Pertanika J. Soc. Sci. & Hum. 20 (2): 375 - 390 (2012)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

Regional Development of Penang: A Shift-Share Approach

Au Yong Hui Nee

School of Management, Universiti Sains Malaysia, 11800 Pulau Pinang, Malaysia

ABSTRACT

The aftermath of the Global Economic Crisis 2008/09 presents many countries with great challenges to capitalize on their competitive advantages. Understanding the characteristics of the Penang industry, the locomotive of the Northern Corridor Economic Region (NCER), is a crucial step toward formulating a strategy aimed at improving competitiveness in the recovering economy. The objective of this paper is to develop a shift-share model by analysing the industrial mix characteristics and its state competitiveness potential factors for economy development in Penang in order to compare state growth against national development. This study examined the economic competitiveness of the Penang economy using Gross Domestic Product (GDP) and employment data to determine the competitive position of the state. This study provided policy-makers systematic insights into the characteristics of the Penang industry so as to analyse the contributor of the state comparative advantage by targeting industries with strategy and implications which offer significant future growth opportunities.

Keywords: Employment, implications, Northern Corridor Economic Region (NCER), Penang, strategy, and shift-share analysis

INTRODUCTION

Malaysia recorded growth rate of over 7% in 1986 to 2000, except during the global financial crisis in 1998-99. However, the country did not reach 7% of growth rate after 2000. The Gross Domestic Product (GDP) growth was slowed down from 6.3% in 2007 to 4.6% in 2008 and further to retract 1.7% in 2009 (Table 1). Based on United Nations Conference on Trade and Development (UNCTAD) Foreign Direct Investment (FDI) Database, FDI inflows contributed up to 20% of gross domestic product (GDP) in most of the years from early 1980 to 2006 (except for 1990-6 which was up to 26.7%) and dropped to merely 3.5% in 2009, whereas the FDI outflows attained an average of 7% in 1995-2005, crossed the US$10 Billion mark in 2007, and maintained above 20% even during the global recession year 2009 (Table 2 and Table 3). In quantum basis in US Dollar (*see*

Article history:
Received: 25 April 2010
Accepted: 3 November 2010

E-mail address:
ayhn@yahoo.com

ISSN: 0128-7702

TABLE 1
Gross Domestic Product (GDP) Growth rate (%) in Malaysia, 1986-2009

Year	86-91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09
%	7.2	7.8	8.3	8.7	9.8	10.0	7.5	-7.5	6.1	8.5	0.3	4.1	5.8	6.8	5.3	5.8	6.3	4.6	-1.7

Source: Bank Negara Malaysia Annual Report, 1986-2008
Source: BERNAMA 24th February 2010 for 2009

TABLE 2
FDI Inflows as a percentage of Gross Fixed Capital Formation (GFCF)

Malaysia	1980-4	1985-9	1990-6	1997-9	2000-4	2005	2006	2007	2008	2009
Percentage	11.9	8.7	26.7	17.0	12.7	15.2	20.1	21.2	16.8	3.5

Source: UNCTAD FDI Database

TABLE 3
FDI Outflows as a percentage of Gross Fixed Capital Formation (GFCF)

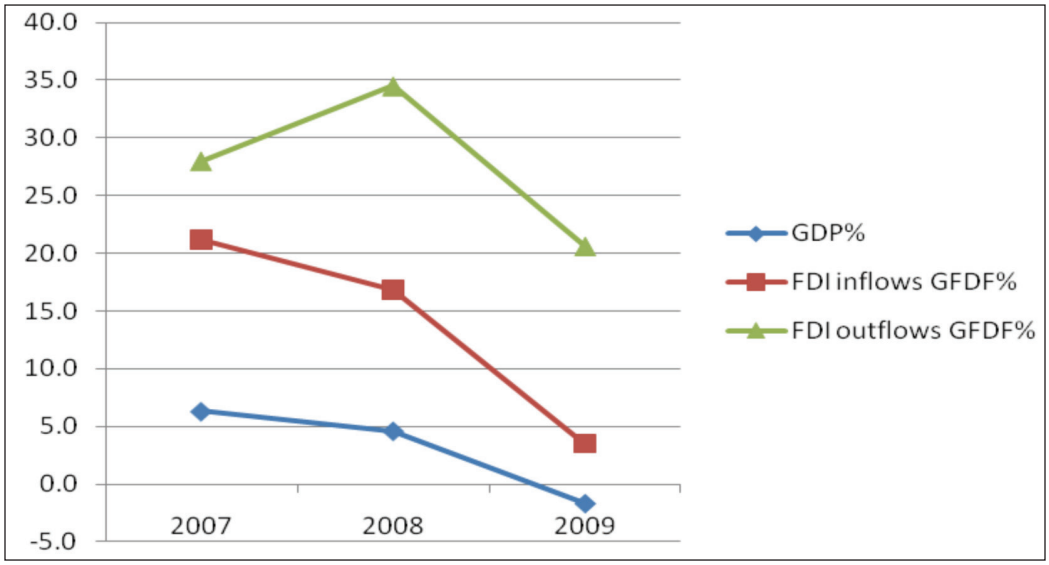
Malaysia	1995-2005 (Average)	2006	2007	2008	2009
US$ million	1,983	6,084	11,280	14,988	8,038
Percentage (%)	7.0	N/A	28.0	34.5	20.6

Source: UNCTAD FDI Database

Fig.1) in economy growing year of 2008, the FDI outflow was slightly two times of FDI inflows, while it was about seven times of FDI inflows during the global recession in 2009. The economy growth pattern was very much affected by the FDI inflows.

