

Malaysian Textile & Apparel Industry

May, 2007
Volume 9, Issue 5



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INTRODUCTION

Do you know that Alain Delon, Gucci, Adidas, Nike, Reebok, Brooks Brothers, Kohl's, Polo, Ralph Lauren, Calvin Klein, Yves St Laurent, and many more world reknown up-market brands are made by the contract manufacturers in Malaysia? On the other hand, some local brands like British India and John Masters have penetrated into global markets with their superior quality and designs, whilst other home-grown brands such as Somerset Bay, East India Company, Seed, Anakku, and lot of others are striving to expand the domestic middle-class market share as a warm up to venture overseas.

Textile and apparel are basic consumption items, in both developed and developing countries. The industry, especially clothing / apparel, is labour-intensive and requires relatively modest capital to start up and operate. Therefore, developing economies such as China, India, Vietnam, Cambodia, and others, that have pool of low wage rates labours, appeal to the companies seeking off-shore production with cost advantage than the developed countries.

The textile and apparel was once the top three export earners of manufactured goods for Malaysia, and Penang is one of the prominent location for textile and garment makers in the country. Today, Penang / Malaysia, however, is no longer the low wages labour intensive production centre, with the emergence of China and Indochina. Do we still remain competitive in this industry? Is textile and apparel a sunset industry in Malaysia? This article presents briefly Penang / Malaysia's development of the textile and apparel industry, highlights the opportunities and challenges faced by the industry players in Penang / Malaysia, as well as to gauge the prospect and direction of the industry in the context of a changing global textile and apparel market.

OVERVIEW OF THE WORLD TEXTILE AND APPAREL MARKET

For the period of 2000 – 2004, the global textile and apparel market recorded a 2.9 per cent of compound annual growth rate (CAGR) to reach USD 2.3 trillion (or RM9 trillion), with textiles, and apparel and accessories, accounted for about 43.4 per cent and 44.1 per cent respectively (in 2004). Asia pacific region captured more than 50 per cent of the world market, followed by Europe (21 per cent) and the United States (about 16 per cent)¹.

In 2005, a total of USD 70.8 billion worth of apparel and clothing were imported by **United States**, of which 23.7 per cent were from China². The imposition of quotas against China has reduced the imports. Nonetheless, imports of cotton bed linen from India, Pakistan and Brazil rose. The demand of apparel and clothing in the United States continues to grow - upbeat sales were recorded in 2006 in the clothing, superstores, warehouse clubs and accessories stores³.

¹ The Third Industrial Master Plan (IMP3), 2006 – 2020

² Trade', August – September 2006, A MATRADE Publication for Malaysian Exporters, *Malaysia External Trade Development Corporation (MATRADE)*

³ World Textile and Apparel Trade and Production Trends', *Textiles Intelligence; December 2006*

The surge of import from China due to the global quota phase out on textile and apparel trade in January 1, 2005, had caused a misfortune for **European Union** (EU) manufacturers. Nevertheless, when quotas were re-imposed again in mid-2005, the situation started to improve in early 2006. The import of made-in-China clothing and apparels to EU has slowed. Local production in EU stopped falling and orders picked up due to some success in the East European markets. The EU manufacturers have to relocate their lower value textile and clothing production to low cost developing countries, and to venture into higher value interior decoration textiles and technical textiles.

China's exports of textile and apparel increased significantly during the past ten years in transition to a complete phase out of the quotas⁴. According to World Trade Organisation (WTO), the export share of China-made textile and apparel intensified from 13 per cent of world trade value in 1994 to 20 per cent in 2003. When the global quotas on trade in textile and apparel lifted in January 2005, the import data of United States and EU in first quarter of 2005 registered sharp increases in the volume and steep declines in unit prices for the China made textile and apparel products. The quotas were re-imposed by United States and EU in mid-2005 to restrict imports from China. Nonetheless, the exports of China continued to grow steadily in 2006 as the Chinese textile and apparel exporters managed to source for new / alternative markets such as Turkey, Mexico and South Korea.

India is one of the prominent suppliers in the world textile and apparel market. Its export of textile and apparel has grown substantially since the elimination of quotas. The export of textile and apparel to United States, for instance, have increased more than 25 per cent, from USD 588 million (February 2004) to USD 737 million (February 2005)⁵. The modernization effort and provision of textile and apparel parks by the Indian government have enhanced the competitiveness of the industry.

Low production cost and the availability of a large pool of low wage labour gave Vietnam the cost advantage to develop its textile and apparel industry. For the first four months of 2007, the country registered a year-on-year rise of 31.7 per cent of textiles and garments export worth nearly USD 2.2 billion. Vietnam aims to ship USD 7 billion worth of textile and apparel in 2007, compared to USD 5.8 billion last year⁶. The conventional markets for Vietnamese clothing include United States, EU, and Japan.

The exports of USD 3 billion worth of **Indonesian** clothing to United States have positioned the country as the fifth largest textile and apparel supplier to the United States⁷. Indonesia's textile and apparel exports continued to grow steadily in 2006 due to the strong demand in the United States.

The exports of **Thai** apparels have surged in 2006. For the first quarter of 2006, the country's export of garments and clothing accessories increased 11.3 per cent to USD 868.3 million compared to the same period in 2005⁸. The United States was the largest export market for Thai's textile and apparel, accounted for more than 30 per cent of its total textile and apparel exports during the first quarter of 2006. The second and third crucial markets were EU and the rest of ASEAN respectively. However, high costs are putting pressure on the Thailand's garment makers to relocate elsewhere such as in China, Vietnam and Cambodia.

⁴ Global quotas on trade in textiles and apparel ended January 1, 2005. This quota had existed for many decades under the world's Multi Fiber Arrangement, but were phase out over 10 years, starting in 1995, under the World Trade Organisation's (WTO) Agreement on Textiles and Clothing.

⁵ *Major Shippers Report*, February 2005 data. U.S. Department of Commerce

⁶ Vietnam Textile and Apparel Association (Vitas)

⁷ United States and Indonesia Sign Agreement to Prevent Illegal Transshipments of Textiles and Apparel', Sept 26, 2006, Office of the United States Trade Representative

⁸ <http://www.textileworldasia.com/>

MALAYSIAN TEXTILE AND APPAREL INDUSTRY

When the policy shift from import substitution to export oriented industrialization was promulgated in the Second Malaysia Plan (1971-1975), it led to the growth of the textile and apparel industry. Textile and apparel has remained in the second / third ranking in terms of exports value of manufactured goods, before it is overtaken by manufactures of metal, petroleum products, and optical and scientific equipment, from 2003 till present.

In 2006, there were more than 68,000 workers employed by 645 licensed textile and apparel companies in Malaysia (Table 1). The industry is mainly clustered in Johor (Batu Pahat, Segamat, Keluang) and Penang. Batu Pahat, for instance, accounted for nearly 60 per cent of the garment / apparel firms that produce almost 40 per cent of the country's textile and apparel exports in 2005⁹.

Table 1: Malaysia - No. of Companies in Operation for Textiles and Apparel Industry, 1996, 2005 and 2006

Year	No. of Companies		
	1996	2005	2006
Textiles	164	253	n.a.
Apparel	281	342	n.a.
Total	445	595	645



Source: 1996 and 2005 data were derived from *The Third Industrial Master Plan (IMP3), 2006 – 2020*
2006 data was derived from <http://www.mida.gov.my>

Over the past 10 years period (1996-2005), a total of RM4.9 billion of the textile and apparel investments were approved, with nearly 83 per cent of them were in the textiles sub-sector (Table 2). Foreign investments accounted for almost 58 per cent and the majority was in textiles sub-sector. Domestic investments dominated the apparel sub-sector, with a total amount of RM572 million or about 67 per cent.

