# RESOURCE TO KNOWLEDGE-BASED INDUSTRIES: THE CASE OF MALAYSIA AND CHINA


## ABSTRACT

This study investigates the patterns and trends of the manufacturing exports of the knowledge-based industries of Malaysia and China using the Revealed Comparative Advantage at 3-digit level for the period of 1993 to 2001. The results indicate that Malaysia and China are evolving along the knowledge-based industries over the period of study. Despite the movement to knowledge-based industries both the countries only show similarity in the medium knowledge-based industries. Nevertheless it has been found that China is in the process of improving its competitiveness in the high knowledge-based industries. In contrast Malaysia's export specialization is found to be ahead of China in the high knowledge-based industries. The study further proposed policy adjustment for the knowledge-based industries.



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## INTRODUCTION

The foundation of the new economy has emphasized on the role of knowledge, technology and skills as the dominant determinants of economic growth. This recent advancement in the theory of endogenous technological progress has led to the interest in the relation between trade, technological change, human capital and economic growth. In addition, many economists have considered foreign trade as a carrier of knowledge through Multinational Corporations (MNC) in introducing foreign technology. With this trend dominating the market, nations all around the world are developing strategies to jump into the bandwagon of knowledge-based economy. This is especially crucial for the developing countries to stay competitively in the world market, as more challenges are clear with the recent development of trade liberalization, the implementation of ASEAN Free Trade Agreement (AFTA) and China's entry into World Trade Organisation (WTO). In an effort to create knowledge-based economy, diversity and specialisation shape the knowledge spillovers, especially for the developing countries. It is also important to note that changes in structural trends among the trading partners have put pressure on the industrial structure of the developing countries. Report by the OECD and others have emphasized the shift to knowledge-based growth among the OECD members. While in the context of developing countries, Sunil (2000) in his study indicated the significant increase in technology content of the exports where the share of technology export products surged to 23% in 1997 compared to 8% in 1988.

It has been true to some extent that trade dependent developing countries are only going to benefit if comparative advantage is established in the high-knowledge and technology industries, particularly to secure the export performance. This is due to the fact that low skilled and technology industries shift to China as a result of low wage advantage. Realizing the above phenomenon Malaysia must shift to the high and medium knowledge based industries to take advantage of the demand for the market and to develop strategy in securing international competitiveness in those areas. It could also be argued that many foreign investors are still finding a home in Southeast Asia particularly in Malaysia where technological corridor has stayed active for decades. Malaysia has been found attractive for the high technology manufacturing as it requires a lot of engineering know-how and expertise while China, which is making strides in those areas still lags behind some other Asian nations in its ability to support more expensive hi-tech manufacturing, product design and research. Moreover the dynamics of the 'new economy' industries is highly dependent on trade as their primary growth. The above notion has set a platform to undertake a study on the competitiveness of the trade structure in the knowledge-based industries of Malaysia and China. Specifically this study examines the following questions: To what extent does the trade structure of Malaysia and China evolve along the line of knowledge-based industries? To

what extent have Malaysian and Chinese export industries shifted away from labour and resource based industries? What is the similarity between Malaysian and Chinese trade specialization pattern? What are the implications of China's entry into World Trade Organisation? Finally, to discuss some of the policy implication in enhancing knowledge based industries.

## RECENT DEVELOPMENTS

The existing evidence on the progress of knowledge based industries trade in Malaysia and China is limited. Indeed evidence on the threat and opportunity that China has on other developing countries are mixed. For instance many of the studies have investigated the pattern of China and Malaysia's export specialization using different tools of measurement. Studies by (Mckibbin and Woo,2003), (Weiss and Shanwen, 2002), Yean (2001), (Lloyd and MacLaren, 2000), (Voon, 1998), and (Herschede, 1991) supported that China has comparative advantage in labour and resource, low and medium technology based industries while in the knowledge based industries it is still in the process of developing its competitiveness. The progress of China has also been viewed as a threat to Malaysia in a range of labour and resource based products. On the other hand, some of the above studies also supported that Malaysia has become competitive especially in the electrical and electronics sub sector by largely maintaining comparative advantage over China. Furthermore, it is also evident that Malaysia has departed from labour and resource based products to a more skilled and technology industries. Indeed, some of these studies have viewed China's expansion as an opportunity for Malaysia. However, differences in export performance of the knowledge-based industries depend on many crucial factors especially for Malaysia and China.

Recent studies have focused on the factors contributing to the acceleration of export performance in developing countries particularly in the knowledge-based industries. It is worth looking at the trends of the emerging Asian countries in the world economy to understand the capability of the economies in relation to each other. One of the common factors influencing the performance of export is the inflow of Foreign Direct Investment (FDI). Table 1 shows that the destination of FDI in terms of individual country has shifted over the last decade. Malaysia, Singapore and Thailand, which used to be the prominent destination, were replaced by the Republic of Korea and Hong Kong as a result of the Asian economic crisis. China remains the most preferred country in the list of Asian destination for FDI. India has emerged replacing Indonesia in the list of recent FDI inflows. Detailed examination of the FDI inflows suggests that share of total world FDI inflows in Asian economies were temporarily dampened by the 1997 financial crisis. However it should be noted that China showed a drastic

change in annual average FDI between 1991-93 and 1998-2000. According to the World Investment Report (2002), the share of global foreign investment relative to its share of global GDP in China had risen but it remained lower than that of Singapore, Hong Kong, Vietnam and Thailand and was about on a par with that of Malaysia. However comparing Malaysia with others, evidence shows the declining FDI inflows as Malaysian rank subsequently slipped to 6$^{th}$ position. Realizing that Malaysia's high reliance on FDI as a short cut in boosting export performance, this new development may serve as a stumbling block for the development of the knowledge based industries.

On the other hand, it is also a well-known fact that FDI alone would not be sufficient for the growth of the knowledge-based industries. Other new factor endowments have been given priority in recent years and among them are productivity, knowledge and technology creation. Studies indicate that there is a significant growth of productivity in relation to the structural changes within the manufacturing production and exports in developing countries. This is exactly what most of the Asian countries have experienced where labour productivity (output per worker measured by value added per employee) and annual wages per employee tend to move together across manufacturing sectors. For example, Malaysia, Korea, India and Thailand show structural shift from labour intensive industries towards more sophisticated technology lines of production especially in electrical and electronic, non-electrical machinery and transport equipments which is associated with high productivity growth. (Cooper Charles, 1995) The improvement in productivity may reflect the content of knowledge and technology in the manufacturing industries itself. In turn, knowledge has become another factor of production, which supplements the capital and labour. Indeed, OECD suggests the great importance of knowledge relatively to the natural resources, physical capital and low skill labour that is evident in all the OECD economies. In addition, knowledge has played a crucial role in determining the productivity and wage rates of the employees.

Another factor contributing to the export competitiveness is the technology capability. Technology with a blend of knowledge and skills will be able to develop production capability. Countries such as Korea, Singapore and Taiwan were among those, which have improved investment in technology production and R&D to reap the benefits by developing international competitiveness in high-end manufacturing industries. However one should note that developing local technologies or importation of technology must be supported with development in higher education system, which may produce well trained, scientists, engineers and technicians.

## DATA AND ANALYTICAL FRAMEWORK

***Classification of Knowledge-Based Industries.***

There has been much debate on classifying the industries based on the knowledge intensive and till now there is no standard classification for high knowledge based industries. Many studies have classified the knowledge-based industries based on the proportion of professional, engineers, technical, scientific and senior management staff employed in that particular industry. In addition, study was also concentrated in capturing the level of education attainment by the knowledge-based industries. Recent study has also attempted to classify the knowledge industries by measuring several knowledge indicators such as R&D activities and human capital content. In contrast many others have also classified these industries based on the level of technology since the characteristics of technology have a high degree of correlation with knowledge as both share common properties. It has also been noted that the growing importance of technology and knowledge based industries has implication for the skill composition of the industries. This study adopts the classification of skill levels rather than knowledge and technology intensity proposed by many other studies. Thus the level of skill requirements of the industries basically measures the level of knowledge requirement in this study. This classification is indeed perceived as more rational in the case of developing Asian countries since these countries are lacking in terms of R&D expenditure and efforts, investment of knowledge creation and proportion of scientists and engineers. Thus skills may act as an appropriate measure for knowledge in respect to capture the true knowledge substance in the developing countries. The grouping of industries is made based on the United Nations Standard International Trade Category (SITC) classification, which is subdivided into 3 categories of skills (low, medium and high) in the technology based industries. They are further categorised in the following ways:

1. Low knowledge based industries refer to manufactures with low skills and technology intensity
2. Medium knowledge based industries refer to manufactures with medium skills and technology intensity
3. High knowledge based industries refer to manufactures with high skills and technology intensity

In addition to the above classification the labour and resource based industries were also included in this study as a means to examine the shift of export specialization from labour and resource based industries to knowledge content industries. It should be clear that in this study only the manufactured exports were analysed while other knowledge-based industries related to service such as information technology were excluded. This is due to insufficient availability of data. It should be pointed out that the term knowledge-based industries in the following discussion refer to those industries, which require different level of skills.

