywords: Aesthetic disruption, Clifton Gachagua, poetic silence, postcolonial Kenya, trauma

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INTRODUCTION

Kenya's post-independence history is a story of unfulfilled promise, upheaval and aspiration. The newly independent nation, heralded as a site of progress and democratic potential, emerged out of the violence of British colonialism

(Nasong'o, 2024). However, complete liberation did not follow upon independence in 1963; decades of authoritarian rule, political repression and uneven socio-economic development followed. Exclusionary politics were perpetuated by successive regimes, which created ethnic divisions and weaponised silence via censorship, detention and intimidation (Gohdes, 2024; Kisiangani, 2021). This history of political repression and enforced quietude through systemic silence produced a culture in which trauma was rarely articulated directly, instead sedimenting itself in fractured memory, affective withdrawal, and silences that continue to shape Kenyan expressive forms. The scope of this legacy propagates collective trauma, not only in the political sphere but also in the lived experience of ordinary Kenyans. However, this trauma is still embedded in memory, identity and language and, generally, arises in fragmented and evasive forms; not least in the country's evolving literary landscape. Contemporary Kenyan poetry has increasingly become a site where this unassimilated trauma is registered not through overt political narration, but through formal disruption, reticence, and affective opacity (Anake, 2024). The tensions are manifested in contemporary Kenyan poetry, which moves away from explicit political commentary toward more introspective, formally innovative utterances of pain and detachment. Clifton Gachagua's *Madman at Kilifi*, an arrestingly brave debut collection, represents one of the most striking illustrations of this trend:

it takes leave of conventional narrative forms in favour of ambiguity, fragmentation and silence. This study takes *Madman at Kilifi* as its primary text to examine how poetic silence, fragmentation, and minimalist form operate as aesthetic strategies for articulating psychological and historical trauma in postcolonial Kenya. The minimalism and erratic syntax in Gachagua's poems are accompanied by a persistent refusal to declare meaning outright (Adelokun, 2021). It is the poetic persona who is psychologically weighed down by the disillusionment of postcolonial history, emotionally numbed, withdrawn, and linguistically constrained. Gachagua resists the grand narrative of progress in the new Kenya by fragmenting that concept and exposing the fractured interiority of the postcolonial subject through these formal and affective strategies (Ifowodo, 2010). This article argues that trauma in *Madman at Kilifi* is not narrated as recoverable content but performed through poetic form. Gachagua's silences, syntactic fractures, and refusal of narrative coherence enact trauma as an ongoing condition rather than a concluded event, positioning aesthetic disruption as both a mode of representation and a form of resistance.

Rather than offering an extended theoretical exposition at the outset, this study foregrounds form as the primary site through which trauma becomes legible in Gachagua's poetry. This disjointed form and sparse diction are not accidental stylistic orientations. It is closely connected with the representation of the unnamed

psychological trauma, which, as today's trauma theorists maintain, is inherently incoherent. Dalglish and Brewin (2007) argue that trauma hardly ever occurs as a single, closed event, but instead comes belatedly in broken-up, involuntary recollections. Trauma disrupts the cognitive and linguistic faculties necessary for linear storytelling, leading to fractured narratives that destabilise form (Jena & Samantray, 2021). Formal construction enacts this disruption in Gachagua's poetry. Instead of explaining trauma, the collection's refusal of narrative progression, its erratic voice shifts, and its fractured imagery reproduce it in the very structure of the poems (Osimen et al, 2025). Aesthetic decisions of such kind thus locate *Madman at Kilifi* within the broader coordinates of postcolonial poetics. Almost by definition, silence is imposed upon many postcolonial contexts, particularly where state violence and cultural erasure have been endemic; nevertheless, it is also a strategic choice. Amateshe (1979) points out that, in the Kenyan literary tradition, poets used literature to openly divide power and side with what was socially correct. Gachagua's retreat to poetic silence trenches the generational and stylistic division. He does not engage in direct protest; his mode of protest is an affective refusal: to provide clarity, to bring closure, or even to be coherent (Nyongesa, 2024).

However, silence and fragmented installation pervade Gachagua's work, thereby bringing into focus the epistemological crisis, or the question of alternative knowledge, that lies at the heart

of postcolonial experience. According to Gruber (2024), postcolonial experience is characterised by a fractured temporality, in which historical trauma persists unresolved, and the present becomes a prolonged suspension. This temporal disturbance is reflected in Gachagua's poetry. His poems hover in a class of uprooted time and place. They frequently induce feelings of numbness, amnesia, or disembodiment, which seem to imply that the speaker's person is confined within a psychic sphere created by unassimilated history and stagnant emotion. The sparse, opaque language amplifies the atmosphere of suspension, reflecting the experience of living under the weight of collective silence and unacknowledged trauma. One of the features of Gachagua's poetic style is that he does not need narrative logic to make a point. The poems are not plot-driven, nor do they advance an argument; instead, they develop organically through associative imagery and distorted minds. However, instead, they play on the reader's expectations, yet to achieve this, they (the readers) overpower narrative cognition by demanding a different mode of engagement, a different way of working with the text, a way that prioritises affect over appreciation, sensation over meaning. It takes the reader beneath it as an experience rather than leading them through what the poet experienced. This recreation of disorientation is in effect a recreation of someone infested with trauma and of someone living in a world that works in no recognisable way, in a world where there is no air for breath, there is no time, and the

only socially occulted trauma is the tyranny. However, Gachagua's unwillingness to actually speak about his pain may read like a comment on the lack of capacity in Kenyan society to respond to pain.

Madman at Kilifi is thus a representational and critical poem. Symbolic of the speaker's emotional fragmentation is the situation itself, which the speaker does not hesitate to critique, as well as the cultural and political systems that led to this fragmentation. The work of Gachagua is so necessary in a country that is wrestling with the long shadow of colonialism, betrayal of the ideals of independence, and is underpinned by state-sanctioned ethnic violence and repression. His silence, expressed through poetic utterance, must not be mistaken for either indifference or detachment. However, it reminds us that there are things that do not find expression in words, things that create scars that last for a while. Furthermore, the study explores how Gachagua's minimalist aesthetics and structural breaks capture the psychological break characterising postcolonial situations. The anthology explores the deployment of poetic form as an encounter with trauma, rather than its description, and asserts that silence is a site of critical engagement. The analysis of fragmentation, indeterminacy, and suicidal narrative closure in *Madman at Kilifi* establishes this work as an archive of emotional dissonance. It rejects dominant models of postcolonial literary representation that apply to this text. Gachagua's voice is not strong, but vulnerable to the gaps that language can leave in his verse.

Trauma theory is employed here not as a universal explanatory model but as a critical lens for understanding how poetic form registers psychological rupture within a specific postcolonial context (Asiedu, 2024). The intersection of psychoanalytic theory and literary trauma studies, especially Freud's initial insights and Caruth's literary elaborations, is woven into the reading of Clifton Gachagua's *Madman at Kilifi*. As a framework for comprehension, trauma theory illuminates how the residues of psychic and historical violence are manifest in language, silence and aesthetic form. The thematisation of trauma in postcolonial Kenya, characterised by political disillusionment and sociohistorical fracture, is structurally enacted in the poetic text. A traumatic experience for Freud is an event that overcomes the psyche and later comes back in compulsive repetitions. Freud defines trauma as any experience that cannot be integrated into the individual's conscious narrative of the self, and trauma is typically expressed in symptoms, dreams or else in silence. Gachagua's voice mirrors the Freudian structure. The expression of the emotional is deferred or withheld, in practice and, in repetition, the speaker is caught in affective dislocation, where speech is possible only in fragments. The same could be said of the deferral here, in its correspondence with Freud's model of trauma as an unassimilated excess that comes back through indirect channels.

LITERATURE REVIEW

According to Kirmayer (2016), trauma interrupts the linearity of memory and

narrative, making it unequally fragmentary, recursive and often hidden. Literature, then, becomes a crucial site of dealing with trauma, he notes, because it can formally represent the discontinuities and repetitions that characterise traumatic remembrance. However, much trauma theory, including Krmayer's formulation, emerges from Euro-American psychoanalytic traditions that conceptualise trauma primarily as a singular event that later returns in memory. Within this framework, trauma is not merely remembered; it recurs, it makes its way into the present through affective dislocation and narrative fragmentation (Onwuka et al., 2019).

The study departs from a purely event-based understanding of trauma by situating it within the prolonged historical and political condition of postcolonial Kenya. Gachagua's *Madman at Kilifi* exemplifies a rejection of linear, page-turning narrative progression, which refuses to embrace minimal, cryptic, and fragmentary utterances as a turning process of coherent narrative progression. Trauma is not narrated as an event in the poems. Instead, it is an atmosphere where the reader is invited into the affective and linguistic disruptions of the traumatised subject. In psychoanalysis and trauma studies, silence is more than just an absence of speech (Ilogho et al., 2020). However, such a formulation risks oversimplifying silence when applied to African postcolonial texts, where silence may function not only as psychic absence but also as historical inheritance and political condition. It usually means repression, a psychic mechanism by which what is an unbearable truth is

ousted from the consciousness. Silence is not quite the right word in *Madman at Kilifi*. There are poems consisting of sparsely placed lines with long white spaces between. Some are begun or ended suddenly, as if they are the breaking off of one line of thought or have left language behind. However, these poetic silences point not only towards trauma repression, but towards the unutterable nature of this experience within conventional language. In other words, the speaker not only refuses to speak, but also refuses to speak. He stands in silence, at the threshold between speech and truth, which is, truth.

Exceptionally, when constrained by the postcolonial condition, the dynamic becomes even more charged. In postcolonial theory, the subject is usually distinguished in terms of fracture, hybridity and historical dislocation. Forms of knowledge, speech and representation were imposed on the colonial experience, which still haunt postcolonial identities. A crisis of subjectivity arises from the silencing of indigenous languages, the distortion of memory and the imposition of foreign cultural scripts. Karkaba (2010) explains that this postcolonial self-inhabits a splintered space defined by fragmentation, hybridity, contradiction, and dislocation, in which identity is constantly negotiated rather than fixed. Gachagua's poetic persona personifies this condition. It not only alienates the speaker from the nation but also from himself. He drifts on stage, passing through sensations, memories, and images that refuse synthesis, enacting what might be called postcolonial melancholia.

The silence in this instance has political and aesthetic meaning. It becomes at once a symptom of repression and a strategy of resistance (Mezzalana et al, 2023). Gachagua's refusal to offer narrative closure, his parenthetical suspension of grammar, and his diction that borders on minimalism work to destabilise the reader's expectations and reflect the displacement of his readers' experience of living with an unspoken historical pain. Silence here explicitly resists the normative pressures to articulate trauma, to intelligible language or to translate pain into a legible form. Through this process of speech, they do not casually disseminate the experience, but rather preserve the integrity of fragmentation, indicating that specific experiences, usually manifestations of political betrayal or historical violence, cannot be fully spoken.

Gachagua's work reveals how aesthetic disruption not only comes as a formal innovation but also as a psychological and political gesture, hence the convergence of psychoanalysis and postcolonial theory. Not only are the fractured lines, disordered syntax and elliptical structure a representation of a distressed mind. As a poetics of rupture, they make silence a place for memory, resistance and ethical concern. Instead, *Madman at Kilifi* shows trauma in this way. Trauma thus felt, structurally and affectively, through the choking reader's desire for clarity and resolution. Trauma in *Madman at Kilifi* is therefore neither explained nor resolved; it is structurally and affectively felt through the reader's encounter with absence, disruption, and silence.

This study contributes to scholarship by bridging trauma theory and postcolonial literary analysis in a way that highlights the formal enactment of historical and psychological rupture. While much existing research applies trauma theory to individual or event-based experiences, this study demonstrates how postcolonial poetry, exemplified by Gachagua's *Madman at Kilifi*, mobilises form itself to embody collective and historical trauma. It extends the scope of trauma studies beyond Euro-American psychoanalytic paradigms, showing how structural and aesthetic choices can carry political, ethical, and mnemonic significance. By situating trauma within the prolonged postcolonial condition of Kenya, the research illuminates how poetic form becomes both a medium of memory and a site of resistance, offering a methodological and theoretical framework for analysing the intersection of aesthetics, history, and affect in African literature.