Table 2: Malaysia - Approved Investment in the Textiles and Apparel Industry

Industry	1996 – 2005 (RM billion)
Textiles	4.093
Foreign	2.568
Domestic	1.525
Apparel	0.852
Foreign	0.280
Domestic	0.572
Total Investment	4.945

Source: Derived from *The Third Industrial Master Plan, 2006 - 2020*

The Malaysian textile and apparel industry comprises two main sub-sectors:

- (i) Textile – encompasses a broad range of activities such as polymerization, spinning, weaving, knitting and wet processing;
- (ii) Apparel – includes garment making and clothing accessories (buttons, zippers, labels and packaging)

Various made-in-Malaysia textile and apparel goods, as listed in Table 3, have gained an excellent reputation in the world market for quality, reliability and prompt delivery.

⁹ The Third Industrial Master Plan (IMP3), 2006 – 2020

Table 3: Made-in-Malaysia's Textile and Apparel Goods

Textiles	Apparels
<ul style="list-style-type: none"> • Fibres • Yarns e.g. cotton yarn, CVC yarn, polyester/cotton yarn, polyester/ rayon yarn, spun polyester yarn, texturised nylon yarn, polyester filament yarn, acrylic yarn, acrylic/ wool blended yarn, worsted and woollen yarn, cotton coarse yarn • Special yarns, textile fabrics and related products • Woven cotton fabrics • Fabrics woven of man-made textile materials • Knitted or crocheted fabrics • Tullies, lace, embroidery, ribbons, trimmings and other small wares • Floor coverings such as carpets and rugs • Home textiles such as bedlinen, table linen, towels • Industrial textiles such as ropes, cords, car seat fabrics, geotextiles, dryer fabrics and press belt 	<ul style="list-style-type: none"> • Jackets • Overcoats • Skirts • T-shirts • Blouses • Pants • Undergarments • Scarves • Handkerchiefs • Headgear such as caps and hats • Textile accessories such as zippers, buttons, sewing thread, industrial thread, embroidery thread, drawstrings, labels, laces, embroidered articles, collars, cuffs, hooks and eyes, tape, polyester padding, interlining, velcro tape, cotton tape and narrow fabric.

Source: Malaysia External Trade Development Corporation (MATRADE)

In 2006, the total export of textile and apparel amounted to RM10.6 billion (Table 4), or the seventh largest contributor to total value of manufactured exports of the country. Although the export share of textile and apparel to the total exports has dropped from 3.5 per cent in 1996 to 1.8 per cent in 2006, its export value, in fact, has increased. The exports of textile and apparel grew at a compound annual growth rate (CAGR) of 4.1 per cent, from RM6.8 billion in 1996 to RM10.6 billion in 2006. The major export markets for Malaysian textile and apparel are United States, European Union, Turkey, and Canada. Among the major Malaysian textile and apparel exporters include Penfabric, Penfibre, Ramatex, Pen Apparel, Canteran Apparel, Tai Wah Garments, Sin Wah Industries, Hytex Apparels, Honsin Apparel, Plas Industries, Esquel, etc. The Malaysian export of textile and apparel accounted for approximately two (2) per cent of the world textile and apparel trade¹⁰.

Import of textiles and apparels, mainly from China, Taiwan, and Japan, have increased by an average annual growth rate of 2.5 per cent, from RM4.1 billion in 1996 to RM5.4 billion in 2006. The import of raw materials, mostly textile yarns, woven and knitted fabrics, was mainly due to the shortage of local supplies, both in quantity and quality.

¹⁰ The share of Malaysian export to the world textile and apparel trade was estimated by Malaysian Textile Manufacturers Association (MTMA).

Table 4: Malaysia – Export and Import of Textile and Apparel Goods, 1996 - 2006

Year	Description	Export	Import
		<i>RM million</i>	<i>RM million</i>
1996	Total	197,026.1	197,279.7
	Textile & Apparel	6,816.0	4,134.2
	<i>Share (%)</i>	<i>3.5</i>	<i>2.1</i>
2000	Total	373,270.3	311,458.9
	Textile & Apparel	10,265.3	5,036.3
	<i>Share (%)</i>	<i>2.8</i>	<i>1.6</i>
2005	Total	533,787.8	434,009.9
	Textile & Apparel	10,289.1	5,033.6
	<i>Share (%)</i>	<i>1.9</i>	<i>1.2</i>
2006	Total	588,949.0	480,492.6
	Textile & Apparel	10,601.9	5,400.0
	<i>Share (%)</i>	<i>1.8</i>	<i>1.1</i>

Source: 1996, 2000 and 2005 data were derived from The Third Industrial Master Plan (IMP3), 2006 – 2020
2006 data was derived from <http://www.matrade.gov.my>



PENANG TEXTILE & APPAREL INDUSTRY

Textile and apparel is a pioneering industry leader that set their foothold in Penang, when the industrialization process started to take place in the early 1970s. Among the prominent players since 70s and still in operation today include Penfabric, Penfibre, The Eastern Garment Manufacturing, South East Garment, etc. There were 52 textile and apparel establishments in Penang in 2006. The jobs offered in the textile and apparel industry accounted for approximately 6.5 per cent of the total employment of the manufacturing industry of the State (Table 5). Most of the larger textile and apparel players in Penang are either fully foreign owned or joint venture, while the smaller establishments are mainly dominated by local small and medium size firms.

Table 5: Penang – No. of Companies in Operation in the Textile and Apparel Industry, 2006

Sectors	Total Companies	Total Employment*	% Contribution to Total Employment
Textile and Apparel	52	14,515	6.5
Others	1,373	208,742	93.5
Total	1,425	223,257	100.0

Source: The Penang Industrial Survey 2006

Table 6 shows the total approved manufacturing projects for both Penang and Malaysia for the period of 2004 - 2006. Out of the total 156 approved manufacturing projects in Penang for 2006, three (3) of them were textile and apparel, with a total capital investment of RM48.6 million and a potential to create 224 employment opportunities.

Table 6: Approved Manufacturing Projects for Penang and Malaysia

	No. of Projects			Potential Employment			Capital Investment (RM million)		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Textile and Apparel									
Penang	0	1	3	0	76	224	0	4.4	48.6
Malaysia	36	35	30	5,865	12,800	2,863	823.9	373.9	821.3
Overall Manufacturing									
Penang	144	148	156	9,235	21,904	13,539	2,030.3	4,624.8	5,350.6
Malaysia	1,101	1,026	1,077	88,634	114,956	88,952	28,773.0	31,057.0	45,993.0

Source: Malaysian Industrial Development Authority (MIDA)

Penang contributes to approximately 50 per cent of the country's total textile and apparel export¹¹. Penfabric, Penfibre, Pen Apparel, The Eastern Garment, United Sweethearts, DNP, Plas Industries, South Island Garment, Dora Knitwear, Amtek Garment, and several others, are among the major exporters from Penang. The major export destinations include United States, EU, Canada, Japan, and Asia Pacific.

CHALLENGES

(i) Stiff Global Competition

According to industry sources, the Malaysian textile and apparel industry is currently undergoing consolidation. For the period 2000-2005, the exports of textile and apparel to the major conventional markets have registered contracted growth (Table 7). Although the exports to Turkey have recorded favorable surge from 2000-2005, the country has imposed quota on Malaysian textile and apparel.

Table 7: Malaysia – Major Export Markets for Textile and Apparel

Textiles	2000	2005	2000-2005
	RM million	RM million	Average Annual Growth (%)
EU	367.2	446.1	3.3
Turkey	79.9	573.5	38.9
USA	294.6	220.4	-4.7
Canada	24.6	16.4	-6.5
Apparel	RM million	RM million	Average Annual Growth (%)
USA	2,947.0	2,707.2	-1.4
EU	1,103.4	970.0	-2.1
Canada	188.2	107.5	-8.9
Turkey	1.8	64.6	81.6

Source: Derived from the Third Industrial Master Plan, (IMP3), 2006 – 2020

¹¹The Penang's export share was estimated by Malaysian Textile Manufacturers Association (MTMA). No official data was obtained from MATRADE / MIDA.

