

Chapter 5

Japanese Investment and Technology Transfer to Malaysia

5.1 Introduction

The term 'technology' can be defined as "the collection of manufacturing techniques associated with particular industrial sector or industrial products" (Stewart, 1979). According to Brookes (1966),

"Technology transfer is a process by which science and technology are diffused through-out human activity. Whenever systematic rational knowledge developed by one group or institution is embodied in a way of doing things by other institutions or groups, we have technology transfer. This can refer to either transfer of more basic scientific knowledge into technology or adaptation of an existing technology to a new use"

(Chakrabathi, 1972)

There have been much emphasis regarding the role of technology in the process of economic and industrial development. It is increasingly recognized in several countries, that an essential prerequisite to economic growth is the rapid development of technological capability in the use, absorption and adaptation of foreign technology in the growth of indigenous techniques and process (Guyton, 1996).

In the initial stages, technological development was mainly promoted by institutional programs for technical education and training; and by the establishment and operation of government owned research institutions. Thus, policies and programs that were designed to establish production capacity were also expected to result in the necessary flow of production technology and management techniques.

During the last two decades, some specific policies have been adopted that directly affect the application and development of technology particularly at the production level. Technological development, including issues of foreign technology transfer and its absorption and adaptation, and development of

indigenous technological capability, became an important feature of current policies and programs. These aspects are in turn closely linked with policies towards FDI and the role of activities of MNCs in developing countries (Marton, 1986)

FDI formally results in a transfer of considerable technology to the host country. It could even be considered as the major benefit of FDI, particularly for a developing country like Malaysia that has a wide technology gap. Thus, the aim of this chapter will be to examine the impact of JDI in the form of technology transfers for Malaysia's industrialisation. In view of the fact that Japan has been a major player in the industrial development of Malaysia, there have been many expectations of its role in technology transfers to domestic industries. Since Malaysia needs to upgrade its industrial base and technological capabilities, the extent of technology absorption and assimilation is indeed critical.

While transfer of technology may be important, it is also necessary to consider the extent at which it has been adapted to suit the local environment, technology developed in the developed countries is generally based upon the requirements of such countries, and not the requirements relevant to developing countries. As a result, the technology developed is often of a capital-intensive nature, whereas the relevant one would require a labour intensive or at least, an intermediate technology. So it's important to examine not only the extent but also the type of technology transferred (Chee, 1979).

5.2 Policies on Technology Transfer

The Malaysian government has expressed a positive attitude towards the importation of foreign technology. This is in accordance with the realisation of the importance of foreign technical aid and management and marketing expertise. This can be seen clearly as the terms and regulations imposed on the importation of foreign technology are relatively more liberal compared to other developing countries.

In addition to the incentives showered on foreign investors, the government has always emphasised the type of technology imported to ensure appropriate transfer of technology. The assurance of an appropriate transfer is vital, particularly in the transferring of equipment and intermediate goods and services.

In order to encourage the entrance of foreign technology via FDI (inclusive JDI), the government has drawn up several investment promotion incentive plans to attract greater inflow of direct investment. It is hoped that, with this, the problem of insufficient technical know-how and management expertise can be overcome. In addition, the local workers can equip themselves with the relevant technical experience to handle new technologies and innovations in future.

Free trade zones and industrial estates were set up in selected areas, whereby foreign investors are granted tax exemption for importation of machinery and other capital and intermediate goods. With these incentives, the government hope to encourage greater flexibility when the transfer technology and assistance occur. With the implementation of the Investment Incentives Act in 1968, the Ministry of Trade and Industry was given the role of selecting companies for approval. And in 1975, under the Industrial Coordination Act, the Technology Transfer Unit was set up to function as a screening board for all investment projects. This unit came up with several regulations on the criteria pertaining to technology transfer agreements in Malaysia. It states that all agreements should include the principal features of the technology, anticipated production, quality, specification of products, particulars on technical assistance and the channel of transfer (Burhan, 1983).

5.3 General Characteristics of Japanese Technology Transfer

Ozawa (1971) had observed some of the characteristics of Japanese technology transfer to developing countries. Kojima (1978) obtained similar results through his study on Japanese and American type of technology

transfer. The Japanese technology is often transmitted through a 'packaged' mechanism, where capital, management and technical know-how came from the same supplier. This form of transfer is categorised as turnkey agreement that involve direct and complete transfer of technology beginning with the construction of the plant to the production stage. The provision of technical and managerial resources is the sole responsibility of the Japanese.

