

CONCLUSION

5.1 INTRODUCTION

This is the concluding chapter of the study. The chapter begins with summary of the findings of the study. Firstly, it summarizes the findings of the evaluation on the dominant technology transfer channels in the surveyed Malaysian automobile firms. This is followed by the summary on the findings of the evaluation on the dominant constraints in the technology transfer channels adopted by the surveyed automobile firms. The chapter ends with discussions on recommendations.

5.2 SUMMARY OF THE FINDINGS

Based on literature review the study has identified eleven technology transfer channels. The recognized eleven technology transfer channels are technical assistance agreement, know-how agreement, license agreement, patent agreement, management agreement, turn-key contract, training abroad for local staffs, visits of foreign experts and long-term contracts of expatriate engineers, engineering services agreement, supply agreement and trade mark agreement. The general evaluation of the dominant technology transfer channels in the surveyed automobile firms identified five of the above mentioned channels as dominant. They were technical assistance agreement, training abroad for local staffs, visits of foreign experts and long-term contracts of expatriate engineers, engineering services agreement and supply agreement. Among these five identified dominant channels, the most dominant technology transfer channel in the surveyed automobile firms was technical assistance agreement. The second most dominant channel was visits of foreign experts and long-term contracts of expatriate engineers. This is followed by supply agreement and training abroad for local staffs. And, finally the fourth most dominant channel was engineering services agreement.

The comparative evaluation in chapter three found that the five technology transfer channels adopted by the Malaysian assemblers/manufacturers were dominant

and linked with each other. It showed that all surveyed automobile assemblers/manufacturers have adopted technical assistance agreement, training abroad for local staff, visits of experts and long-term contracts of expatriate engineers, engineering services agreement and supply agreement simultaneously. This can be due to the complex technology that is required in producing a complete built unit. As all the assemblers as well as the national car manufacturers have no sufficient experience and know-how, they have to adopt these channels simultaneously firstly to produce the vehicles and secondly to keep up the technology level with the changes of their vehicle models. Meanwhile in the surveyed component parts firms, technical assistance agreement was identified as the most dominant channel, followed by visit of foreign experts and long-term contracts of expatriate engineers. The third dominant channels were training abroad for local staffs and supply agreement. And the final dominant channel was engineering services agreement.

One major difference between the assemblers/manufacturers and the component parts firms is that the additional channels other than the five dominant channels were adopted by the assemblers. The additional dominant channels are license agreement, trade mark agreement, know-how agreement, management agreement and know-how agreement. This can be due to the fact that 67% of them are assemblers that operate as foreign subsidiaries hence, the additional channels are required. Another major difference is that while for the assemblers/manufacturers the five dominant channels are adopted simultaneously, for component parts, it does not seem to be the case. The component parts manufacturers seem to have a preference of ranking among the five dominant channels. This major difference could be due to the fact that the complexity of the technology, which is greater for assemblers/manufacturers in producing the complete, built car compared to component parts manufacturers in Malaysia. This is shown in the product characteristic of the surveyed component parts manufacturers whereby, most of the component parts produced locally are based on simple technology. Hence, it can be concluded that these five channels are dominant in both the firms and the only difference is in the way of adoption. These five channels are compulsory among assemblers/manufacturers while for the component part manufacturers, preference of ranking seem to be prevalent.

The dominance of these channels in the surveyed automobile firms is mainly due to lack of technical capabilities in these firms. Lack of technical capabilities is due to the shortage of skilled manpower in the Malaysian automobile industry, which in turn is due to the delayed attention given to technical education in Malaysia. When the first national car project was established, there were only 9 secondary technical schools and 7 polytechnics with no attention given to technical courses required by the automobile industry (Sadoi 1998). In addition, there were only few education institutions for automobile-specific subjects in Malaysia such as Federal Institute of Technology (FIT), Universiti Teknologi Malaysia (UTM) with limited working relationship with the automobile industry which, also led to the shortage of skilled manpower in the industry. Another cause of lack of technical capabilities is the first time participation of "bumiputera".

In an effort to increase the availability of the required skilled manpower, the government introduced Double Deduction Incentive (DDIT) in 1987. DDIT was introduced to encourage firms to train their staffs, especially to develop the skills needed to introduce new products and processes as well as raise productivity and quality standards, by permitting employers to claim double the cost of training as expenses. The Malaysia government introduced the Industrial Technical Assistance Fund (ITAF) in 1990 as one of the measures to support technology development in small and medium scale industries. Till 1994, the government has approved 21 ITAF schemes to the automobile firms (MITI 1994). Furthermore, in 1993, in increasing the availability of the required skilled manpower, training and retraining of workforce the government introduced the Human Resources Development Fund (HRDF) under the HRD Act. The financial assistance of the HRDF is 80% of the training expenses on technical as well as computer related skills and 75% of all other retraining and skills upgrading. The areas covered by the fund are computer-related skills for automation, die making, welding, fitting and machining, management and supervisions, research and development, company wide productivity and quality improvements programs, and basic education for skills training. Thus, technical assistance agreement, training abroad for local staff and supply agreement played a crucial role in transferring the required skills.