After the removal of quota on global textile and apparel trade in January 2005, there was immense competition from low production cost countries like China, India, Bangladesh, Cambodia, Indonesia, and Vietnam. Major markets such as United States, EU, Japan, and Canada, as depicted by Table 8, have recorded double digit increase for their imports of textile and apparel from those low cost production centers. Furthermore, the Malaysian exporters are expected to face more intense challenges once the United States begin to abolish completely the quotas on China's textile and apparel, on 1 January 2008.

Table 8: Imports of Textile and Clothing by Major Markets by Country of Origin (Percentage change in USD terms, January – November 2006)

	United States	EU-25	Japan	Canada
	% change	% change	% change	% change
Bangladesh	22	34	4	19
Cambodia	25	19	-	21
China	15	10	8	22
India	8	13	12	6
Indonesia	25	19	4	18
Pakistan	12	12	-7	9
Philippines	9	26	-	5
Sri Lanka	2	24	12	-
Thailand	1	11	-2	0
Vietnam	18	51	6	33



Source: <http://www.emergingtextiles.com>

(ii) Shortage of Local Design and Development

Technical experts are often lacking to help grow the industry. The other constraint is tied to availability of funds. These factors have deterred the small and medium size local players from engaging in design and development (D&D) activities in the industry. Unlike the major fashion centers such as Hong Kong, Shanghai and Singapore, Malaysia has limited number of design houses and designers.

(iii) Lack of Skilled Personnel and Training Courses

As a whole, the country does not produce enough textile technocrats, textile machinery and maintenance technicians, colour specialists, fashion designers for textile and apparel, as well as international textiles and apparel merchandisers and marketers.

Only limited training institutions offer courses to cater the needs of textile and apparel industry. If the country is to sustain the growth of the textile and apparel industry, and more importantly, to move up the value chain, the local technical training institutions and universities should conduct courses such as textiles environment control and treatment technology, spinning technology, textiles economic and cost management, quality assurance, control process and management, fibre chemistry and applications in textiles, computer-based automated processes, and etc., to meet the demand of the industry, not only locally but regionally.

(iv) Keep Pace with the Advancement of Technologies

In order to remain competitive, local small and medium size players need to keep pace with the advancement of technologies, utilize and adopt the relevant automation and information and communication technology (ICT) to reduce labour and production costs, streamlining production processes, upgrading existing facilities, improve productivity, enhance product quality, develop new design, shorten delivery time, as well as to equip with latest market information.

OPPORTUNITIES

(i) US–Malaysia Free Trade Agreement

According to the Malaysian Textile Manufacturers Association (MTMA), if the US-Malaysia Free Trade Agreement (FTA) is materialized, it is anticipated that exports from the textile and apparel sector to the United States will double, from the current RM3 billion to RM6 billion, and this will also generate additional 20,000 job opportunities. According to the source from the industry, FTA can be a catalyst to draw more investments, both local and foreign, into the textile and apparel sector in Malaysia.

From the industrialist point of view, the liberalization and eventual removal of tariffs under FTA, is expected to enhance the market access to United States as well as to give an edge or at least a few years head-start to Malaysian exporters over their competitors in non-FTA countries, such as China, Vietnam, Indonesia and Thailand.

Currently, the exports of Malaysian textile and apparel to United States have to pay a high import duty of up to 14.7 per cent and 28 per cent respectively. As such, the elimination of import duties under the FTA is expected to give a competitive advantage to Malaysian textile and apparel industry.

The negotiation of the US-Malaysia Free Trade Agreement (FTA) is still underway. As in all negotiation, striking the balance of interests may not be an easy task. However, the industrialists have entrusted upon the negotiator to act and examine carefully the economic and social impact of the concessions and tariff eliminations under the FTA.

(ii) ASEAN Free Trade Area (AFTA)

ASEAN members, as a condition for participation in the ASEAN Free Trade Area (AFTA), are bounded by the terms of Common Effective Preferential Tariff (CEPT) Scheme, which requires them to reduce tariff rate and eliminate quantitative restrictions and other non-tariff barriers to intra-ASEAN trade. AFTA has been implemented since early 2002, and by 2010, the original six members of ASEAN would have eliminated duties from all products, and for the rest of the four new members, they are required to comply it by 2015. With the implementation of AFTA, ASEAN is currently moving towards deeper economic integration of the region. Through the realization of AFTA, the ASEAN leaders are envisioned to establish the ASEAN Economic Community (AEC) by 2020 – a single market and production base with free flow of goods and services and skilled manpower, as well as capital and investment.

The textile and apparel industry is one of the eleven (11) priority sectors that have been identified for integration aimed at fostering the realization of AEC¹². Apart from tariff elimination, measures are underway to facilitate intra-ASEAN trade and investment, collaboration in marketing, improving customs procedures, as well as the movement of business personnel, professionals and manpower within the region.



PROSPECTS

The outlook of the Malaysian textile and apparel industry is indeed challenging. With the FTA, the industry foresees some 200 per cent increase in exports to the US market; otherwise, a marginal increase of 0 - 3 per cent or perhaps contracted annual growth is anticipated.

Local textile and apparel makers are fearful of the exaggerated competition once the quota imposed by United States on China's textile and apparel is completely removed in 2008. In addition, with more exporting countries to enter into FTAs deal with the United States in the future, the local textile and apparel industry would lose its comparative advantage, especially to the lower cost production centres.

Malaysian contract manufacturers have maintained a good reputation in terms of quality and timely delivery for middle to up-market brands. Almost 90 per cent of the apparel/garments exports of the country are from contract manufacturers. To move up the value chain, the experienced apparel contract manufacturers are advised to explore and embark on own-design manufacturing (ODM), and subsequently move further into creating and developing their own indigenous brands. A quality brand image is the asset of a company that will ensure the products be well-positioned in the market and keep the price war irrelevant. Nevertheless, brand development and promotion is not an easy task. It requires serious commitment of the top management in developing a comprehensive brand strategy for their products. The apparel makers that are serious about developing own brand name should tap the Brand Promotion Grant and work with agencies such as MATRADE that could provide professional advice in brand building.



The Penang / Malaysian textile and apparel players should also venture into high value added products such as higher quality functional fabrics (wrinkle-free, anti-bacteria, ultraviolet protection, and fire resistant), industrial textiles, and home textiles. Other niche products to consider include high-end apparel, bridal gowns and blazers, and ethnic fabrics (*batik* and *songket*).

In addition, to encourage investments in the textiles and apparel industry in the country, several textile products/activities have been gazetted as promoted products/activities under the Promotion of Investment Act, 1986 and could be considered for tax incentives in the form of Pioneer Status or Investment Tax Allowance. These products / activities include natural or man-made fibres, yarn of natural or man-made fibres, woven fabrics, finished knitted fabrics, finishing of fabrics such as bleaching, dyeing and printing, knitwear, skiwear or winter outerwear, non-woven products, elastic webbings and textile hose piping.

CONCLUSION

Although low labour cost is crucial for textile and apparel industry, other factors could be as important. These 'other' factors include labour skills and productivity, availability of workers, availability of executive and managerial personnel, readiness of infrastructure, logistic and supply chain, reliability of suppliers, cost and availability of capital, proximity to markets, business climate, and political stability.

In order to face the challenging future, the local textile and apparel manufacturers need to identify which are the key factors to their operation. They can benchmark and objectively reassess their situation. They should aim to be above the industry's standard to stay competitive and prosper.

