KNOWLEDGE WORKER TRAINING IN MALAYSIA

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Thesis submitted to the University of Nottingham

for the degree of Doctor of Philosophy

March 2010

ABSTRACT

An increasing number of countries have shifted, or are shifting, towards the knowledge-based economy. For these countries, including Malaysia, the quality of knowledge workers is extremely important in determining the pace and success of such transition. Thus, training is often carried out to improve the skills of knowledge workers at the workplace. But despite its importance, research on knowledge worker training is extremely limited. This study seeks to partially fill this gap in the literature by investigating three aspects of knowledge worker training in Malaysia. Using an online survey, data is collected from a sample of companies and knowledge workers in MSC Malaysia.

In the first part of the study, the role of foreign ownership on the provision of, and participation in training in MSC Malaysia, is examined. Here the questions of whether or not there are any differences between the quantity and quality of training provided by local and foreign MSC-status companies and whether or not there are any differences in training participation between knowledge workers working at both entities are investigated.

After establishing that some variations in training do exist between local and foreign companies in MSC Malaysia, the second part of the study examines in more detail the determinants of training among companies in MSC Malaysia. It particularly investigates the factors that affect the occurrence and magnitude of training by MSC-status companies as a whole

To complement these findings, the final part of the study investigates the impact of training on the knowledge workers' earnings, productivity and career advancement. Due to the nature of the data set, however, the issue of endogeneity of

training and selectivity bias are not addressed in the analyses of wage effects of training while productivity is measured subjectively via the knowledge workers' perceptions of the effect on ability to perform job tasks. The third analysis on career advancement is further divided into the impacts of training on the knowledge workers' likelihood of receiving a promotion and searching for a new job.

ACKNOWLEDGEMENTS

I am indebted to many individuals and organizations who have contributed directly or indirectly to the completion of this thesis. Fist of all, I would like to express my deepest appreciation and gratitude to my three supervisors, who have been with me throughout such a unique Ph.D program, which literally takes place in two countries. I am truly grateful for the insightful comments, suggestions and constructive criticisms of my supervisors in the UK, namely, Professor Oliver Morrissey and Dr. Wyn Morgan as well as Dr. Jarita Duasa for her supervision in Malaysia. I thank them for their sincere help, patience and dedication, without which this work could not have been completed. My gratitude also goes out to Professor Holger Görg, who deserves a mention, for his guidance during the early stages of my studies.

I would like to thank the Ministry of Higher Education Malaysia, the International Islamic University Malaysia and the University of Nottingham for offering this wonderful opportunity for me to further my studies via the Malaysia-Nottingham Doctoral Program (MNDP). I would also like to acknowledge the financial assistance provided by the two universities in funding my research and the participating MSC-status companies and knowledge workers who were kind enough to respond to my surveys.

I thank my *Abah*, Zulkifli Ishak, who has always supported and encouraged my years of study; to my moms and mother-in-law, I thank them for looking after my daughter while I was away in the UK in the initial stages of my studies. To my sisters and best friend, I thank them for keeping me sane throughout such an otherwise, strenuous, process.

Most importantly, I would like to thank my husband, Hafeiz Murshidie Hassan, for his constant support and encouragement, for his love and patience, for his understanding that this research will preoccupy most of my time and for his willingness to share this experience with me.

Finally, I thank and praise Allah, God the Almighty, who gave me the capability and perseverance to complete my study. *Alhamdulillah*.

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CHAPTER 1

INTRODUCTION

1.1. Background to the Study

According to the United Nations Conference on Trade and Development, global foreign direct investment (FDI) flows in 2007 soared to a record level at US$1.5 trillion with a significant growth rate recorded among *developed* countries (UNCTAD, 2008).[1] The US maintained its position as the world's largest single FDI recipient with a total of US$ 193 billion, followed by the UK (US$ 171 billion) and France (US$123 billion). The European Union (EU) as a whole continued to be the largest host region, attracting almost 40 per cent of total FDI inflows in 2007. Among the developing economies, China, Hong Kong and India remained the top FDI destinations with inflows of US$ 67 billion, US$ 54 billion and US$ 15 billion, respectively. Within Southeast Asia, Singapore continued to be the biggest FDI receiver with US$ 36.9 billion in 2007, followed by Thailand with US$ 10 billion.