Japanese technology is often designed to accommodate short run changes and variations. The production techniques transferred are merely technical know-how and general industrial experience. As such, the transfer is more suited for mature production. The fundamental technical modifications expected from the local workforce were minimal.

The Japanese have also shown a tendency of investing in countries that enjoys a comparative advantage. Most of the developing countries have abundance of labour and they are also easily available. In accordance with Hecksher-Ohlin theorem, countries with high labour supply would have a comparative advantage in promoting labour intensive industries. As such, Japan with abundant capital, would attempt to exploit this advantage by developing industries which are often highly labour intensive.

According to Kojima (1978), the features of Japanese technology transfers can be described as an 'orderly transfer of technology'. This form involved the transmission of technology between both countries that have a small difference in their technological status. The transfer of technology between these countries is easy and convenient because the marginal technological gap between them will not result in major adjustments in the technology transferred. In this way, the transfer may generate greater spread effect in the recipient country.

5.4 Japanese Technology Transfer within Malaysia

As some general features of typical Japanese technology transfer have been identified, we would continue with investigating the relevance of these to Japanese technology transfers within the Malaysian manufacturing framework.

Generally all JDI related firms should have acquired some assistance from their foreign partner. Some of the most commonly used methods of technology transfer among the Japanese investors include formal training, direct purchase of machinery and capital equipment, technical and management know-how, licensing/turnkey agreements and patented technology. These forms of assistance are common because the Japanese firms relied heavily on capital goods from either their parent company or other producers in Japan.

In evaluating the pattern of JDI, we found that initially, Japanese investments were primarily in labour intensive industries such as textiles, electrical/electronics, etc. Their intention was basically to exploit the cheap and easily available labour force in Malaysia. Japanese basically developed industries that would facilitate Japanese labour intensive production process that have become uneconomical in Japan. This was further supported by Malaysian government incentives. The government was fundamentally promoting import substitution industries (ISI) and hoped that the entrance of JDI to the economy would reduce imports, particularly Japanese manufactured goods.

The technology transfer diffusion by JDI is governed by the capability of the local workforce. This is evident where there were a high inflow of JDI in low-level technology application industries. With the lack of appropriate skills and qualifications among local labour force, many Japanese investors adopted simpler technology. These are essentially types of technology that demand less technical knowledge from local workers. The types of technology used or transferred primarily depend on the technical and engineering ability

among local workers. The higher the technical and engineering ability among the local workforce, the greater the possibility of introducing higher level technology.

In addition, in some cases, the technology transferred is often of a specific type because the products manufactured in Japanese overseas plants are generally standardised products. This would mean that local workers are not required to make major adjustments prior to the adoption of the technology into local production. Instead they directly adopt production techniques according to specifications set by the Japanese parent company itself.

As the Malaysian economy entered the heavy industrialisation phase, the type of industries emphasised by Japanese investors also began to change, with the volume and number of JDI in export based industries increasing compared to previously. There was a small decline in JDI into labour intensive industries. This decline was due to the increase of Japanese investment in less labour intensive industries. Furthermore during this phase, there was an increased participation of Taiwanese investors in industries such as electrical/electronics that were a stronghold of the Japanese. However, we should note that eventhough there were more Taiwanese projects, the value of Japanese investment still exceeded their Taiwanese counterparts (Star, 1990).

The structural transformation experienced by the Malaysian industrial sector since mid 1980s, where the focus shifted from light to heavy industries had actually provided the JDI the opportunity to move away from low level technology application industries. As the move towards more advanced techniques of production, usage and absorption of unskilled labour too have become unfavourable. This actually lead to improvements in the level and quality of education to generate a more technically educated workforce. So, the Japanese were encouraged to introduce higher level of techniques of production that was not possible during their early years in Malaysia. Consequently, capital intensive industries were developed and many JDI

came in, especially in heavy industries. Currently, JDI is more concentrated in capital intensive industries as compared to only one tenth in the late seventies. In relation to the increase in capital intensive industries, the JDI in high-level technology application industries also increased as well. By 1980, only RM 121.8 million worth of JDI was directed towards high level technology application industries, but this figure soared up to RM 500 million by early 1990s. In view of the changes in the Malaysian industrial structure, many of the JDI have switched their investment priorities to suit the objectives drawn up by the Malaysian industrial policy (Malaysia, 1996).

