

## Malaysia's Industrialization: The Issue of Technology Transfer

**Jaafar Muhamad**

### ABSTRACT

*The transfer, adaptation and diffusion of modern technology and skills from transnational corporations (TNC) to our local industries has been a crucial element in the industrial plans of Malaysia. From time to time, conflicts do result from the present mechanism whenever technology is transferred from the TNC to Malaysia. An attempt is made here to focus on a few of the important issues and basic features concerning the roles and effects of technology transfer to Malaysia. This paper will provide a basic framework for consideration by our entrepreneurs and they should realise that industrial technology is beneficial and can be applied realistically, appropriately and effectively to our industrial setting.*

### ABSTRAK

*Satu perkara pokok dalam perancangan perindustrian di Malaysia ialah berhubung dengan pemindahan, penyesuaian dan penyerapan kemahiran dan teknologi daripada syarikat induk transnational kepada syarikat tempatan. Mekanisme usaha ini sering menimbulkan konflik dan kertas ini cuba menyorot isu dan rencana penting seperti ini dari segi peranan dan kesan perancangan berkenaan agar mampu melahirkan satu rangka renungan yang jelas kepada pengusaha tempatan bahawa teknologi industri itu berfaedah dan boleh digunakan secara realistik, sesuai dan berkesan kepada suasana perindustrian.*

### INTRODUCTION

#### PAST AND FUTURE PATTERNS

With the promulgation of the Pioneer Industries Ordinance of 1958, industrialization then became a firmly-based policy objective for Malaysia's national development. Since then manufacturing sector became the most dynamic and fast growing sector in Malaysia. On the average, the annual rate of growth was 11.5 percent in the 1960s and 12.5 percent in the 1970s. With the help of rapid structural changes in products, exports, and size, Malaysia has now achieved a sustained growth averaging 6.7 percent per annum. Based on the targeted output growth rate, Malaysian GDP would increase from \$115 billion from 1990 to \$920 billion (in constant 1990 prices) by 2000,

reflecting an average growth of 7 percent per annum. The economy is expected to continue growing progressively with a high domestic saving rate, a well developed physical, social and institutional infrastructure, political, economic and financial stability. This high growth is expected to be propelled largely by the private sector.

What will be the global scenario till the year 2000? Based on the forecasting 'megatrends' for the world, the rate of structural change for the Malaysia economy is likely to be more rapid. The manufacturing sector would tend to expand and relatively younger workers will be employed. The prospects of achieving better quality of growth is possible due to the importation of the latest technical know how as well as by avoiding known pitfalls from the experience of others. Table 1 shows the pattern of regional international trade which indicates a rapid growth and it is expected to continue growing in the future. However, the competitive environment to some extent will affect Malaysia. For instance, the replacement of raw materials (i.e. natural rubber) by synthetics has shifted production towards the use of the latter given that its production cost being relatively lower.

TABLE 1. Interregional trade as percent of world trade

Region	1980		1988		1980-1988 Growth (%)
	US\$ bil	%	US\$ bil	%	
North America-Asia	49.7	2.5	90.6	3.2	7.8
Western Europe-Asia	30.1	1.5	70.8	2.5	11.2
North America-Western Europe	75.3	3.8	90.1	3.2	2.3

Source: World Development Report, 1990.

Table 2 shows a continuing increase in trade of manufactured products whereas the exports of raw materials, on the other hand, indicate a declining trend.

Based on a very brief overview of the projected pattern of world interregional trade, and also based on the Malaysian targeted output growth rate of 7 percent per annum, it is expected that the manufacturing sector of Malaysia to grow rapidly. With the shifts in the industrialization policies towards more export-oriented manufactures and the desire to reduce the dependence on foreign technology suppliers, it is expected that Malaysia reviews its respective science and technology development policies and to

TABLE 2. Recent trends in the composition of world trade

Year	1980 (%)	1988 (%)
Manufactured Goods	58	75
Agricultural Products	15	14
Petro-Chemicals	25	10
Minerals	2	2
Total Value	US\$2,000 bil	US\$2,829 bil

Source: World Development Report, 1990.

institute measures to build local capacities to adapt, innovate and absorb technology.