***Data***

Export data was obtained from the United Nations, International Trade Center PC-TAS CD ROM. The export data used in this study was at 3 digits Standard International Trade Category (SITC) level. The time frame selected for the study was from 1993 to 2001.

***Measuring Competitiveness***

The revealed comparative export advantage method introduced by Balassa (1965) is used to analyse the comparative advantage of a country's product exports in the world exports. The approach used information, which is revealed from post trade situations.

$$RCA = Xij / \sum_i Xij / X_{iw} / \sum_i X_{iw} \quad (1)$$

Where

$Xij$ = Export value of sector i by Malaysia

$\sum_i Xij$ = Total export of Malaysia

$\sum_j Xiw$ = Total world exports of sector i

$\sum_i Xiw$ = Total export of the world

The numerator represents the percentage share of a given product in national exports and the denominator represents the percentage share of a given product in world exports. Thus the RCA measures the comparison of national export structure with the world export structure. The percentage share of export will be identical with the world average when RCA equals to 1. A value of above 1 indicates the country's export advantage (country is said to be specialised in that product) and vice versa where RCA is below 1.

One drawback of the RCA method lies with its assessment of the country's position in international trade since it only includes the export value of a country. For instance, if a country has a high degree of import dependence, one must not conclude that the particular country has the comparative advantage. Thus this measure has sometimes been criticized on the grounds that it is neglecting the import side of trade since for any given level of export specialization a country's comparative advantage may differ according to its degree of import dependence. To overcome this problem the second measure known as normalized trade balance (z) is being

introduced which is the ratio of the trade balance to the total value of trade (Iapadre, 2001) This measure will be used together with the RCA to identify the true comparative advantage of a country.

$$z_{ij} = \frac{x_{ij} - m_{ij}}{x_{ij} + m_{ij}} \tag{2}$$

Where,

$x_{ij}$ = Export of country i of product j
$m_{ij}$ = Import of country i of product j

The range of the indicator is between –1 to +1. The normalized trade balance would improve if the export growth were higher than that of the imports. This makes the indicator a suitable measure of the degree of disequilibrium of trade flows and as a tool for comparisons over time and space.

***Measuring Export Specialisation Differences and Similarities***

Based on the RCA the major manufacturing export products are ranked and compared between countries. To assess the strength of relationship of the export specialization between countries the study used Spearman's Rank Correlation (SRC) Coefficients of RCA. The SRC of RCA in this study compares the ranked data associated with China and Malaysia. By computing a correlation coefficient we could determine the extent to which two sets of ranking are similar or different. The SRC value could range from –1 to +1 with –1 suggesting total disagreement in the export specialization where China and the country compared would act as a complement to each other. A value of +1 indicates that both countries have total agreement in terms of export specialization that could intensify competition between them. A value of 0 would indicate that there is no relation between the two countries. The result is also proving to be useful to analyse the trend of trade among the countries.

The Spearman's Rank Correlation is given by:

$$r_{sp} = 1 - \frac{6\sum d^2}{n(n^2 - 1)} \tag{3}$$

Where
*$d^2$ is the difference between any pair of RCA ranks*

## RESULTS

The results of the export/import shares as a proportion to the world and individual country are presented in Table 2 and 3 respectively, while table 4 -7 show the export specialization trend from 1993 to 2001 for both the countries. Table 8 shows the results of the Spearman Rank Correlation coefficient, which is associated with the degree of similarities and differences in ranking.

### *Export and Import Shares*

It is evident that China has been the leading exporter of labour and resource-based products compared to the Malaysia. China's share of the labour and resource-based products in the total labour and resource-based products of the world has increase from 8.6% to 15.5% between 1993 and 2001 (See Table 2).This translated to an average export growth rate of 14.1%. In contrast, Malaysia's share is much lower compared to China with an average annual growth rate of 1.6%. The proportion of labour and resource based export in Malaysia and China's total manufactured exports are 35.3% and 10% respectively in the year 2001. However, the trend seems to decline over the years.

In the low knowledge based industries (Table 2) the trend somehow differs from the labour and resource-based products. Table 3 suggests that China has been moving to the low knowledge industries. Export share of the low knowledge industries in world markets are increasing (from 2.4% to 7.2%) through the years suggesting China's market penetration in these products while Malaysia's share is very much lower compared to that of China. In fact, Malaysia seems to import more than export in this group. In turn, the share of this group in total manufacturing exports of the individual country gives similar results (see Table 3).

Referring to Table 2, it is notable that China's exports of medium knowledge based industries have surpassed Malaysia with an average annual growth of 2.3%. It is also evident that China's export share has grown from 1% in 1993 to 3% in 2001,while Malaysia only made a very minimal marginal improvements in the medium knowledge exports. However, import shares of these countries also seem considerably more than the export shares. In addition, analysing the export and import share as a proportion in total manufactured export and import of both the countries have strengthen the above facts (see Table 3).

Referring to Table 2, one interesting point to note is that in the high knowledge based industries, Malaysia has taken the lead leaving China behind the race for exports of knowledge based industries in early 1990s. Table 2

clearly indicates that Malaysia's share of exports in the world for high knowledge based industries improved from 1993 to 1997. The trend seems to divert after 1997 where China in turn, took the lead compared to Malaysia. In addition, looking at China, we found that the share has improved drastically from merely 1.8% in 1993 to 5.2% in 2001. This suggests that China's openness and increasing flow of FDI has enhanced the exports of high knowledge based industries. Equally directed FDI between labour-intensive manufactured sectors (e.g. textile and clothing, food processing, furniture) and technology intensive manufacturing (e.g. medical and pharmaceutical, electrical machinery and equipment, electronics) has propelled the progress of high knowledge and technology based industries (Tseng W. & Zebreg H., 2002). Beijing government's effort and great plans for industrialization emphasizing on high technology industries has further enhanced these industries. Furthermore with the geographical advantage (close to Taiwan, Korea and Hong Kong) China's share has accelerated. For instance, faster delivery of goods with the help of Taiwan and Hong Kong trading companies, and transfer of investment to mainland, China has made these industries catch up with other ASEAN countries like Singapore and Malaysia.

However, there is one big difference between Malaysia and China in the high knowledge based industries. Comparing the share of imports of this group, we found that relatively China has high import content of high knowledge based industries suggesting the inability of China in producing quality high end products. Thus, Malaysia seems to have a better prospect since it has established the high knowledge industries long before China. Even the proportion of high knowledge and technology exports in the total manufactured export of Malaysia is nearly about 70% compared to China with only 29% in 2001.

***Export Specialisation Trends***

Table 4 shows the ranking of the labour and resource based products for China and Malaysia. The RCA trends at SITC 3-digit product categories confirm the dominance of China in the resource-based products. In the case of China, 22 out of the 37 labour and resource based industries have largely maintained a comparative advantage. China's export specialization is mainly in clothing (SITC 8) products. The top ranking products based on RCA are products such as, trunks and cases (SITC 831), baby carr/toy/game/sport (SITC 894) women/girl clothing woven (SITC 842), headgear/non-text clothing (SITC 848), made-up textile articles (SITC 658), footwear (SITC 851), cotton fabrics (SITC 652), woven (SITC 666) pottery, (SITC 845) articles of apparel, men/boy wear knit/croch (SITC 843), furskins tanned/dressed (SITC 613), clothing accessories (SITC 846), women/girl wear knit (SITC 844) and woven textile fabric (SITC 654). As for Malaysia, the comparative advantage is clearly

present in products such as veneer/plywood (SITC 634), headgear (SITC 848), men/boy wear (SITC 843), wood manufacturers (SITC 635), women/girl wear (SITC 844) and furniture (SITC 821). This indicates that Malaysia has to compete with China in the clothing industries[1.] Indeed the situation will be made worst, when US and European Union drop all textile quotas (covered under the Multi-Fiber Arrangement) for the World Trade Organization (WTO) members on January 2005 especially in textile industries[2]. Additionally when the implementation of AFTA takes full effect, Indonesia could be the major player in wood and clothing industries. However there are certain caveats to the above statement. For instance, although China is regarded as the major competitor for the textile industries, evidence also indicates that China is also the major importer of textiles. For instance, the normalized trade balance[3] shows a negative figure indicating that imports of textiles is relatively more than exports. Based on this evidence the clothing and wood industry is still competitive if Malaysia could improve the quality, design, brand and also add more values to its production. Indeed a better marketing network is vital for the progress of these industries.