As shown in the Northern Corridor Economic Region (NCER) Blueprint, the Northern Corridor Economic Region (NCER) located in the north of Peninsular Malaysia encompasses the states of Perlis, Kedah, Penang and the four northern districts of Perak. It covers a land area of 2.4 million hectares which accounts for 7.28% of Malaysia's total land area. The region has a population of 4.29 million people. It also accounts for 21% of Malaysia's manufacturing investments, and contributes to 20.1% of Malaysian GDP (NCIA, 2007). Over the period since industrialization in the 1970s, Penang's economic growth, which has been largely based on export of electronics products, grew at an average of 8% per year. Penang is the third largest economy in Malaysia, after Selangor and Johor.

The technique of shift-share has been increasingly used in regional economic analysis and planning since 1960. Meanwhile, data of Gross Domestic Products (GDP) and employment have been used to provide a picture of the regional economy. The Shift-Share model lends itself to the analysis of the total growth in each economic sector as a composite of growth due to the national growth, growth due to the unique industrial mix of the region, and growth attributable to the competitive share



Source: Bank Negara Annual Reports, UNCTAD FDI Database

Fig.1. GDP Growth Rate vs. FDI Inflows and Outflows as GDP percentage

of the region. Industry Mix Effect captures that portion of the industry divergence that is due to the difference between a states composition of industry and the composition of that country's total. Regional Effect measures the effect of differential growth of various industries compared to average national industries. The shift-share model attempts to separate the causes of change into a shift and a share. The technique is based on the assumption that local economic growth is explained by the combined effect of three components, namely, national share, industry mix, and regional shift. The shift-share technique provides a simple, straightforward approach to separating out the national and industrial contributions from local growth. The actual change in a variable over some given periods is different from its expected change which is determined using benchmark figures. This difference or residual is examined and explained further by a shift and a share. As an analytical tool for this objective, principal component analysis was adopted for the investigation of regional characteristics. Thus, each component's contribution to the local economic growth can be determined. In addition, the shift-share technique may be used to identify a local economy's competitive industries, the industry that outperforms its counterpart at the national level. A shift-share analysis is one way to account for the competitiveness of a region's industries and to analyse the local economic base. This analysis is primarily used to decompose employment changes within an economy over a specific period. It paints a picture of how well the region's current industries perform by systematically examining the national, local, and industrial components of employment change. A

shift-share analysis will provide a dynamic account of the total regional employment growth that is attributable to the growth of the national economy, a mix of faster or slower than average growing industries, and the competitive nature of the local industries.

LITERATURE REVIEW

Regional economy development and policy decision-making are closely related. Carlton (1983) showed that location and employment choice of new firm branches are linked via duality theory. Bauer and Cromwell (1989) found that firm births are positively associated with low wages, low taxes, and a large number of existing firms. The attraction of new firms is an important goal of local economic development policies, which often provide public-sector financial incentives. Their results support the position that bank structure and profitability are significant factors in facilitating economic development. The researchers concluded that since bank credit is an important source of financing for new firms, the differences in bank structure could affect local economic development and growth. Munnel (1992) proposed that only cost-benefit studies could determine which infrastructure projects should be implemented, and while reforms to grant programmes and pricing should occur, the infrastructure investment should not be held off as the public infrastructure investment provides immediate economic stimulus and has a significant and positive effect on output and growth.

In the past, some studies used the shift-share model which was applied in selected industries in Malaysia. Mohd. Arshad and Radam (1997) focused on the export performance of selected electrical and electronics (E&E) products. Chandran and Pandiyan (2004) recommended improvement in diversity, clusters, education, research and development to sustain the progress of high technology industries.

On the other hand, research with application of the shift-share model is rather limited. Ismail and Nik Muhammad (2009) described the growth in Kelantan through shift share analysis. Mondal (2009) developed a Shift-Share model for analysing the unique industrial mix of the East Coast Economic Region (ECER) and its local competitiveness potential for economic development. Mohd Ghazali (2007) found that the manufacturing sector in the Northern Region State, comprising the states of Penang, Kedah, Perak and Perlis, recorded Gross Domestic Product (GDP) contributions as follows: Penang (43.1%), Kedah (21.9%), Perak (16.5%) and Perlis (13.4%), respectively.