5.5 Types of Technology Transfer

Technology transfers to developing countries like Malaysia, generally involves the transfer of written information, human embodied skills, know-how and the adaptation of production processes by technology suppliers. This type of transfers are usually through a variety of different channels, the main ones being the purchase of technology through licensing agreements, imports of machinery and equipment, technical assistance contracts and turn-key arrangements. The options used are usually influenced by the technology capabilities of the users as well as the desire of the suppliers to extract maximum rent from the provision of it's technology.

Whenever technology is purchased as an important component of an investment package to be complemented by the management, marketing services and equity participation, it is generally referred as *packaged* type of technology transfer. However, the main disadvantage with this packaged approach is that it can lead to technology dependency upon industrial countries and to create bottlenecks that can hamper the pace of industrial growth in a developing economy. Many developing countries, including Malaysia try to *unbundle* the packages to facilitate separate treatment of the different components offered. However, this also depends on the extent of their technological capabilities.

Unpackaged technology refers to technology acquisition by licensing which exclude foreign equity participation. But the question is how effective is this approach compared to the earlier one. The effectiveness actually depends upon both the industrial infrastructure and technological capabilities in the national economy. In Malaysia, there's quite a significant number of manufacturing firms that had used this approach to acquire technologies from Japan. But given the country's narrow industrial base and dominance of FDI in key industries, technology acquisition and assimilation has been all the more difficult. In acquiring foreign technology, the domestic industry has to consider various other factors, including the willingness of MNCs to transfer their technologies, the appropriate price of such technologies, as well as domestic absorptive capacity (Anuwar Ali, 1994).

The channels through which Japanese technology is transferred in Malaysia will now be examined. Some of the more common practices used by Japanese firms are through agreements, training and manufacturing practices.

5.5.1 Technology Transfer Agreements

Technology Transfer Agreements (TTAs) is very evident in the manufacturing sector in Malaysia. Within the manufacturing sector in Malaysia, the electronics industry had the highest number of TTAs. As a percentage of the total number of agreements in the manufacturing sector, the share of the electronics industry rose from 17 percent during 1976-85 to 24 percent between 1986 and Nov 1992 (MITI, 1997). This high proportion of TTAs suggests that this industry made use of TTAs as a means to obtain foreign, especially Japanese technology. Firms producing components within the consumer electronics industry had a particularly high number of TTAs. This can be explained by the fact that the subsector being export oriented and technology driven, faced pressure from the international market to constantly upgrade its technology. In examining the type of agreements in operation, the common ones are technical assistance agreements (TAAs) and know-how agreements (KHAs). Some of them had licensing patent agreements with the

parent company, but the majority had turnkey agreements. This is because turnkey agreements are the common mode relied upon in the initial operational phase of a firm, so as to obtain foreign expertise in the construction of the plant, installation of machinery, etc. But this mode of technology transfer should decline with the maturing of the firms.

5.5.2 Purchase/Loan of Machinery and Other Capital Equipment

In the initial stages of JDI, Japanese firms relied heavily on their parent company for the supply of machinery and other capital goods. In fact, some firms imported all their capital equipment directly from Japan (Chee, 1979). However, there has been a gradual change among Japanese manufacturing firms in Malaysia in terms of their procurement of machinery and capital equipment.

One could associate the appreciation of Yen since the late 1980s in explaining the declining procurement of machinery in Japan. Many Japanese firms, in order to maintain their competitiveness, had to avoid any possibility of incurring high cost in production. They might have used Japanese machinery extensively at the initial stages of production because they were still highly dependent on Japanese guidance. But, now, with the escalating cost, they can afford to, so they had to divert their machinery source to other foreign countries. Singapore became a more convenient source of machinery because of its proximity to Malaysia. The Japanese firms were able to save cost which was crucial in maintaining their competitive position in the international market.

Besides procurement from foreign countries, many Japanese firms have slowly began to turn to local manufacturers for their supply of machinery such as generators/motors, air compressors, radiators, conveying machines, etc. The support and assistance given by the local government to assist indigenous manufacturers was the crux to the improvement in the production of capital and intermediate products. Furthermore, it was common for local manufacturers to establish more joint ventures with foreign equity or foreign

technical collaboration with the intention of bridging the technology gap via improvement in production techniques particularly in the area of quality control and product research.

Moreover, the type of machinery imported from Japan is often not the most up to date because the Japanese investors feel that advanced machinery would be too sophisticated to suit the Malaysian manufacturing environment. Thus, to be more applicable, they have introduced some of the less sophisticated machines to Malaysia that the Japanese felt to be more suitable and fitting to the local manpower capabilities. The Japanese investors might have thought that it is not worthwhile adopting a more advanced technology here and running it below capacity (Woon, 1990).