Despite the similar pattern of export specialization between China and Malaysia, one can find that the ranking of the product are somehow different. For instance, Malaysia's export specialization is more towards natural resources such as wood production where else China exhibits a strong presence in unskilled labour products mainly toys, textile and clothing where it has the lower cost advantage

In the low knowledge based industries, it is clearly evident that only China maintained a comparative advantage. The leading industries of China in this category are mainly in manufactures of metal (SITC 69) such as pig iron (SITC 671), cutlery (SITC 696), base metal household equipments (SITC 697), hand/machine tools (SITC 695) and (SITC 78) mainly in road vehicles (SITC 786) trailers/caravans, and (SITC 785) motorcycles/cycles (See Table 5). In comparison, Malaysia seems to have a comparative disadvantage in this low knowledge production as indicated by the RCA, which is below one.

Table 6 shows the RCA trend for the medium knowledge based industries, which indicate that division electrical machinery (SITC 77) as an important export industry for China. In this medium knowledge based industry China's export specialization shows a growing trend for items like articles of plastics (SITC 893), electrical power transmitter equipment (SITC 771), rotating electrical plant (SITC 716), domestic equipment (SITC 775), fans/filters/gas pumps (SITC 743), electrical equipment (SITC 778), electric circuit equipment (SITC 772), textile/leather machinery (SITC 724), (SITC 773) electrical distribution equipment (SITC 744), mechanical handling equipment (SITC 625), rubber tyres/treads and steam generating boilers (SITC 711). However looking

at the trend of normalized trade balance it is evident that SITC 716, 743, 772 and 744 do not have the true gains, as import of these products are considerably high for China. As a whole, from the results it can be concluded that China is becoming stronger year after year (shown by the increasing RCA) in the medium knowledge intensive industry. The export structure seems to have moved to the medium knowledge based production.

In the case of Malaysia, four products maintained comparative advantage with declining RCA namely materials of rubber (SITC 621), electrical power transmitter equipments (SITC 771), industrial heat/cool equipment (SITC 741) and electric circuit equipment (SITC 772). It is expected that in the future, the medium knowledge and technology-based industries of Malaysia will lose their position to China as a result of the China's competitive effect. However, it should be kept in mind that this may only be a temporary phenomenon until China is capable of cultivating their industries with the help of MNC. In addition, it is also the practice of the Chinese government to transfer technology from the more advanced countries in various ways especially through companies, which intend to invest in China[4]

In the high knowledge based industries (see Table 7), China's RCA is seen to be increasing in a wider range of products especially (SITC 762, 523, 881, 871, 531, 751, 764 and 763) suggesting a stronger comparative export advantage. Despite China's scarce capital, progress has been made in the areas of telecommunication, chemical and other consumer products such as photographic equipments. Malaysia on the other hand, maintained its comparative advantage for products such as SITC 76 and SITC 75. One of the worrying trends is that Malaysia's RCA trend tends to significantly decline over the years. In comparison, China has been showing great improvement in the RCA indices for a wide range of products. Competition may intensify for products such as electronics and telecommunication (SITC 76), office and data machines (SITC 75), organic chemical (SITC 51) and photographic (SITC 88). It seems that both the countries have sub merged their production in the above category as it promises a better demand worldwide.

Although China shows a great improvement in the high knowledge based industries it is also found that there are some limitations towards its progress. Firstly, the normalised trade balance indicates that China still heavily depends on the imports of these products, which in turn provide opportunity for Malaysia to gain from China's trade liberalization. This may be due to the fact that China is relatively low in capital especially industrial equipments for the future production of goods and services. Secondly, looking at a detailed RCA trend (at fine disaggregated SITC level- 4-5 digit level) revealed that many of China's high knowledge based industries are far

below that of Malaysia. This may prove that China is still in the process of developing its comparative advantage in these industries.

As a whole it is evident that Malaysia seems to move from labour to high knowledge content industries with Malaysia still having the first mover advantage. In turn, China is found to be following the same path of progress with limited progress in the high knowledge content industries since import still substantially influences the true comparative advantage.

***Differences and Similarities in Export Specialisation***

Table 8 shows the Spearman Rank Coefficient (SRC) for three groups namely labour and resource based industries, medium and high knowledge based industries. The SRC for the labour and resource based industries shows dissimilarity in the export specialization between China and Malaysia, which may indicate a potential trade expansion between both countries. However it should be pointed out that Malaysia is moving away from the labour and resource based production.

For the medium knowledge based industries the rank correlation coefficient between China and Malaysia are highly significant at 0.01 levels. China's export specialization seems to be similar to Malaysia. In this case it can be concluded that China and Malaysia will be competing in the foreign trade particularly for industries such as electrical power transmitter equipments (SITC 771), electrical distribution equipment (SITC 773), electrical equipments (SITC 778) and industrial heat/cool equipments (SITC 741).

From Table 8, we find that for the high knowledge based exports, China's comparative advantage position had reached the status of Malaysia only in recent years where similarity has been detected. This indicates China's ability to catch up with Malaysia that has emphasized on the high skilled and technology based production, a long time ago compared to China. However, at disaggregated 4 digit level Malaysia still maintains a higher RCA compared to China. It should be noted that given the time China would fast improve its high knowledge based industries capability[5]. To this respect, one might anticipate competition mainly in radiobroadcast receivers (SITC 762), computer equipments (SITC 752), office machines (SITC 751) and television receivers (SITC 761). It can be concluded that China is building its comparative advantage in electronic-telecommunication and computer equipments exports.

## POLICY IMPLICATIONS

The competitiveness of the knowledge-based industry is solely dependent on the government's efforts in promoting and supporting the industries. This may attract more quality foreign direct investment with respect to that of China. In order to stay competitive internationally the best government's contribution would be to invest in knowledge producing agendas. In addition there is a need to create competitive advantage through innovation in facilitating the creation of knowledge. This might be achieved by shaping the national system of innovation, promoting business and university linkages and joint researches, commercialisation of scientific research and encouraging small and medium sized industries to develop and adopt international best practices in strategic management and advanced technology. The government must play a vital role in providing R&D infrastructure, technology support to small business and creating the information highway to develop a smart nation. Policy development should emphasize on the following areas:

***Labour costs vs. productivity***

Relatively, China has the advantage of lower production cost compared to other ASEAN member countries. For example based on Table 9, its labour cost is between 729 from 1995-1999 which is comparatively lower than of Malaysia (3429), Singapore (5576), Thailand (2305), Philippines (1240) and Indonesia (898). But one must not fail to realize that productivity does matter in the world of mass production. More specialized and skilled workers have been the key ingredients in maintaining a true competitive advantage. Two aspects of competitiveness are worth mentioning here. First, reducing production costs must focus on improving efficiency and productivity and second, and most important, is the capability required to produce a different set of products in line with the changing economic environment. This fact is proven true looking at Singapore as the model as it's value-added in 1995-1999 (40674) is higher than Malaysia (12661), Thailand (19946), Indonesia (5139), Philippines (10781) and China (2885).

For instance, despite, higher labour costs, Singapore remains a favoured destination for regional activities of the foreign companies due to the excellent education, technical and language skill it has to offer, providing a higher value added in manufacturing. In contrast, China is still in the process of developing its human skills and this will indeed take time for the poorly skilled workforce. For example, Toyota's new plant in China has recently encountered some problem with their workforce since they even fail to identify the parts and components of the cars in the production line. Among the ASEAN countries Singapore, Malaysia and to some extent Thailand

stand a better chance in progressing up the technological ladder if productivity growth could be improved further. Since Malaysia has managed to concentrate on high knowledge based production, high value added per worker is vital for the progress of the industries. New ways to improve productivity and value added in the manufacturing industries should be looked at. One good example is by looking at how the Japanese automobile manufacturers compete with their counterparts. Their lean production system with new management and organizational technique has created added advantage over their rivals who solely rely on the Fordist system of production. Two strategies are prevalent in capturing the export market share namely producing at a lower costs or emphasizing in quality with a premium price. Malaysia could emphasize on the second strategy in marketing its export products.

***Knowledge Content, Acquisition and Creation***

It has long been recognized that knowledge is vital to a country's international competitiveness. A large number of research, have confirmed the effect of education on creating the knowledge content of industries. It is evident that education basically facilitates the adoption of new technologies and promotes technological capability. Indeed it is one of the key factors in improving productivity.

As it is evident Malaysia's export growth indicates a movement towards high knowledge based industries. The right supplies of knowledgable workers are vital for the development of these industries. For instance many of the Japanese companies still find Malaysia to be attractive since they have trained Malaysian workers through the production lines. All these indicate that human capital development is vital to support the existing industries as well as to attract FDI. A cross examination of the knowledge content between China and Malaysia revealed that relatively Malaysia has been able to lead in terms of supplying knowledge content workers with excellent English speaking labour force. However, major improvements should be made especially with its education system, which fails to provide relevant skilled workforce for the manufacturing firms. For example, many of the firms in Malaysia find that the relevance of the subjects learned in schools and universities are totally different from industrial requirements. China on the other hand, is lacking proper education, language and skills to promote their high skilled industries and it is expected to take several years for China to develop as investment in education will not yield immediate results. However, China has its own advantage especially in terms of their tertiary students in science and technology, which is relatively higher than Malaysia.

