

Firms' Measures in Response to Labor Markets and Technological Change: A Study on Local Skilled Workers Participation at Multinational Companies

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Abstract

Identifying reasons and needs for skilled workers is an imperative managerial issue for multinational companies (MNCs) operating in foreign countries. This study examines factors that influence demand for skills at firm-level in response to external forces such as labor markets and technological change. The issue is important and urgent in the case of Malaysia, whereby the supply of skills is critically insufficient for high technology manufacturing MNCs. As an attempt to provide an insight into the issue of increasing demand for skilled workers, a comparative study on two Malaysian-based Japanese MNCs was undertaken. This exploratory study takes a qualitative approach to analyze data covering the period from 1980 to 2012. Findings show that besides the needs for technological change and constraints in labor markets, differences in firm measures have resulted to increasing demand for skilled workers. These findings have significant theoretical and practical implications to international human resource management studies. The study extends knowledge on the impact of MNCs activities on human capital development.

Keywords: Skill Development; MNCs; technological change; labor markets

1. Human Resources Management and Development at Multinational Companies

There is mounting interest in the study of international human resources management and development of workforce at multinational companies (MNCs) (Welch, 1994;

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Morishima, 1998; Muta et al., 2003; Rojvithee, 2006; Shiraki, 2007; Iberahim, 2008, 2010; Millar & Choi., 2011; Cooke, 2012; Enderwick, 2013). The existing literature on MNCs provides mixed interpretations on the effect of international business activities on skills and human capital (Lall, 1997; Ritchie, 2002). While some literature asserts that MNCs rarely upgrade their local workforce because of the alternative of getting expatriates from their home country (Welch, 1994), others claim that it is one of the important contributors (Gamble, 2007; Iberahim, 2008, 2010). Failing to upgrade the skills of local workforce is widely criticized. Thus, it is necessary to clarify the way MNCs develop technical skills and managerial skills of their locally hired workers.

On the same ground, many developing countries face intricate issues such as shortages of skilled workers and mismatches in the labour markets, as a result of accelerated economic transition under rapid industrialization (World Bank, 1986; Muta et al., 2003). Given the complexity of bridging the cultural, social and economic gaps between the geographically dispersed MNCs, attracting, upgrading, and retaining adequate stock of competent workforce that is capable of understanding the complexity/diversity of the emerging markets becomes a daunting task. In particular, in the case of Malaysian high-tech manufacturing industry in line with the Malaysian government's Economic Transformation Plan 2011, the development of skilled workers is one of the most pressing issues (World Bank, various years; EPU, 2011). Malaysia faces shortage of skilled workers in specialized fields such as engineering, information and communication technology and high technologies, due to mismatch between the supply of and demand for skills (MITI, 2006; EPU, 2011).

Appointments of staff through long-term career development are common among subsidiaries of MNCs in advanced countries such as Japan, Europe and the United States (Takamiya, 1985; Koike, 1998). But, the practice is considered exceptional in the case of subsidiaries of MNCs in developing economies. A study shows that subsidiaries in developing countries with foreign equity occupying capital share of more than 50 per

cent rarely appoint locally hired staff as members of the board of directors (Shiraki, 2007). The top management positions are frequently dominated by expatriates dispatched from parent company (Welch, 1994; Shiraki, 2007). Considering the importance of this topic in international HR studies, it is crucial to establish a deeper understanding on how subsidiaries of MNCs built their workers' competence despite the complexity that they faced in distinctive business environment

Considering the role of MNCs and their importance as a driving force behind the Malaysian manufacturing industry (Ariff, 1991, 2003; EPU, 2011), the objective of this paper is to examine how Malaysian-based MNCs have effectively increased the required skills and competent workforce. This paper poses a question on factors that influence demand for skilled workers by examining the changes in the proportion of skilled workers at middle and top management levels. In this study, skilled workers are defined as engineers, technical managers, technicians and supervisors in the middle and top management level.