METHODS

This study employs a qualitative, interpretive-critical design, using close reading as its primary method. Close reading is particularly suited to examining silence, fragmentation, and minimalism, which operate at the level of form and require careful attention to microtextual features. The analysis focuses on a purposively selected set of sixteen poems from *Madman at Kilifi*, chosen to represent a range of formal disruption, psychological rupture,

and postcolonial disillusionment, ensuring that each text provides material relevant to trauma and memory. The study applies trauma theory and postcolonial aesthetics to analyse formal and linguistic features such as enjambment, ellipsis, white space, and fractured syntax. Trauma theory offers a framework for understanding psychic rupture, belatedness, and the non-integration of experience, while postcolonial aesthetics situates these disruptions within historical conditions of colonial violence and post-independence disillusionment. Formal features are examined as enactments of psychological and historical disturbance rather than as stylistic ornamentation. Analysis emphasises how poems enact trauma through structural disruption rather than represent it through linear narration.

This study extends existing scholarship by grounding the analysis in trauma studies, subaltern studies, and African literary criticism. It demonstrates how Kenyan postcolonial poetry mobilises form as a site of trauma, memory, and resistance, and positions poetic silence and syntactic disruption as systematic tools for reading the psychological and sociohistorical residues of postcolonial experience. The contribution of this study lies in showing how Gachagua's poetry makes form itself a medium for registering trauma, memory, and resistance, establishing poetic silence and syntactic disruption as analytical tools for interpreting both the psychological and political dimensions of postcolonial experience.

RESULTS AND DISCUSSION

Fragmentation, Absences, and the Unspeakable

Clifton Gachagua's *Madman at Kilifi* constructs trauma through an architecture of gaps and silences that render suffering not as narrative disclosure but as affective atmosphere, textual rupture, and formal disturbance. Rather than offering trauma as something that can be recounted or resolved, the collection repeatedly situates it in moments of suspension—where syntax breaks down, images refuse completion, and meaning stalls. Fragmentation thus operates not merely as a thematic concern but as a governing poetic logic. Lines are pared down to their barest elements, images appear briefly and then vanish, and the poems resist narrative continuity or explanatory progression. Trauma emerges not in what the speaker explains but in what the poems structurally withhold.

This aesthetic is especially visible in Gachagua's reliance on white space and truncated syntax. Across the collection, the speaker frequently halts mid-thought or presents only partial utterances, producing poems that feel interrupted or unfinished. These breaks are not accidental. They enact moments of cognitive or emotional collapse, where language proves insufficient to carry experience forward. Absence, in this context, does not function as a simple lack of content but as a marker of what cannot be articulated. As trauma theorists note, psychic rupture often resurfaces through fragmentation, repetition, and temporal disturbance rather

than through linear recall (De Bruyn, 2014). Gachagua's poems formally perform this condition by denying narrative sequence and emotional exposition, allowing rupture itself to organise the reader's encounter with the text.

The poem "Reunion" offers a particularly clear example of how this fragmentation operates at the level of lineation and imagery rather than theme alone. The sequence "my mother's face. / a field. / a hand that does not return" is composed entirely of isolated noun phrases, each terminated by a full stop. The absence of verbs eliminates action, causality, or temporal movement, leaving only static fragments of perception. These phrases read less like memories consciously recalled than like mnemonic shards that surface without context or explanation. The maternal figure, the landscape, and the absent hand never converge into a unified scene or narrative moment. Instead, they remain suspended, refusing synthesis.

Line breaks in "Reunion" function as cognitive interruptions. Each break forces a pause precisely where meaning might otherwise cohere, compelling the reader to linger in uncertainty. The white space between the lines visually intensifies this disjunction, enacting the emotional distance between memory and comprehension. What emerges is not a recollection shaped by reflective consciousness but a series of arrested impressions, suggestive of trauma's resistance to narrative integration. The poem thus produces a temporal dislocation in which past and present collapse into isolated moments that cannot be ordered or resolved.

This strategy recurs throughout *Madman at Kilifi*. In several poems, Gachagua allows silence to function as a mode of expression in its own right. Statements trail off, images are presented without context, and emotional cues are deliberately withheld. These silences are not empty; they are charged with affective weight. The reader is made to feel the pressure of what remains unspoken rather than being guided toward interpretation. In this way, Gachagua reclaims poetic silence as a legitimate register of testimony, aligning with trauma theorists who argue that silence itself can bear witness to suffering that exceeds the limits of language (Tercero, 2024).

Importantly, this poetics of fragmentation does not only register personal or psychological pain. It also gestures toward a broader socio-political condition. The refusal of closure and coherence mirrors a national context in which historical violence and political betrayal remain unresolved. The broken syntax and suspended imagery echo a cultural landscape shaped by suppressed memory and deferred justice in post-independence Kenya (Mati, 2020). Just as individual trauma resists narrative completion, so too does the postcolonial nation remain marked by unfinished histories and unacknowledged wounds. Gachagua's aesthetic, then, becomes a reflection of this condition. His poems do not seek to repair fragmentation or fill in silence. Instead, they insist on inhabiting rupture as a formal and ethical stance. By foregrounding absence, disjunction, and incompleteness at the level

of line, syntax, and white space, *Madman at Kilifi* positions trauma not as something that can be narrated into coherence but as something that must be formally endured.

The Figure of the Madman as Metaphor of Disrupted National Psyche

The title *Madman at Kilifi* introduces madness not merely as a clinical diagnosis but as a figurative framework through which both personal and national disorder are apprehended. The madman is not a singular figure of private suffering nor a mere symbolic abstraction; rather, he emerges as a fragmented consciousness shaped by systemic instability and historical disillusionment. This portrayal allows Gachagua to bridge the spaces between communal and personal trauma, suggesting that madness need not be seen solely as an individual affliction, but as a response to larger societal breakdowns. Throughout African literature, madness has often functioned as a metaphor to depict the psychological and ethical consequences of colonialism and its failures, from Ngũgĩ wa Thiong'o's critiques of postcolonial governance to Ayi Kwei Armah's portrayal of a fragmented post-independence Ghana. In Gachagua's work, however, madness deviates from prophetic or revolutionary roles; instead, it becomes a fragmented mode of perception that reflects a broken, unstable reality.

This instability is most evident in Gachagua's formal choices. In poems such as "*A Slow Boat to China*," madness is registered through abrupt shifts in tone and form. For

example, Gachagua writes, "The trip begins in a landlocked country with a navy / and old sea captains" (Gachagua, 2014, p. 2). The language starts with a grounded, almost absurd specificity—placing the speaker in a geographically ambiguous world. Yet as the poem continues, it becomes clear that the speaker's perception is fractured, shifting between images of a "slow boat to China" and disjointed references to "Brutus" and "henna" (Gachagua, 2014, p. 3). These shifts—from calm reflection to erratic agitation—construct a consciousness incapable of coherence. The madman in Gachagua's work does not merely represent an individual breakdown, but a mode of perception, one that distorts and makes unreliable the very fabric of everyday experience.

This disjunction becomes even clearer in "*Reunion*," where fragmentation operates at the level of both syntax and imagery. The poem's structure, "my mother's face. / a field. / a hand that does not return" (Gachagua, 2014, p. 44), invokes a series of incomplete, isolated images that refuse to cohere. The noun phrases, devoid of verbs, deny temporal progression or emotional resolution, mirroring the speaker's fragmented psyche. These are not memories in the conventional sense; they are fragmented flashes, frozen moments that never coalesce into a full recollection. Each pause between the phrases further isolates the images, creating an emotional and temporal dislocation. This formal fragmentation enacts the madman's fractured perception, one that lacks continuity or logical sequence.

Gachagua's departure from the prophetic use of madness further deepens the tension between individual and national fragmentation. His madman does not speak truth to power. Instead, his incoherence stands as a mark of fractured witnessing. The madman inhabits a position of fractured perception, and in this role, his instability reflects not only personal disarray but the broader disintegration of societal structures. In "*The Lights in Zanzibar*," the imagery of "the reef is an imaginable wall of resistance" (Gachagua, 2014, p. 6), the suggestion of bodies floating aimlessly in the sea, and the reference to "drowned men clutching their wives' clutch bags" (Gachagua, 2014, p. 6) speaks to a national disillusionment, where historical violence and political failures go unresolved. These images are not merely symbolic; they capture a psychic landscape, wherein madness functions as a survival strategy in a world that resists coherence or closure.

Kilifi, where the madman resides, is not merely a physical space but a symbolic margin that reflects the speaker's psychic displacement. The peripheral location of Kilifi mirrors the exclusion experienced by the madman, whose wandering is both spatial and psychological. By positioning his madman in Kilifi, Gachagua underscores how definitions of sanity, belonging, and progress are produced from the centre, while marginal lives remain unreadable, their experiences fragmented. This marginality speaks to a broader postcolonial condition in which national and personal narratives remain incomplete.

The madman's wandering, as evidenced in poems like "*Madman at Kilifi*," where the speaker contemplates "the Indian Ocean / is a small estuary under our green exuberant toes" (Gachagua, 2014, p. 44), becomes both a literal and figurative journey of disconnection, exclusion, and disillusionment.

This fragmentation of experience points to the deeper crisis within postcolonial Kenya. Gachagua's aesthetic doesn't portray the madman as a tragic figure but as a revelatory one. His madness, his incoherent speech, and his disjointed existence reflect not only personal suffering but also the affective cost of silence, fragmentation, and historical denial that mark the postcolonial landscape. Madness, in this light, functions as a coping mechanism, a strategy of survival in a world that offers neither clarity nor resolution. In "*Lost Stones*," Gachagua writes, "Follow me to lost stones; / all this I beg you" (Gachagua, 2014, p. 27), suggesting that the search for meaning is both hopeless and necessary, an effort to navigate a terrain marked by brokenness and abandonment. The "lost stones" become a metaphor for the fractured reality the madman inhabits, where past and future are both unreachable and irreconcilable. Through this poetics of disjunction, Gachagua mirrors a national condition in which the promises of progress and stability remain unfulfilled. The fragmented worldview of the madman thus becomes a metaphor for a society caught between its founding ideals and its unresolved historical wounds.

Poetic Language and Syntax

In *Madman at Kilifi*, minimalist form operates less through visual austerity than through sustained syntactic breakdown. Across the collection, Gachagua repeatedly disrupts sentence structure, withholding grammatical completion and semantic closure (Gachagua, 2014). This disruption resists narrative coherence and emotional transparency, compelling the reader to encounter trauma as a destabilising experience rather than as a recoverable meaning. Language does not transmit trauma in these poems; instead, it falters under its pressure. The skeletal verbal economy of the collection suggests an exhaustion with language itself, foregrounding the limits of articulation under conditions of historical violence and affective distress.

Syntactic incompleteness emerges as the dominant stylistic strategy through which trauma is formally enacted. In poems such as “Lost Stones,” meaning is carried almost entirely through fragmentary imperatives and isolated phrases, “Follow me to lost stones; / all this I beg you” (Gachagua, 2014, p. 27), without narrative framing or explanatory context. Clauses remain unresolved, and sentences rarely reach grammatical closure. Similarly, in “Travel Guide,” the poem offers only fleeting perceptual moments; “Termites float on the leaves waiting to descend” (Gachagua, 2014, p. 28) without syntactic markers that would anchor the image to a narrative or emotional trajectory. These fragments appear as suspended impressions rather than communicative statements, mirroring the

instability of traumatic consciousness. As Robinett (2007) observes, trauma frequently obstructs linear narration, producing disoriented and discontinuous modes of expression. Gachagua's syntax performs this condition rather than describing it, forcing the reader into hesitation, rereading, and interpretive uncertainty.