OBJECTIVE OF STUDY

The objective of this paper was to develop a Shift-Share model by analysing the industrial mix characteristics and its local competitiveness potential factors for economy development in the state of Penang, and to compare the regional growth against the national development.

METHODOLOGY

Shift-share analysis was used to analyse the composition of the growth of Penang in the 1990s. The shift-share analysis enabled the author to isolate the competitive position of a state from the impact on it of national trends and the industrial mix of GDP that existed in the state at the beginning of the time period being studied. The data were analysed both on a ten-year. The technique of analysis utilised the national GDP data extracted from the Economic Planning Unit (EPU) of the Prime Minister's Department, the state's Gross Regional Products (GRP) data from Penang Statistics published by Socio-Economic and Environmental Research Institute (SERI), and the employment data obtained from the Labour Force Survey conducted by the Department of Statistics (DOS). For the purpose of this research, the growth in five main economic sectors of Malaysia was analysed for the period of 1990-2005. In the case of this study, the data period was selected due to its availability from SERI. Furthermore, it would reflect the achievement of the Five Year Malaysia Plan (MP), namely, from 5MP to 7MP (1990-2000) and 6MP to 8MP (1995-2005). Using the Shift-Share model, the economic performance of Penang in each of its major economic sector could be decomposed to analyse the growth occurring during a period of time. Industries which saw an increase in GDP greater than that implied by Malaysia's overall GDP growth rate are said to have experienced positive net shifts in growth, and conversely for negative net shifts. These shifts in growth were then decomposed into sources of divergence, namely, industry mix effect and regional effect, from which implications for Penang's characteristics of GDP growth could be drawn. The author first investigated the impacts of productivity and output change on employment change in these states by employing the methodology explained by Lann (2005) and Paytas (2002).

$$E_{i,r}^{t_t} \quad (1)$$

Notation:

is employment or GDP in industry *i* in region *r* at time *t*

If there is no industry subscript, it indicates total employment or GDP in the region

If "*r*" is for regional subscript, "*n*" indicates Nation

The technique separates growth into three components; national growth, industrial structure, and regional competition.

National (growth) share estimates the total employment or GDP in industry *i* in the region if industry *i* in the region grows at the same rate as the nation, i.e. derived from the base year of region employment or GDP times the total percent national change.

$$NS_{i,r} = E_{i,r}^{t_0} * \frac{E_n^{t_1}}{E_n^{t_0}} \quad (2)$$

Industry Mix Share estimates the change in employment or GDP in industry *i* based on the

$$IM_{i,r} = E_{i,r}^{t_0} * \left(\frac{E_{i,n}^{t_1}}{E_{i,n}^{t_0}} - \frac{E_n^{t_1}}{E_n^{t_0}}\right) \quad (3)$$

difference in the growth rates between industry *i* nationally and the entire national economy, which was derived from region

industry (base year) times the national growth rate and minus total national growth rate.

Regional "shift" estimated the change in employment or GDP in industry *i* in the region based on the difference in the growth rates between the industry *i* in the region and the industry *i* nationally derived from the region industry (base year) times region growth rate minus total national growth rate.

$$RS_{i,r} = E_{i,r}^{t_0} * \left(\frac{E_{i,r}^{t_1}}{E_{i,r}^{t_0}} - \frac{E_n^{t_1}}{E_n^{t_0}}\right) \quad (4)$$

Putting it all together is the shift-share formula for regional growth (Total Employment or GDP Change):

Shift-Share = National Growth Share + Industrial Mix Share + Regional Shift

$$SS=NS+IM+RS \quad (5)$$

The first step was to identify those industries with very large positive or negative absolute changes. These will be the industries with the greatest likelihood for potential job opportunities. Secondly, the author looked at the local share column. This column gave the first indication as to whether the local area was performing well or poorly and also helped to identify the industry sectors in which the local area might have a comparative advantage. As the local share is larger than the industrial mix, and both figures are positive, these indicate that the local area may have some comparative advantages. Once completed, the analysis provides a representation of the changes in employment growth or decline, and it is useful for targeting industries that may offer significant future employment opportunities.

The shift-share analysis is a technique used to analyse sources of change in the regional economy, decompose regional economic growth by components and disaggregate regional employment change into three component parts. The results interpreted from the shift-share analysis are listed below:

a. National (Growth) Share (NS): changes in the regional economy/ local job attributable to changes in the national economy.

b. Industrial Mix Share (IM): changes in the regional economy/ local employment attributable to the mix of industries.

c. Regional/Local Shift (RS): changes in regional employment due to unique local factors, or regional competitiveness.