This paper is organized as follows. To begin with, section 2 presents a review of existing research on factors that influence demand for high-tech manufacturing skills. In section 3, the data collection method and cases are explained. Section 4 briefs the companies' background and outlines the change in the proportion of expatriates group which is an important indicator to assess the level of participation as a result of increasing demand for local skilled workers. Section 5 discusses firms' measures in response to the two determinants; labor markets and technological change. The final section concludes with a discussion on the findings.

2. Factors that Influence Demand for Skills and Skilled Workers

Several bodies of literature are relevant to explain the factors that stimulate demand for skilled workers. For instance, the literature on technology transfer argues that MNCs increase skilled workers due to rapid progress of technology transfer from parent

companies to subsidiaries. Slaughter (2002) proposes that the higher level of technology within MNCs create demand for skilled workers. McKendrick et al. (2000) noted that hard disk drive companies took advantage of low-wage unskilled but highly trainable human resources. Over time, rising levels of process and product technologies increased the demand for higher skilled workers. Similar dynamics were also discernible across the East Asian region in optics, precision engineering (tool and die), automobiles, rubber, palm oil and micro chips (Rasiah, 1999; Ritchie 2002).

In contrast, studies on technological development in the South East Asia region posit some distinct technological effect. In contrast to Singapore or Penang (Salleh, 1995; Ariffin and Bell, 1999; McKendrick, 2000; Ritchie, 2002), other developing countries such as Philippines, Thailand and Indonesia were less likely to experience such path-dependent processes. MNCs were said to be under-investing in training. Deyo (1989) shows that literate and trainable labour with basic skills appears to have been sufficient to attract FDI, at least in low-end manufacturing. Subsequently, Pangestu (1997) and Salleh (1995) consistently claim that the provision of training was only enough to fulfill the existing required level but insufficient for the firm to extend operation into higher value added activities or the acquisition of concomitant skill in product design and development. Tan and Batra (1995) noted that only large MNCs which involved in export manufacturing and high technology, receive training remuneration, support and incentives from government would train. These studies suggest that the investment on human skills and knowledge is interrelated with the characteristics of the MNCs'.

However, one aspect overlooked by the present studies is the impact of external forces in business environment on MNCs workforce. In particular, very little is known about the extent to which labor markets and needs for technological development influence the demand and supply of required workers in the case of MNCs. On this account, it is relevant to investigate the increasing needs for higher manufacturing skills that brought about the increasing number of skills and skilled workers in MNCs.

Furthermore, there is still little research documenting MNCs' human resource development (HRD) in respect of firm business environment, especially the shortage of labor supply and increasing technological change. This paper examines the way MNCs have responded to these external forces and the consequences on the retention of skills and skilled workers as talents.

3. Methodology

This exploratory paper takes a qualitative approach in identifying underlying relationships between firms' measures in response to factors that contributed to increasing demand for local skilled workers. This approach is helpful in interpreting linkages between various factors, firms' activities and the increasing number of skilled workers at MNCs as it is the best way to understand firm-level practices (Welch, 1994; Shen, 2003).

Two companies are selected to represent two large groups of well-established Japanese multinational companies (JMNCs) in the worldwide market for color television (CTV) that possess high market shares in the US and Japan. Due to terms and conditions on secrecy as agreed with the companies, author used pseudonyms STM and HCP for this paper. The cases are chosen for some relevant attributes such as the remarkable achievement of locally hired skilled workers in top management positions, beside other characteristics of the MNCs which are interesting. One of the reasons for selection is the remarkable achievement of locally hired skilled workers in top management positions. The two subsidiaries represent groups of long-established MNCs that have contributed to employment, regional development and export earnings. This cases give a variation of a few criteria such as ownership (joint venture and wholly owned), type of product/process technology (high technology) and firms' size (employment number of more than 1000).

During the fieldwork, in-depth interviews were conducted with eleven staff members that represent the Japanese expatriates group, local skilled workers group and managers of the human resources department. According to Sekaran (2007) the in-depth interview is an effective tool in order to obtain a rich understanding of a phenomenon, such as firm level management issues. The validity, correctness or credibility of an in-depth interview research, consists of strategies to identify and rule out the threats that the researcher might be wrong (Maxwell, 2005). First, to ensure that eleven personnel are adequate, researcher has carefully selected respondents based on their reputation in strategic management as leaders and outstanding staff with more than 8 years of experiences. These experts were chosen from different department within the companies. Second, the interviewees were chosen upon their willingness to share.