Minimalism in *Madman at Kilifi* is therefore not a stylistic reduction for its own sake but a critique of the adequacy of conventional language. By dismantling grammatical expectation, Gachagua exposes the insufficiency of dominant linguistic structures to contain experiences shaped by psychic rupture and historical suppression. Meaning remains provisional, deferred, or incomplete, particularly in poems that gesture toward memory or loss without narrativising them, such as “September” (Gachagua, 2014, p. 16) and “Unclaimed” (Gachagua, 2014, p. 35). Trauma is not rendered intelligible within familiar narrative logic but remains resistant and unresolved.

At the same time, this syntactic minimalism constitutes a pointed intervention into postcolonial literary expectations. Given the longstanding association of African poetry with political clarity or nationalist affirmation, Gachagua's refusal of coherence and message-driven lyricism is a deliberate departure. Poems such as “A Genre of Isolation” (Gachagua, 2014, p. 52) and “Treason” (Gachagua, 2014, p. 54) resist declarative political speech, offering instead compressed, opaque utterances that refuse interpretive mastery.

This aesthetic position rejects the assumption that the postcolonial subject must be fully legible or narratively stable. By withholding clarity, Gachagua asserts opacity as a valid mode of poetic knowing. As Lionnet (2018) argues, postcolonial identity emerges within tensions between visibility and erasure, fragmentation and coherence. Gachagua's pared-down syntax inhabits precisely this unstable terrain.

Temporal dislocation in the poems likewise emerges through syntactic ambiguity rather than explicit shifts in tense or chronology. In "September," the repetition of the present collapses temporal progression into stasis, while the absence of narrative markers prevents past and future from being clearly distinguished (Gachagua, 2014, p.16). This grammatical indeterminacy enacts trauma's resistance to temporal ordering, forcing the reader to inhabit a suspended present that neither advances nor resolves. The near absence of punctuation further intensifies this instability. In poems such as "Lost Stones" (Gachagua, 2014, p. 27) and "Travel Guide" (Gachagua, 2014, p. 28), lines bleed into one another without syntactic signals to organise thought, compelling the reader to negotiate meaning tentatively. This disrupted reading process mirrors trauma's intrusion into consciousness, where experience arrives abruptly, and coherence cannot be sustained. Gachagua's poetry embodies this state by denying the reader a fixed interpretive grid.

The political force of *Madman at Kilifi* thus lies not in explicit commentary but in its syntactic refusal of legibility.

By denying grammatical completion and interpretive closure, Gachagua resists inherited expectations that African poetry must instruct, resolve, or console. Syntax becomes a site of disobedience, where the poetic voice speaks only in fragments, exposing the affective cost of historical denial and silenced violence. Trauma is not offered as a theme to be understood but as an experience to be endured through reading. In this way, the collection advances a reconfigured African poetic voice—one that locates political and emotional intensity not in declarative clarity but in disjunction, ellipsis, and silence. Gachagua demonstrates how minimal, fractured language can carry as much political force as overt ideological articulation. His poetics refuses to simplify pain; instead, it insists on its complexity by interrupting, withholding, and breaking apart speech. This formal inventiveness situates *Madman at Kilifi* as a significant contribution to contemporary Kenyan poetry and to broader debates on how language can register psychological and historical trauma when coherence itself is under strain.

Political and Psychological Intersections

In *Madman at Kilifi*, political disturbance is registered through fractured voice rather than explicit commentary. Disrupted syntax, fragmented imagery, and tonal instability render psychological displacement as a lived condition rather than an abstract critique. Political disillusionment emerges indirectly, filtered through a voice that cannot sustain coherence or emotional clarity. Across the collection, the poems articulate the psychic

cost of betrayal and repression not through accusation but through linguistic exhaustion. It is from this muted, splintered voice that state failure is most acutely felt, and the psychic price of political abandonment most insistently charged (Gachagua, 2014).

The poems rarely refer to specific political events, institutions, or figures. Instead, they convey disillusionment through affective states such as estrangement, fatigue, and uncertainty. These moods are realised through incomplete utterances, suspended images, and unresolved syntax, signalling a crisis of meaning rather than a programmatic critique. In "September," the speaker listens to "uninterrupted sirens" and admits, "I'm not invited into my own body" (Gachagua, 2014, p. 16), a line that collapses civic emergency and personal alienation into a single affective register. Political failure is thus internalised and experienced as psychic fragmentation rather than narrated as historical fact. As Kisiangani (2021) observes, post-independence Kenya has remained structured by elite continuity and inherited colonial logics despite nationalist rhetoric. Gachagua's poetry internalises this political history, transmuting structural violence and systemic betrayal into lived psychic disorientation.

The absence of a coherent narrative voice is therefore not a stylistic omission but a formal necessity. The reader is repeatedly disoriented, unable to stabilise identity, chronology, or perspective. In this sense, the poetic form replicates the experience of living under a political order that is opaque, inconsistent, and unaccountable.

Just as state institutions conceal truth through bureaucracy, censorship, and the manipulation of historical memory, Gachagua's poetry withholds meaning through syntactic disruption and deliberate silence. In poems such as "Desertion," where a friend in a psychiatric ward is described through fragmented observation, "Silly drugs go up and down / her capillaries" (Gachagua, 2014, p. 22), language itself appears constrained, speaking only in partial disclosures. The poetic voice, trapped within this system, registers the cost of moving through a political terrain in which coherence is unsafe and clarity invites punishment.

Madness in *Madman at Kilifi* is articulated through broken speech, hesitation, and emotional flattening rather than through diagnostic markers. These features do not individualise pathology; instead, they suggest a shared condition of psychic strain. The speaker's instability reflects an environment in which coherence is difficult to sustain and emotional survival requires withdrawal. In the title poem, the madman is described not through clinical labels but through observation and proximity—"He means no harm" (Gachagua, 2014, p. 44)—a phrase that underscores vulnerability rather than danger. Madness here cannot be reduced to personal illness; it functions as an index of a national order whose logic has been inverted, leaving ordinary subjects to bear the psychic consequences. Mbembe (2006) characterises the postcolonial state as a space of excess and contradiction, where

violence and absurdity coexist within the everyday. Gachagua's poetry inhabits this terrain precisely. The speaker in "Madman at Kilifi" does not deliver testimony or political exposition; instead, he moves through moments of sensory disjunction and unreal calm—"At night. / My God, at night" (Gachagua, 2014, p. 44)—where language falters and perception slips. In broken sentences and abrupt silences, the poems enact a continuous sense of unreality that mirrors the contradictions of postcolonial governance.

Mental health emerges as a crucial dimension of this political poetics. By foregrounding psychological vulnerability, Gachagua challenges the silences surrounding mental illness in Kenyan public discourse, where distress is often framed as moral weakness or spiritual failure. His poetry neither diagnoses nor resolves mental suffering. Instead, it presents psychic fragility as a politically charged condition. In "Desertion," the friend's institutionalisation is framed not as individual failure but as the culmination of accumulated familial, social, and historical pressures (Gachagua, 2014, p. 22). The speaker's vulnerability is not a personal inadequacy but a response to a world that has failed to provide stability, care, or coherence. By placing emotional fragility at the centre of the collection, Gachagua insists that psychological suffering belongs within national literature and political analysis.

This integration of psychological and political dimensions expands the boundaries of Kenyan literary tradition. Where earlier

generations often foregrounded heroic resistance or revolutionary clarity, *Madman at Kilifi* attends to the residue of unprocessed history. The poems suggest that even in moments of apparent calm, historical wounds persist in the rhythms of daily life and the textures of thought. The poetic voice becomes a witness to a slow, internalised form of violence—one that does not erupt but corrodes. Through broken syntax, withheld meaning, and vocal restraint, Gachagua articulates a poetics of quiet devastation, in which political failure is mirrored by language's inability to contain emotion. In *Madman at Kilifi*, the political and the psychological are inseparable because both are inscribed at the level of form. Fragmentation, silence, and syntactic instability expose how external structures leave internal scars. The collection asks the reader to encounter trauma not as explanation but as experience, enacted through the act of reading itself. Gachagua's refusal to separate the personal from the political marks a significant intervention in African literary discourse, demanding attention to how neocolonial power operates not only through governance and economics but through the shaping of consciousness.

CONCLUSION

Clifton Gachagua's *Madman at Kilifi* is a collection where silence and poetic reticence are transformed into aesthetic and political power. The book does not rely on the declarative or the explicit as tools for conveying meaning. Instead, it clings to absence, minimalism, and

fragmentation as forms of poetic resistance that challenge received expectations of language, narrative, and political expression. By its very inability to explain, resolve, or stabilise, then, the anthology brings to the fore the inarticulability of trauma and the affective intensity of postcolonial disillusionment. In this way, it resists the normative call for clarity that typically prefaces stories of suffering, particularly in African literature, where poetry has traditionally been called upon to teach, redeem, or condemn in more straightforward terms. The silence that moves through Gachagua's poetry is not passive. Instead, it is a resistance to hegemonic structures of knowledge and representation. Within the neocolonial Kenyan state, characterised by the historical suppression of dissidence, enforced forgetting, and performative reconciliation, the poet's refusal to issue a direct political statement disrupts the expectation that expression must be overt to be legitimate. By inhabiting the interstices of intelligibility, Gachagua's poetry performs the "interstitial space" where other modes of meaning become feasible. The poems do not present themselves as transparent windows into trauma. Rather, they beckon the reader into the disorientation and opacity that characterise the lived experience of those traversing the psychic remains of historical violence and social abandonment. Silence is a mode respectful of the incompleteness of memory, the illegibility of suffering, and the impossibility of complete linguistic recovery.

In this respect, poetic restraint is not merely resistance but documentation. It records the contours of trauma that traditional narrative forms cannot. The decision to break up thought, pause syntax, and isolate images is an awareness of trauma as a fragmentation of temporal, affective, and linguistic continuity. Instead of offering a narrative of trauma, Gachagua's poems enact trauma in the formal and syntactic design. The poems bear witness by embodying rupture. They document not the facts of political betrayal or psychological suffering, but the affective rhythms of life under these conditions. This is a subtle yet potent form of documentation. It allows poetry to work as an archive of feeling, where the unspeakable is documented without being resolved.

Additionally, reticence in Gachagua's poetry resists the commodification of pain common in international literary markets. The refusal to aestheticise trauma into consumable images or cathartic endings foils the anticipation of African writings to commodify pain into palatable political messages. The poems, instead, demand ambiguity, unease, and suspension of emotion. This obscuring is in keeping with the trauma writing ethics that believe nothing in pain can or should be fully readable. Elhillo and other modern African poets have also used the politics of opacity to safeguard the dignity of pain. Silence here does not annihilate experience. It preserves it from reductionism, voyeurism, and theft. Additionally, poetic silence in *Madman at Kilifi* marks the failure of postcolonial

institutions to make room for speech and healing. The figure of the madman, traditionally figured as marginal, unstable, or mute, is a metaphor for the politically disempowered and psychologically erased citizen. His silence is not simply a sign of madness. It is a structural silencing, one that situates the place of many in post-independence Kenya. Gachagua enables the madman's incoherence to say much about the nation-state's incoherence. Poetic silence, therefore, is not only a personal but national articulation, writing in the failures of national imaginaries and the exhaustion of emancipatory rhetoric.

Implications of the Study

The paper provides valuable insights into how poetic form can embody and communicate trauma, particularly within postcolonial African contexts. By analysing *Madman at Kilifi* through the lenses of trauma theory and postcolonial aesthetics, the study highlights the significance of poetic silence, fragmentation, and minimalism as deliberate strategies for representing psychological rupture and collective historical disappointment. The analysis demonstrates that disjuncture in Gachagua's poetry is not a deficiency or a lack of literary skill, but a formal choice that mirrors the fractured consciousness of the postcolonial subject and the residue of historical violence. In this way, Gachagua's work expands the expressive possibilities of African poetry, moving beyond overtly rhetorical or political statements toward a more intimate articulation of trauma, where

affect, silence, and formal constraint convey what cannot be fully narrated.