The local textile and apparel players can seek opportunities in line with the Third Industrial Master Plan, 2006-2020, where six (6) strategic thrusts have been drawn up for the further development of the Malaysian textile and apparel industry. Initiatives will be undertaken to promote investments, sustain exports and market share of the targeted key areas, and enhance the industry's overall competitiveness.

Textile and Apparel industry is one of the pioneering sectors in Penang that have driven and contributed to the economic growth and industrialization process of the State. Today, the larger and established enterprises are still remaining and they have managed to overcome competition by re-orienting production with technology and quality focus. The industry leaders share a common view. They have expressed the desire that FTA with US would benefit the textile and apparel sector and if it could be realized, that is when the sector would soar again. § **Lim Wei Seong**

SERI would like to thank the following resource persons and institutions for their insights and invaluable contributions to this article:

Ybhg Dato' Y. H. Tan, President, Malaysian Textile Manufacturers Association (MTMA)
Ybhg Dato' O.K. Lee, President, Federation of Malaysian Manufacturers (FMM Northern Branch)
Mr. K. Prabakaran, Senior Sales Manager, New Business Development, Penfabric Sdn Bhd, 'Toray' Malaysia Group
Ms. Audra Chin, Malaysian Textile Manufacturers Association / Malaysian Textile And Apparel Centre
En. Muhd. Shahrulmiza Zakaria, Director, MATRADE Penang
Malaysian Industrial Development Authority (MIDA), Penang
Department of Statistics Malaysia, Penang Branch

New Industries in Southeast Asia's Late Industrialization: Evolution versus Creation The Automation Industry in Penang (Malaysia) considered

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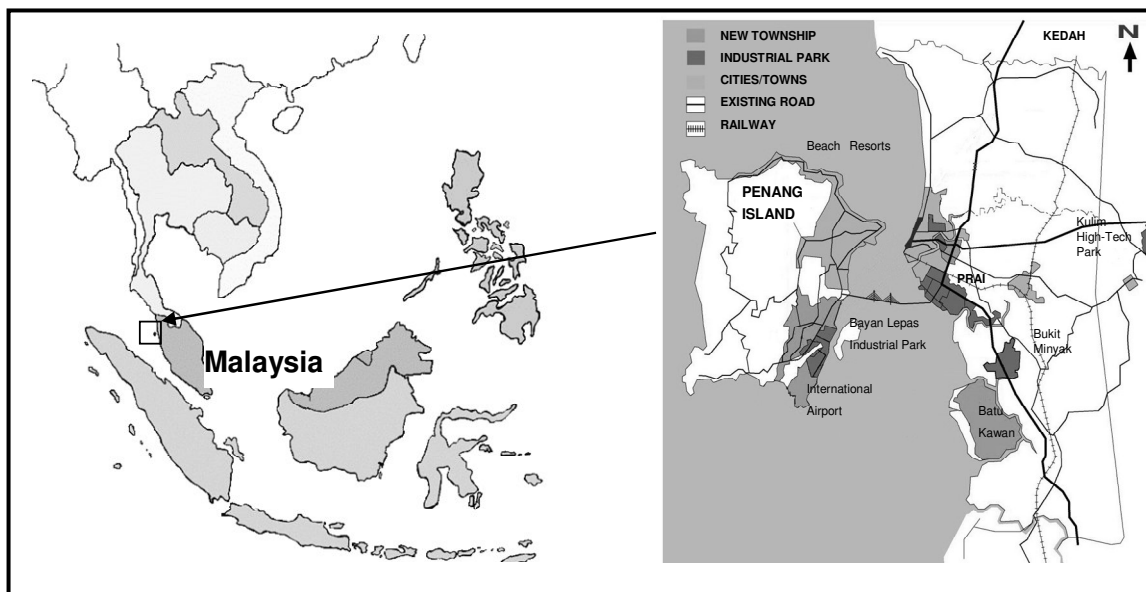


February 2007

THE AUTOMATION INDUSTRY IN THE PENANG COMPLEX

The rapid rise of Penang (Figure 1 and Table 1) as 'Silicon Island' was closely related to the EOI drive, especially in microelectronics, in the early 1980s (van Grunsven & van Westen, 2000). The industrial history of the complex can be divided into three major stages, each of which shows different characteristics, yet building on the path earlier established.

Figure 1 The Penang Export Manufacturing Complex



Part 1 – published in the Penang Economic Monthly, April 2007, Volume 9, Issue 4

Table 1 : Penang Industrial Growth

	1970	1990	2003	growth 1990-2003
(A) No. of Factories (in PDC Industrial Parks)	31	430	713	66%
(B) Employment	3,000	100,953	154,121	53%
(C) Paid-Up Capital (RM)	-	1.1B	7.7B	600%

Source: Invest Penang



During the first ‘branch plant economy’ stage in the 1970s, Penang developed into a satellite platform as – in majority American and European – multinational firms in especially textiles and garments, semiconductors and consumer electronics located in the region. During the second stage, lasting from the mid-1980s till the late 1990s, the complex transformed into a more integrated production economy as human resources, capital and technological deepening in industries occurred; new industries within the same techno-industrial path, like the hard disk drive industry (Haggard, Pao Li and Ong, 1998), emerged; and a more extensive and sophisticated supply structure developed around key firms/industries (Best 1999; Rasiah 2001, 2002; Haggard, Lim & Ong 1998; Doner & Ritchie 2002). The latter contributed to a process in which new industries dominated by local firms started to flourish, aided by systemic coordination deeper and more extensive than elsewhere in Malaysia (Rasiah, 2001, 2002). The genesis of the automation industry rests very much on the foundation of the local support industry.

In the post-Asia Crisis period the complex appears to have become structurally more volatile. It seems to have entered a third phase as the competitiveness profile (Ong 2000) and new industry drivers have begun to ‘test’ dynamism. Turnover of establishments in the main industries has been on the increase. However, some of the key industries developed in the first phase have maintained a remarkable local presence, in particular the semiconductor industry. There has been a further development of new variety through local initiative, like photonics, opto-electronics, computer and software development, and industrial automation (SERI, 2002, 2004).

Although there is now a substantial automation equipment industry in Malaysia, and particularly in Penang, little was known about its genesis, its composition, characteristics, and so on. In discussions with local officials and academics in the framework of a project on the dynamics of the manufacturing complex stories were frequently heard about the rapid growth of this industry. This prompted us to initiate a pilot study in 2005 to uncover its development story².

² The research assistance of Ms. Marscha Aaldering, Masters student in the Faculty of Geosciences, Utrecht University, is gratefully acknowledged here, as well as local support provided by Prof. Goh Ban Lee of the School of Social Sciences, Universiti Sains Malaysia.