FINDINGS AND ANALYSIS

GDP Growth Performance

Shift-Share (1990-2000):

9,325 = 7,778 +2,186 + (-639)

Shift-Share (1995-2005):

7,873 = 10,801 +2,620 + (-5,548)

As shown in Tables 4 and Table 5, the GDP National Growth Share (Column 10), i.e. a decomposition of Penang's net, shifted in the economy growth by industry up to 2000 and 2005, revealing Penang's strong economy growth performance in

TABLE 4
GDP Growth Performance (1990 – 2000)

GDP (1987 constant prices)	GDP State				GDP National				National Growth Share	Industrial Mix Share	Local Share
Industry	1990	2000	State Change	State Change %	1990	2000	National Change	National Change %			
Agriculture, forestry, fishing	228	228	(1)	0%	17,308	18,662	1,354	8%	225.4	(207.5)	(18.6)
Mining & Quarrying	23	191	168	717%	9,968	15,385	5,417	54%	23.1	(10.4)	155.0
Manufacturing	3,394	7,860	4,466	132%	26,060	67,250	41,190	158%	3,349.6	2,015.4	(899.3)
Construction	250	418	169	68%	3,750	6,964	3,214	86%	246.2	(32.4)	(45.1)
Tertiary	3,987	8,511	4,524	113%	48,892	102,297	53,405	109%	3,934.4	420.6	168.8
Total	7,882	17,208	9,326	118%	105,977	210,557	104,580	99%	7,778.3	2,185.7	(639.2)

TABLE 5
GDP Growth Performance (1995 – 2005)

GDP (1987 constant prices)	GDP State				GDP National				National Growth Share	Industrial Mix Share	Local Share
Industry	1995	2005	State Change	State Change %	1995	2005	National Change	National Change %			
Agriculture, forestry, fishing	216	321	105	48%	17,114	21,018	3,904	23%	172.9	(123.5)	55.4
Mining & Quarrying	163	182	19	12%	13,643	16,387	2,744	20%	129.9	(97.2)	(13.3)
Manufacturing	5,935	9,171	3,236	55%	45,174	107,237	62,063	137%	4,743.0	3,410.9	(4,917.9)
Construction	439	363	(76)	-17%	7,411	9,596	2,185	29%	350.8	(221.4)	(205.4)
Tertiary	6,761	11,350	4,589	68%	83,283	145,547	62,264	75%	5,403.4	(348.5)	(466.4)
Total	13,515	21,387	7,872	58%	166,625	299,785	133,160	80%	10,800.7	2,620.2	(5,547.6)

Manufacturing and Tertiary. Overall, Penang experienced slower growth from 118% in the year 2000 to 58% in 2005, with the share of manufacturing reduced from 46% to 43%, while tertiary increased from 49% to 53% in the same period. On the other hand, the outputs of agriculture products had decreased marginally at 0.31% and constructions experienced a relatively slow growth at 68% during the 1990 – 2000 period, while mining and quarrying grew slower at 12% and a minus growth at -17% for the construction industry for the period up to 2005. Up to 2005, as the National Growth Share of 10,801 was higher than State Growth Share of 7,873, Penang state share should achieve a higher growth if it's the industry composition was same as the national average; nonetheless, all the state industries were found to have under-performed compared to the national growth. In particular, the agriculture growth rate of 48% in Penang was greater than the national agriculture growth average of 23% for the period 1995 to 2005, and the regional growth factor was negative for construction for the same period. In term of GDP Industrial Mix Share (Column 11), the regional shift showed industry-wide changes that occurred due to the local factors that affected unique industry mix of the region. It seemed that the Manufacturing and Tertiary industries enjoyed faster growth rate than national average up to 2000, and only the Manufacturing industry enjoyed a faster growth rate than national average up to 2005. In term of the GDP Local Share (Column 12), Mining and Quarrying, and Tertiary industries were more competitive than the national average businesses up to 2000, and only the agriculture industry was more competitive than the national average businesses up to 2005.

As for its overall growth, more emphasis and support should be given to the tertiary sector as a strong potential growth sector in Penang's economy. In order to tap on the advantage of large area, undeveloped land (especially those located in Seberang Perai) in Penang should be further explored to search for the potential of the agriculture sector which is more competitive than the national average Local share recently.

Mega projects, such as the construction of the second bridge and Butterworth Outer Ring Road (BORR) running through the region, have not always caused big effects on the agricultural sector although they have great effects on the non-agricultural sectors. Thus, the results obtained may shed useful light into the potential of different economic sectors, with significant policy implications towards accelerating the economic growth of the Penang.

Trends in Penang's Employment Growth

Shift-Share (1990-2000):

168 = 163 +117 + (-112)

Shift Share (1995-2005):

146 = 174 +61 + (-89)

To supplement the analysis, the same shift-share technique was applied to its employment (*see* Tables 6 and 7). In term of Employment National Growth Share

TABLE 6
Employment Growth Performance (1990 – 2000)

EMPLOYMENT	Employment State				Employment National				National Growth Share	Industrial Mix Share	Local Share
Industry	1990	2000	State Change	State Change %	1990	2000	National Change	National Change %			
Agriculture & Fishery	25	19	-5.8	-23%	1738	1188	-550	-32%	8.8	-16.7	2.1
Mining & Quarrying	1	1	0.2	40%	37	45	8	20%	0.2	-0.1	0.1
Manufacturing	173	258	84.9	49%	1333	2616	1283	96%	61.5	104.8	-81.5
Construction	34	2	-32.1	-94%	424	845	421	99%	12.1	21.8	-66.0
Tertiary	225	346	120.4	53%	3154	4372	1218	39%	80.2	6.8	33.4
Total	457	625	167.8	37%	6686	9066	2380	36%	162.8	116.7	-111.9