These findings have specific implications for both trauma studies and literary pedagogy. They suggest that readers, critics, and educators should approach structurally minimal or semantically opaque texts not as incomplete or inaccessible, but as carefully constructed sites where form itself conveys ethical, psychological, and historical meaning. For teaching African poetry, this means emphasising attention to line breaks, white space, ellipsis, and syntax as integral to understanding trauma and memory, rather than focusing solely on thematic content. Methodologically, the study demonstrates how formal analysis can bridge local postcolonial experience with global discussions of trauma, memory, and aesthetic disruption, while still retaining attention to the specific historical and cultural contexts of post-independence Kenya. Gachagua's poetry thus models a poetics in which trauma is communicated through both what is said and what is deliberately withheld, offering a framework for interpreting African poetry that foregrounds structural and affective strategies alongside narrative content (Ehibor, et al, 2025).

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study is limited to one poetry collection, which may limit its generalisability to other African literary texts. Though *Madman at Kilifi* offers a dense setting for pursuing

poetic silence and trauma, the stylistic and contextual peculiarities of the Gachagua text preclude a straightforward application of its implications to other poets and traditions without additional comparative study. Moreover, the research does not claim to involve the voices of readers, mental healthcare experts, and/or cultural practitioners who could offer divergent interpretations of the poems' emotional and psychological aspects. This restricts the interpretation to a solely textual structure.

The research could be developed in the future by comparing *Madman at Kilifi* with other modern African poetry collections focusing on trauma, silence, and postcolonial dislocation. These studies could consider whether similar aesthetic strategies are employed across various regional or linguistic traditions in African literature. Moreover, interdisciplinary methodologies integrating literature with psychology, ethnography, or reception studies might enhance knowledge of how different listeners/readers perceive and respond to poetic depictions of trauma. It is also possible to explore how poetic silence works in crafted poetry and recited verse poems in present-day Kenya, where emotional expression meets new media and oral performance.

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REFERENCES

- Adelokun, A. O. (2021). Aesthetics of postmodernism in Clifton Gachagua's *Madman at Kilifi*. *International Journal of Language and Literary Studies*, 3(2), 205-214. <https://doi.org/10.36892/ijlls.v3i2.548>
- Amateshe, A. D. (1979). *The social function of poetry in underdeveloped society: An East African experience*. University of Nairobi.
- Anake, S. A. (2024). Tracking Mental Health: A social Semiotic analysis of Instagram Discourse. *Pakistan Journal of Life and Social Sciences (PJLSS)*, 22(2). <https://doi.org/10.57239/pjlss-2024-22.2.00666>
- Asiedu, M. (2024). Commissioned Book review: Anita R. Gohdes, *Repression in the Digital Age: Surveillance, Censorship, and the Dynamics of State Violence*. *Political Studies Review*. <https://doi.org/10.1177/14789299241268508>
- Dagleish, T., & Brewin, C. (2007). *Autobiographical memory and emotional disorder*. <https://ci.nii.ac.jp/ncid/BA84669521>
- De Bruyn, D. C. (2014). *The performance of trauma in moving image art* [Doctoral thesis, Deakin University]. <http://dro.deakin.edu.au/eserv/DU:30040129/debruynd-licence-2011.pdf>
- Ehibor, O. J., Eyisi Jr, J., Odukoya, J. A., Ogbulogo, C. U., Ugorji, C. U. C., Odo, O., ... & Adesiyan, R. U. (2025). Linguistic-stylistic analysis of the language of leadership in the political arena and the business world. *Cogent Arts & Humanities*, 12(1), <https://doi.org/10.1080/23311983.2025.2464382>
- Gohdes, A. R. (2024). *Repression in the digital age: Surveillance, censorship, and the dynamics of state violence*. Oxford University Press.
- Gruber, A. (2024). *Time and the (post)colonial self: Oppressive uses of time and the construction of postcolonial identities* [Doctoral thesis, Friedrich-Alexander-Universität Erlangen-Nürnberg].

- Ifowodo, O. (2010). *Re-Constructing Identities: History, trauma and healing in the Post-Colonial narrative*. <https://ecommons.cornell.edu/bitstream/1813/17739/1/Ifowodo%2c%20Ogagaoghene.pdf>
- Ilogho, J. E., Alao, A., Adekeye, O., Gesinde, A., Adeusi, S., & Ifijeh, G. (2019). The prevalence of bibliotherapy program practice among helping professionals in Ota, Nigeria: A pilot study. *Journal of Poetry Therapy*, 33(1), 30-43. <https://doi.org/10.1080/08893675.2020.1694212>
- Jena, D., & Samantray, K. (2021). Traumatic experiences and their representation in narratives: A study. *International Journal of English Language Studies*, 3(11), 1-6. <https://doi.org/10.32996/ijels.2021.3.11.1>
- Karkaba, C. (2010). Deconstructing identity in postcolonial fiction. *ELOPE: English Language Overseas Perspectives and Enquiries*, 7(2), 91-99. <https://doi.org/10.4312/elope.7.2.91-99>
- Kirmayer, L. J. (2016). Landscapes of Memory: trauma, narrative, and dissociation. (2016). In *Routledge eBooks* (pp. 211-236). <https://doi.org/10.4324/9781315022222-17>
- Kisiangani, I., Mohamed, S. F., Kyobutungi, C., Tindana, P., Ghansah, A., Ramsay, M., & Asiki, G. (2022). Perspectives on returning individual and aggregate genomic research results to study participants and communities in Kenya: A qualitative study. *BMC Medical Ethics*, 23(1), Article 67. <https://doi.org/10.1186/s12910-022-00767-y>
- Lionnet, F. (2018). *Postcolonial representations: Women, literature, identity*. Cornell University Press.
- Mati, J. M. (2020). *Political protest in contemporary Kenya: Change and continuities*. Routledge.
- Mbembe, A. (2006). The banality of power and the aesthetics of vulgarity in the postcolony. In A. Sharma & A. Gupta (Eds.), *The anthropology of the state: A reader* (pp. 381-400). Blackwell Publishing. <https://doi.org/10.1215/08992363-4-2-1>
- Mezzalira, S., Santoro, G., Bochicchio, V., & Schimmenti, A. (2023). Trauma and the disruption of temporal experience: a psychoanalytical and phenomenological perspective. *The American Journal of Psychoanalysis*, 83(1), 36-55. <https://doi.org/10.1057/s11231-023-09395-w>
- Nasong'o, W. S. (2024). *Kenya and the politics of a postcolony* (Vol. 1). Anthem Press. <https://doi.org/10.2307/jj.17681820>
- Nyongesa, A. (2024). *Postmodern reading of contemporary East African fiction: Modernist dream and the demise of culture*. Routledge.
- Onwuka, E., Uba, E., & Fortress, I. (2019). Versifying history and national trauma in Tanure Ojaide's *The endless song*. *SAGE Open*, 9(1), Article 2158244019837435. <https://doi.org/10.1177/2158244019837435>
- Osimen, G. U., Ehibor, O. J., Daudu, B. O., & Alofun, G. O. (2025). Reconstructing culture and building societal values in the global era: The imperative of mother-tongue in elementary school curriculum in Africa. *Research Journal in Advanced Humanities*, 6(1). 1-11 <https://doi.org/10.58256/t4jrj684>
- Robinett, J. (2007). The narrative shape of traumatic experience. *Literature and Medicine*, 26(2), 290-311. <https://doi.org/10.1353/lm.0.0003>
- Tercero, D. N. (2024). *Women's voices and silences in the contemporary literature of Central America and its US diaspora* [Doctoral thesis, University of California, Berkeley].

Investigating the Acceptance of Virtual Health Consultations in Malaysia: A Study Based on the Initial Trust Model

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ABSTRACT

The rising demand for healthcare services causes an immense strain on healthcare service providers. Due to the ubiquity, real-time interactivity, and multimedia features of the Internet, Virtual Healthcare Consultation (VHC) has emerged as a viable solution for addressing the fast-rising demand for quality and affordable healthcare services. However, the usage of VHC in Malaysia is still relatively new and unpopular. Additionally, not much research has been done on this topic by using the Initial Trust Model as the theoretical foundation. Using the Initial Trust Model as the theoretical foundation, the key objective of this study is to examine the intention to utilise VHC in Malaysia. This research adopted a positive research philosophy and a quantitative research strategy. Primary data was collected from 300 respondents using questionnaires, and the collected data was analysed using SMART PLS and SPSS statistical tools. The research outcome showed that the initial trust variable has a strong positive relationship with intention to use. The structural assurance and propensity to trust variables both have a significant positive impact on the initial trust variable. This research result provides practical implications for VHC providers to strengthen the initial trust level and the intention to use VHC. VHC providers should strengthen structural assurance mechanisms to improve the acceptance of VHC. Furthermore, VHC providers should create and execute focused

communication plans for customers in various age groups and those with low trust propensities. Lastly, the research also reinforces the credibility and generalisability of the Initial Trust Model in investigating technology acceptance.

Keywords: Initial trust model, intention to use, propensity to trust, reputation, structural assurance

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INTRODUCTION

Healthcare services have long drawn public attention worldwide. The need for reasonably priced and high-quality healthcare services has grown due to many factors, including ageing populations, urbanisation, longer life expectancies, growing health consciousness, and an increase in the variety of diseases (Wan et al., 2021). Because of this, there is a worldwide mismatch between supply and demand in healthcare systems, which has resulted in issues like the healthcare services being inaccessible, inefficient, and unaffordable, especially for those people who live in less developed economies, where access to medical professionals and facilities is limited. Furthermore, an alarming trend that highlights a serious problem in Malaysia's healthcare system is the rising costs of medical services. According to Bank Negara Malaysia's (BNM) 2023 report, medical services inflation in Malaysia was 12.6%, significantly higher than the world average of 5.6% (Parzi, 2024).

Since the ubiquitous, multimedia, real-time, and interactive features of the Internet technologies can enhance effectiveness, accessibility, affordability, and equity of healthcare services, Internet technologies have emerged as viable solutions to these issues (Yan et al., 2023). Furthermore, apart from the consequences of the COVID-19 pandemic, patients are increasingly using VHC to consult with doctors (Jiang et al., 2023). Technological innovation and growth are disruptive, but these innovative forces can revolutionise the healthcare sector.

By 2029, the worldwide VHC market is predicted to have grown from its 2019 estimate of USD 45.5 billion to USD 175.5 billion. Despite North America's dominance in the digital healthcare market in 2019, the Asia-Pacific region is anticipated to be crucial for the future growth of VHC (Jiang et al., 2021). To provide its citizens with better, more accessible, and more affordable healthcare services, the Malaysian government has been implementing and promoting the use of VHC in recent years (Omar et al., 2023).

Nevertheless, despite the possible benefits, VHC has only lately become widely accepted worldwide. A World Health Organisation survey found that between 13% and 33% of countries had introduced VHC services (Ng et al., 2022). Furthermore, 74% of doctors in Malaysia who participated in a study conducted by Thong et al. (2021) revealed that only 30% of their patients benefited from VHC. Past research on VHC adoption has been based on the Unified Technology Acceptance and Use of Technology (UTAUT) model and Technology Acceptance Model (TAM) as underpinning theories (Kuen et al., 2023). For instance, Tan et al. (2022) adopted the UTAUT model to conduct a preliminary study on ageing Malaysians' and caregivers' acceptance of VHC. UTAUT and TAM models primarily focus on the perceived ease of use and perceived usefulness of the technology. However, VHC is a high-risk, credence-based online service that depends heavily on the formation of initial trust; analysing the variables in the Initial Trust

Model will reveal what influences the VHC's initial uptake in Malaysia's multicultural setting. Thus, the Initial Trust Model provides a more appropriate theoretical foundation to study the acceptance of VHC. The Initial Trust Model suggests that a user's readiness to rely on or use new technology is shaped by a combination of independent factors such as structural assurance, reputation, and propensity to trust. However, little research has been done on VHC acceptance in Malaysia using the Initial Trust Model as the underpinning theory. Only a few empirical studies, such as Gallardo et al. (2024) on the acceptance of online medical services, used the Initial Trust Model as an underpinning theory, and even these take place in other countries or with specialised contexts rather than mainstream VHC. Thus, to bridge these research gaps, this research will examine the acceptance of VHC in Malaysia based on the Initial Trust Model.