#### OBJECTIVE OF THE PAPER

Following from the above, this paper attempts to highlight the role and the effects of technology transfer in manufacturing industries in Malaysia as the result of government industrial policy of import-substitution (IS) policy (1957-68) and export-expansion (EE) policy (1968-1980). This paper will provide some insights for existing firms particularly among Malaysian investors in an attempt to redress the imbalance in ownership of equity capital and control of enterprises between Malaysia and foreigners. Also, this paper will provide some important information to Malaysian firms to the process of technological choice and development.

#### DEFINITION

The term "technologies" employed in this paper is embodied in various forms such as machinery, human capital or management and written documents or information. Transfer technology is "a process in which the country is free to choose autonomously, from among different alternatives of scientific and technological knowledge, those which are suited to its natural conditions and to its development objectives, its capacity for assimilation and its pattern of living" (Anuwar Ali 1985). During the last decade in Malaysia, the concept of technology transfer has assumed considerable importance in the context of technological choice and application.

#### DATA AND METHODOLOGY

This is an exploratory paper. The following discussions and analysis in this paper are based on data report obtained from several surveys made by various

researchers. These were surveys on the Japanese electronic and non-electronic firms (Osman, Anuwar & Toh 1985), a report on shortages and future requirements of professionals (Manpower Survey in Malaysian Industries 1991), opinion survey on the Management of Japanese Joint Ventures in the ASEAN Region (1987) and also from other regional studies and reports pertaining to technology transfer and finally focus the study based on a comparative study of cultural values between Japanese and Malaysian managers (Jaafar & Shukry 1983).

This study adopts the value definition of Kluckholm and Stroback (1961). Kluckholm and Stodback see value orientations as complex but definitely patterned (rank ordered) principles, resulting from the transactional interplay of three analytically distinguishable elements of the evaluative process - the cognitive, the affective, and the directive elements which give ordered direction to the ever-flowing stream of human acts and thoughts as these relate to the solution of 'common human' problems. The instruments measuring these aspects are shown in Appendix I.

#### SAMPLE

A sample of 48 Malaysian and 50 Japanese managers were drawn at random from trading, manufacturing, construction firms and banks operating in Malaysia. Of the 48 Malaysian managers, Malays made up 62.5% of the total, Chinese 31.3%, Indian 4.2% and others 2.1%. The bulk of the Malaysian managers are in 31 - 40 age group (48.9%), while the rest are below 30 years old. Nearly 65% of the Malaysian managers held either university degrees or professional qualifications. Age wise, the age distribution of the Japanese managers differed slightly from as the Malaysians. Fifty-two percent were from the 31 - 40 age group while 38% were from the 41 - 80 age group. Eighty-eight percent of the Japanese managers had undergone university education.

#### STATISTICAL METHOD

Contingency tables were constructed based on suitable coding of the responses. The Chi-Square statistics were then calculated to determine if there are significant differences between the values of Malaysian and Japanese managers. The results are discussed in the next section.

#### FINDINGS

##### ROLE OF TECHNOLOGY TRANSFER

Basically, there are several reasons why this concept of technology transfer is widely needed and important. First, it is becoming more apparent that most of the advanced countries like the United States, Japan, Germany and

France are continuing to restructure their industries with increasing levels of protectionism. This creates an environment of instability among the Third World economies like Malaysia whereby the prospects for enhancing manufacturing exports would be diminished. This instability is further aggravated with the rapid development of new technologies in the field of microelectronics and biotechnology and advanced materials which are primarily intensified by the Japanese, American and EEC multinational firms (Commonwealth Secretariat 1985, p. 32-42). As a result, many developing countries including Malaysia, are faced with the arduous task to be in line with their standards and demands. Competing on the terms of the industrial countries would be too expensive, risky and involve large-scale operations. With the exception of a few large firms or enterprises which have substantial amount of investment or capital, most enterprises are not able to compete with new technologies and innovations (ESCAP UNTAC Publication Series B. No.3:4). However, despite the rapid technological development of the industrial countries, it creates an inherent advantage to the latecomer. In this respect the developing countries which can adapt or import the proven technologies in their industries are able to achieve high productivity while minimizing the development costs.