Another issue of concern is the importance of knowledge acquisition and creation. With the long history of the manufacturing sectors, Malaysia still faces difficulty in improving its indigenous capability in creating new products, processes and technologies. The establishment of MNC has only improved the general knowledge content but failed to transfer detailed technological capabilities. In fact, attempts made by Malaysia to tailor its investment policies towards technology transfer have failed to yield any results due to the economic downturn[6].

It should be made a point that the universities and research institutions play a vital role in knowledge creation. Malaysia is still at the infant stage in propelling technology commercialisation from institutions of higher learning. This may in fact be the stumbling block for the progress of knowledge-based industries.

***Technological Progress and Research and Development***

In addition to the above initiatives, improving technological progress and research and development is also equally vital to enhance manufacturing exports. Scientific education and R&D activities are significant contributors to the industrial performance. It was found that, in terms of R&D expenditure as a percentage of GNP, China is relatively better off than Malaysia. It is in this area that Malaysia should focus to maintain and improve her competitiveness over China.

***Information, Communication and Technology***

Recent studies showed that information, communication and technology (ICT) were the driving force for economic growth and industrial performance. Indeed, better ICT infrastructure (including communications, computer and access to internet) will lower the cost of production and create more competitive firms. In this aspect, Malaysia has been seen as a viable location in recent years due to the government's support for ICT development. China, on the other hand is still lagging and is in the process of developing its platform. Thus, directing the policy towards the development of ICT would be invaluable for Malaysia and at the same time be ahead of China in this area.

***Other policies***

In addition to the above, initiatives should also be diverted towards establishing and enforcing intellectual property rights law[7], institutional building for coordination, establishing marketing networks, developing knowledge-based industry clusters, increasing reliance on the private sectors, establishing partnership with other

nations, fighting corruption and development of small and medium industries. Thus sound policy development in this area would strengthen the capability of the knowledge-based industries. In addition to the above, Malaysia should also find ways to diversify the export base and export markets, diversify and deepen industrial base, promote industrial linkages between SMEs and larger firms (e.g. supply chain), identify regional potentials & promote industrialization (ASEAN as the platform), increase knowledge and skills of the manufacturing work force at all levels and develop manufacturing capability of local firms (move up the value chain).

## CONCLUSION

The aim of this study was to examine the pattern of export specialisation between China and Malaysia. It is evident that Malaysia has been able to move towards knowledge-based industries compared to China. In turn China's strong comparative advantage lies within the labour and resource and medium skilled industries. However, in recent years the results suggested that China is becoming competitive in a range of high skilled industries as well as exhibiting a similar export specialisation with Malaysia. The future progress of the export industries of Malaysia relative to China depends on the policy and strategies option adopted by Malaysia. Policymakers should foresee and initiate strategies in the right direction especially in the aspects of the above mentioned issues to fully reap the benefits in China and also the other markets such as the US, European Union and Japan. The cost of doing nothing could be enormous in terms of lost opportunities in the world markets since the advantage in world trade may only come to countries that are prepared to create them. Indeed only the appropriate policies can keep the competitiveness to continue in Malaysia. In fact the high growth industries of the future such as information technology and biotechnology are also the potential gainers if the policies could be incorporated as soon as possible.

### Endnotes

[1] World Bank estimated that China's export share of apparel to jump to 45% once all quotas are lifted. In addition, China will be a major player as in average the labour cost in apparel industries are $73 per month followed by a quicker delivery of its goods with the help of Taiwan and Hong Kong's trading companies. In an anticipation of end of the quotas, companies like Gap and Nike are searching for new suppliers in China. (Business Week, December 15, 2003) Other studies which indicate China's strong growth in the clothing industries include Tyers et al.(1987) and Liu et al (2000).

[2] In Malaysia in terms of the share of manufacturing export in total merchandise export; 65-Textile is the second largest industry within section SITC 6 after 63-Cork and Wood manufacturers. This is followed by 69- Manufactures of metals. However in recent years contribution of these industries were declining. (Chandran V G R, et al.)

[3] The normalized trade balance (NTB) is measured by subtracting exports and imports divided by total sum of exports and imports of the particular industry. The NTB is not reported in the study due to space constraints. It will be made available upon request.

[4] It should be noted that China has imposed a lot of restrictions for the MNS especially with regard to technology transfer and local participation. For example, the Taiwanese and Korean companies have established joint ventures with Chinese partners in certain industries

[5]According to the new Five Year Plan, China plans to raise its share of electrical and electronic products and hi-tech products to 50% and 20% respectively. (Shafaeddin S.M., 2002)

[6]Tax deduction was given for firm's expenditure on training as well as R&D. Indeed for the approval to enjoy benefits, criteria was established proposing firms to meet certain percentage of value-added, transferring technology, committing R&D and others.

[7] In China there is growing concern for intellectual property protection as the issue of piracy are very repent. Investors may shy away from China because of poor establishment of intellectual property law.

**References**


Asian Development Bank (2003), *Asian Development Report, 2003*

Balassa, Bela (1965), "Trade Liberalization and Revealed Comparative Advantages", *The Manchester School of Economic & Social Studies*, 33: 99-123

Cooper Charles, (1995), Technology, Manufactured Export and Competitiveness, Background Paper Global Forum on Industry Perspective for 2000 and Beyond, India UNIDO

Herschede, F., (1991), "Competition among ASEAN, China, and the East Asian NICs: A Shift-Share Analysis," *ASEAN Economic Bulletin*, 7(3): 290-306.

Iapadre Lelio P. (2001), "Measuring International Specialization", *International Advances in Economic Research*, 7(2): 173-183.

Liu, A. and Yao, S., (1999), "On the measurement of spatial differentials in economic growth: An application of a shift share method for China in 1985-1994", Applied Economic Letters, 6:231-234

Lloyd, P.,J. and MacLaren, D. (2000), "Openness and Growth in East Asia after the Asian Crisis", *Journal of Asian Economies*, 11: 89-105.

Mckibbin, J.W. and Woo, T.W. (2003), "The Consequences of China's WTO Accession on its Neighbours", *Working Papers in Trade and Development No. 2003/17*, The Australian National University.

Shafaeddin S.M., 2002, "The Impact of China's Accession to WTO on the exports of developing countries", *UNCTAD Discussion paper No. 160*.

Sunil Mani, (2000), Exports of High Technology Products from Developing Countries: Is it Real or a Statistical Artifact, Discussion Paper Series 2000-1 United Nations University, Institute for New Technologies.

Tseng W. and Zebregs H. (2002), "Foreign Direct Investment in China: Some Lessons for Other Countries", *International Monetary Fund Discussion Paper*. Asia and Pacific Department.

Tyres, R., Phillips, P., and Findlay, C. (1987), "ASEAN and China exports of labour-intensive manufactures: Performance and Prospects", *ASEAN Economic Bulletin*, pp. 339-367

United Nations, (2002), *World Investment Report 2002*, Transnational Corporations and export Competitiveness.

Voon, J. P. (1998)," Export Competitiveness of China and ASEAN in the US market, *ASEAN Economic Bulletin*, 14(3): 270-291.

Weis, J. and Shanwen, G. (2002), "The People's Republic of China's Export Threat to ASEAN", *World Development Bank Institute*.

Yean, T.,S. (2002), "Can Malaysian Manufacturing Compete with China in the WTO?", *Asia Pacific Development Journal*, 8(2): 1-25.

World Bank, (2003), *World Development Indicator 2003*.