LITERATURE REVIEW

Theoretical Underpinning - Initial Trust Model

One of the crucial components in evaluating the uptake of virtual healthcare technology is initial trust. Since consumers' intent to engage with unknown online service providers is greatly influenced by trust, online service providers must strategically build client trust (McKnight et al., 2002b). To determine new information technology adoption intents, the initial trust model has been extensively employed in research across a wide range of industries (Lin &

Wu, 2021). Dealing with a relationship that has limited emotional connection and prior knowledge about the trustee, as well as having faith in an unidentified party, are characteristics of initial trust. (Lokshina et al., 2022). Previous studies revealed that consumers often base their acceptance of new technologies that involve ambiguity or potential hazard on their first assessment and development of trust (Octavius & Antonio, 2021). Initial trust is a crucial determinant factor in the acceptability of VHC because these services are relatively new in Malaysia and carry some degree of risk (Wu, R. et al., 2021). According to McKnight et al. (2002a), the initial trust model was based on three primary constructs: 1) structural assurance, 2) personal propensity to trust, and 3) firm reputation.

Initial Trust

According to McKnight et al. (1998), initial trust is the act of placing one's faith and confidence in an unidentified trustee in a circumstance where the parties do not yet have a trustworthy relationship or emotional bond. One key concept for comprehending how people view technology is trust, which is also thought to play an important role in how well consumers embrace and adopt digital services, a predictor of intended use, an efficient way to reduce social uncertainty, and an effective way to reduce uncertainty among inexperienced and novice users (Weck & Afanassieva, 2023). Compared to offline transactions, initial trust formation is more important to the acceptance of online services because

of concerns about things like physical distance, non-face-to-face interactions, ambiguity regarding online services, and security concerns due to possible personal information breaches (An et al., 2023). When predicting whether consumers would embrace new e-healthcare services, the initial trust variable is frequently seen as a critical component. Determining the degree of initial trust that consumers have in VHC is crucial because this disruptive technology is still in an emerging stage of revolutionising the healthcare industry.

Structural Assurance

Structural assurance is the notion that the use of the product, service, or technology is protected by law and has a technological framework that guarantees risk-free, secure transactions (McKnight et al., 2002b). From an online technology standpoint, the safeguards consist of feedback mechanisms, third-party certification, encryption, data protection, warranties, safe processes, and secure procedures (Farooq et al., 2021). Additionally, when a company takes legal precautions, consumers are more likely to think that the company is committed to maintaining its principles, contractual duties, and efforts to avoid legal ramifications. Organisational and technological contexts can both benefit from the application of structural assurance (Lokshina et al., 2022). A reasonably high structural assurance level increases customer trust because people feel more confident utilising the system or product (Cheng et al., 2021).

Reputation

Reputation is the result of people assuming that a certain technology or system has positive qualities (such as honesty and care) based on second-hand information about it. People always hear positive things about it, which helps to build a positive reputation (McKnight et al., 2020). Reputation is a pragmatic, consistent, comprehensive assessment of a subject that has been developed over time with the ongoing awareness of stakeholders; it is not merely a disjointed and impromptu assessment (Yu & Han, 2021). Consumers evaluate a company based on its reputation, which is the economic worth of an intangible asset (Kim & Han, 2020). Organisations with higher ratings or greater reputations tend to have more pleasant and trustworthy relationships with their customers (Che et al., 2023).

Propensity to Trust

Personal propensity to trust is a gauge of a person's willingness to depend on and trust others in a range of circumstances, according to McKnight et al. (1998). A person's values, views, willingness, and reservations about trusting a trustee are all related to their personal predisposition to trust (an individual, an object, or a system) when they don't know them well enough and have limited experience with the trustee (Nourallah, 2023). A person's psychological composition and cultural background influence their traits, experiences, and personal propensity to trust (Lin & Wu, 2021).

Thus, lifelong experiences and ongoing socialisation contribute to an individual's propensity to trust (Alharbey & Van Hemmen, 2021).

Intention to Use

The stronger someone's behavioural intentions, the more likely they are to act on those intentions later. Having the willingness to embrace or use new technology is the first step in using it (Harris & Rogers, 2023). According to Wang et al. (2022), behavioural intention is a very reliable indicator of an individual's actual adoption of a technology activity. Intention to use is favourably correlated with actual usage, according to numerous previous studies (Mailizar et al., 2021). To forecast the actual technology use and acceptability, numerous studies concentrated on behavioural intention to use the technology. (Zin et al., 2023). Furthermore, other studies demonstrated that actual usage of technology and intention to use are strongly correlated (Mailizar et al., 2021). Therefore, the dependent variable in this study was behavioural intention to use online medical consultations rather than actual usage of VHC.

The Relationship Between Structural Assurance and Initial Trust

Based on the Initial Trust model, consumers depend on structural assurance in the process to reduce perceived risk and the formation of initial trust. As an institutional instrument, structural assurance shows the presence of a dependable and enforced structure (McKnight et al., 2002a). According to a

study by Kimiagari and Baei (2022) on the promotion of e-banking's real usage, the establishment of initial trust may be impeded by the absence of structural assurance. The results of the study indicated that structural assurance and initial trust were significantly positively correlated (Kimiagari & Baei, 2022). However, Dewi and Dominggus's (2024) study on trust in utilising P2P lending showed that the structural assurance variable had no noticeable impact on P2P lending trust. Previous studies on the relationship between initial trust and structural assurance produced contradictory results. Thus, to close this research gap, the following hypothesis was formulated:

H1: There is a significant relationship between structural assurance and initial trust in VHC.

The Relationship Between Reputation and Initial Trust

From the perspective of the formation of trust, reputation is a cognitive shortcut to help people make an early judgment of the reliability of technology (McKnight et al. 2002a). Garrouch's (2021) study on mobile wallet applications showed a significant positive relationship between reputation and initial trust in mobile wallets. The study's findings support the notion that reputation is vital for acquiring the trust of customers, especially in situations where there is a lack of knowledge about a new service and the company's reputation is used as a backup source of information (Garrouch, 2021). Additionally, the study on consumers' ongoing trust in mobile

banking apps by Che et al. (2023) showed that there is a strong positive correlation between an Organisation's reputation and customers' initial trust in mobile banking apps. On the other hand, Xue et al.'s study in 2023 revealed that patients' distrust beliefs were not significantly impacted by the reputation of online medical platforms. Previous studies on the relationship between reputation and initial trust show inconsistent results. Therefore, to close this research gap, the following hypothesis was formulated:

H2: There is a significant relationship between reputation and initial trust.

The Relationship Between Propensity to Trust and Initial Trust

According to the Initial Trust Model, consumer trust propensity is a primary antecedent that influences the assessment and adoption of new technology, especially in situations characterised by uncertainty and lack of evidence regarding the trustworthiness of technology (McKnight et al., 1998). Based on Nourallah's (2023) study on the acceptability of financial robo-advisors, personal propensity to trust has a substantial effect on the formation of initial trust. Wu and Yuen's (2023) study on the formation of initial trust in shared autonomous vehicles also showed that initial trust is strongly influenced by an individual's propensity to trust. In addition, the hypothesis that consumers' personal propensity to trust influences their initial trust in consumer-to-consumer e-commerce was supported by Leonard and Jones's (2021) research on trust in

consumer-to-consumer e-commerce. One of the key factors in the initial trust model is personal propensity to trust, which is a reliable indicator of initial trust. One important finding from the literature review was whether the influence of a person's inclination to trust on the formation of initial trust is consistent across various technologies, such as healthcare, banking, and green technology. Thus, to validate this notion, the following hypothesis was formulated:

H3: There is a significant relationship between propensity to trust and initial trust

The Relationship Between Initial Trust and Intention to Use

Initial trust has been recognised as a crucial precursor to intention to use in research on technology adoption, particularly when users have limited prior experience (McKnight et al., 2002). Based on the Theory of Reasoned Action (TRA), trust reduces perceived risk, allowing consumers to develop favourable expectations about a technology's dependability (Fishbein & Ajzen, 1975). The study by Nourallah (2023) on retail investors' adoption of financial artificial intelligence (AI) advisors found that the initial trust variable significantly positively correlates with the intention to use a financial robo-advisor. Furthermore, research by Wu et al. (2021) on the desire to utilise the international mobile payment system demonstrated a significant positive correlation between the initial trust variable and the intention to use. However, there is a

dearth of research on how initial trust affects intention to use VHC in Malaysia. Thus, to close this research gap, the hypothesis below was proposed:

H4: There is a significant relationship between initial trust and intention to use.

Age Group Moderates the Relationship Between Initial Trust and Intention to Use

Technology acceptance is thought to be significantly influenced by age group (Al Mamun et al., 2023), and a person's psychological composition and cultural background influence their traits, experiences, and personal predisposition to trust (Lin & Wu, 2021). Some research has indicated that the acceptance of technology is affected by the interrelationship of sociodemographic variables, which include age group, gender, level of education, family situation, and technical knowledge (Weck & Afanassieva, 2023). Additionally, the research carried out by Terblanche & Kidd in 2022 on “factors that determine non-directive reflective coaching chatbot” indicated that the age group survey participants moderated the relationship between perceived usefulness and intention to use. On the other hand, the research conducted by Al Mamun et al. (2023) showed that the age group of respondents did not have a moderating effect on the relationship between perceived ease of use and the intention to use new technology. The research conducted by Hamadeh et al. (2025) also demonstrated that age did not moderate the relation between

perceived usefulness and the intention to use blockchain technology. The moderating effect of age group in past research is inconsistent. Furthermore, there is a paucity of research that examines the moderating effect of age group in the relationship between initial trust and intention to use VHC. Thus, to close this research gap, the following hypothesis was formulated:

H5: Age group moderates the relationship between initial trust and intention to use.

METHODOLOGY

Research Design

This research design was formulated based on the research onion proposed by Saunders et al. (2019). This research adopted the positivist research philosophy, and the research approach was deductive. In line with the research approach, the primary data were collected using a mono-method quantitative survey strategy, over a fixed, cross-sectional time horizon. The target population is Malaysians who are 18 years old and above. The survey instruments were adopted from past research. The quality of the data was checked and cleaned before conducting descriptive and inferential statistics using SPSS and SMART PLS. Structural Equation Modelling (SEM) was utilised for this research because SEM enables the simultaneous analysis of multiple dependent relationships by integrating structural and measurement elements into a model. SEM allows researchers to assess reliability, convergent validity, and discriminant validity (Byrne, 2016).

Thus, SEM is more effective and robust than conventional regression methods in testing complex theoretical frameworks, as shown in Figure 1 (Hair et al., 2017).

Sample Size and Sampling Technique

As recommended by Mumtaz et al. (2017), the non-probability sampling method is suitable when the researcher is unable to determine the sampling framework for the research, and the research aim is to achieve theory generalisation. Malaysia's VHC adoption is new and sparsely distributed; the VHC users in Malaysia are difficult to enumerate, and there is no complete sampling frame. Thus, the non-probability sampling method was suitable for this exploratory research, and this sampling method also accommodated the time limitations. According to Kline (2023), a sample size of 100 is considered minimal for structural equation models. A sample size that ranges

from 100 to 200 is considered moderate, while a sample size greater than 200 can be considered high. Based on the G*Power sample size calculator, the recommended sample size for this research is 77 to 89 with a confidence level of 95%. The sample size for this research was increased to 300 to improve its statistical reliability and widen the scope of generalisability, which resulted in a more reliable representation of the population under study. Furthermore, to ensure the collected sample has adequate representativeness and lower biases, the researcher used various recruitment sources, such as online and offline. For the online sources, the researcher recruited respondents using random emails and various social media platforms. For the offline sources, the researcher distributed the survey questionnaire randomly to diverse groups of people in shops, clinics, hospitals, and in urban and rural areas.