TABLE 7
Employment Growth Performance (1995 – 2005)

EMPLOYMENT	Employment State				Employment National				National Growth Share	Industrial Mix Share	Local Share
Industry	1995	2005	State Change	State Change %	1995	2005	National Change	National Change %			
Agriculture & Fishery	12	28	16	132%	1,493	1,307	(186.2)	-12%	4.3	(5.8)	17.3
Mining & Quarrying	0	1	0	25%	41	42	1.8	4%	0.1	(0.1)	0.1
Manufacturing	215	207	(9)	-4%	2,028	3,200	1,172.8	58%	77.0	47.6	(133.1)
Construction	27	44	17	61%	717	880	163.0	23%	9.8	(3.6)	10.4
Tertiary	231	353	123	53%	3,721	5,430	1,708.3	46%	82.4	23.4	16.6
Total	486	632	147	30%	7,999	10,859	2,859.7	36%	173.7	61.5	(88.7)

(Column 10), a decomposition of Penang's net shifts in employment by industry up to 2000 and 2005 revealed that Penang's strong economy growth performance was in the tertiary industry. Up to 2005, as the National Growth Share of 174 is higher than State Growth Share of 146, Penang state share should achieve higher growth if its industry composition was same as the national average; especially for the main industry i.e. manufacturing, was under-performed compared to the national growth. First, while employment in Agriculture and Construction shrunk in the 2000, employment in manufacturing experienced a negative growth in 2005. Second, while the state's economy growth experienced slower rate from 118% to 58% respectively in 2000 and 2005, the corresponding employment growth was 37% and 30% for the same years, suggesting that the employment added might not constitute high value added jobs. In term of Employment Industrial Mix Share (Column 11), a positive industrial mix share indicated local employment, especially in the manufacturing and tertiary industries which enjoyed faster growth rates than the national total employment average up to 2000 and 2005. In term of Employment Local Share (Column 12), the tertiary and agriculture industries were more competitive in securing additional employment over those due to national growth and its industrial structure up to 2000 and 2005.

Foreign Direct Investment, Small and Medium Enterprises and Growth

Under the Third Industrial Master Plan (IMP3), domestic private investment (DPI) and foreign direct investment (FDI) were targeted to reach a 60:40 ratio by 2020 (MITI, 2006). According to MIDA (2010), the total approved investment for the manufacturing sector amounted to RM32.6 billion, with a 32:68 ratio between domestic private investment and FDI. Domestic investments accounted for RM10.5 billion while FDIs stood at RM22.1 billion in 2009. The Bank Negara Malaysia Annual Report 2009 showed that the gross national savings (GNS) declined for the first time since 2001 to RM207.2 billion from RM270.9 billion in 2008, led to a savings-investment surplus of RM112.7 billion or 17% of the gross national income (GNI) in BNM (2010). The savings-investment gap has to be lowered further by encouraging domestic private investment. Malaysia dropped to the 20th place in the A.T. Kearney Foreign Direct Investment Confidence Index from 16th in 2007. In contrast, UAE and other Gulf countries were among the top 15 most attractive FDI markets in 2010 A.T. Kearney Foreign Direct Investment Confidence Index (A.T. Kearney, 2010). According to A.T. Kearney Middle East, the Small and Medium Enterprises (SMEs) are the simplest and cheapest way for an economy to diversify and create growth; these businesses contribute more to the GDP and the provisions of jobs. Private

ownership, knowledge, entrepreneurial spirit, flexibility and adaptability are key attributes that enable SMEs to rapidly contribute to the success of a nation's economic development and drive additional FDI (A.T. Kearney Middle East, 2010). In a mature market economy, one of the factors contributing to the growth in SMEs has been an increase in outsourcing activity by large enterprises (Smallbone, 2006).

FDI to manufacturing sector recorded the highest and even achieved RM4.6 billion in the local currency, contributed by the depreciation of Malaysian Ringgit during Asia Financial Crisis in 1999 (Table 8). Based on the latest data, as a manufacturing FDI destination, Penang dropped one rank from the fourth to the fifth place, after Sarawak, Selangor, Sabah and Johor, with investments totalling RM2.17 billion in 2009 during the global recession; RM1.45 billion of which came from overseas, as compared the total investments brought in RM10.16 billion in 2008. Penang's electronics and electrical sector recorded the highest investment approved in 2009, with RM608.29 mil despite the labour shortage issue (Table 9).