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**TABLE 1: TOP 10 FDI DESTINATIONS IN DEVELOPING ASIA (ANNUAL AVERAGE, US MILLION)**

| Rank | Country | 1991-1993 | Rank | Country | 1998-2000 |
|---|---|---|---|---|---|
| 1 | People's Rep of China | 14,346 | 1 | People's Rep of China | 41,614 |
| 2 | Malaysia | 4,729 | 2 | Hong Kong, China | 33,768 |
| 3 | Singapore | 3,926 | 3 | Korea, Rep. of | 8,009 |
| 4 | Hong Kong, China | 2,082 | 4 | Singapore | 7,866 |
| 5 | Thailand | 1,978 | 5 | Thailand | 3,839 |
| 6 | Indonesia | 1,754 | 6 | Malaysia | 3,466 |
| 7 | Taipei, China | 1,022 | 7 | Taipei, China | 2,692 |
| 8 | Korea, Rep. of | 832 | 8 | India | 2,373 |
| 9 | Philippines | 670 | 9 | Vietnam | 1,491 |
| 10 | Vietnam | 537 | 10 | Philippines | 1,190 |
| | Total | 31,877 | | Total | 106,309 |
| | (Percentage of World Total) | 17.3 | | (Percentage of World Total) | 9.7 |

Source: Asian Development Report (2003)

**TABLE 2: MARKET SHARE IN TOTAL WORLD TRADE BY INDUSTRY**

| **MALAYSIA** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** | **2001** |
|---|---|---|---|---|---|---|---|---|---|
| Labor/Resource Industries | 1.3[0.7] | 1.3[0.7] | 1.3[0.8] | 1.5[0.7] | 1.5[0.6] | 1.3[0.4] | 1.4[0.5] | 1.4[0.5] | 1.3[0.5] |
| Low Knowledge Industries | 0.6[1.8] | 0.6[2.2] | 0.7[2.1] | 0.7[2.2] | 0.7[2.3] | 0.7[1.3] | 0.6[1.4] | 0.6[1.2] | 0.7[1.3] |
| Medium Knowledge Industries | 0.5[1.5] | 0.6[1.7] | 0.6[1.8] | 0.6[1.7] | 0.6[1.6] | 0.6[0.9] | 0.6[1.0] | 0.7[1.3] | 0.7[1.2] |
| High Knowledge Industries | 2.8[2.2] | 3.3[2.5] | 3.5[2.8] | 3.6[2.7] | 3.5[2.6] | 3.2[2.2] | 3.7[2.3] | 3.9[2.5] | 3.7[2.3] |
| **CHINA** | | | | | | | | | |
| Labor/Resource Industries | 8.6[3.1] | 9.8[3.2] | 9.5[3.2] | 9.5[3.5] | 12.6[3.4] | 12.6[3.2] | 12.8[3.3] | 14.7[3.5] | 15.5[3.7] |
| Low Knowledge Industries | 2.4[7.6] | 3.2[5.5] | 4.7[3.4] | 4.4[3.4] | 5.3[2.9] | 5.2[2.7] | 5.4[3.0] | 7.1[3.6] | 7.2[4.2] |
| Medium Knowledge Industries | 1.0[3.8] | 1.2[3.5] | 1.4[3.1] | 1.5[3.1] | 1.7[2.6] | 1.8[2.3] | 2.1[2.5] | 2.6[3.0] | 3.0[3.6] |
| High Knowledge Industries | 1.8[2.9] | 2.2[3.1] | 2.5[2.9] | 2.7[2.9] | 3.1[3.0] | 3.3[3.3] | 3.5[3.9] | 4.2[4.5] | 5.2[5.6] |

Source: Author's Calculation based on COMTRADE database

Note: The total sum of the export and import share may not be equal to 100. The balance represents share of other industries, which do not fall in our 4 grouping of industries.

Figures in [ ] indicates the import shares

**TABLE 3: EXPORT AND IMPORT SHARE IN TOTAL MANUFACTURING OF MALAYSIA AND CHINA**

| MALAYSIA | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|
| Labor/Resource Industries | 16.6[7.8] | 14.7[7.1] | 13.4[7.1] | 14.2[6.4] | 13.4[5.9] | 11.9[5.1] | 11.0[5.3] | 10.0[5.0] | 10.0[5.1] |
| Low Knowledge Industries | 3.8[9.1] | 3.3[9.8] | 3.2[8.4] | 3.3[8.8] | 3.2[9.7] | 3.5[7.8] | 2.4[6.7] | 2.1[5.1] | 2.5[5.7] |
| Medium Knowledge Industries | 13.0[30.4] | 12[30] | 12[29.6] | 12[29.3] | 11.4[27] | 12.8[22] | 11.5[22] | 11.4[25] | 12.2[24] |
| High Knowledge Industries | 61[42.8] | 65[43.8] | 66.4[46] | 65.5[47] | 67.2[48] | 67[56.4] | 70.6[56] | 72.0[57] | 70.5[56] |
| **CHINA** | | | | | | | | | |
| Labor/Resource Industries | 49.5[15.6] | 47.5[16.9] | 43.1[17.9] | 42.2[18.6] | 42.7[19.0] | 40.3[17.4] | 38.6[15.3] | 36.5[13.6] | 35.3[12] |
| Low Knowledge Industries | 6.6[16.7] | 7.2[12.7] | 10.2[8.7] | 9.1[8] | 9.2[7.2] | 9.1[6.7] | 8.3[6.1] | 9.0[6] | 8.3[6] |
| Medium Knowledge Industries | 11.1[33.3] | 11.0[33] | 12.2[31] | 13.0[31] | 13.0[27] | 13.8[24] | 15.1[23] | 15.7[22.8] | 16.2[23.6] |
| High Knowledge Industries | 17.7[24.2] | 18.7[28] | 20.9[30] | 22.8[30] | 22.6[33] | 24.6[37] | 26.1[40] | 27.8[42] | 29.8[43] |

Source: Author's Calculation based on COMTRADE database

Note: The total sum of the export and import share may not be equalling to 100. The balance represents share of other industries, which do not fall in our 4 grouping of industries.

Figures in [ ] indicates the import shares

**TABLE 4: RCA OF LABOR AND RESOURCE BASED INDUSTRIES**

**MALAYSIA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 634 | VENEER/PLYWOOD/ETC | 8.03 | 7.61 | 7.14 | 8.00 | 8.21 | 6.20 | 6.00 | 5.50 | 5.35 |
| 848 | HEADGEAR/NON-TEXT CLOTHG | 5.52 | 5.18 | 5.60 | 6.11 | 6.43 | 7.42 | 6.34 | 4.73 | 4.47 |
| 843 | MEN/BOY WEAR KNIT/CROCH | 2.33 | 1.88 | 1.54 | 1.78 | 1.56 | 1.67 | 1.35 | 1.31 | 1.29 |
| 635 | WOOD MANUFACTURES N.E.S. | 2.00 | 1.63 | 1.36 | 1.44 | 1.67 | 1.60 | 1.36 | 1.30 | 1.32 |
| 844 | WOMEN/GIRL WEAR KNIT/CRO | 1.87 | 1.51 | 1.17 | 0.98 | 0.70 | 0.87 | 0.87 | 0.96 | 0.91 |
| 821 | FURNITURE/STUFF FURNISHG | 1.48 | 1.52 | 1.45 | 1.58 | 1.81 | 1.67 | 1.72 | 1.71 | 1.62 |
| 894 | BABY CARR/TOY/GAME/SPORT | 1.41 | 1.12 | 1.05 | 1.23 | 0.70 | 0.69 | 0.51 | 0.46 | 0.45 |
| 655 | KNIT/CROCHET FABRICS | 1.22 | 1.04 | 1.13 | 1.09 | 1.02 | 0.84 | 0.68 | 0.69 | 0.71 |
| 666 | POTTERY | 1.18 | 0.99 | 0.88 | 0.69 | 0.36 | 0.35 | 0.25 | 0.24 | 0.25 |
| 663 | MINERAL MANUFACTURES NES | 1.02 | 1.14 | 1.18 | 1.01 | 0.77 | 0.61 | 0.65 | 0.65 | 0.55 |
| 651 | TEXTILE YARN | 0.77 | 0.75 | 1.12 | 1.40 | 1.46 | 1.37 | 1.34 | 1.33 | 1.15 |
| 664 | GLASS | 0.29 | 0.37 | 0.52 | 0.58 | 1.09 | 1.10 | 0.90 | 0.84 | 1.11 |