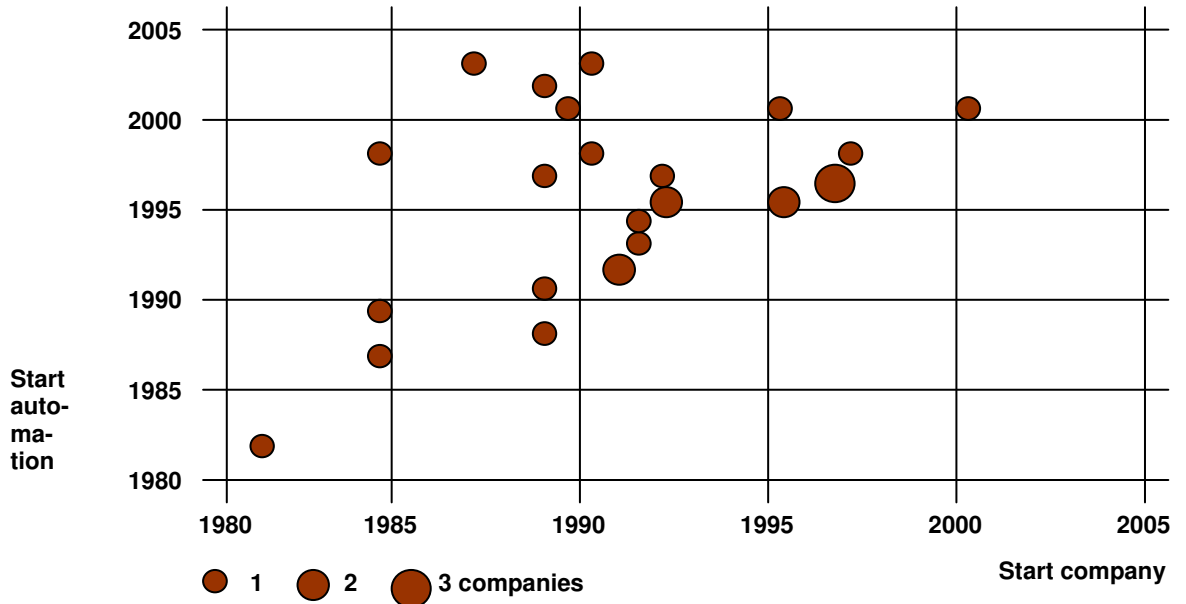
A review of industrial policy in the initial phase revealed that not only was the industry not targeted for 'state-guided' development, but also hardly any mention was made in the Second Industrial Master Plan. A chapter on machinery industry was absent from the Plan, although it received some mention in the context of local support industries (as part of the foundation for developing targeted industry clusters).

A necessary step in the study was the inventarization of firms that belonged to the industry. A number of criteria (related to products manufactured) applied to a range of sources (such as company lists available from the industry division of Penang Development Corporation and from the local Federation of Machinery Producers) resulted in close to 40 company names in the Penang region, which were subsequently contacted to verify their classification as (industrial) automation firm. A few had to be removed from the list; the remainder were approached for an interview. A good response rate resulted in 27 completed interviews, on the basis of which an empirical database could be compiled on the industry in the Penang complex. It should be noted however that the numbers mentioned above may not accurately reflect the size and dynamics of the industry (in the local context). We may have overlooked some firms in the identification exercise; also, as no exit data could be uncovered, there is no insight into firms that had entered the industry at some stage but had already exited before the listing was compiled.

Of the 27 interviewed firms only two were of foreign origin, one from Japan and the other from Canada. Although both are subsidiaries of reputable international companies in the industry (Advantest and ATS Automation), the negligible number of MNC establishments and their small size demonstrate that the industry has not been fuelled by a significant FDI inflow. Initial analysis of local firms reveals that these are a heterogeneous lot. Yet it clearly unveils the genesis and development of the industry as an evolutionary process with a decisive role played by local dynamic – Chinese – entrepreneurship in symbiosis with selected hub firms in the local base of MNCs which have maintained a significant presence in the complex until today. In about two-thirds of the interviewed cases entry into the automation industry involved already existing companies for which automation was a diversification from the hitherto product-portfolio. The remainder were *de novo* firms. As figure 2 demonstrates, the genesis of (industrial) automation activities in the firms may be situated in most cases during the 1990s; in a number of cases even more recently and in only three cases before 1990. But in a substantial number of cases the origin of the company dates (much) further back, i.e. there is a (substantial) time lapse between the establishment of the company and the start of activities in (industrial) automation. There is no clear pattern indicating that *de novo* firms were established more recently vis-à-vis the start of automation activities in the other set of firms.



Figure 2 : Automation Firms In Penang: Start of Automation Activities Relative to Start of The Company



Diversifying firms almost invariably originated earlier through local Chinese entrepreneurship engaging in the production of machine tools, machine parts, metal components, precision components, jigs & fixtures, precision tooling and so on. In a number of cases this is still the core business of the company, in other cases automation is now the core business but the other products are still part of the total product portfolio. In yet other cases further diversification has taken place after the company successfully joined the industrial automation branch. Logically, most of the *de novo* firms had a less broad range of activities, although a few have grown rapidly and have started to diversify within and beyond automation. We encountered a range of organizational structures. As local Chinese firms often organize different lines of business in individual corporate entities, only a minority of pre-existing diversifying firms still have a simple one-corporate entity structure. More common among these is a group structure, that is, a varying number of subsidiaries with a holding company as the owner (e.g. LKT Industrial Berhad, which is among the largest and most well-known local companies in the complex).

Three of the *de novo* companies have also assumed a group structure, reflecting diversification either *within* automation or *beyond, but linked to* automation in rapid growth. An example of the former is ViTrox Corporation, one of the most recently established companies that has grown rapidly specializing in high-speed machine vision inspection systems for the semiconductor industry. An example of the latter is PentaMaster, an often-quoted success story in the industry, not only in Penang but also in Malaysia. We will return to these organizational structures when we discuss capability development in the companies.

Generally, the establishment of most companies, both diversifying and *de novo* ones, conforms very much to the mechanisms in the 'evolutionary model'. As to the diversifying companies, the founder or founders of most of them had an employment history in one of the MNCs in the complex. Only a few came from a different background (e.g. founder acquired experience in related activities) or had a history as far as the pre-MNC period (e.g. established in the 1950s as a foundry). Strikingly, in many cases the founder(s) was employed in the semiconductor industry, Intel Penang being a prominent employer. Entrepreneurs were driven by the desire to set up an own company banking on the experience gained in an MNC and the market opportunities present (in which the former employer also played a role).



The information obtained on the background of these companies and their founders/owners confirms that a substantial local support industry, consisting of local firms, has co-evolved with the operations of MNCs in a number of industries in the complex. Secondly, it reveals that employee start-ups have played a significant role here; that is, the background of founders/owners shows substantial spinout from MNCs to be a major mechanism. Thirdly, it appears that only a small number of 'hub' firms are responsible, with Intel Penang as the major spawning firm in this aspect. Rasiah's 1999 account of the development of a local supporting industry in Penang, the company Eng Teknologi in particular, reveals the main reasons. However, our findings do not corroborate Rasiah's (1999, 2001b, 2001c) argument that the establishment of firms that at a later stage diversified should be attributed to systemic coordination and thus to the (local) state. From the accounts given by the respondents as to how diversification came about (see below), it is apparent that systemic coordination did not play a significant role in this. In this context it may be observed that not until last year through private-public initiative a 'Penang Automation Cluster' (PAC) was established, aiming at collective action in addressing issues currently facing the industry. We will return to this later.

Also in the establishment of *de novo* firms hardly any evidence of a role played by systemic coordination was found. A similar process of spawning of spinouts from a set of MNCs accounts for most of these firms. Founders were mostly former employees of MNCs (frequently in the semiconductor industry) turned entrepreneur (for similar reasons as the founders of diversifying firms). They often possessed substantial engineering skills. Later we will address how they managed to jumpstart their own business. In some cases it took several steps to establish the current company. One example is Pentamaster. Both current CEOs - and co-founders - had served as automation engineers for National Semiconductor and Intel Technology Malaysia. They left these companies to set up the company Penta-Electronics, with a third partner. After a few years it became apparent that the three founders had different ideas as to the direction of

development of the company. It was then decided to discontinue the cooperation. Two went on to establish Pentamaster; the third partner continued the original company with a different name, Pentatronics Technology System. The latter company until today has remained quite small, while Pentamaster became one of the leading companies in the local industry, whose co-founders were awarded Entrepreneur of the Year several times.