From early 1990s, there have been studies, such as Jomo (1993), Felker and Jomo (1999), Drabble (2000), Narayanan and Wah (2000), Mirza *et al*. (2004) and Henderson and Phillips (2007), which report that FDI provides limited spill over effects and even causes crowding out of the local SMEs. However, from the mid 1990s, other studies have started reported positive inter-firm linkages (e.g. Rasiah, 1995; Jomo, 2001; Rasiah, 2005; Giroud, 2007; Wong *et al*., 2009). According to Hayter and Edgington (2004), Malaysia lacks the domestic entrepreneurs found in abundance in South Korea and Taiwan. Even there is a dedicated SME Bank, the small and medium-scale enterprises (SMEs) are still facing difficulty in securing financing from banks, bureaucracy issue and insufficient incentives, as presented in the National Domestic Investment Dialogue and Seminar reported by the Star (MITI, 2010). Lim and

TABLE 8
Penang Manufacturing FDI (Ringgit Malaysia, billion)

1997	1998	1999	2000	2001	2002	2003	2004
0.42	1.28	4.60	3.56	3.58	1.99	1.46	1.02

Source: MIDA Annual Report as quoted by Lee (2006

TABLE 9
Approved Manufacturing Projects in Penang

Year	2007	2008	2009
Ringgit Malaysia billion	1.15	10.16	2.17
Ranking by State	5th Rank	4th Rank	5th Rank

Source: MIDA. Malaysia: Performance of the Manufacturing and Services Sectors.

Pang (1991) reported that Taiwanese firms, small and large, were not crowded out by FDI. Lee (2009) suggested that the entry of local enterprises into higher value-added industries in South Korea was made possible not by better opportunities, but by capability building associated with tertiary education and private research and development (R&D). In more specific, Chin (2006) and Lee (2006) suggested strategies to enhance the capabilities of the SMEs in Penang to move up the value chain in response to the new business requirements.

CONCLUSION AND LIMITATION

Regional performances provide a basis to assist policy-planning that aids in the decision-making process in allocating funds among the regions. In this paper, the comparative performance of economic growth, as measured by Gross Domestics Product in Penang, was analysed for the period of 1990 to 2005. The research findings concluded that Penang is a rapidly growing region that primarily dependent upon the services and manufacturing industries up to 2000 and 2005 to advance its economic development. From the analyses, significant implications on the economy of Penang could be drawn. First, the key to sustaining robust economy expansion will continue to emphasize on high value-added electronics sectors. Second, while electronics remain its importance in Penang's GDP growth, higher growth in the tertiary sectors could be obtained if greater efforts were made to expand the information and communication technology industry, as indicated in the Second Penang Strategic Development Plan (PSDP 2). This suggests that the action needed for next stage of Penang development should be improved further based on development expansion policies, such as more open domestic market both for foreign investment and domestic investment. Through NCER blueprint, it stressed that structural changes in the domestic economy could have significant impact on Penang's productivity growth and competitiveness. Thus, Penang can no longer rely on cheap labour, but it should depend on its skills-, knowledge- and technology-capabilities to create a higher value added economy and globally competitive workforce. For this, vocational training and life-long learning are among the efforts done to overcome the issue of lack of technical skills among the industrial workers. The economy will be expanded from predominant assembly and test activities to higher value added activities, including wafer fabrication, chip design, automation design and materials or packaging, Research and Development (R&D), and services, such as tourism and logistics. In addition, private-sector investment of the SMEs should be further encouraged to regain competitiveness. Learning from the experiences of South Korea and Taiwan, and on top of speeding up the capability building policy of the youth enrolment to the tertiary education and R&D spending, further provision of tax and credit concessions are essential in developing the SMEs.

Nevertheless, it is important to note that the shift-share technique is only a descriptive

tool and it should be used together with other analyses to determine a region's economic potential. It does not account for other factors which include the impact of business cycles and the identification of the actual comparative advantages. It is a snapshot of a local economy at two points in time. Thus, the analysis may not offer a clear picture of the local and national economies, as the results are sensitive to the time period chosen. The conclusions of this study could be strengthened if the analyses were made of other time periods or other regions of Malaysia. Therefore, future studies could be improved by using dynamic shift-share formulation (Arcelus, 1984; Barff & Knight, 1988; Harris *et al*., 2004; Li & Huang, 2010), decision tree of industry targeting analysis (McLean & Voytek, 1992), demographically enhanced shift-share model (Brox & Carvalho, 2002), two-category model (Mulligan & Molin, 2004), spatial interaction (Nazara & Hewings, 2004; Fernandez & Mendez, 2005; Márquez & Ramajo, 2005; Evans, 2008), Esteban-Marquillas extension (Toh, Khan & Lim, 2004), decomposition (Felbermayr & Kohler, 2006; Besedes & Prusa, 2007), and incorporation of sectoral structure (Márquez, Ramajo & Hewings, 2009).

REFERENCES

Arcelus, F. J. (1984). An Extension of Shift-Sharing. *Growth and Change 15*(1), 3-8.