Researcher bias is an important threat (Maxwell, 2005; Sekaran, 2007), which is caused by lack of trust and rapport, or when the responses are misinterpreted or distorted, or when the interviewer unintentionally encourages or discourages certain responses. In order to reduce the possibilities of bias, this study adopted semi-structured interview method to ensure that the interviewer was asking the right-open questions and minimize possible suggested responses. Furthermore, in order to capture and incorporate relevant findings in the analysis, the researcher voice recorded and make notes on all in-depth interviews and transcribed the words said, allowing the researcher to review and analyze the entire interview at a later stage of the research. Transcripts of interviews were analyzed using the interpretative content analysis which is grounded theory type of data consolidation. In order to enhance the reliability of the findings, triangulation of data technique was used for literal interpretation whereby interviewees` responses from three different groups of personnel are verified and validated against the companies` internal reports and records to find similarities and discrepancy in findings. The secondary data is based on various sources such as local newspapers, companies` record, financial reports, research papers, surveys and information recorded. This study

covers from 1980 to 2012 as the time frame as it reflects the operations and changes in business portfolio and environment that involved the two cases.

4. Findings and Discussion

This study looks at the cases from two perspectives: the changes of the organizational structure and the firms' measures in response to labor markets and technological change. The participation of expatriates and skilled workers at the operational and managerial levels reflects the firm behavior in response to external business environment. The discussion section interprets the findings on the trends in participation of local skilled workers and expatriates in relation to the firms' measures that has significantly influence the reallocation of human resources, specifically, the expatriates and local skilled workers.

4.1 Change in Participation of Expatriates and Skilled Workers in Managerial Positions

At STM, the ratio of expatriates to total employees decreased from 2.1% in 1994 to 0.7% in 2009 and 2012. According to the General Manager, in 2001, out of 86 Japanese expatriates 60 of them were engineers of production, R&D and product design sections. In 2009, although the number of expatriates to total employees declined, Japanese engineers retained important positions in production, quality control, production control and maintenance. On the other hand, the number of engineers, technicians and technical managers to total employees increased from 1,300 in 1994 to 2,500 in 2009. Overall, the ratio of technical managers increased gradually throughout 22 operating years. Table 1 shows the reduction in the number of expatriates and the increase in the number of skilled workers to total employees from 1994 to 2012.

Table 1: Change in Number and Ratio of Expatriates and Skilled Workers at STM

	1994	2001	2009	2012
Number of Expatriates to Total Employees (Percentage)	163/8000 (2.1%)	86/6000 (1.4%)	60/8000 (0.7%)	60/7800 (0.7%)
Number of Skilled Workers to Total Employees (Percentage)	1300/8024 (16.2%)	1600/6000 (26%)	2500/8000 (31%)	2500/7800 (32%)

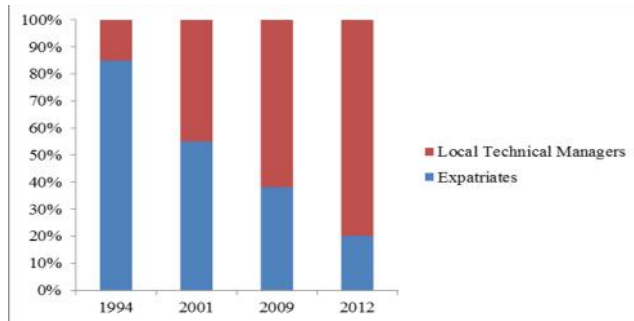
Source: Author's firm study.