**CHINA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 831 | TRUNKS AND CASES | 8.63 | 8.37 | 8.16 | 8.04 | 8.59 | 8.70 | 8.37 | 7.38 | 6.31 |
| 894 | BABY CARR/TOY/GAME/ | 6.92 | 6.78 | 6.23 | 6.70 | 6.72 | 6.94 | 6.41 | 6.44 | 5.72 |
| 842 | WOMEN/GIRL CLOTHING WVE. | 6.84 | 6.68 | 5.50 | 5.42 | 5.44 | 4.91 | 4.96 | 4.87 | 4.48 |
| 848 | HEADGEAR/NON-TEXT CLOTH | 6.73 | 7.19 | 7.19 | 7.57 | 7.44 | 7.13 | 6.82 | 6.92 | 6.44 |
| 658 | MADE-UP TEXTILE ARTICLES | 6.64 | 6.44 | 6.12 | 5.71 | 6.20 | 5.75 | 5.65 | 5.45 | 5.03 |
| 851 | FOOTWEAR | 6.14 | 5.46 | 5.25 | 5.59 | 6.24 | 6.38 | 6.46 | 6.07 | 5.36 |
| 652 | COTTON FABRICS, WOVEN | 5.31 | 4.77 | 5.01 | 4.35 | 4.46 | 4.01 | 4.06 | 3.77 | 3.33 |
| 666 | POTTERY | 5.11 | 6.51 | 5.93 | 6.29 | 3.54 | 3.50 | 3.58 | 3.25 | 2.28 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 845 | ARTICLES OF APPAREL NES | 4.76 | 4.47 | 4.34 | 4.47 | 4.77 | 4.86 | 4.86 | 4.69 | 4.24 |
| 843 | MEN/BOY WEAR KNIT/CROCH | 3.78 | 4.03 | 3.29 | 3.98 | 4.50 | 5.52 | 5.00 | 4.64 | 4.22 |
| 613 | FURSKINS TANNED/DRESSED | 3.67 | 2.99 | 2.33 | 1.83 | 1.56 | 2.13 | 2.84 | 3.20 | 3.20 |
| 846 | CLOTHING ACCESSORIES | 3.34 | 3.10 | 2.96 | 2.88 | 3.93 | 3.65 | 3.15 | 3.34 | 3.06 |
| 844 | WOMEN/GIRL WEAR KNIT/CRO | 3.28 | 3.57 | 3.08 | 4.08 | 5.88 | 5.93 | 5.03 | 4.41 | 3.76 |
| 654 | WOVEN TEXTILE FABRIC NES | 3.26 | 3.72 | 3.26 | 2.52 | 2.68 | 2.52 | 2.46 | 2.68 | 2.35 |
| 655 | KNIT/CROCHET FABRICS | 3.07 | 3.05 | 3.09 | 2.58 | 2.15 | 2.29 | 2.33 | 2.42 | 2.29 |
| 635 | WOOD MANUFACTURES | 2.53 | 2.30 | 2.40 | 2.34 | 2.24 | 2.17 | 2.30 | 2.32 | 2.31 |
| 659 | FLOOR COVERINGS ETC. | 2.45 | 2.32 | 1.81 | 1.38 | 1.51 | 1.83 | 1.71 | 1.68 | 1.65 |
| 651 | TEXTILE YARN | 2.33 | 2.16 | 2.10 | 1.97 | 2.22 | 2.07 | 2.26 | 2.25 | 2.11 |
| 653 | MAN-MADE WOVEN FABRICS | 1.94 | 2.43 | 2.35 | 2.15 | 2.45 | 2.42 | 2.38 | 2.60 | 2.65 |
| 661 | LIME/CEMENT/CONSTR MAT'L | 1.73 | 1.84 | 2.52 | 2.99 | 3.02 | 2.56 | 2.29 | 2.15 | 2.10 |
| 821 | FURNITURE/STUFF FURNISHG | 1.26 | 1.29 | 1.23 | 1.24 | 1.43 | 1.51 | 1.67 | 1.76 | 1.77 |
| 656 | TULLE/LACE/EMBR/TRIM ETC | 1.09 | 1.65 | 1.65 | 1.62 | 1.71 | 1.39 | 1.24 | 1.18 | 1.07 |
| 612 | LEATHER MANUFACTURES | 0.88 | 3.50 | 2.74 | 2.26 | 1.96 | 2.19 | 2.07 | 2.08 | 3.32 |
| 665 | GLASSWARE | 0.64 | 0.67 | 0.73 | 0.78 | 0.92 | 1.04 | 1.13 | 1.11 | 1.07 |
| 611 | LEATHER | 0.46 | 0.71 | 0.74 | 0.57 | 0.59 | 0.69 | 0.70 | 0.79 | 1.15 |

Source: Author's Calculation based on COMTRADE database

## TABLE 5: RCA OF LOW KNOWLEDGE BASED INDUSTRIES

**MALAYSIA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 671 | PIG IRON ETC FERRO ALLOY | 0.61 | 0.50 | 0.46 | 0.54 | 0.42 | 0.23 | 0.16 | 0.09 | 0.13 |
| 693 | WIRE PROD EXC INS ELECTR | 0.40 | 0.33 | 0.29 | 0.38 | 0.36 | 0.28 | 0.38 | 0.25 | 0.28 |
| 694 | NAILS/SCREWS/NUTS/BOLTS | 0.37 | 0.35 | 0.37 | 0.46 | 0.38 | 0.30 | 0.31 | 0.26 | 0.24 |
| 785 | MOTORCYCLES/CYCLES/ETC | 0.36 | 0.31 | 0.26 | 0.28 | 0.22 | 0.20 | 0.21 | 0.18 | 0.13 |
| 678 | IRON/STEEL WIRE | 0.36 | 0.38 | 0.32 | 0.19 | 0.13 | 0.12 | 0.19 | 0.17 | 0.12 |

**CHINA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 671 | PIG IRON ETC FERRO ALLOY | 3.87 | 3.87 | 6.19 | 4.60 | 5.40 | 4.12 | 2.91 | 3.14 | 2.34 |
| 696 | CUTLERY | 3.19 | 3.01 | 3.22 | 3.46 | 3.77 | 3.89 | 3.73 | 4.23 | 3.86 |
| 697 | BASE METAL H'HOLD EQUIPM | 2.17 | 2.32 | 2.50 | 2.71 | 2.92 | 3.04 | 3.38 | 3.58 | 3.63 |
| 786 | TRAILERS/CARAVANS/ETC | 1.85 | 2.84 | 3.94 | 3.70 | 3.12 | 4.00 | 3.91 | 5.25 | 4.55 |
| 785 | MOTORCYCLES/CYCLES/ETC | 1.64 | 1.73 | 1.74 | 1.75 | 1.75 | 1.82 | 2.03 | 2.72 | 2.58 |
| 695 | HAND/MACHINE TOOLS | 1.49 | 1.41 | 1.39 | 1.30 | 1.23 | 1.31 | 1.21 | 1.22 | 1.16 |
| 693 | WIRE PROD EXC INS ELECTR | 1.37 | 1.19 | 1.23 | 1.27 | 1.37 | 1.34 | 1.40 | 1.23 | 1.30 |
| 694 | NAILS/SCREWS/NUTS/BOLTS | 1.30 | 1.24 | 1.31 | 1.08 | 1.03 | 1.08 | 1.15 | 1.20 | 1.19 |
| 699 | BASE METAL MANUFAC NES | 1.24 | 1.26 | 1.27 | 1.30 | 1.36 | 1.33 | 1.33 | 1.26 | 1.27 |
| 678 | IRON/STEEL WIRE | 1.19 | 0.89 | 0.84 | 0.77 | 0.67 | 0.54 | 0.73 | 0.62 | 0.66 |
| 677 | IRON/STEEL RAILWAY MATL | 1.12 | 0.35 | 0.77 | 0.40 | 0.57 | 0.83 | 0.70 | 0.87 | 0.33 |
| 691 | IRON/STL/ALUM STRUCTURES | 0.58 | 0.69 | 0.80 | 0.96 | 0.89 | 1.05 | 1.03 | 1.14 | 1.26 |
| 672 | PRIMARY/PRODS IRON/STEEL | 0.17 | 0.65 | 3.20 | 2.14 | 3.46 | 2.31 | 2.07 | 3.35 | 1.78 |

Source: Author's Calculation based on COMTRADE database

## TABLE 6: RCA OF MEDIUM KNOWLEDGE BASED INDUSTRIES

**MALAYSIA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 621 | MATERIALS OF RUBBER | 3.55 | 3.37 | 2.98 | 2.84 | 3.00 | 2.46 | 2.39 | 2.26 | 2.20 |
| 771 | ELECT POWER TRANSM EQUIP | 3.37 | 2.92 | 2.34 | 2.15 | 2.05 | 1.78 | 2.03 | 2.34 | 1.80 |
| 741 | INDUST HEAT/COOL EQUIPMT | 2.42 | 2.49 | 2.49 | 2.08 | 1.19 | 1.19 | 1.40 | 1.20 | 1.31 |
| 772 | ELECTRIC CIRCUIT EQUIPMT | 1.82 | 1.60 | 1.67 | 2.19 | 2.44 | 3.47 | 3.00 | 2.54 | 2.82 |
| 716 | ROTATING ELECTR PLANT | 1.53 | 1.54 | 1.80 | 1.71 | 1.51 | 1.47 | 1.45 | 1.32 | 1.01 |
| 773 | ELECTRICAL DISTRIB EQUIP | 1.06 | 1.13 | 1.12 | 1.26 | 1.09 | 1.00 | 0.96 | 0.96 | 0.93 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 893 | ARTICLES NES OF PLASTICS | 0.95 | 0.95 | 1.01 | 1.03 | 1.13 | 1.04 | 1.11 | 1.16 | 1.23 |
| 778 | ELECTRICAL EQUIPMENT NES | 0.75 | 0.87 | 0.82 | 0.80 | 0.93 | 0.97 | 1.11 | 1.21 | 1.29 |