A. T. Kearney. (2010). *2010 A.T. Kearney Foreign Direct Investment Confidence Index*. Vienna, Virginia, USA.

A. T. Kearney Middle East. (2010). *FDI into Middle East Benefits SMEs*. 18 May 2010. Retrieved 20 September 2010, from http://www.atkearney.ae/index.php/News/fdi-into-middle-east-benefits-smes.html.

Bank Negara Malaysia. *Annual Report* (Various). Kuala Lumpur.

Barff, R. D., & Knight, III P. L. (1988) Dynamic Shift-share analysis, *Growth and Change, 19*, 1-10.

Bauer, P. W., & Cromwell, B. A. (1989). The Effect of Bank Structure and Profitability on Firm Openings. *Economic Review, 25*, 29-39.

Besedes, T., & Prusa, T. J. (2007). *The Role of Extensive and Intensive Margins and Export Growth*. NBER Working Paper 13268. National Bureau of Economic Research. Cambridge, MA.

Brox, James A., & Carvalho, Emanuel (2002). Sectoral Labour Market Adjustment in the Provinces of Ontario and Quebec. *Canadian Journal of Regional Science*, *25*(3), 405-422.

Carlton, D. W. (1983). The Location and Employment Choices of New Firms: An Econometric Model with Discrete and Continuous Endogenous Variables. *The Review of Economics and Statistics, 65*(3), 440-449.

Chandran, V. G. R., & Pandiyan, V. (2004). Policy Endorsement in High Tech-Export Industries of Malaysia: A Region centric Approach. *National Conference on Research Findings*, 21 February 2004, Malacca, Malaysia.

Chin, Y. W. (2006). Penang Small and Medium Enterprises: Struggle, Accommodation and Challenges. *Akademika, 69*(July), 17-35.

Drabble, H. J (2000). *An Economic History of Malaysia, c. 1800-1990: The Transition to Modern Economic Growth*. Great Britain: Macmillan Press.

Evans, G. K. (2008). Spatial Shift-Share Analysis of the Leisure and Hospitality Sector on the Gulf Coast following Hurricane Katrina. *Southern Agricultural Economics Association Annual Meeting,* 2-6 February 2008, Dallas, TX.

Felbermayr, G. J., & Kohler, W. (2006). Exploring the Intensive and Extensive Margins of World Trade. *Review of World Economics, 142*(4), 642-674.

Felker, G. & Jomo, K. S. (1999). Introduction. In Felker, G., & Jomo, K. S. (Eds.), *Technology, Competitiveness and the State: Malaysia's industrial technology policies* (pp. 1-35). London: Routeledge.

Fernandez, M., & Menendez, A. (2005). Spatial Shift-Share Analysis: New Developments and Some Findings for the Spanish Case. *45th Congress of the European Regional Science Association*. Amsterdam, Netherlands.

Giroud, Axe` le. (2007). MNEs vertical linkages: The experience of Vietnam after Malaysia. *International Business Review*, *16*, 159–176.

Hayter, R., & Edgington, D. W. (2004). Flying Geese in Asia: The Impacts of Japanese MNCs as a Source of Industrial Learning. *Tijdschrift voor Economische en Sociale Geografie (Journal of Economic and Social Geography), 95*(1), 3–26.

Harris, T., Gillberg, C., Narayanan, R., Shonkwiler, J., & Lambert, D. (2004). *A Dynamic Shift-Share Analysis of the Nevada Economy*. Technical Report UCED 94-06. University of Nevada-Reno.

Henderson, J., & Phillips, J. (2007). Unintended consequences: Social policy, state institutions and the 'stalling' of the Malaysian industrialization project. *Economy and Society, 30*(1), 78-102.

Ismail, Nurazleena, & Nik Muhammad, Nik Maheran (2009). Preliminary Study of Regional Development: Case of East Coast Regional Development. *Global Business Summit Conference (GBSC) 2009*. 15-17 June 2009, Selangor, Malaysia.

Jomo, K. S. (1993). Introduction. In K.S. Jomo (Eds.), *Industrialising Malaysia: Policy, Performance, Prospects*. (pp. 1-13). London: Routledge.

Jomo, K. S. (2001). *Southeast Asia's industrialization: Industrial policy, capabilities and sustainability*. Basingstoke, NY: Palgrave.

Lann, R. (2005). *Shift-Share Analysis (Mix and Share Analysis)*. Retrieved 26 August 2009 from http://www.gatech.edu.

Lee, H. K. (2006). *Enhancing Global Competitiveness for Penang Electronics and Electrical Small and Medium Industries Through Improving Linkage Programmers* (Doctoral dissertation). Universiti Teknologi Malaysia, Malaysia.

Lee, K. (2009). *How Can Korea be a Role Model for Catch-up Development? A 'Capability-based View'*. Research Paper No. 2009/34. United Nations University – World Institute for Development Economics Research (UNU-WIDER).

Li, H., & Huang, L. (2010). The Competitiveness of Hong Kong's Travel Industry: A Dynamic Shift-Share Analysis. *Tourism Economics, 16*(3), 665-684.