As shown in Figure 1, expatriates in managerial positions were in inverse proportion to skilled workers at STM. In 2001, out of the total number of 86 expatriates, 26 Japanese technical managers were head of production departments. In 2009, with the exception of managing director and general manager of the production department which are permanent posts for Japanese managers. In 2012, there was a slight improvement in the percentage of skilled workers to the total number of managerial positions. Most of the Japanese technical managers were appointed as coordinators and advisors. Local technical managers accounted for 80% of managerial positions such as engineers, managers, senior managers, deputy general managers and general managers. According to the Japanese director interviewed at STM, the changing proportion of expatriates and skilled workers was an unplanned but favorable change.

At HCP, the percentage of expatriates to total employees declined from 1.7% in 1997 to only 0.2% in 2007. In 2001, the ratio of expatriates at HCP was 0.5% of total employees with 11 Japanese expatriates holding several key positions at production and managerial levels. Other than 3 Japanese Directors, 9 Japanese engineers were assigned to production, R&D, maintenance and product development sections which needed expertise to cater to urgent response for tailor-made products. However, the number was

reduced to only 2 positions in 2007: a managing director and a general manager for the production department.

Fig. 1. Ratio of Expatriates and Local Technical Managers in Managerial Positions at STM



Source: Based on STM company records from 1994 to 2012.

The percentage of engineers to total employees increased from 15% in 1997 to 48% in 2007, although during the same time period there was a drastic reduction in total employees from 2,280 workers to 796. Even though the total number of skilled workers slightly declined from 400 to 380 engineers, the proportion in percentage shows an increment from 20% in 2001 to 48% in 2007. Table 2 shows the change in number and percentage of the expatriates and skilled workers which eventually bring about the fairly high number of skilled workers in 2012.

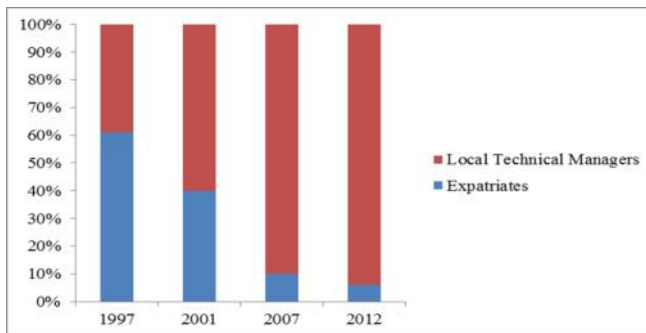
Table 2: Change in Number and Ratio of Expatriates and Skilled Workers at HCP

	1997	2001	2007	2012
Number of Expatriates to Total Employees (percentage)	40/2280 (1.7%)	11/1917 (0.5%)	2/796 (0.2%)	2/700 (0.3%)
Number of Skilled Workers to Total Employees (percentage)	350/2280 (15%)	400/1917 (20%)	380/796 (48%)	298/700 (43%)

Source: Author’s firm study.

At HCP, expatriates in managerial positions are in inverse proportion to skilled workers. In 1997, out of 40 expatriates, 20 Japanese expatriates were managers. In 2007, the majority of Japanese expatriates were coordinators and advisors to local technical managers. Local technical managers accounted for 90% of managerial positions as shown in Figure 2. According to a Japanese Director interviewed at HCP, the changing proportion of expatriates to skilled workers has been desired since the beginning. One of the HCP's corporate objectives was to transfer CRT technology and delegate the production management to local technical managers in order for Japanese mother plant to venture into advanced display technology such as thin-film transistor liquid crystal display (TFT-LCD).

Fig. 2. Ratio of Expatriates and Local Technical Managers in Managerial Positions at HCP



Source: Based on HCP company records from 1997 to 2012.

4.2 Firms' Measures in Response to Labour Markets and Technological Change

In order to understand what factors affect the increasing demand for skilled workers and how the two MNCs responded to the Malaysian business environment, interviews were conducted with personnel of human resource (HR) departments. From the interviews, there are four types of business environmental pressures related to technology and labour supply that act as factors influencing employment practices: 1)

shortages of human resources in the Malaysian labour market, particularly the unskilled and skilled workers in the early 1990s, 2) technological change as a result of the product technology shift from analogue to digital in the early 1990s, 3) technological change as a result of dissemination of information and communication technology (ICT) in the late 1990s, and 4) technological change as a result of new emerging technology such as Flat Panel Display in the early 2000s.