Second, in recent years, the use of technology has assumed considerable significance especially in manufacturing industries. However, the scenario facing industries is that too many jobs are chasing too few job seekers. It is not only confined to lower categories of staff but, also, includes shortages of skilled personnel, professionals and other levels of management. Based on a Survey of Malaysian Industries which was conducted by the Malaysian International Chambers of Commerce and Industry (MICCI), Federation of Malaysian Manufacturers (FMM) and Malaysian Employers Federation (MEF) among its 2600 member companies throughout Peninsular Malaysia, during the period of October 1990 January 1991, most of the vacancies existed in the electronics and electrical industry followed by rubber products and financial services industries (Table 3). In terms of the sectoral distribution of employment, the highest number of manpower is in the manufacturing sector, followed by services (Table 4). Also, based on a report of a projected manpower requirements in the years 1994 and 1996, it shows a buoyant demand for engineering and business graduates in those industries. The shortages facing the industries would certainly require new alternatives to solve their problems. One possible option is by the importation of both technological expertise (expatriates) and capital equipment that are highly proficient, able to adapt, innovate and invent in response to the quickly changing supply and demand pattern.

Third, the government through various policy instruments has asserted the need for technological advancement to enhance the quality and productivity levels of Malaysian enterprises. For instance, the Industrial Master

TABLE 3. Manpower requirements by types of industry

Types of Industry	Current No. (1991)	Vacancies (1991)	1994	1996
Rubber Products	1878	488	805	559
Wholesale	42	13	10	2
Retail	686	279	420	512
Transportation	228	60	58	81
Financial Services	3472	410	136	166
Utilities	279	195	150	103
Public Relations	20	1	2	0
Construction	986	190	434	326
Palm Oil Products	332	135	115	68
Food Processing	809	236	164	186
Wood Based	320	96	86	132
Electronic & Electric	5600	964	2131	2070
Transport Equipment	208	46	140	162
Machinery and Engineering	259	83	65	154
Iron and Steel	662	217	341	124
Textiles	567	165	195	213
Others	6269	1327	1746	1696

Source: Manpower Survey in Malaysian Industries Report, 1991.

TABLE 4. Manpower requirements by types of operations

Types of Operations	Current	Vacancies	1994	1996
Manufacturing	9171	1940	3764	3505
Trading	849	162	264	327
Services	1656	1244	1040	1161
Manufacturing and Trading	1893	695	1101	1073
Manufacturing and Services	155	103	38	46
Trading & Services	1540	328	379	385
AU 3 Operations	1533	290	433	44

Source: Manpower Survey in Malaysian Industries Report, 1991.

Plan (IMP) and the Action Plan for Industrial Technology Development (ITD) outlined significant technologies to consolidate the nation's industrialization goals. Long-term plans were initiated for substantial allocation of resources in new and emerging technologies to ensure focus in areas which can yield

the highest economic returns. The Sixth Malaysia Plan (SMP) has also identified the strategies for sustaining development through utilization of resources. The SMP emphasizes the need to restructure domestic industries towards enhanced technological sophistication and better quality products that are integrated and competitive with the markets of the developed countries. In encouraging technological upgrading and diversification, it is therefore necessary for industries to adapt new technologies from the advanced industrialized countries.