When seen in the light of an evolutionary economic perspective on the *spatial* formation of new industries it becomes clear why Penang has become a major location (in Malaysia) for the development of an automation industry. We asked the respondents about specific advantages which Penang (as a region) offers in automation. Many mentioned the local labour market (availability of skilled labour, partly through inter-firm mobility) and the 'technology environment', derived from the general industrial profile of the region. Inter-firm networking is present to some extent, and also appears to play a role in the operation of firms. Agglomeration/localization economies have to a lesser extent been at work. As table 2 shows, varying origin of companies, role of automation activities and development of companies are reflected in substantial differences in the share of automation in the total product portfolio, as well as in the share of employees in automation. The table also reveals substantial heterogeneity in terms of size (measured by number of workers).

While the above indicates the 'origin' of entrants into the industry we still have to deal with the 'conditions' governing entry. As to diversifying firms, moving into industrial automation was often client-driven. Reasons for diversification were only to some extent declining profitability or uncertain market prospects of other lines of business, but most often it was demand from customers for other lines of business (see table 2). This is reflected in the fact that many firms still operate on a custom basis. Not many focus on standard OEM/OBM production, being customer- rather than product-oriented. As MNC establishments in industries marked by rapid technological development of products (e.g. semiconductor, HDD) increasingly required *rapid* process adjustments, they looked for opportunities for this locally and extended local product procurement. This however at the same time led to the emergence of Penang and Malaysia at large as a significant market in its own right – put to advantage by several companies to develop the product portfolio from custom (only) to an increasing proportion of standard and own brand products. Most of the diversifying firms felt that they could meet the challenges that their clients presented to them, as they already had a foundation to build on. As capability extension rather than building a completely new set of capabilities was involved most companies perceived a rather short learning process.

It may be noted in this context that in many cases a discussion about capabilities and competencies was not so easy given varying interpretations. Many companies themselves often judged their capabilities and competencies as being related to the range/nature/quality/specifications of equipment on the production floor. This is also how many companies 'advertise' their capabilities in brochures and on their website. Such embodied capabilities obviously are only part of the picture. Only a few companies – in the capabilities section of their website for instance – referred to the ability to come up with *solutions* (be they design, technology, hardware tolerances, or hardware-software integration) in the context of projects clients award them, and related capabilities identified in the literature. It was apparent that clients assisted virtually all companies in the initial phase of going into full systems supply. This took the forms of design support, the opportunity to observe on the client's production floor, having their engineers stationed in the supplying company for the duration of the project, and so on.



Table 3 shows the main findings as to capabilities and technology development. Most companies felt that capability/competencies extension was primarily a matter of intra-firm learning (internal training offered to employees, learning by doing). In some cases, the solution to deficiencies was sought in tapping into local worker mobility through which skilled workers from competing companies were brought in, or tapping into international skilled worker flows. Regular discussions with clients about product specifications and technical matters were mentioned often as an important component of the learning process. Strikingly, inter-firm collaborative networking or – simpler – inter-firm knowledge exchange was hardly mentioned as a mechanism for learning and extension of capabilities/ competencies. Also strikingly, none of the interviewed companies in this category acknowledged a role of government (in the form of systemic coordination involving e.g. collective training programs, financial assistance) in capability extension. We will come back to inter-firm networking later on.

As to *de novo* companies entrepreneurship by venturing out on their own was certainly not discouraged by the former employer; yet, only in the case of a *small* number of such spinouts did the former employer constitute the initial node in a market network through which *inter alia* orders were secured (see table 2). As revealed in the interviews, in most cases the business did not develop through orders secured from the company where the founder(s) had worked previously (nor the expectation that support in this form would continue for some time). Thus, founders of local *de novo* dedicated firms apparently could not always bank on incumbent firms as an initial market opportunity. Most such companies introduce new activities in the production system rather than function as a division that is being outsourced but still fully dependent on the mother firm. Firms with new activities are the driving force behind an endogenous evolutionary development as they broaden and

deepen the competencies available. Market and product opportunity were mentioned frequently as motivations to venture out on their own, suggesting that *de novo* companies are more product-oriented and seek out niche markets. The fact that custom products feature less prominently in the product portfolio of these companies and that they more often offer OBM lends some support to such an interpretation. The orientation of their product portfolio also does.

In the case of *de novo* companies, initial capabilities are based on the skills ‘transferred’ by the founding entrepreneur(s) from their previous employer, or earlier businesses they had been involved in. While these companies do not show a significantly different pattern of learning it may be assumed that they are marked by a different learning process and curve, to the extent that they lacked the foundation of capabilities/competencies acquired in *related* business. Yet, it appears that the product and technological knowledge that entrepreneurs were able to ‘transfer’ to their own firm has provided sufficient compensation and the basis for product-oriented research and development, resulting in niche products. The findings indeed suggest that *de novo* firms do not perform significantly different compared to diversifying companies, but even better. One characteristic that may be taken as an indicator of performance is export propensity. A independent samples t-test was carried out on this characteristic with diversifying/*de novo* as grouping variable. The resulting t-score (-.882, with $\alpha=0.05$ and under the assumption of equal variance) remains well within the non-significance range (indicated by the upper and lower limits of value with 23 degrees of freedom; the two foreign subsidiaries were excluded from this analysis). Thus there is no significant difference between the two groups as to the mean export propensity. It may be noted that *de novo* firms nonetheless have a lower mean export propensity compared to diversifying companies (45 versus 52%).

Another consideration is the company’s rating of capabilities. We asked companies to rate their capability on a 5-point scale on a number of aspects: market monitoring; marketing; design; custom/ODM/OBM production, low-/middle-/high-end; mechanical and system aspects; software integration and integration of new technology. As to non-production aspects the two groups do not differ substantially in terms of average rating score. A simple cross-tabulation shows that *de novo* firms focus relatively more on production of standard machinery. This is translated in these firms engaging relatively more in ODM and OBM and less in custom production, especially lower-end. Again, t-tests were carried out with each of the aspects listed above as test variables and diversifying/*de novo* as grouping variable. The t-scores obtained again lead to the conclusion that there are no significant differences between the two groups in capabilities (according to their own rating, whereby the element of subjectivity may cause some distortion). Finally, it may be noted that a substantially larger proportion of *de novo* firms disagreed with the proposition that current capabilities are still rather shallow and narrow.

Table 2 : Penang Automation firms: Selected Characteristics A (na = not available)

Firms	Automation share product-portfolio	Custom/Standard Products	Own brand	Export	Employees Company/Group	Employees Automation	Reason introduction/diversification	First client(s) related to employment history?
<i>Advantest Engineering Malaysia</i>	100%	standard	yes	65%	30	30	Market	N/a
<i>ATS Automation Malaysia</i>	100%	standard	yes	80%	50	50	Market	N/a
<i>Excel Precision</i>	100%	both	yes	80%	90	90	market opportunity	N/a
<i>Polytool Integration</i>	100%	both	yes	50%	300	na	market, demand from clients other business	no, to other activities
<i>Greatech Automation</i>	80%	standard	yes	60%	350	130	competition in parts market	no, to other activities
<i>K.K.Choong Engineering</i>	50%	custom	no	30%	60	20	market, demand from clients other business	no
<i>Lis-Tec</i>	35%	custom	no	40%	70	15	market, demand from clients other business	no, to other activities
<i>Alpha Master (M)</i>	15%	custom	no	0%	na	4	market opportunity	no, to other activities
<i>Splendid Growth (M)</i>	100%	custom	no	20%	15	15	market	partly, clients were earlier also clients of previous companies of founder
<i>LKT Automation</i>	100%	standard	yes	80%	na	175	market, demand from clients other business	no, to other activities
<i>Pentatronics Technology System</i>	80%	custom	no	30%	20	15	clients other business	no, to other activities
<i>PentaMaster</i>	80%	standard	yes	70%	300	200	market	no
<i>ER Mekatron</i>	100%	custom	no	50%	40	40	originally expansion from Singapore; later taken over	related to Singapore entrepreneur
<i>Hillton Precision Engineering</i>	60%	custom	no	40%	21	15	clients other business	yes
<i>Gops Equipment Designer</i>	50%	custom	no	10%	na	25	clients other business	no
<i>JSI Systems</i>	100%	custom	yes	50%	15	15	market	no
<i>Vista Equipment Manufacturing</i>	Na	custom	no	70%	100	10	market	no, to other activities group
<i>Brusia Engineering</i>	30%	custom	no	0%	na	na	market	yes
<i>Micro Modular System</i>	100%	both	yes	70%	60	60	market	no, to clients of sister company
<i>UWC Automation</i>	10%	standard	no	0%	na	35	market	no, to other activities group
<i>AT Automation Technology</i>	100%	both	no	30%	150	150	market	no
<i>Wanjun Technology</i>	30%	custom	no	20%	60	10	more value added; safety net	yes
<i>Zoomic Automation</i>	70%	custom	no	50%	60	40	clients	partly
<i>ViTrox Corporation</i>	100%	both	yes	40%	48	48	product opportunity	yes, were working in the same MNC
<i>Prodelcon / Multimatic Systems</i>	30%	both	yes	70%	240	15	clients	yes, but not previous employer; rather existing network
<i>SRM Integration (M)</i>	100%	both	yes	50%	60	60	n/a	yes
<i>Epsilon Technology (M)</i>	48%	custom	no	70%	70	20	clients	yes