- The Case of STM

STM addressed the problem of technological change and shortages of workers with employment measures corresponding to the long-term target of establishing a high quality and cutting-edge product. STM adopted HR measure that enabled technical staff to develop and upgrade their skills related to advanced display technology in order to meet the needs of improving and developing products such as High Definition (HD) Flat CRT TV and Liquid Crystal Display (LCD) TV. To date, STM is producing 6 series of HD Flat Cathode Ray Tube (CRT) TV model and 5 models of a famous `B` brand 32" and 46" V-series, 37" and 40" S-series and 40" W-series which are the leading LCD TV model for Japan and the Asian market.

The first of these employment measures was in response to shortage of skilled workers in local labour market. It involved STM employing a large portion of its unskilled workforce through contract practice. In the early 1990s, STM recruited nearly a thousand of female operators from Batam, Indonesia, on a contract basis for one to two years. The reason for this measure was to ensure that HR department could flexibly adjust production workforce in line with production activities. The Malaysian operators were trained to manage production and testing machines as line leaders and supervisors.

Meanwhile, STM annually recruited about six to ten fresh graduates in engineering from local and foreign universities. The graduates were trained at STM headquarters in Japan under a three-month-long young management trainee program. The STM

headquarters assigned engineers to a two week induction course in order to familiarize them with STM's policy, organization structure and corporate strategy. In the following two and half months, engineers were transferred to their designated sections for on-the-job training in which Japanese engineers would guide 2 to 3 engineers in groups. Technical training covered the latest technology that would be transferred to STM, Malaysia including LCD and HD CRT Flat CTV.

In the early 1990s, technological change that entailed the shift in product and process technology from analogue to digital had shortened product life cycles. With the introduction of digital products, the life cycle of the old-styles bulky CRT TVs ended within 6 months to one year after its introduction such as the case of Trinitron. In due course, STM started its television design centre for digital TV in 1992 to keep pace with product remodeling speed. Trinitron models from 13 to 36 inch were produced in small lots for a short duration from three to six months. In 2001, STM introduced its Flat Trinitron CRT-based as HD TV `W` brand models to sustain its CRT technology. Consequently, by 1994, STM employed 500 engineers of whom 30 are assigned to R&D department and 800 technicians, constituting 16.2% of total workforce to handle the shift in technological change. However, in March 2008, STM stopped the production of old models Trinitron due to the shrinking market share and sales.

In response to technological change due to the dissemination of ICT in the late 1990s, STM purchased a package of knowledge management solution from Microsoft in 2000, to streamline the work flows and reengineer business processes. Along with the utilization of advance paperless data processing tools, STM conducted intensive in-house information technology courses to train managers and engineers. With the new system, STM reduced production cost related to overtime allowance and indirect operating cost, such as clerical workers to control the flows of management information and engineering data. The IT competence built up among the skilled workforce was reported to save total operating costs of about MR80,000 per month. In conjunction

with implementing the knowledge management solution, STM set up its IT department in 1999 employing about 20 IT engineers to monitor and find solutions to upgrade the IT integration between functions.

In response to the global competition in new emerging technology of flat panel display, in 2002, STM established its R&D department for product reengineering and product design to upgrade the spherical CTV to HD Flat TV. The renewed models are produced with lead-free materials. STM employed engineers from various fields of specialization including electrical engineering, mechanical engineering, material and chemical engineering as well as IT engineering for value engineering. At the same time, STM built laboratories with clean rooms to facilitate product testing activities. STM trained about 2000 engineers and technicians to utilize automated testing machines.

STM sent a group of 30 selected technical staff to undergo technical training at STM Kisarazu, Japan, prior to the transfer from Japan of LCD technology needed for the manufacture `B` brand model of LCD TV and Projection TV. The technical training was conducted in three main areas: 1) assembly technology with the usage of conveyor belts; 2) production technology; and 3) quality control. It took 6 months before the first production machineries were installed at STM. In 2003, the production line for LCD TV deployed about 200 engineers and technicians to operate two fully automated lines with advanced test machines.