#### EFFECTS OF TECHNOLOGY TRANSFER

Since Malaysia began its industrial programme in the fifties, the transfer of technology to Malaysia has been very limited, whether it was in the form of engineering, training of personnel and marketing distributions. The problem is due to the lack of Malaysian technical and managerial capabilities to choose and assimilate imported technologies. Besides, the decision and choice of technologies and improvements are generally made by the foreigners or technology suppliers. As a result, some of technologies imported are not appropriate for domestic needs, despite the high costs involved in purchasing them.

The following discloses the effects of technology transfer to Malaysian enterprises. Looking at the data collected from 11 Japanese electronic firms in Malaysia (Osman, Toh & Anuwar 1985) with regard to their performance in technological transfer and the development of technological skills, the survey showed that:

1. The choice of products or the type of products to be produced was mainly decided by the parent companies. Of the 11 firms surveyed, 8 indicated that the decision on what to produce was determined by the parent companies, 4 mentioned by the firms' own technical capability, while only one company mentioned that the government policy influences the choice. Firms which produce electronic components such as semiconductors and integrated circuits, the choices were determined by the nature of foreign markets. That was why most of those types of companies were export-oriented. Seven out of the eight firms that export electronic and semiconductors products indicated that the foreign market needs influenced the types of products they produced.

2. The availability of various technological options or choices for the firm's production was rather limited. Two firms mentioned that they have substantial choices of technology that suited to the country's needs. Five replied that they have only limited choices, while two replied that there were no choices available.

3. The experience of firms with regard to R & D efforts was mixed. Five firms did not have any formal efforts aimed at R & D in any area while four firms had formalized efforts aimed at R & D in production methods and

process. The majority of the firms claimed that R & D had continuously improved their production methods.

4. The method of technology transfer was in the form of “know-how” and technical assistance from the parent companies. That was confirmed in all the 11 firms surveyed. In addition, seven firms said that technological transfer was given with greater emphasis on training and seminars, while two mentioned patents/trademarks/licences as important methods.

5. The bulk of the total cost of technology transfer was taken up in the form of payments for the importation of new machinery and equipment through parent companies. That was mentioned by nine companies surveyed. Other expenses were done by sending their staff overseas, usually Japan, for training, while some were payments for royalty and technical fees.

6. The majority (8) of the firms had agreements relating to technical assistance, royalty, patents or trademarks with foreign companies while three said they had none.

7. Technology transfer benefited local industries because many foreign, especially Japan, investors come to Malaysia. Also, with the establishment of various industries, it created “spin-off” effects which encourage the growth of domestic firms.

8. The firms did not encounter much difficulty in acquiring new ideas on technology and products. That was because the ideas were readily provided by the parent companies which were willing to provide them to their own subsidiaries.

9. There was a mixed opinion of the general skills and efficiency of the local personnel. At the managerial level, most companies reported that there is substantial improvement as compared to the situation 3 years then (1982). Three companies reported slight improvement while four companies reported no change. At the level of technician/engineers, quite a number of companies reported substantial improvement while the number of companies reported slight improvement. Three companies reported no change. At the level of factory workers, the majority of companies reported slight improvement while only three companies reported substantial change. Four companies reported no change at all.

10. There was considerable participation by the parent companies in the planning and decision making process in most of the companies. Expatriates generally played an important role in decision-making compared to the local counterparts whose participation was in most cases were fair.

Based on the findings of the research, indicated that there were several advantages of some of the technology transfer to Malaysia. However, there were some problems that need to be overcome through appropriate policies.

These were some of the findings from the research. In a research study on Malaysian and Japanese Managers: a comparative study of cultural values, (Jaafar & Shukry 1983), which basically trying to develop the value



profiles of Malaysian and Japanese managers. The values were linked to the character of human nature, the relation between man and nature, and the temporal focus of human life. Out of those links values were further subcategorized into the following manners:

1. Character of human nature; Distrust (D) vs. Trust (T).
2. Relation between man and nature; Fatalism (F) vs. Mastery (M).
3. Temporal dimension of human life; past orientation (PO) vs. Future orientation (FO).