Table 3 : Penang Automation Firms: Selected Characteristics B



Firms	Capabilities			Acquired capabilities/learning					Role	Technology Development
	Cutom	ODM	OBM	Intrafirm learning	Workers other firms	Workers abroad	Clients discuss	Observation	Government	
<i>Advantest Engineering Malaysia</i>	high	high	high	yes	yes	yes	yes	yes	no	from parent
<i>ATS Automation Malaysia</i>	high	high	high	yes	yes	yes	yes	yes	no	from parent
<i>Excel Precision</i>	good	good	good	yes	yes	no	yes	no	no	learning by doing
<i>Polytool Integration</i>	high	good	na	yes	no	no	yes	no	no	learning by doing, needs of clients, from abroad
<i>Greatech Automation</i>	high	good	good	yes	yes	yes	yes	no	no	learning by doing, needs of clients, from abroad
<i>K.K.Choong Engineering</i>	good	na	na	yes	no	no	yes	no	no	learning by doing
<i>Lis-Tec</i>	fair	na	na	yes	yes	no	yes	yes	no	learning by doing, networking
<i>Alpha Master (M)</i>	na	na	na	yes	no	no	yes	no	no	learning by doing, needs of clients, from abroad
<i>Splendid Growth (M)</i>	fair	na	na	yes	no	yes	yes	no	no	learning by doing, collaboration with local university
<i>LKT Automation</i>	high	high	high	yes	yes	yes	yes	yes	no	learning by doing, needs of clients, from abroad
<i>Pentatronics Technology System</i>	good	na	na	yes	no	no	yes	yes	no	learning by doing, networking
<i>PentaMaster</i>	high	high	high	yes	no	no	yes	no	no	learning by doing, needs of clients
<i>ER Mekatron</i>	good	na	na	yes	no	no	yes	yes	no	learning by doing, needs of clients
<i>Hilton Precision Engineering</i>	medium	na	na	yes	no	no	yes	yes	no	client specifications, tracking market developments
<i>Gops Equipment Designer</i>	medium	na	na	yes	yes	no	yes	yes	no	acquire skilled labour
<i>JSI Systems</i>	good	good	good	yes	no	yes	yes	no	no	learning by doing, needs of clients
<i>Vista Equipment Manufacturing</i>	good	na	na	yes	no	yes	yes	yes	no	learning by doing, needs of clients
<i>Brusia Engineering</i>	good	good	na	yes	yes	yes	yes	no	no	learning by doing
<i>Micro Modular System</i>	good	good	good	yes	no	yes	yes	no	no	work with MNCs, needs of clients
<i>UWC Automation</i>	medium	medium	na	yes	no	no	yes	no	no	client specifications, tracking market developments
<i>AT Automation Technology</i>	medium	good	na	yes	no	no	yes	no	no	learning by doing
<i>Wanjun Technology</i>	medium	na	na	yes	yes	yes	yes	no	no	acquire skilled labour
<i>Zoomic Automation</i>	high	na	na	yes	yes	yes	yes	yes	no	learning by doing
<i>ViTroX Corporation</i>	good	high	high	yes	no	no	yes	yes	no	learning by doing
<i>Prodelcon/Multimatic Systems</i>	high	high	high	yes	yes	yes	yes	yes	no	know how from clients
<i>SRM Integration (M)</i>	na	good	good	yes	yes	yes	yes	yes	no	client specifications, tracking market developments
<i>Epsilon Technology (M)</i>	high	na	na	yes	no	no	yes	yes	no	trial/error; discussions clients

Notwithstanding the young age of the industry, dynamic trends are already evident. These concerns (amongst others) the following: 1) technological composition of the product portfolio, 2) type of products, 3) type of markets, and 4) geography of markets. As to the first aspect, many companies had started out with simple machines/systems in terms of technological content, design, and systems integration; but they had moved already to more complex machines/systems along with their learning trajectory and capability development. Over the past decade or so, companies were able to enhance capabilities in design; a number subsequently had also expanded into research and development to support the business partnerships with existing clients in the region and were able to expand the client portfolio. This is reflected in a widening of the product portfolio from made to order only to a more diversified one, including own design and own brand manufacturing (table 2). However, most companies acknowledged that they are not yet able to serve the high-end segment of markets. While *de novo* firms generally appear to be more specialized in a limited range of products for specific processes serving 'niche' markets, these companies stated that they still mostly served the low- and middle-end segments.



The higher degree of specialization of *de novo* companies seems to limit them to a narrower range of markets. From the findings it is quite apparent that the industry has already developed an export capability; for many companies the local market is still important – especially for the smaller ones – but only a few companies do not export part of their output. Export varies from as much as 80% to as low as only 10% of output (table 2). Export signals that already a geographical shift of markets is taking place. Many companies commented that the local market actually has limited growth opportunities. In part, this is associated with MNCs in client industries opting to expand elsewhere in the region, especially China (for cost reasons). Thus far this has not (yet) affected the client base as on the one hand Penang companies are still turned to for automation services and on the other hand automation companies have followed MNC clients to new locations. Over half of the companies already have established operations in China, not only marketing/sales and service offices but in a number of cases also manufacturing units. Such overseas presence is used not only to serve existing clients but also to look for new opportunities. Some companies foresee that in due time production is going to be shifted entirely to China, unless new markets in Malaysia (and elsewhere) can be tapped.

For another part local market perception reflects the initial focus of markets on two (local) industries: semiconductor and hard disk drives (focusing on machinery/systems for back-end rather than front-end processes). This is in line with the background of many of the founders. Gradually however, companies seek to diversify markets to different industries, such as the medical devices industry, opto-electronics, photonics and others.

It is precisely for the purpose of further market development that the industry and the state government (in the form of Invest Penang) have recently formed the Penang Automation Cluster. At this point a few further observations may be offered about its establishment and functioning. Notwithstanding minimal attention in federal policy, the involvement of the state government testifies that locally the developments in the industry have not gone unnoticed in economic/industrial management circles. The establishment of the cluster on the one hand acknowledges its potential by the state government. From the perspective of the industry, it is driven mainly – as noted earlier – by collective efficiency considerations in addressing issues concerning its future, especially markets and skills of the entrepreneurs in capturing new markets. An observation here is that the role of the state – rather than a steering one – appears to be limited to providing (logistical) support.