- The Case of HCP

HCP addressed the problem of shortages and technological change with employment and development measures that corresponded to its short-term target which was to sustain the cost performance of mass production. For example, HCP's production cost to produce a unit of Deflection Yoke (DY) was about US\$40 in 1990 which was reduced to an average of US\$30 upon the establishment of second plant in rural area in

1992. The cost was much lower than that of competitors' average production cost at about US\$50 per unit in the 1995.

In response to the shortage of unskilled labour in the early 1990s, HCP recruited female operators from remote rural areas in Kelantan, instead of contracting foreign workers. HCP recruited Malaysians to ensure a continuously trainable workforce. HCP tried to avoid the high hiring cost of temporary foreign workers which included agency cost, visa application, medical insurance, travelling and accommodation. However, as the shortages of unskilled workers became serious in the mid 1990s, HCP reduced the number of female operators with the automation of assembly technology and utilization of labour saving technology such as robotics and computer integrated manufacturing systems (CIM). As the new manufacturing system requires more technicians and engineers, HCP recruited experienced skilled workers on immediate vacancies throughout the year. As a result, experienced engineers made up more than half of its skilled workforce while fresh graduates were rarely recruited.

In the early 1990s, the shift from analogue to digital product technology has affected HCP product lines badly. As HCP was mainly producing key components for analogue CRT TV, it chose a more moderate measure to stay competitive in the shrinking CRT TV market by reducing labour costs. HCP upgraded its automated manufacturing lines with in-house designed Numerical Controlled (NC) machineries and advanced processing systems, and reduced 15% of its total production workforce gradually from 2,280 in 1997 to 796 in 2001.

In response to the rapid product life cycles, HCP widened and deepened its main product lines to produce variety in DY and FBT models. HCP shifted its manufacturing focus from cost reduction on labour cost to prompt product delivery. HCP attempted to maintain the merit of economy of scale and scope so that the company can reduce the operating cost. As HCP localized CRT product and process engineering in Malaysia, it

employed experienced engineers in product and manufacturing equipment design activities. These skilled staff number about 200 by 1997.

In response to technological change due to the introduction to ICT in the late 1990s, HCP trained engineers and technicians to use design software such as Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) without integrating its administration system with its production system. From my observation during the visit to the HCP in 2005, the HCP IT system was less extensive compared to STM in terms of its implications for costing and effectiveness in integrating administrative and production functions. The HR manager claimed that though the mailing system is extensively utilized, they were yet to administer management enquiries online or digitalize engineering data because most of the data could not be codified due to its complexity and specificity. ICT training for about 300 engineers was conducted at production departments that required the utilization of CAD and CAM to execute tasks.

In response to the emergence of Flat Panel Display technology, HCP strengthened its production with the aim of dominating the CRT key components market. In 2000, HCP obtained International Purchasing Centre (IPC) status from the Malaysian government to act as a material and parts procurement centre for its group companies in the East Asian region, while its sales departments had been strategically operating since 1992. HCP became a profit centre replacing the mother plants for CRT analogue parts and components. HCP maintained the capacity to produce 1410 kpcs of parts and components per month in 2002, a record during the peak time, and marked an accumulated number of 200 million pieces of components in 2004. In line with the expansion, HCP recruited experienced engineers and technicians with expertise in process engineering while terminating contracts workers attached to production lines that had closed.

4.3 Responding to External Forces and Reallocating Human Resources

Table 3: Firms' Measures in Response to Labour Markets and Technological Change

Firms' Measures and Target Business Environment Factors	STM Long Term: Establishing Firm-specific Skills for High Quality & Cutting-edge Products	HCP Short Term: Engaging Experts as Immediate Solution for Low Cost Mass Products
1. Shortages of Workers in Local Labour Market	Recruited foreign workers from Indonesia on contract basis. Recruited fresh graduates from technical colleges and top universities.	Recruited women operators from rural areas on permanent basis. Recruited experienced workers from related industries.
2. Technological change as a result of product/process technology shift from analogue to digital	Upgraded skills of production workers for product design and product engineering	Installed NC machines. Recruited experienced workers for machine design and production engineering
3. Technological change as a result of information and communication technology (ICT)	Upgraded in-house communication tool and network with affiliates. Purchase communication solution from software provider; Microsoft.	Upgraded in-house communication tool for administrative purpose only.
4. Technological change as a result of new technology such as Flat Panel Display	Reallocated workers to new production lines. Upgraded skills and increase training for engineers at all level.	Terminated excessive production workforce by closing production lines. Recruited experienced workers for design department and new production lines.