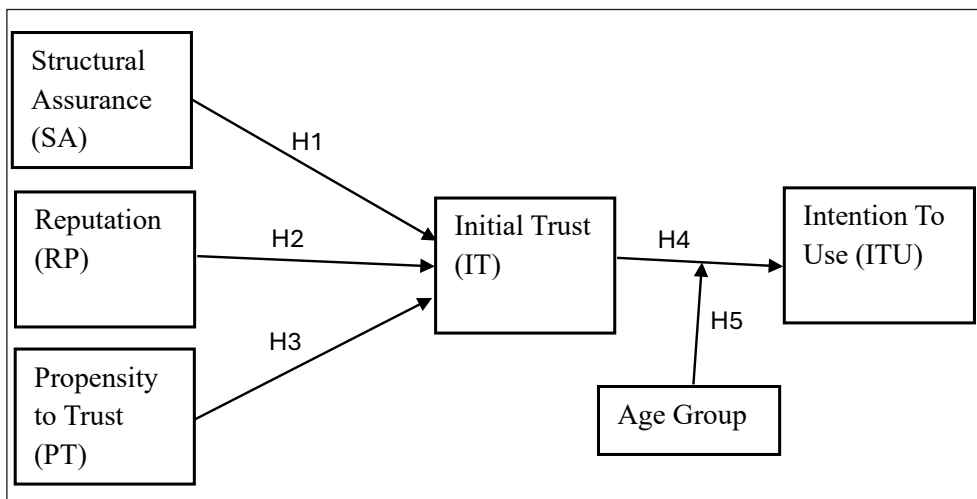


Figure 1. Research framework

Instrumentation

The survey questionnaire was separated into two parts. Part A collects demographic data of the survey participants, such as age, education level, and others. Part B was the measurement instruments of all the variables of this research. Variables are measured by a 5-point Likert scale. 4 questions for structural assurance were adapted from McKnight et al. (2002a), 3 questions for reputation were adapted from Kim et al. (2009), and 1 question for reputation was adapted from Zha et al. (2018). 4 questions of propensity to trust were adapted from Park & Tussyadiah (2020). 4 questions for initial trust were adapted from Fan et al. (2020), and 1 question of initial trust was adapted from Gu & Wei (2020). 4 questions of intention to use were adapted from Venkatesh & Bala (2008).

Data Collection, Data Preparation, and Analysis

Primary data were collected from Malaysians who have reached the majority age. The questionnaires were distributed randomly to avoid bias by hand as well as via the internet. According to Sekaran and Bougie (2016), data analysis aims to achieve three primary objectives: determining the nature of the data, evaluating its quality or accuracy, and validating the study hypotheses. The data were tabulated into an MS Excel file and subsequently exported to IBM SPSS Statistical Software 26 and Smart PLS 4. The data were first checked for missing values and outliers. Descriptive statistics were calculated using SPSS

statistical software to generate a visual representation of the data. The next steps were to examine the reliability, factor loading, convergent validity, discriminant validity, and multicollinearity of the data to verify its reliability and validity. Smart PLS 4 was used for this analysis. To ensure the survey questions' validity and reliability, questions with low factor loading were removed. The researcher used Cronbach's Alpha and composite reliability to examine the internal consistency of the instruments. Hair et al. (2021) suggested that Cronbach's Alpha and composite reliability should be higher than 0.70. The average variance extracted (AVE) was used to evaluate convergent validity. Hair et al. (2021) also suggested that the AVE score must be higher than 0.5. The Heterotrait-Monotrait (HTMT) ratio was used by the researcher to assess discriminant validity. HTMT ratios should not be higher than 0.9 (Hair et al. 2021). The variance inflation factor (VIF) was used to assess multicollinearity. The VIF value should not be higher than 0.5. The predictive relevance of the model was examined by using the coefficient of determination, R^2 . Subsequently, a 5,000 resample bootstrapping procedure in SMART PLS was performed to assess the path coefficient's significance. The correlation coefficients were analysed for hypothesis testing.

RESULT

Participants' Demographics

Table 1 shows the demographics of survey participants.

Table 1
Demographics

Profile	Breakdown	Frequency	Percentage
Gender	Male	153	51.00%
	Female	147	49.00%
Marital Status	Single	118	39.33%
	Married	179	59.67%
	Divorced	3	1.00%
Age Group	18 - 28	69	23.00%
	29 - 38	73	24.33%
	39 - 48	66	22.00%
	49 - 58	67	22.33%
	59 and above	25	8.33%
Education level	High School	31	10.33%
	Diploma	31	10.33%
	Degree	164	54.67%
	Postgraduate (MBA, PhD, DBA)	57	19.00%
	Others	17	5.67%

Internal Consistency Reliability

The reliability issue is related to whether the measurement instruments provide consistent results under different situations and at different times. As recommended by Hair et al. (2017), the Cronbach’s Alpha values should be more than 0.7. The composite reliability rho_a, on the other hand, offers a

more realistic evaluation of dependability; the acceptable values of rho_a normally range from 0.7 to 0.95 (Hair et al., 2017). The measurement instruments’ composite reliability and Cronbach's Alpha values all fulfilled the suggested benchmark, as shown in Table 2. Thus, the reliability of measurement instruments was established.

Table 2
Internal consistency reliability

Variable	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)
Initial Trust (IT)	0.893	0.895	0.921
Intention to Use (ITU)	0.908	0.910	0.935
Propensity to Trust (PT)	0.901	0.905	0.931
Reputation (RP)	0.933	0.939	0.952
Structural Assurance (SA)	0.801	0.804	0.870

Convergent Validity

According to Sekaran and Bougie (2016), convergent validity is demonstrated when two distinct instruments measuring the same concept exhibit a substantial correlation with one another. The Average Variance Extracted (AVE) was utilised to evaluate the constructs' convergent validity. Hair et al. (2021) stated that 0.50 is the lowest permissible AVE. A construct is considered to explain at least 50% of the observed variation in its items if its AVE is 0.50 or above (Hair et al., 2017). Table 3 shows the convergent validity result for all variables in this research, since AVE for every construct is higher than the 0.5 benchmark. Therefore, convergent validity was validated.

Discriminant Validity

Discriminant validity in a structural equation model refers to a construct's uniqueness or distinctiveness in relation to other constructs (Hair et al., 2017). Discriminant validity was established when two variables are found to be empirically not correlated, according to Sekaran and Bougie (2016). This research employed the Heterotrait-Monotrait (HTMT) ratio to assess discriminant validity. Developed by Henseler, the HTMT ratio is based on a multitrait-multimethod matrix to test discriminant validity. As recommended by Henseler et al. (2015), the maximum threshold of the HTMT ratio is 0.9. As shown in Table 4, all HTMT ratios are less than 0.9; thus, discriminant validity was validated.

Table 3
Convergent validity

Variable	Average Variance Extracted (AVE)
Initial Trust (IT)	0.701
Intention to Use (ITU)	0.783
Propensity to Trust (PT)	0.773
Reputation (RP)	0.833
Structural Assurance (SA)	0.625

Table 4
Discriminant validity HTMT

	Age	IT	ITU	PT	RP	SA	Age × ITU
Age							
IT	0.176						
ITU	0.245	0.708					
PT	0.057	0.589	0.407				
RP	0.156	0.358	0.363	0.192			
SA	0.198	0.791	0.713	0.464	0.500		
Age × ITU	0.147	0.255	0.320	0.155	0.259	0.368	

Multicollinearity

The existence of substantial correlation among two or more independent variables is known as multicollinearity. The presence of multicollinearity will result in an inability to calculate the regression coefficients accurately. Thus, the estimation of regression coefficients will not be reliable (Sekaran & Bougie, 2016). To examine multicollinearity, the Variance Inflation Factor (VIF) was used for this research. Multicollinearity issues may exist if the VIF value is 5 or higher (Grewal et al., 2004). Thus, the maximum threshold for VIF is 5. Tables 5 and 6 show the VIF values for the outer model and the inner model. All VIF values are lower than the threshold of 5. Thus, this outcome demonstrates no multicollinearity issue, as shown in Table 5 and 6.

Table 5
VIF- Outer model

Variables	Items	VIF
Initial Trust	IT 1	3.227
	IT 2	3.091
	IT 3	2.338
	IT 4	2.005
	IT 5	1.993
Intention to Use	ITU 1	3.449
	ITU 2	3.893
	ITU 3	2.742
	ITU 4	2.473
Propensity to Trust	PT 1	3.820
	PT 2	3.349
	PT 3	1.916
	PT 4	2.730
Reputation	RP 1	3.276
	RP 2	3.683
	RP 3	3.263
	RP 4	3.658
Structural Assurance	SA 1	2.346
	SA 2	2.434
	SA 3	1.801
	SA 4	1.582

Table 6
VIF- Inner model

Path	VIF
Propensity to Trust → Initial Trust	1.197
Reputation → Initial Trust	1.228
Structural Assurance → Initial Trust	1.426
Initial Trust → Intention to Use	1.081
Age group x Initial Trust → Intention to Use	1.075

Common Method Bias

To enhance the validity and reliability of these research findings, a common method bias analysis was carried out to ensure that correlations among variables are not exaggerated by employing a single measurement source (Richardson et al., 2009). This research used Harman’s single-factor test to analyse common method bias. From Harman's single-factor test of this study, the first unrotated factor explained 42% variability, which is less than the 50% threshold. Thus, the validity of the study's findings is unlikely to be affected by common method bias.

R-square and Adjusted R-square

The coefficient of determination, or R², was employed to assess the predictive relevance of the model. R² is a number ranging between 0 and 1. Greater explanatory power is indicated by a higher R² score. As a general guideline, an R² value higher than 0.75 was considered strong, 0.5 was considered moderate, and 0.25 was considered weak (Hair et al., 2017). As shown in Table 7, the R² values were considered moderate for all the endogenous variables of this research.

The coefficient of determination, Initial Trust, is 0.537, implying that 53.7 per cent of the variation in the dependent variable can be attributed to the independent variables. The coefficient of determination of Intention to use is 0.449, which explains that 44.9% of the variation in intention to use was influenced by exogenous variables.

Path Coefficients and Hypothesis Testing

To examine the significance of the path coefficients, a bootstrapping procedure in Smart PLS 4 was carried out using 5,000 subsamples, and path coefficients were analysed to determine the significance of the structural equation model relationships. If the path coefficient value is negative, the relationship is an inverse relationship.

The P-value and the t-statistic are considered in the evaluation. According to Hair et al. (2021), the t-statistic needs to be greater than 1.960 for a significant relationship to be evident. In the meantime, when the P-value is lower than 0.05, it indicates significance. Table 8 displayed the path coefficients and effect size of the structural equation model relationships of this research. Figure 2 shows the structural equation model used in this study.

The path coefficient of structural assurance to initial trust was statistically significant. The original sample estimate (β) was 0.531, indicating a positive relationship. The t-statistic was 9.256, which was greater than the critical value of 1.96 for a two-tailed test at the 95% significance level, suggesting that the relationship was statistically significant.

Table 7
Coefficient of determination R²

Endogenous Variable	R-square	Adjusted R-square
Initial Trust	0.537	0.532
Intention to Use	0.449	0.443

Table 8
Path coefficients and effect size

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	f ²	t- statistics	P values	Decision
H1 SA → IT	0.531	0.530	0.057	0.426	9.256	0.000	Supported
H2 RP → IT	0.046	0.047	0.049	0.003	0.932	0.351	Not Supported
H3 PT → IT	0.307	0.307	0.049	0.170	6.285	0.000	Supported
H4 IT → ITU	0.588	0.589	0.044	0.580	13.147	0.000	Supported
H5 Age × IT →ITU	0.142	0.141	0,045	0.036	3.171	0.002	Supported

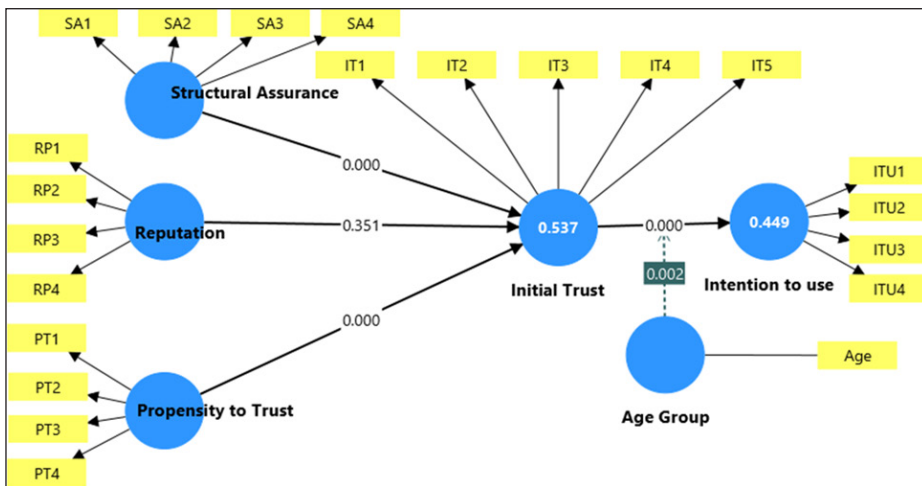


Figure 2. Structural equation model

The p-value was 0.000, which was below the threshold of 0.05, further confirming the significance of the path. Thus, structural assurance had a significant positive effect on initial trust, supporting the hypothesised relationship.