Limited education institutions offering automobile related studies led to the establishment of foreign joint-venture training centres such as German-Malaysian Institute (GMI) in 1992. Based on the German "dual apprenticeship" system, apprentices were trained in skilled work while, at the same time, perform contract work for industrial firms. Plastic Technology Training Centre and Institute of Precision Moulds were established in 1993 and 1995 respectively in Penang to train more skilled workers in automobile technical skills. Thus, its only appropriate for visits of foreign experts and long-term engineering contract and engineering services agreement to be identified as dominant in the surveyed automobile firms, through these institutions.

The dominance of these five technology transfer channels is also due to the related Malaysian government policy. Firstly, the Deletion Mandatory Policy in 1979 made such technology transfer channels indispensable as most of the component parts are imported. In addition, the government's promotion of local automobile industry under the heavy industrialization strategy in the early 1980s was also an important factor as the national car project involved the participation of in-experience "bumiputera". Another factor is the implication of the "look East Policy" in 1981, which involves Japanese technology suppliers who prefers to transfer technology through these channels as proven in the first national car project.

Moreover, these channels are dominant also as the implication of the first Industrial Master Plan that gives emphasizes on Science and Technology Policies. The National Science and Technology Policy focuses on the promotion of scientific and technological self reliance in support of economic activities through the upgrading of R&D capabilities by the creation of an environment conducive to scientific creativity and the improvement of scientific, educational and other relevant infrastructures. One of the main strategies under the first IMP is the creation of Vendor Development Programme to expand the production of automobile component locally. As the Vendor Development Programme involve small and medium scale companies, the acquisition of technology is done normally through technical arrangement with the design franchise holders. 60% of the national car vendors are under this agreement (Mahani 1996).

Furthermore, the Science and Technology policy in the first IMP emphasizes skills upgrading, that led to the introduction of HRD Act in 1993 which, replaced the Double Deduction Training Incentive (DDTI) for firms with an employment size of 50 and more in order to upgrade the skill of their employees. To complement industrial expansion, the government has also resorted to long-term development of human capital supply through expansion and improvements in schooling at all levels from primary to post graduate studies, especially in science and technical fields (Anuwar Ali and Rasiah 1998). Finally, these channels are also dominant due to the second IMP (1996-2005) in addition to first IMP's goals, advocates for greater dependency and linkages among industries and activities. The concept is more than strengthening backward and forward linkage but to also develop market niches through product development (Mahani 1996).

One of objectives of this study is also to identify the dominant constraints in the technology transfer channels. Altogether five constraints were found. They are territorial limitations (divided into export restrictions and limited field of application of the transferred technology), restrictions concerning technical assistance, grant-backs, minimum royalties and tie-in. The study found that the most dominant constraint in the channels of technical assistance agreement, training abroad for local staff, visits of foreign experts and long-term contracts of expatriate engineers, engineering services agreement and supply agreement was restriction concerning technical assistance. This constraint is found in all the five channels as these channels are adopted simultaneously by the surveyed assemblers/manufacturers. Meanwhile, in the case of component parts manufacturers, it was identified that they adopted supply agreement and training abroad for local staff simultaneously. This constraint involves the restriction on the number of dispatched experts, restricting the duration of training or releasing of blueprints. Such constraint is imposed for it is the intention of the technology supplier to control the technology supply in order to create continuous demand for their technology. Furthermore, as all of the surveyed firms are products of the New Economy Policy that requires the participation of local equity owner especially "bumiputera" the foreign control over the equity ownership and profit is weakened. In order to overcome this, the foreign partners who are also technology suppliers keep the technology transfer within their control so as to ensure continuous revenue from the sale of technology.

According to Machado (1994) MMC and MC agreed to joint venture with Proton even as minority shareholders in view of the dependence of Proton on their technology. He added that MMC and MC derived great leverage in negotiating the Proton agreement because of their control of capital and technology. MMC and MC used this leverage at the very outset to ensure that construction arrangements were advantageous to themselves. Thus, MMC and MC were key suppliers of equipment and machinery and also had continuing profits as suppliers of CKD kits and steel for car bodies. In addition, Jomo (1994) showed that besides profits from the sale of cars, Mitsubishi has made substantial gains from the supply of car parts, production equipment, technical and managerial support. He also added that Mitsubishi had profited even while the Proton car project was incurring losses for HICOM. This constraint is also self imposing as the firms especially component parts manufacturers, with paid-up capital less than RM50million could not afford long term training as well as contract of expatriate engineers due to its low volume of production.