Source: Author's compilation from fieldwork.

This study found that external forces in distinctive business environment have pressured companies to take necessary measures in reallocating internal resources in order to stay competitive and operating effectively. From the case study, first, it was ascertained that the two MNCs increased the proportion of their skilled workers such as engineers, technicians and technical managers, over the years. Eventually the proportion of expatriates became small as the management delegated administrative and technical tasks at medium and top managerial level to local skilled workers. Second, this paper

suggests the proportion of the skilled workers increased because of the needs to cater to new technological change and the shortage of workers in local labour markets. Despite different measures taken by STM and HCP in response to the business environment, the proportion of skilled workers was increased in both firms as shown in Table 1 and Table 2.

Third, this study classifies the firm's behavior into two types of responses: a long term human resources measure of STM and a short term human resources measure of HCP. The identification of two types of measures is based on the subsidiaries manufacturing strategy. First, STM tended to produce high technology products such as HDTV and LCD which were new and the skills for their development and production were rarely found in Malaysia. The emphasis on high-tech products at STM is reflected in the recruitment of fresh graduates with strong foundation in engineering, to undergo technical training for new products at the parents company in Japan. In the case of HCP that produced mature analogue products such as DY and FBT, the manufacturing technology was widely disseminated in Malaysia in the 1990s. To achieve cost competitive advantage, HCP needs experienced engineers who have expertise in production processes to find alternative in cost reduction strategy and could perform tasks immediately. Table 3 summarized the findings.

5. Conclusion and Implications

This study suggests that external forces in distinctive business environment pose inevitable change on the employment structure of MNCs. The paper concludes that the two types of firm measures consistent with firm strategies: STM implemented long-term human resources measures for quality control and new product development whereas HCP implemented short-term human resources measure for sustaining cost performance of mass production. Despite the differences in their responses, the proportion of the skilled workers at STM and HCP increased because of the needs to cater to

technological change and the shortage of workers in local labor markets. The insufficient supply of human resources in the local labor markets stimulated the firms to shift their manufacturing activities from labor intensive to technology and capital intensive. It appears that technological change as a result of product digitalization, ICT application and competition in advanced technology stimulated the demand for skilled workers in numbers and quality.

The study provides several implications for research in international human resources management of MNCs that operate in a business environment with a shortage of skilled workers. In the literature, researchers posited that an extensive number of expatriates mitigated the needs to recruit locally-hired skilled workers (Welch; 1994; Morishima, 1998; Muta et al., 2003; Rojvithee, 2006; Shiraki, 2007, Iberahim, 2008, 2010; Lerxundi and Landeta, 2012, Enderwick, 2013). This study found that the making up for lack of local skilled workers was a temporary phenomenon at the early stage of MNCs' operation. The increased knowledge and skills of local skilled workers in the 2000s is related to the extensive number of highly skilled expatriates in the 1990s. Eventually, an increasing number of retainable and outstanding local core workers reduced the dependence on expatriates and thus, reduced the number of expatriates in key positions of important functions. To date, the most outstanding core workers are in administrative functions such as sales or human resources, but less in production and engineering functions. Obviously, apart from the number of retainable skilled workers, the intensity of rapid technological transfer keeps expatriates in technical related functions. A study by Shiraki (2007) also found this to be the case, particularly among the Japanese MNCs.

Finally, this study suggests that researchers conducting international human resources development and management research should pay more attention to the characteristics of the subsidiaries and the detailed accounts of their experiences. Each MNC is unique and distinct, though they may share identical characteristics such as origins or other

contextual variables which have received most attention in many studies on international business.

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