The path coefficient of reputation to initial trust was statistically insignificant. The original sample estimate (β) was 0.046, indicating a positive relationship. The t-statistic was 0.932, which was lower than the critical value of 1.96 for a two-tailed test at the 95% significance level, suggesting that the relationship was statistically insignificant. The p-value was 0.351, which was above the threshold of 0.05, further confirming the insignificance of the path. Thus, reputation had an insignificant positive effect on initial trust, not supporting the hypothesised relationship.

The path coefficient of propensity to trust to initial trust was statistically significant. The original sample estimate (β)

was 0.307, indicating a positive relationship. The t-statistic was 6.285, which was greater than the critical value of 1.96 for a two-tailed test at the 95% significance level, suggesting that the relationship was statistically significant. The p-value was 0.000, which was above the threshold of 0.05, further confirming the significance of the path. Thus, propensity to trust had a significant positive effect on initial trust, supporting the hypothesised relationship.

The path coefficient of initial trust to intention to use was statistically significant. The original sample estimate (β) was 0.588, indicating a positive relationship. The t-statistic was 13.147, which was above the critical value of 1.96 for a two-tailed test at the 95% significance level, suggesting that the relationship was statistically significant. The p-value was 0.000, which was above the threshold of 0.05, further confirming the significance of the path. Thus, initial trust had a significant positive effect on

intention to use, supporting the hypothesised relationship.

The path coefficient of the age group as a moderator of the relationship between initial trust and intention to use was statistically significant. The original sample estimate (β) was 0.142, indicating a positive relationship. The t-statistic was 3.171, which was above the critical value of 1.96 for a two-tailed test at the 95% significance level, suggesting that the moderation effect was statistically significant. The p-value was 0.000, which was above the threshold of 0.05, further confirming the significance of the path. Thus, age group significantly moderates the relationship between initial trust and intention to use, supporting the hypothesised relationship.

DISCUSSION

The main objective of this research was to examine the acceptance and intention to use VHC in Malaysia based on the Initial Trust model as the theoretical foundation.

This research outcome demonstrated that the relationship between structural assurance and initial trust in VHC (H1) was supported ($P < 0.05$). This research outcome is similar to the research conducted by Kimiagari and Baei (2022) on the acceptance and usage of internet banking; the lack of structural assurance could make it more difficult to form initial trust among consumers. Furthermore, the research conducted by Xue et al. (2023) on patients' distrust behaviour on online medical platforms showed that the absence of structural assurance has a significant effect on distrustful behaviour.

The presence of structural assurance will form initial trust and reduce perceived risk. For online services, such as VHC, structural assurance comprises elements like reliable connectivity, robust internet, online assistance, consistent performance, governance, data encryption, patient data protection, and privacy.

This research outcome showed that the relationship between reputation and initial trust in VHC (H2) was not supported ($P > 0.005$). Although some prior research has demonstrated a positive correlation between reputation and the initial trust variable, other research suggests no significant correlation. For example, the research conducted by Lokshina et al. (2022) showed that reputation did not significantly impact the formation of initial trust in autonomous vehicles. The process of initial trust formation in VHC is complex and multi-dimensional, with numerous factors intertwined with each other, including structural assurance, propensity to trust, perceived risk, perceived usefulness, and others. Reputation is a subjective factor that can be misled by personal expectations and biases. Marketing tricks, fake testimonials, artificial intelligence (AI) generated social media followers, deceptive reviews, and paid practitioner endorsements may impact reputation. Consumers find it challenging to verify and confirm the validity of this information. Furthermore, as VHC brands are still in the developing stage in Malaysia, limited brand awareness weakens the reputation's effect in influencing the intention to use, as compared to other variables such as structural assurance.

This research outcome showed that the relationship between propensity to trust and initial trust in VHC (H3) was supported ($P < 0.005$). This outcome is similar to the research findings of Nourallah (2023) on the acceptance of financial-robot advisors, where propensity to trust had a significant positive impact on initial trust. Consumers who are more likely to trust will feel more comfortable in navigating, exploring, and using online services. They also feel more confident in the safety, efficacy, and advantages of online services, including VHC. Furthermore, consumers with a high propensity to trust are more likely to communicate with online service providers in an open, honest, and mutually beneficial manner to learn more about the services and thus increase their initial trust in VHC.

This research outcome demonstrated that the relationship between initial trust and intention to use VHC (H4) was supported ($P < 0.05$). This outcome is similar to the research findings of Nourallah (2023) on the acceptability of financial-robot advisors, in which initial trust was significantly related to the intention to use. This relationship demonstrated the strongest positive relationship (t-statistic of 13.147) among other relationships in this research. One of the most important steps in developing positive attitudes and intentions to use VHC is for consumers to first develop trust in these services. The decision-making process for selecting online services, especially VHC, heavily relies on initial trust due to the complex nature of providing personal data, medical records, and the online healthcare delivery process.

This research outcome showed that the age groups of survey respondents moderated the relationship between initial trust and intention to use VHC (H5), which was supported ($P < 0.05$). This outcome is similar to the research finding of Terblanche & Kidd's (2022) on non-directive reflective coaching chatbots, where the age groups of respondents moderated the relationship between perceived usefulness and intention to use. Furthermore, the research conducted by Merhi et al. (2021) on consumer mobile banking also demonstrated that the age groups moderated the relationship between initial trust and intention to use. Values vary through the age groups; the younger age group may place more importance on innovation and convenience, while the older age group may give greater importance to safety and reliability. Furthermore, digital natives (younger generations who were born during the digital age) are more familiar with online services and rely less on initial trust to form the intention to use VHC.

CONCLUSION

Implications of the Study

This research has both theoretical and practical important implications. From the theoretical perspective, this research validates and reinforces the credibility and generalisability of the initial trust model in explaining technology acceptance, including VHC, which are becoming more important in the post-pandemic era. This research outcome revealed that initial trust had a significant positive relationship with intention to use VHC. This research outcome

validates that structural assurance and propensity to trust in predicting intention to use. Structural assurance (institutional-based trust mechanism) is important in the formation of initial trust that leads to the intention to use VHC. This research outcome reveals that initial trust formation is also consumer-driven (propensity to trust), highlighting the important roles of individual-level psychological factors in the formation of initial trust. Thus, this research addressed the research gap by expanding the pool of literature in this subject matter.

From a practical perspective, VHC providers and developers should focus on enhancing structural assurance mechanisms, such as a clear privacy policy, data encryption, robust systems, online support, assurances, and dispute-resolution policies. The policymakers and government agencies, such as the Ministry of Health, should develop a comprehensive regulatory framework to govern VHC providers and introduce official accreditation and certification processes for VHC to communicate and endorse the safety, quality, and legitimacy of services.

Since propensity to trust plays a significant role in the formation of initial trust, and age group moderates the relationship between initial trust and intention. This outcome also suggests that providers of VHC should develop targeted communication strategies, such as testimonials from past users, certifications from authorities, and free trial consultation sessions, for prospective customers who are low in propensity to trust and prospective

customers who are from different age groups. Healthcare professionals should explicitly inform patients about the VHC procedures and how patients' data are stored and protected to reduce the anxiety of consumers and increase the willingness to use VHC.

Stakeholders who gain benefits from this research outcome are: 1) Consumers: will experience safer, better access, and trustworthy VHC. 2) VHC providers will gain valuable insight about the formation of initial trust in VHC, improving the trustworthiness of VHC, enabling better communication and service delivery. 3) Platforms and applications developers, this research outcome provides useful insight for developers to develop robust, user-friendly interfaces and secure VHC platforms. 4) Policymakers gain support to establish regulations and standards that support the healthy growth of the VHC ecosystem, and 5) Future research and educators will benefit from the theoretical and empirical insights of this study on how initial trust was formed and how technology was accepted.

Lastly, Initial trust in VHC is influenced by cultural norms in Malaysia as well, including respect for authority, collectivist beliefs, and reliance on community advice. People's trust assessments and general acceptability of VHC are further influenced by structural issues, such as government initiatives and differences in technology literacy. This research outcome also suggests social and ethical implications, including the need to address digital disparities, create culturally informed trust, ensure patients'

data privacy, and maintain transparency to uphold ethical standards and improve user confidence in VHC.

Limitations and Recommendations for Future Research

This research used the positivist, quantitative, cross-sectional research design based on the Initial Trust Model to study the factors influencing intention to use VHC. Factors affecting the intention to use VHC are multi-dimensional; other variables may have an impact on the intention to use VHC. Therefore, future researchers can adopt other underpinning theories to develop the research framework. To investigate the deep contextual understanding and subjective experience of customers, future researchers can use other research approaches, such as qualitative research or mixed methods. Future researchers may consider using longitudinal research time horizons to examine the changes in respondents' behavioural intention over time. Future research might apply more demographic variables, such as income level, to examine the moderating effects of these variables on the relationships. Furthermore, future research can consider increasing the sample size to further enhance the representativeness of the sample.

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REFERENCES

- Al Mamun, A., Naznen, F., Yang, M., Yang, Q., Wu, M., & Masukujjaman, M. (2023). Predicting the intention and adoption of wearable payment devices using hybrid SEM-neural network analysis. *Scientific Reports*, 13(1), Article 11217. <https://doi.org/10.1038/s41598-023-38333-0>
- Alharbey, M., & Van Hemmen, S. (2021). Investor intention in equity crowdfunding: Does trust matter? *Journal of Risk and Financial Management*, 14(2), Article 53. <https://doi.org/10.3390/jrfm14020053>
- An, S., Eck, T., & Yim, H. (2023). Understanding consumers' acceptance intention to use mobile food delivery applications through an extended technology acceptance model. *Sustainability*, 15(1), Article 832. <https://doi.org/10.3390/su15010832>
- Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (3rd ed.). Routledge.
- Che, M., Say, S. Y. A., Yu, H., Zhou, Q., Shu, J., Sun, W., ... Xu, H. (2023). Investigating customers' continuous trust towards mobile banking apps. *Humanities and Social Sciences Communications*, 10(1), 1-10. <https://doi.org/10.1057/s41599-023-02483-3>
- Cheng, X., Fu, S., & de Vreede, G. J. (2021). Determinants of trust in computer-mediated offshore software-outsourcing collaboration. *International Journal of Information Management*, 57, Article 102301. <https://doi.org/10.1016/j.ijinfomgt.2020.102301>
- Dewi, C. S., & Dominggus, A. (2024). Analysis of structural assurance, integrity, ease of