On the other hand, in know-how agreement, license agreement, patent agreement and management agreement the dominant constraint was territorial limitations in terms of limiting the field of application of the transferred technology. The lack of technical capability due to no previous experience in the automobile production as well as weak involvement in research and development of the surveyed firms have been turned into an unfair advantage by the technology suppliers. According to Anuwar Ali (1996) technology suppliers are reluctant to disclose full information about their products to potential buyers until all transactions are completed to protect the proprietary value of the product. As such, valuable technological knowledge is not readily given away, but has to be purchased at a price. Thus, the buyers lacking technical expertise will generally agree to purchase technology knowledge without sufficient knowledge of its eventual functional performance. On the same note the government through the Technology Transfer Unit overseeing the screening of technology transfer agreements signed between Malaysia and foreign companies lacks technically and economically proficient technocrats and bureaucrats to maximize gains for local licensees when dealing with foreign licensors and other technology suppliers (Rasiah 1997). Both, restrictions concerning technical assistance and territorial limitations in the form of limited field of applications were

Meanwhile, the dominant constraint in the trade mark agreement was tie-in. This is because, the firms that produce products under trade mark agreement are normally forced to purchase intermediate products from the trade mark owner to strengthen the position of the technology suppliers as well as maintain the quality of the product. Inversely, grant-backs was a non dominant constraint in any of the evaluated technology transfer channels, as the surveyed automobile firms lack in research and development activities. Minimum royalties too was not a dominant constraint because the government ensures that the royalty payments are linked to production performance or sales receipts, which is generally calculated as a percentage of 'net sale' or ex-factory price. The rate is usually fixed at 1-5 percent of net sale. For less sophisticated technology and assembly operations, a royalty fee not exceeding 2% of net sales are usually permitted. For motor vehicle assembly, where assembly operations are basically involved, royalty payments are discouraged (Anuwar 1993).

Hence, the implication of the occurrence of such dominant constraints in the technology transfer channels led to limited production of technologically complex parts. This is in line with Leutert and Siddhoff (1999) who showed that locally produced parts consist of bodywork, accessories, wheels, tyres and electronic components. In contrast engine parts, suspensions, shock absorbers and gear box components are mostly imported.

5.3 RECOMMENDATIONS

It is clear as the survey shows, technology transfer is a vital element in the upgrading of product designs and manufacturing techniques in the Malaysian automobile industry. One of the obvious finding is that the five technology transfer channels were dominant in the surveyed automobile firms is primarily due to the lack of technical capabilities because of shortage of skilled manpower in Malaysia. Hence, priority must be given to creating more skilled scientific and technical personnel in the automobile industry. Malaysia's current rate of training still falls critically short of its needs, especially in view of the future expansion of the industry. Shortages of experienced and qualified scientist and engineers will act as a brake on the industrial expansion where much of the growth will be in the technology-intensive fields.

Therefore the government, in line with its current objective to make Malaysia a centre of education should enhance the capacity to absorb foreign technology and skills through establishment of an education institutional for automobile-specific subjects such as an Advanced Skill Development Centre for the Automotive Industry as suggested by the JICA. In addition, the government should establish more of foreign joint-venture training centres with nations who are experts in the automobile technology such as the German-Malaysian Institute, to provide skills training as well as consultancy to the local automobile industry. In addition, to promote skill formation in the automobile industry, the government should encourage participation in international skill formation competitions such as the International Skill Olympics with attractive rewards like Korean government's reward scheme.

Finally, in order to ensure the required technology is transferred wholly, the Technology Transfer Unit in the Ministry of International Trade and Industry is responsible for approving technology transfer agreements should have substantial technical depth and experience in the automobile technology in order to make reliable assessments. The organization only evaluates on technology level, local equity participation, local content, export share of output, patents, trade mark, investment level, R&D facilities, human resources training and some sub conditions related to use of know-how, sublicense, removal of restrictions on sale exports, continued use of technology after license expiry date and transferability of improvements of technology involved to licensor at a fee. In order to ensure total technology transfer required by the local automobile firms, the government body should also estimate the duration of the agreement if it is enough to transfer the whole technology as needed by the local firms. It should be knowledgeable enough to find out if the agreement duration is utilized to transfer technical knowledge or, low priority knowledge like non-technical knowledge is also included, hence reducing the value added to the agreement.