In addition, some firms also purchase their machinery from local producers. Apart from this, purchases of reconditioned and used equipment are also a common feature in Japanese firms. The usage of second hand and reconditioned machinery include radiators, packaging machineries, engines, etc. However it should be noted that these machines were once imported from Japan or other foreign sources, but have undergone reconditioning. Apart from being readily acquired, these reconditioned machines are also cheaper. The Japanese firms have expressed high preferences for the usage of reconditioned machinery if the need arises for new machines to fulfill unexpected changes in demand.

5.5.3 Patent Technology

Patented technology is the least used method in transferring technology to Malaysia by Japanese firms. It involves the use of patents and trademarks for the production of certain goods. This technology can be classified as unpackaged technology, which demands sufficient supporting skills from the recipient country to produce the same products specified, by the patents. Unfortunately, the level of technical expertise in Malaysia is still insufficient to meet the prerequisite requirements to ensure a successful

transfer of technology. The lack of scientific and technological infrastructure may hamper this type of technology transfers.

5.6 Effectiveness of Technological Transfer

Japanese MNCs' transfer of technology can be rated as relatively ineffective. The cause of the ineffective technology transfer may be contributed by factors within Malaysia itself. One of the problem is the insufficient supporting personnel and expertise to sustain an effective technology transfers. This is further compounded with the lack of attention given to industrial R&D, which has made technology transfer ineffective and unyielding. To a certain extent, there is almost a total absence of R&D culture within the private sector (IMP, 1990). In addition, Malaysia still lacks sufficient facilities to complement and accommodate more intense research activities.

The failure of successful transfer of technology could be attributed to the process of transfer itself. The MNCs would normally import the required technology and technical know-how from the parent company or other countries abroad (especially dealing with machinery and capital equipment). And normally these MNCs would use Japanese personnel as keymen to ensure smooth running of the operation, particularly at the initial stages. This nature of technology transfer may lead to technology isolation, as the source of technology know-how is obviously limited and is not nurtured with continuing technology advances and development. Constant technological upgrading and modernisation that is so vital to a manufacturing industry is therefore not available.

The practice of importing wholesale technology from parent company is not completely suitable for Malaysia. The type of technology adopted in other developed countries are usually designed for larger scale production and the local market is not large enough to enable optimal utilisation of these technologies. In relation to this, efforts should be taken to encourage the importation of technology that caters more for a smaller and less sophisticated market.

Another reason for the failure of effective technology transfer deals with the cost of procuring these technologies. Foreign sources might take advantage of the limitations of technological know-how of the local personnel. It is convenient for them to transfer outdated processes at inflated prices. By doing so, they are not only making high profit, but can clear out their inefficient old machineries.

Another contributing factor for ineffective transfer of technology might be due to the attitude and cultural difference between Malaysian and Japanese workforce. Malaysian workers are not able to instill the type of work commitment and style demanded by the Japanese. Malaysian workers also face difficulty in tuning themselves towards the Japanese speed of work. Thus, many of the Japanese investors have identified some level of inefficiency among the local workers.

The government also might have compounded this ineffectiveness with a lot of red tape. The Malaysian government like many developing countries tends to adopt a watchful attitude towards the entrance of foreign technology in order to avoid the infiltration of inappropriate technology into the economy. There is a ruling that all technical, licensing and know-how agreements and the payment of fees and royalties should obtain prior approval from the Ministry of Trade and Industry. The MNCs also need to state the nature of technology transfer and the possible spill-over effects generated from the transfer. This type of close scrutiny imposed by the government has actually made it difficult for foreign investors entering the economy.

On the other hand, if there is no control, the Japanese investors would be bringing in wholesale package of technology with the least consideration for the local factor endowment. The Japanese firms would then try to transfer obsolete or outdated technology from the parent company at a very high cost to Malaysian manufacturing firms. In addition, the adaptability of this technical know-how to comply with local factor endowments would be minimal or questionable. This would affect the effectiveness of Japanese transfer of technology further.

5.7 Conclusion

We can conclude that there has been an ineffective transfer of technology within the Japanese manufacturing firms in Malaysia despite the ongoing claims from the Japanese that local workers have in fact benefited tremendously from the diffusion of their technology. It is no doubt that the local workers have received considerable amount of knowledge from the Japanese but the extent and spread of the knowledge is still meager and little compared to the number of years the Japanese have established themselves here.