Assistance in the penetration of international and new industry markets appears to be the main focus. There is no attempt at systemic coordination. Another observation is that broad collective action throughout the industry currently appears to be constrained. As it is, certain autonomous developments in the industry appear to be due to the current (lack of) participation in the cluster. Typically, the industry ‘elite’ has been most active in advocating the establishment of the cluster and has taken a lead role since its establishment. Membership is thus far limited and biased towards the larger companies and a number of key suppliers. Apparently, the heterogeneity and perceived tiered structure of the industry currently militates against broader collectiveness. Broader participation is one of the stated items on the development agenda of the cluster committee.

In its perception, an important avenue is to offer positive spillovers, e.g. more knowledge transfer within the industry by organizing seminars to be conducted by the larger players (personal communication). In view of the current structure of inter-firm relations, it remains to be seen whether this will materialize. Unequal strength, also reflected and translated into divergent interests and orientations of players in the industry, may continue to obstruct the cluster agenda. It will be interesting to see what trajectory the industry will actually follow. If markets continue to change as they already have over the past five years or so, despite the role small companies fulfill in the industry, heterogeneity – if left unattended – may well result in the shakeout predicted in the evolutionary life cycle model.

CONCLUSION

A basic premise inspiring this article is that at the current stage of late industrialization in Southeast Asia alternative 'models' of development of new (especially high-tech) industries are emerging. On the basis of the industrial automation industry in Penang we propose that a 'model' of autonomous evolution is gaining relevance vis-à-vis state-orchestrated, or state-assisted industry development. In the introduction we posed four questions concerning the development of the automation industry in Penang according to an 'evolutionary' model.

Though wide-ranging, a 'limitation' of the preceding discussion is the focus on the 'birth' of the industry, necessary because of its 'infancy' stage of development. At the current juncture it is not yet possible to research the full richness of an evolutionary economic interpretation of new industry development. The findings of the current research, revealing 'evolutionary mechanisms' of initial development although in somewhat modified form compared to models, certainly encourage further longitudinal study of the industry. We have seen that new firm formation is indeed driven by spinout that introduces new activities in the local production system thereby diversifying and deepening the competencies available.

The current state of the industry appears to be that many local automation companies now have the technical know-how in-house to export medium to increasingly more advanced technology equipment to MNCs in the rest of the region – and mature markets as well – given two major advantages. First, they have acquired the competencies to produce quality-automated equipment and therefore do less need transfer of technology from overseas. Second, the industry has the capability to produce good quality automated equipment at competitive prices.

The industrial base that developed in Penang in subsequent phases of its development and the propensities of a set of MNC firms have done much to provide the necessary conditions for automation (companies) to develop and grow. However, this is not the same as saying that FDI is a necessary driver. Rather, one of the implications of this case research appears to be that new high-tech industries can develop without attracting investments by foreign companies in the industries concerned. Another implication appears to be that greater indigenization is possible without *planned* industry development employing selective interventions directed to targeted industries, firms or activities.



At the present juncture only some initial thoughts can be offered as to implications for industrial policy. The case study has revealed that the automation industry could emerge without any explicit industrial policy of systemic coordination. Following from our analysis we conceive the prospect of an 'evolutionary' industrial policy that moves away from 'creation' as dealt with earlier. This is a difficult message. Within export-oriented - originally FDI-driven - industrialization, governments very often still look at local firms only from the perspective of growing local support industries (seen as necessary to tie MNCs to the locale). So far, policy circles have rarely perceived localized hub and spoke systems as a potential breeding ground for new (high-tech) industries, i.e. the potential of evolution of new industries from the existing industrial base through diversification and spinout.

An argument that governments at all levels should develop such awareness and direct efforts at promoting a conducive environment would seem to bring us back directly to some of the government-assisted models of industry development. Yet, some industrial policies are straightforward within an evolutionary model, in particular, policies facilitating entrepreneurship, in particular, the encouragement of spinout. As it is, there is a tendency in industrial policy to address competitiveness issues by radical change, i.e. to create new industries and activities that constitute a new variety that does not build on the existing resource and knowledge base. We argue for an industrial policy that also nurtures new variety built on regional assets acquired in the previous stage and therefore representing an *incremental* change within the predominant technological trajectory pursued, rather than a radical departure from it.

Arguably government intervention could be directed to the lack of homogeneity of firms in the early stage of a co-evolved industry, to the underlying causes and potential implications for its longer-term development. In the particular case under study we have so far been able to 'see' only evolution at the infancy stage. Further study involving longitudinal tracking of the population is necessary to identify the development path of the industry at large and (subsets) of its constituent companies. If heterogeneity conforms to the early stage of the life cycle model, it may be assumed that sooner or later selection occurs. As our case demonstrates, heterogeneity appears to defy a policy applied to industry at large. In particular it renders collective efficiency-based courses of action problematic. More promising could be courses of action that 'listen' to life cycle interpretations. The policy implications might be that interventions seem most beneficial and productive if directed to specific subsets of companies, or specific aspects.

As to the prospects of late industrialization in Southeast Asia in the light of increasing relocation and competition from other countries in the region, there seems to be a double answer emanating from the case studied. On the one hand the observations gathered from this study lead one to conclude that there is still a range of opportunities to bank on. On the other hand the analysis also points towards a number of limitations, at the micro level translating ultimately also to the meso level. It will be interesting to see whether future courses of action will be entrepreneurship rather than state-initiated.

Article Disclaimer

The article is the opinion of the author and does not necessarily reflect the view of SERI.

Acknowledgement

SERI would like to express on gratitude to the contribution by Prof. Leo van Grunsven.



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International Headlines

The expand of economic growth in Taiwan

28th May 2007, The EDGE Malaysia

Economic growth in Taiwan expanded 4.15% year-on-year in the first quarter of this year. The growth was lead by the strong exports which helped offset the weak domestic demand. Private consumptions which made up two-third of Taiwan's economy grew by 2.3%. It is expected to grow to 3% this year, marginally slower than initial growth expectations of 3.2%.

PENANG
ECONOMIC
MONTHLY

Vietnam wins attention as new outsourcing hub

29th May 2007, The Asian Wall Street Journal (Asia)

Intel's move to build a \$1 billion semiconductor factory near Ho Chi Minh helps attract interest from abroad. Outsourcing companies are beginning to latch onto Vietnam as a destination for developing software and handling back office chores like payroll and accounting.

U.S. tech companies give Brazil a go

30th May 2007, USATODAY.com

Brazil is the latest country with an emerging economy to attract big investments from U.S. tech companies. Brazil, which is slightly smaller than the USA and has about two-thirds the population, has long had potential to become a significant tech market. But economic instability hindered growth. Tech spending in Brazil is expected to jump to \$32.3 billion in 2011 from \$20.5 billion this year. U.S. tech firms moving in include: Dell, Draper Fisher Jurvetson and MySpace. Other companies are making similar forays. Brazil's economic growth has been stunted for decades by inflation exceeding 70% a month. The financial turmoil left a mixed legacy. Brazil's per-capita gross domestic product is about \$8,600, compared with \$43,500 in the USA. But Brazil also has a highly developed banking system and entrepreneurial spirit. Doing business in Brazil remains difficult. Taxes are high. Brazil has a thriving market for illegally imported goods.

High Australian dollar stabilises economy

31st May 2007, Yahoo Business News.com

The higher Australian dollar has a stabilizing affect on the economy, although the currency had not risen as much as the country's strong terms of trade. The Australian dollar was back above 82 U.S. cents at a one-week high after last month touching a 17-year peak of 83.90 cents against the U.S. currency. Australia's terms of trade were at the highest level in 50 years, with growth in China fuelling strong investment and employment in Australia's mining sector. Terms of trade are a measure of the price of goods and services exported relative to the price of imports.