These value of the characters of human nature, the relation between man and nature, and the temporal dimension of human life were related to the traditional and modern continuum as follows:

Traditional	Modern
Distrust	Trust
Fatalism	Mastery
Past Orientation	Future Orientation

The result of the findings were that the Malaysian and Japanese managers tend to be modern in their value orientations. So they could possibly be described as being more trusting, less fatalistic and future oriented as compared to those traditional ones. Table 5 indicates that on every value orientation there is consistently a higher proportion of both Malaysian and Japanese managers with modern value orientation. The analysis suggests that there is no significant difference between Malaysian and Japanese managers of each value orientation.

TABLE 5. Values of Malaysian and Japanese managers

Type of Values	Managers				X <sup>2</sup>
	Malaysian		Japanese		
	TV	MV	TV	MV	
Broad	14	34	17	13	0.22
	D	T	D	T	
Human Nature	15	25	18	32	1.44
	F	M	F	M	
Man and Nature	15	33	20	30	0.83
	PO	FO	PO	FO	
Time	7	41	9	41	0.91

An attempt was also made to compare the values of managers from the Malay and Chinese group, the two ethnic groups of Malaysian, with the Japanese managers respectively.

From Tables 6 and 7, it can be seen that Japanese managers are no different from their Malay counterparts and the Chinese managers also share similar values.

TABLE 6. Values of Japanese and Malay managers

Type of Values	Managers				X <sup>2</sup>
	Japanese		Malay		
	TV	MV	TV	MV	
Broad	17	33	10	20	0.00
	D	T	D	T	
Human Nature	18	32	16	14	2.31
	F	M	F	M	
Man and Nature	20	30	20	30	0.35
	PO	FO	PO	FO	
Time	9	41	6	24	0.07

TABLE 7 Values of Japanese and Chinese managers

Type of Values	Managers				X <sup>2</sup>
	Japanese		Chinese		
	TV	MV	TV	MV	
Broad	17	33	5	10	0.00
	D	T	D	T	
Human Nature	18	32	9	6	2.73
	F	M	F	M	
Man and Nature	20	30	5	10	0.20
	PO	FO	PO	FO	
Time	9	41	3	12	0.42

As a conclusion, the findings on the value analysis of Malaysian and Japanese managers were indeed encouraging. If there were no significant difference between Malaysian and Japanese managers in term of cultural values, it might be possible for Malaysian managers to learn the art of Japanese management with ease especially when they have acquired similar educational exposure (Potmore & Chaney 1974; Inkles 1973) and were doing the same type of work. However, it was rather difficult to say that the values of Malaysian managers in particular would remain relatively unchanged. Some values change with time as suggested by De Silva and Gemill (1971) in their study about generation gap and by Morris and Small (1971) in their investigation into the changing concepts of the good life. So, it appears that values can and have changed through time and in different settings. Hence, the capability of Malaysian managers to learn and accept Japanese management thinking depends on the stability of their values. Furthermore, in view of the exploratory nature of this study and because of the samples used are relatively small, the findings of that study should be viewed as tentative rather than conclusive. If conclusions from the study were to be strengthened, there is a need for elaborate and sophisticated effort to understand the cultural values of Malaysian and Japanese managers.

## CONCLUSION

As a conclusion, technology transfer is absolutely important and beneficial to Malaysian industries since the trend of globalization of the world economy has increased. The world becomes more integrated via increased trade, investment and capital flows as well as labour movements. Such linkages is then reinforced by rapid improvement in communications and transport, increased trade resulting from economic growth and increasing per capita incomes, the appearance of new growth poles "particularly" in the Asia Pacific region, further globalization of output and the opening up of "closed" economies like Eastern Europe, India and perhaps Indo-China. Judging by the trends of world trade which has increased tremendously, it is anticipated that this will continue in the future. The success of developing countries like Malaysia will, to a large extent, depend on its response to the global changes.