**CHINA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 893 | ARTICLES NES OF PLASTICS | 5.18 | 5.95 | 5.86 | 6.35 | 8.23 | 9.12 | 8.38 | 8.84 | 9.44 |
| 771 | ELECT POWER TRANSM EQUIP | 5.05 | 6.24 | 6.70 | 6.68 | 7.93 | 9.71 | 10.30 | 10.30 | 11.38 |
| 716 | ROTATING ELECTR PLANT | 4.05 | 3.62 | 3.96 | 4.31 | 5.54 | 5.93 | 5.90 | 6.75 | 6.27 |
| 775 | DOMESTIC EQUIPMENT | 3.57 | 3.86 | 4.17 | 4.89 | 6.36 | 7.26 | 8.42 | 9.84 | 11.73 |
| 743 | FANS/FILTERS/GAS PUMPS | 2.40 | 2.23 | 2.38 | 2.46 | 2.41 | 2.62 | 2.29 | 2.23 | 2.72 |
| 778 | ELECTRICAL EQUIPMENT NES | 2.25 | 2.61 | 2.76 | 2.97 | 3.83 | 4.57 | 5.16 | 5.48 | 7.11 |
| 772 | ELECTRIC CIRCUIT EQUIPMT | 1.71 | 1.90 | 2.27 | 2.08 | 2.69 | 3.14 | 3.29 | 3.34 | 4.01 |
| 724 | TEXTILE/LEATHER MACHINRY | 1.47 | 1.35 | 1.50 | 1.54 | 1.96 | 2.45 | 2.83 | 3.60 | 3.79 |
| 773 | ELECTRICAL DISTRIB EQUIP | 1.42 | 1.63 | 1.74 | 2.20 | 2.89 | 3.37 | 3.72 | 3.90 | 4.47 |
| 744 | MECHANICAL HANDLING EQUI | 1.28 | 1.18 | 1.06 | 1.26 | 1.67 | 1.84 | 1.72 | 2.15 | 2.58 |
| 625 | RUBBER TYRES/TREADS | 1.16 | 1.26 | 1.94 | 1.99 | 2.29 | 2.62 | 3.01 | 3.90 | 4.21 |
| 711 | STEAM GENERATING BOILERS | 1.09 | 0.64 | 1.23 | 1.42 | 2.13 | 2.93 | 2.59 | 3.80 | 3.87 |
| 737 | METALWORKING MACHINE NES | 0.73 | 0.61 | 0.78 | 0.81 | 1.01 | 1.31 | 1.20 | 2.28 | 1.99 |
| 728 | SPECIAL INDUST MACHN NES | 0.66 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.72 | 0.65 | 1.09 |
| 749 | NON-ELEC PARTS/ACC MACHN | 0.66 | 0.54 | 0.55 | 0.66 | 0.90 | 0.96 | 1.29 | 1.52 | 1.84 |
| 742 | PUMPS FOR LIQUIDS | 0.48 | 0.50 | 0.55 | 0.55 | 0.71 | 0.89 | 0.92 | 1.25 | 1.59 |
| 727 | FOOD PROCESSING MACHINES | 0.48 | 0.53 | 0.64 | 1.00 | 0.78 | 1.54 | 0.76 | 0.99 | 1.09 |
| 723 | CIVIL ENGINEERING PLANT | 0.29 | 0.28 | 0.45 | 0.49 | 0.57 | 0.51 | 0.56 | 0.87 | 1.41 |
| 745 | NON-ELECTR MACHINES NES | 0.29 | 0.33 | 0.37 | 0.50 | 0.63 | 0.75 | 1.03 | 1.35 | 1.76 |
| 718 | POWER GENERATING EQU NES | 0.28 | 0.36 | 0.60 | 0.75 | 0.87 | 0.62 | 0.88 | 1.38 | 1.57 |
| 741 | INDUST HEAT/COOL EQUIPMT | 0.28 | 0.50 | 0.55 | 0.70 | 1.04 | 1.33 | 1.83 | 2.60 | 3.63 |
| 774 | MEDICAL ETC EL DIAG EQUI | 0.11 | 0.21 | 0.29 | 0.34 | 0.45 | 0.36 | 0.35 | 0.65 | 1.02 |

Source: Author's Calculation based on COMTRADE database

## TABLE 7: RCA OF HIGH KNOWLEDGE BASED INDUSTRIES

**MALAYSIA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 762 | RADIO BROADCAST RECEIVER | 14.54 | 16.14 | 16.72 | 16.66 | 15.38 | 14.22 | 16.25 | 13.99 | 13.40 |
| 763 | SOUND/TV RECORDERS ETC | 9.00 | 10.60 | 12.23 | 12.80 | 11.86 | 10.40 | 8.11 | 8.26 | 8.61 |
| 776 | VALVES/TRANSISTORS/ETC | 8.20 | 7.30 | 6.84 | 7.33 | 7.28 | 7.49 | 7.49 | 5.88 | 6.73 |
| 761 | TELEVISION RECEIVERS | 7.71 | 8.28 | 9.35 | 8.57 | 7.31 | 6.15 | 6.30 | 6.53 | 6.10 |
| 759 | OFFICE EQUIP PARTS/ACCS. | 4.57 | 4.77 | 4.81 | 4.89 | 5.04 | 6.08 | 8.50 | 8.04 | 6.15 |
| 881 | PHOTOGRAPHIC EQUIPMENT | 3.27 | 3.10 | 3.30 | 3.01 | 3.26 | 3.72 | 3.12 | 2.98 | 3.83 |
| 764 | TELECOMMS EQUIPMENT NES | 2.97 | 3.18 | 2.96 | 3.01 | 2.97 | 2.67 | 2.46 | 2.49 | 2.79 |
| 512 | ALCOHOLS/PHENOLS/DERIVS | 2.28 | 2.59 | 2.05 | 1.71 | 3.00 | 3.14 | 3.03 | 2.88 | 2.90 |
| 751 | OFFICE MACHINES | 1.79 | 1.45 | 1.34 | 1.33 | 1.06 | 0.97 | 1.28 | 1.50 | 1.64 |
| 572 | STYRENE PRIMARY POLYMERS | 1.36 | 1.84 | 1.92 | 1.97 | 2.36 | 2.43 | 2.37 | 2.42 | 2.25 |
| 554 | SOAPS/CLEANSERS/POLISHES | 1.33 | 1.25 | 1.11 | 1.14 | 1.29 | 1.38 | 1.38 | 1.30 | 1.16 |
| 792 | AIRCRAFT/SPACECRAFT/ETC | 1.22 | 2.05 | 1.57 | 1.11 | 0.98 | 1.02 | 0.59 | 0.23 | 0.17 |
| 885 | WATCHES AND CLOCKS | 0.94 | 1.27 | 1.16 | 1.28 | 1.55 | 1.33 | 1.05 | 1.18 | 0.84 |
| 871 | OPTICAL INSTRUMENTS NES | 0.94 | 0.94 | 0.71 | 0.78 | 0.54 | 0.28 | 0.30 | 0.30 | 1.53 |
| 562 | MANUFACTURED FERTILIZERS | 0.83 | 0.66 | 0.80 | 0.78 | 0.62 | 0.53 | 0.70 | 1.03 | 1.24 |
| 516 | OTHER ORGANIC COMPOUNDS | 0.57 | 0.72 | 0.52 | 0.62 | 0.74 | 0.38 | 0.48 | 1.03 | 0.76 |
| 752 | COMPUTER EQUIPMENT | 0.53 | 1.12 | 1.55 | 2.58 | 3.54 | 3.45 | 3.73 | 3.47 | 4.07 |
| 513 | CARBOXYLIC ACID COMPOUND | 0.44 | 0.46 | 0.36 | 0.68 | 0.95 | 1.09 | 1.12 | 1.48 | 2.51 |
| 598 | MISC CHEMICAL PRODS NES | 0.38 | 0.99 | 1.57 | 1.74 | 1.73 | 1.36 | 1.20 | 1.20 | 1.12 |
| 874 | MEASURE/CONTROL APP NES | 0.35 | 0.34 | 0.34 | 0.43 | 0.62 | 0.52 | 0.52 | 0.71 | 1.04 |
| 873 | METERS AND COUNTERS NES | 0.23 | 0.25 | 0.16 | 0.19 | 0.24 | 0.18 | 0.57 | 0.87 | 1.08 |
| 511 | HYDROCARBONS/DERIVATIVES | 0.03 | 0.09 | 0.17 | 0.21 | 0.43 | 0.28 | 0.35 | 0.67 | 1.03 |