Lim, L., & Pang, E. F. (1991), *Foreign Direct Investment and Industrialization in Malaysia, Singapore, Taiwan and Thailand*. Paris: OECD.

Malaysian Industrial Development Authority (MIDA). (2010). *Malaysia: Performance of the Manufacturing and Services Sectors 2009*. Kuala Lumpur.

Ministry of International Trade and Industry (MITI). (2006). *Third Industrial Master Plan (IMP3) 2006 – 2020.* Kuala Lumpur.

Márquez, M. A., & Ramajo, J. (2005). *Shift-share Analysis: Global and Local Spatial Dimensions*. University of Extremadura. Retrieved 23 March 2010, from http://www.gla.ac.uk/media/media_7678_en.ppt.

Márquez, M. A., Ramajo, J. H., & Geoffrey, J. D. (2009). Incorporating Sectoral Structure into Shift-Share Analysis. *Growth and Change, 40,* 594–618.

McLean, M. L., & Voytek, K. P. (1992). *Understanding Your Economy: Using Analysis to Guide Local Strategic Planning* (2nd Ed.). Chicago, Illinois: Planners Press, American Planning Association.

Mirza, H., Giroud, A., Jalilian, H., Weiss, J., Freeman, N. J., & Than, M. (2004). *Regionalisation, foreign direct investment and poverty reduction: The case of ASEAN.* Main Report. Bradford: University of Bradford.

MITI to tackle funding woes faced by SMEs. (24 February 2010). *The Star*.

Mohd. Arshad, Fatimah, & Radam, Alias. (1997). Export Performance of Selected Electrical and Electronic Products. *Second Asian Academy of Management Conference on Towards Management Excellence in 21st Century Asia*, 12-13 December 1997. Kedah, Malaysia.

Mohd Ghazali, & Ruslina. (2007). *Productivity Analysis – Northern Region,* National Productivity Corporation (NPC) Research Report No.62/2007.

Mondal, W. I. (2009). An Analysis of The Industrial Development Potential of Malaysia: A Shift-Share Approach. *Journal of Business and Economics Research, 7*(5), 41-46.

Mulligan, G. F., & Molin, A. (2004). Estimating Population Change with a Two-Category Shift-Share Model. *The Annals of Regional Science, 38*(1), 113-130.

Munnell, A. H. (1992). Infrastructure Investment and Economic Growth. *The Journal of Economic Perspectives*, *6*(4), 189-198.

Narayanan, S., & Wah, L. Y. (2000), Technological Maturity and Development without Research: The Challenge for Malaysian Manufacturing. *Development and Change, 31*, 435–457.

Nazara, S., & Hewings, G. (2004). Spatial Structure and Taxonomy of Decomposition in Shift-Share Analysis. *Growth and Change, 35*(4), 476-490.

Northern Corridor Implementation Authority (NCIA). (2007). *Northern Corridor Economic Region (NCER) Blueprint*. Retrieved 24 December 2008, from http://www.ncer.com.my.

Paytas, J. (2002). *Methods of Regional Analysis: Shift-Share.* Retrieved 24 December 2008, from http://www.andrew.cmu.edu/user/jp87/URED/readings/Shift_Share.pdf.

Penang State Economic Planning Unit (UPEN). (2001). *Second Penang Strategic Development Plan (PSDP 2)*. Pulau Pinang.

Rasiah, Rajah. (1995). *Foreign Capital and Industrialization in Malaysia*, St. Martin's, New York.

Rasiah, Rajah. (2005). *Fostering Clusters in the Malaysian Electronics Industry. Conference of the Latin America Asia-Pacific Economics and Business Association (LAEBA). Second Annual Meeting*. 28-29 November 2005. Raul Prebisch Auditorium, Buenos Aires, Argentina.

Socio-Economic and Environmental Research Institute (SERI)**.** *Penang Statistics* (various issues). Pulau Pinang.

Smallbone, D. (2006). Foreign Direct Investment and SME Development: Some Policy Issues for Transition and Developing Countries. *Entrepreneurship in United Europe: Challenges and Opportunities.* 13-17 September 2006. Sunny Beach, Bulgaria.

Toh, R. S., Khan, H., & Lim, L. (2004). Two-Stage Shift-Share Analyses of Tourism Arrivals and Arrivals by Purpose of Visit: The Singapore Experience. *Journal of Travel Research, 43*(August), 57-66.

United Nations Conference on Trade and Development (UNCTAD) *FDI Database*. (2010). Retrieved 20 September 2010, from http://www.unctad.org/Templates/Page.asp?intItemID=1923&lang=1.

United Nations Conference on Trade and Development (UNCTAD) *World Investment Report*, Various. Retrieved 20 September 2010, from http://www.unctad.org/en/docs/wir2010_presentation_en.pdf.

Wong, K. N., Tang, T. C., & Fausten, D. K. (2009). *Foreign Direct Investment and Services Trade: Evidence from Malaysia and Singapore. Global Economic Review, 38*(3), 265-276.