Furthermore, as more less developed countries enter the industrial age, access to abundant factors (land, labour and raw materials) will become less important because it will be replaced by the technology, skills, and ability to process output efficiently. As such more industries will become global in nature such as transnational corporations within which most valuable and high value-added activities take place which greatly influence the wealth of nations. If properly nurtured, these TNCs could be effectively utilised to enhance domestic technological capability.

Finally, the beliefs that cultural value is the main obstacle to technological transfer in management between Malaysian and Japanese managers can no longer hold true, at least among managers with similar educational exposure and work. In general, the adaptability, transferability and the appropriateness of technology transfer to Malaysia basically lies upon the need, uniformity and stability of the objectives, strategy policies, and cooperativeness among the countries involved in technology transfer. It is important to realize that besides the willingness of foreign countries to accommodate host country's desires for technological transfer and adaptation, the ability of a developing country to acquire and adapt new technologies depends primarily also the host country's capacity such as Malaysia to absorb new information as defined by the skills of its people, and host country policies toward technological transfer and information generation and dissemination in general.

## **Appendix I**

### Distrust/Trust

1. A child should never be made to do anything unless he is told why is asked to do it.
2. War is part of human nature.
3. People are naturally good.
4. A man can feel safe only when he is with his family.
5. If you do not watch out for yourself, people will take advantage of you.

### Fatalism/mastery

1. By and large I am quite satisfied with the way life is working out for me.
2. I do not know whether my family and I will be better or worse off in the future than we are now, even when you work hard, you never know what is going to happen.
3. I know quite well what I shall be doing ten years from now.
4. A person is happiest when life is pleasant but difficult; he gets what he wants, yet only after a struggle.
5. People should strive to attain important goals even when they are uncertain of success.

### Past Orientation/Future Orientation

1. Worthwhile goals are never obtained immediately - you must work hard to reach them in the future.
2. If I had the choice, I would rather be promised a large sum of money one year now than to be given a smaller sum to be spent immediately.
3. It is better not to carry a watch because then you do not have to worry about keeping track of time.

4. Usually it is a waste of time to plan for the future be too many unforeseen events interfere with the plan.
5. It is better to hear people talk about the good old days than to hear them guess what will happen in the future.

#### REFERENCES

- Anuwar Ali, Osman Rani & Toh Kim Woon. 1985. *Effective Mechanism for the Enhancement of Technology and Skills in Malaysia*. Singapore: Institute of Southeast Asian Studies.
- Commonwealth Secretariat. 1985. Technological Change: Enhancing the Benefits. *Report of a Commonwealth Working Group*, Vol. I. London.
- De Salvia, D. & Gemmil, B. 1971. An exploratory study of the technical assistance in public administration abroad. *Journal of Comparative Administration* 3: 379 - 399.
- ESCAP/UNTC. 1984. *Costs and Conditions of Technology Transfer Through Transnational Corporations*. United Nations, New York.
- Inkles, A. 1966. The modernization of man. In *Modernization*, M. Weiner (ed.). New York: Basic Books.
- Jaafar Muhamad & Mohd. Shukry Hamid. 1983. Malaysian and Japanese Managers: A Comparative Study of Cultural Values. Unpublished manuscript.
- \_\_\_\_\_. 1991. Manpower Survey on Malaysia Industries - Shortages and Future Requirements of Professionals. Unpublished report.
- Morris, C. & L. Small. 1971. Changes in conceptions of the good life by American college students from 1950 to 1970. *Journal of Personality & Social Psychology* 20 (2): 254 - 260.

Jabatan Pengurusan  
Fakulti Pengurusan Perniagaan  
Universiti Kebangsaan Malaysia  
43600 UKM Bangi  
Selangor D. E.