**CHINA**

| SITC | Product | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| 762 | RADIO BROADCAST RECEIVER | 11.20 | 13.10 | 12.26 | 13.03 | 17.12 | 19.18 | 15.98 | 16.08 | 17.25 |
| 885 | WATCHES AND CLOCKS | 9.97 | 10.58 | 9.87 | 10.18 | 11.44 | 12.41 | 11.68 | 10.50 | 10.01 |
| 524 | OTHER INORGANIC CHEMICAL | 6.46 | 7.22 | 10.18 | 8.24 | 8.86 | 9.00 | 7.21 | 5.20 | 5.63 |
| 522 | ELEMENTS/OXIDES/HAL SALT | 5.35 | 5.75 | 6.54 | 6.38 | 7.35 | 7.85 | 6.92 | 7.43 | 7.97 |
| 523 | METAL SALTS OF INORG ACD | 5.07 | 5.67 | 7.17 | 6.90 | 8.29 | 8.46 | 9.45 | 9.66 | 11.97 |
| 881 | PHOTOGRAPHIC EQUIPMENT | 4.90 | 4.80 | 5.18 | 5.94 | 8.02 | 9.63 | 8.58 | 7.53 | 7.92 |
| 761 | TELEVISION RECEIVERS | 4.75 | 3.40 | 3.37 | 3.27 | 2.92 | 3.14 | 3.53 | 4.22 | 5.31 |
| 871 | OPTICAL INSTRUMENTS NES | 3.45 | 4.13 | 4.83 | 5.32 | 6.90 | 7.12 | 6.84 | 8.28 | 7.28 |
| 541 | PHARMACEUT EXC MEDICAMNT | 3.36 | 3.92 | 4.18 | 3.88 | 4.22 | 4.75 | 4.24 | 4.03 | 4.05 |
| 531 | SYNTH ORG COLOUR AGENTS | 3.16 | 3.77 | 4.34 | 4.42 | 6.09 | 6.93 | 7.09 | 7.57 | 9.14 |
| 751 | OFFICE MACHINES | 2.72 | 3.88 | 4.99 | 7.26 | 8.78 | 9.47 | 9.37 | 10.07 | 12.50 |
| 513 | CARBOXYLIC ACID COMPOUND | 2.38 | 2.49 | 2.60 | 2.22 | 2.85 | 3.39 | 3.65 | 3.46 | 3.69 |
| 764 | TELECOMMS EQUIPMENT NES | 2.36 | 2.94 | 3.16 | 3.55 | 4.06 | 4.45 | 4.70 | 5.15 | 7.22 |
| 763 | SOUND/TV RECORDERS ETC | 2.26 | 3.64 | 4.39 | 5.20 | 6.80 | 7.83 | 8.35 | 9.96 | 15.21 |
| 551 | ESSENT.OIL/PERFUME/FLAVR | 2.21 | 2.24 | 1.98 | 1.80 | 1.48 | 1.41 | 1.11 | 0.92 | 0.89 |
| 884 | OPTICAL FIBRES | 1.92 | 2.41 | 2.88 | 3.29 | 3.56 | 4.33 | 4.27 | 4.29 | 5.20 |
| 512 | ALCOHOLS/PHENOLS/DERIVS | 1.85 | 1.88 | 1.54 | 1.40 | 1.86 | 1.69 | 1.72 | 1.67 | 2.02 |
| 532 | DYEING/TANNING EXTRACTS | 1.75 | 1.12 | 0.96 | 0.94 | 1.10 | 1.13 | 2.06 | 1.70 | 2.57 |
| 516 | OTHER ORGANIC COMPOUNDS | 1.70 | 2.12 | 2.42 | 2.41 | 2.81 | 3.98 | 2.68 | 2.71 | 3.06 |
| 515 | ORGANO-INORGANIC COMPNDS | 1.57 | 1.71 | 1.85 | 2.19 | 2.07 | 1.81 | 1.58 | 1.51 | 1.82 |
| 514 | NITROGEN FUNCTION COMPDS | 1.44 | 1.94 | 2.23 | 2.13 | 2.91 | 2.98 | 2.87 | 3.08 | 3.31 |
| 759 | OFFICE EQUIP PARTS/ACCS. | 1.32 | 1.47 | 1.66 | 1.92 | 2.39 | 3.37 | 3.33 | 3.69 | 6.14 |
| 591 | HOUSEHOLD/GARDEN CHEMCAL | 1.23 | 1.58 | 1.91 | 2.14 | 2.69 | 2.79 | 3.64 | 3.67 | 4.55 |
| 598 | MISC CHEMICAL PRODS NES | 1.10 | 1.22 | 1.10 | 1.33 | 1.60 | 1.51 | 1.44 | 1.47 | 1.75 |
| 873 | METERS AND COUNTERS NES | 0.97 | 1.19 | 0.99 | 1.22 | 1.59 | 1.73 | 1.56 | 2.10 | 2.81 |
| 553 | PERFUME/TOILET/COSMETICS | 0.91 | 0.61 | 0.64 | 0.61 | 0.70 | 0.90 | 0.83 | 0.99 | 1.08 |
| 533 | PIGMENTS/PAINTS/VARNISH | 0.86 | 1.07 | 1.17 | 1.14 | 1.30 | 1.44 | 1.18 | 1.29 | 1.52 |
| 592 | STARCHES/GLUES/ETC. | 0.69 | 0.99 | 1.02 | 0.78 | 1.12 | 1.23 | 1.19 | 1.42 | 1.65 |
| 752 | COMPUTER EQUIPMENT | 0.66 | 0.94 | 1.63 | 2.42 | 3.27 | 4.62 | 4.60 | 5.32 | 6.85 |
| 872 | MEDICAL/ETC INSTRUMENTS | 0.61 | 0.68 | 0.80 | 0.93 | 1.06 | 1.22 | 1.20 | 1.44 | 1.65 |
| 582 | PLASTIC SHEETS/FILM/ETC | 0.61 | 0.73 | 0.92 | 0.78 | 1.23 | 1.30 | 1.17 | 1.21 | 1.29 |
| 874 | MEASURE/CONTROL APP NES | 0.58 | 0.57 | 0.65 | 0.65 | 0.85 | 1.04 | 1.01 | 1.07 | 1.40 |
| 511 | HYDROCARBONS/DERIVATIVES | 0.55 | 0.61 | 1.04 | 0.96 | 1.09 | 0.98 | 1.08 | 0.88 | 1.26 |
| 562 | MANUFACTURED FERTILIZERS | 0.52 | 0.56 | 0.85 | 1.22 | 1.55 | 1.21 | 1.73 | 2.40 | 3.30 |
| 883 | CINE FILD DEVELOPED | 0.41 | 0.86 | 1.08 | 1.55 | 1.12 | 1.02 | 0.62 | 0.54 | 0.03 |
| 776 | VALVES/TRANSISTORS/ETC | 0.40 | 0.47 | 0.67 | 0.77 | 0.97 | 1.28 | 1.61 | 1.68 | 2.08 |
| 572 | STYRENE PRIMARY POLYMERS | 0.37 | 0.66 | 0.82 | 1.30 | 2.02 | 1.44 | 0.60 | 0.84 | 0.76 |
| 882 | PHOTOGRAPHIC SUPPLIES | 0.36 | 0.28 | 0.39 | 0.48 | 0.66 | 0.83 | 1.27 | 1.99 | 2.26 |

Source: Author's Calculation based on COMTRADE database

## TABLE 8: SPEARMAN'S RANK CORRELATIONS COEFFICIENT BETWEEN CHINA AND MALAYSIA

| Country/Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|
| Labour & Resource Intensive | .318 | .201 | .185 | .193 | .084 | .106 | .084 | .034 | .042 |
| Medium Knowledge Industries | .617** | .636** | .691** | .717** | .721** | .701** | .693** | .651** | .634** |
| High Knowledge Industries | .130 | .094 | .096 | .172 | .214 | .237 | .212 | .310* | .375* |

34 resource based and medium knowledge industries and 41 high knowledge industries under observation
Low knowledge industries was not included since Malaysia shows comparative disadvantage.
** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

## TABLE 9: LABOUR COSTS AND VALUE ADDED PER WORKER IN MANUFACTURING (US$ PER YEAR)

| | Labour Costs (Wage) | | | Value added | | |
|---|---|---|---|---|---|---|
| Countries | 1980-1984 | 1995-1999 | % Increase | 1980-1984 | 1995-1999 | % Increase |
| Malaysia | 2519 | 3429 | 36.1 | 8454 | 12661 | 49.8 |
| Thailand | 2305 | 2705 | 17.4 | 11072 | 19946 | 80.1 |
| Indonesia | 898 | 1008 | 12.2 | 3807 | 5139 | 35.0 |
| Philippines | 1240 | 2450 | 97.6 | 5266 | 10781 | 104.7 |
| Singapore | 5576 | 21534 | 286.2 | 16442 | 40674 | 147.4 |
| China | 472 | 729 | 54.4 | 3061 | 2885 | -5.7 |

Source: World Bank, World Development Indicator, 2000