- use and brand image on trust in use of P2P lending. *International Journal of Business, Law, and Education*, 5(1), 386-397. <https://doi.org/10.56442/ijble.v5i1.393>
- Fan, W., Liu, J., Zhu, S., & Pardalos, P. M. (2020). Investigating the impacting factors for healthcare professionals to adopt artificial intelligence-based medical diagnosis support systems (AIMDSS). *Annals of Operations Research*, 294, 567-592. <https://doi.org/10.1007/s10479-018-2818-y>
- Farooq, A., Dubinina, A., Virtanen, S., & Isoaho, J. (2021). Understanding dynamics of initial trust and its antecedents in password managers adoption intention among young adults. *Procedia Computer Science*, 184, 266-274. <https://doi.org/10.1016/j.procs.2021.03.036>
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.
- Gallardo, M. O., Dela Torre, J., & Ebardo, R. (2024). The role of initial trust in the behavioural intention to use telemedicine among Filipino older adults. *Gerontology & Geriatric Medicine*, 10, 1-10. <https://doi.org/10.1177/23337214231222110>
- Garrouch, K. (2021). Does the reputation of the provider matter? A model explaining the continuance intention of mobile wallet applications. *Journal of Decision Systems*, 30(2-3), 150-171. <https://doi.org/10.1080/12460125.2020.1870261>
- Grewal, R., Cote, J. A., & Baumgartner, H. (2004). Multicollinearity and measurement error in structural equation models: Implications for theory testing. *Marketing Science*, 23(4), 519-529. <https://doi.org/10.1287/mksc.1040.0070>
- Gu, Z., & Wei, J. (2021). Empirical study on initial trust of wearable devices based on product characteristics. *Journal of Computer Information Systems*, 61(6), 520-528. <https://doi.org/10.1080/08874417.2020.1779150>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer.
- Hamadeh, A. H., Nouraldeem, R. M., Mahboub, R. M., & Hashem, M. S. (2025). Auditors' intention to use blockchain technology and TAM3: The moderating role of age. *Administrative Sciences*, 15(2), Article 61. <https://doi.org/10.3390/admsci15020061>
- Harris, M. T., & Rogers, W. A. (2023). Developing a healthcare technology acceptance model (H-TAM) for older adults with hypertension. *Ageing & Society*, 43(4), 814-834. <https://doi.org/10.1017/S0144686X21001069>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Jiang, J., Yang, M., Kiang, M., & Cameron, A. F. (2021). Exploring the freemium business model for online medical consultation services in China. *Information Processing & Management*, 58(3), Article 102515. <https://doi.org/10.1016/j.ipm.2021.102515>
- Kim, G., Shin, B., & Lee, H. G. (2009). Understanding dynamics between initial trust and usage intentions of mobile banking. *Information Systems Journal*, 19(3), 283-311. <https://doi.org/10.1111/j.1365-2575.2007.00269.x>
- Kim, H. H., & Han, E. (2020). The application of the theory of planned behaviour to identify determinants of donation intention: Towards the comparative examination of positive and negative reputations of nonprofit organisations

- CEO. *Sustainability*, 12(21), Article 9134. <https://doi.org/10.3390/su12219134>
- Kimiagari, S., & Baei, F. (2022). Promoting e-banking actual usage: Mix of technology acceptance model and technology-organisation-environment framework. *Enterprise Information Systems*, 16(8–9), Article 1894356. <https://doi.org/10.1080/17517575.2021.1894356>
- Kline, R. B. (2023). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.
- Kuen, L., Schürmann, F., Westmattellmann, D., Hartwig, S., Tzafrir, S., & Schewe, G. (2023). Trust transfer effects and associated risks in telemedicine adoption. *Electronic Markets*, 33(1), Article 35.
- Leonard, L. N., & Jones, K. (2021). Trust in C2C electronic commerce: Ten years later. *Journal of Computer Information Systems*, 61(3), 240-246. <https://doi.org/10.1080/08874417.2019.1598829>
- Lin, X., & Wu, R. Z. (2021). An empirical study on the dairy product consumers' intention to adopt food traceability technology: Push–pull–mooring model integrated with D&M ISS model and TPB with ITM. *Frontiers in Psychology*, 11, Article 612889. <https://doi.org/10.3389/fpsyg.2020.612889>
- Lokshina, I., Kniezova, J., & Lanting, C. (2022). On building users' initial trust in autonomous vehicles. *Procedia Computer Science*, 198, 7-14. <https://doi.org/10.1016/j.procs.2021.12.205>
- Mailizar, M., Almanthari, A., & Maulina, S. (2021). Examining teachers' behavioural intention to use e-learning in teaching of mathematics: An extended TAM model. *Contemporary Educational Technology*, 13(2), Article ep298. <https://doi.org/10.30935/cedtech/9709>
- McKnight, D. H., Cummings, L. L., & Chervany, N. L. (1998). Initial trust formation in new organisational relationships. *Academy of Management Review*, 23(3), 473-490. <https://doi.org/10.5465/amr.1998.926622>
- McKnight, D. H., Choudhury, V., & Kacmar, C. (2002a). Developing and validating trust measures for e-commerce: An integrative typology. *Information Systems Research*, 13(3), 334-359. <https://doi.org/10.1287/isre.13.3.334.81>
- McKnight, D. H., Choudhury, V., & Kacmar, C. (2002b). The impact of initial consumer trust on intentions to transact with a website: A trust-building model. *The Journal of Strategic Information Systems*, 11(3-4), 297-323. [https://doi.org/10.1016/S0963-8687\(02\)00020-3](https://doi.org/10.1016/S0963-8687(02)00020-3)
- McKnight, D. H., Liu, P., & Pentland, B. T. (2020). Trust change in information technology products. *Journal of Management Information Systems*, 37(4), 1015-1046. <https://doi.org/10.1080/07421222.2020.1831772>
- McKnight, P. E., & Kashdan, T. B. (2009). Purpose in life as a system that creates and sustains health and well-being: An integrative, testable theory. *Review of General Psychology*, 13(3), 242-251. <https://doi.org/10.1037/a0017152>
- Merhi, M., Hone, K., Tarhini, A., & Ameen, N. (2021). An empirical examination of the moderating role of age and gender in consumer mobile banking use: A cross-national, quantitative study. *Journal of Enterprise Information Management*, 34(4), 1144-1168. <https://doi.org/10.1108/JEIM-03-2020-0092>
- Mumtaz, A. M., Ting, H., Ramayah, T., Chuah, F., & Cheah, J. H. (2017). Editorial: A review of the methodological misconceptions and guidelines related to the application of structural equation modelling: A Malaysian scenario. *Journal of Applied Structural Equation Modeling*, 1(1), 1-13. [https://doi.org/10.47263/JASEM.1\(1\)01](https://doi.org/10.47263/JASEM.1(1)01)
- Ng, S. W., Hwong, W. Y., Husin, M., Ab Rahman, N., Nasir, N. H., Juval, K., & Sivasampu, S. (2022). Assessing the availability of teleconsultation

- and the extent of its use in Malaysian public primary care clinics: Cross-sectional study. *JMIR Formative Research*, 6(5), Article e34485. <https://doi.org/10.2196/34485>
- Nourallah, M. (2023). One size does not fit all: Young retail investors' initial trust in financial robo-advisors. *Journal of Business Research*, 156, Article 113470. <https://doi.org/10.1016/j.jbusres.2022.113470>
- Omar, N. N., Che Zainal, C. N. A. S., Abdul Rashid, M. S., Hassan, N. H., Abd Malek, S. N., & Abu Bakar, A. S. (2023). Framework analysis on the adoption of digital healthcare services among senior citizens by using the extended technology acceptance model (ETAM). *F1000Research*, 12, Article 1551. <https://doi.org/10.12688/f1000research.137009.1>
- Octavius, G. S., & Antonio, F. (2021). Antecedents of intention to adopt mobile health (mHealth) application and its impact on intention to recommend: An evidence from Indonesian customers. *International Journal of Telemedicine and Applications*, 2021, Article 6698627. <https://doi.org/10.1155/2021/6698627>
- Park, S., & Tussyadiah, I. P. (2020). How guests develop trust in hosts: An investigation of trust formation in P2P accommodation. *Journal of Travel Research*, 59(8), 1402-1412. <https://doi.org/10.1177/0047287519884654>
- Parzi, M. N. (2024, October 16). Growing medical costs present major challenges for healthcare sector. *NST Online*. <https://www.nst.com.my>
- Richardson, H. A., Simmering, M. J., & Sturman, M. C. (2009). A tale of three perspectives: Examining post hoc statistical techniques for detection and correction of common method variance. *Organisational Research Methods*, 12(4), 762–800. <https://doi.org/10.1177/109442810933283>
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education Limited.
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill-building approach* (7th ed.). John Wiley & Sons.
- Tan, Y. R., Tan, M. P., Khor, M. M., Hoh, H. B., Saedon, N. I., Hasmukharay, K., ... Khor, H. M. (2022). Acceptance of virtual consultations among older adults and caregivers in Malaysia: A pilot study during the COVID-19 pandemic. *Postgraduate Medicine*, 134(2), 224-229. <https://doi.org/10.1080/00325481.2021.2004792>
- Terblanche, N., & Kidd, M. (2022). Adoption factors and moderating effects of age and gender that influence the intention to use a non-directive reflective coaching chatbot. *SAGE Open*, 12(2), 1-16. <https://doi.org/10.1177/21582440221096136>
- Thong, H. K., Wong, D. K. C., Gendeh, H. S., Saim, L., Athar, P. P. B. S. H., & Saim, A. (2021). Perception of telemedicine among medical practitioners in Malaysia during COVID-19. *Journal of Medicine and Life*, 14(4), 468. <https://doi.org/10.25122/jml-2020-0119>
- Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39(2), 273-315. <https://doi.org/10.1111/j.1540-5915.2008.00192.x>
- Wan, Y., Peng, Z., Wang, Y., Zhang, Y., Gao, J., & Ma, B. (2021). Influencing factors and mechanism of doctor consultation volume on online medical consultation platforms based on physician review analysis. *Internet Research*, 31(6), 2055-2075. <https://doi.org/10.1108/INTR-10-2020-0589>
- Wang, H., Zhang, J., Luximon, Y., Qin, M., Geng, P., & Tao, D. (2022). The determinants of user acceptance of mobile medical platforms: An investigation integrating the TPB, TAM, and patient-centred factors. *International Journal of Environmental Research and Public Health*, 19(17), Article 10758. <https://doi.org/10.3390/ijerph191710758>

- Weck, M., & Afanassieva, M. (2023). Toward the adoption of digital assistive technology: Factors affecting older people's initial trust formation. *Telecommunications Policy*, 47(2), Article 102483. <https://doi.org/10.1016/j.telpol.2022.102483>
- Wu, R. Z., Lee, J. H., & Tian, X. F. (2021). Determinants of the intention to use cross-border mobile payments in Korea among Chinese tourists: An integrated perspective of UTAUT2 with TTF and ITM. *Journal of Theoretical and Applied Electronic Commerce Research*, 16(5), 1537-1556. <https://doi.org/10.3390/jtaer16050086>
- Wu, M., & Yuen, K. F. (2023). Initial trust formation on shared autonomous vehicles: Exploring the effects of personality-, transfer- and performance-based stimuli. *Transportation Research Part A: Policy and Practice*, 173, Article 103704. <https://doi.org/10.1016/j.tra.2023.103704>
- Xue, J., Deng, Z., Wu, T., & Chen, Z. (2023). Patient distrust toward doctors in online health communities: Integrating distrust construct model and socio-technical systems theory. *Information Technology & People*, 36(4), 1414-1438. <https://doi.org/10.1108/ITP-03-2021-0197>
- Yan, M. C., Zhang, M., Pak, A., Zeng, H., & Li, Y. (2023). The roles of trust and its antecedent variables in healthcare consumers' acceptance of online medical consultation during the COVID-19 pandemic in China. *Healthcare*, 11(9), Article 1232. <https://doi.org/10.3390/healthcare11091232>
- Yu, H., & Han, E. (2021). Developing a measure for online shopping mall reputation (OSMR). *Sustainability*, 13(7), Article 3818. <https://doi.org/10.3390/su13073818>
- Zha, X., Yang, H., Yan, Y., Liu, K., & Huang, C. (2018). Exploring the effect of social media information quality, source credibility and reputation on informational fit-to-task: Moderating role of focused immersion. *Computers in Human Behaviour*, 79, 227-237. <https://doi.org/10.1016/j.chb.2017.10.038>
- Zin, K. S. L. T., Kim, S., Kim, H. S., & Feyissa, I. F. (2023). A study on technology acceptance of digital healthcare among older Korean adults using extended TAM (extended technology acceptance model). *Administrative Sciences*, 13(2), Article 42. <https://doi.org/10.3390/admsci13020042>

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