These figures imply two things. Firstly, FDI and multinational corporations (MNCs) are powerful and lucrative drivers of globalization; thus, attracting them has become an integral part of development strategies for many countries.[2] Secondly, there seems to be a positive association between these drivers of globalization with a country's level of human capital. A possible reason why developed nations succeed in

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[1] Due to recent events, the aftermath of the global financial crisis is expected to continue and a quick recovery is unlikely (see the latest UNCTAD Investment Brief, UNCTAD/WEB/DIAE/IA/2009/5). Thus, for the purpose of this study, FDI flows are analyzed prior to the financial crisis.

[2] The terms MNC and FDI are often used interchangeably as data on MNC activities are difficult to obtain. A proxy in terms of FDI is, thus, used to measure the activities of MNC (Navaretti and Venables, 2004).

attracting the bulk of global FDIs is because they are more advanced in technology and have the capability to innovate.[3] These qualities enable them to provide better infrastructures and business environment than could be offered by nations who simply assemble or adopt technologies from others. After all, technologies (or knowledge) transferred via FDI will only contribute more to economic growth when the host country has sufficient absorptive capacity (Borensztein, De Gregorio and Lee, 1998). This is evident in the case of China and India. Both of these countries remain competitive not only for their mass of low-cost workforce, but also for the relative quality of their workforce, which permits them to produce products that meet global standards.[4] As the search for human capital crosses international borders with MNCs forming Greenfield investments or engaging in mergers and acquisitions (M&A) with domestic companies, developing countries such as Malaysia need to equip themselves with a highly skilled workforce to take full advantage of this situation and attract more FDI.[5] One way to achieve this is by developing the human capital of their workforce through training.

Training has long been recognized as an important catalyst of human capital development. Empirical research on training has typically examined its determinants and returns using data from developed countries, but few such studies have been

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[3] Perhaps a more important reason is the occurrence of M&A, which dominate FDI flows among the developed countries (UNCTAD, 1998). But the current discussion will not elaborate on this matter given the focus of this study.

[4] India and China are the top two destinations for outsourcing activities such as IT services, back office support and contact centres, according to the Global Services Location Index (GSLI) (AT Kearney, 2009). The GSLI ranks countries based on scores covering three categories: financial attractiveness, people skills and availability and business environment. Although Malaysia ranked third on the list, its score for "people skills and availability" is the lowest amongst the top five destinations.

[5] Greenfield investments create new assets or facilities through new companies, subsidiaries or joint ventures where the foreign investor takes a controlling stake. M&A, on the other hand, occurs when a foreign company acquires the assets of an existing foreign company or enter into a merger agreement with the country to form a new legal entity (Navaretti and Venables, 2004).

conducted in the developing region or in industries other than manufacturing. Accordingly, this study finds it worthwhile to extend past research by investigating human capital development in the Malaysian knowledge-based industry.

Located in the Southeast Asia region, Malaysia has experienced high growth since the 1980s and a further accelerated growth during the 1990s. Manufacturing and services have traditionally been the leading sectors in the economy and much of its success are also attributed to the openness of the Government towards forming joint ventures with both western and eastern businesses.

In the last two decades, however, the nation began to focus more on its knowledge-based industry.[6] This is in response to globalization and rapid changes in information and communications technology (ICT), which have revolutionized the conduct of businesses. Although manufacturing remains an important part of the Malaysian economy, knowledge and ICT were recognized as the new drivers of economic growth. To ensure competitiveness in the future, Malaysia adapted its economic strategy in line with the information age, and as a result, the *Vision 2020* was launched in 1991 where it aspires for Malaysia to become a fully developed nation with a knowledge-rich society by the year 2020.

Realizing the importance of ICT in achieving *Vision 2020*, the Malaysian Government initiated the construction of the MSC Malaysia (formerly known as the Multimedia Super Corridor) in 1996, which is a multi-billion dollar mega-project designed to leapfrog the nation's use of ICT as well as attract FDI to become a world-

[6] The knowledge-based industry is not entirely new to the Malaysian economy. This is because all industries have some degree of knowledge input but what separates a knowledge-based industry from a non-knowledge-based industry is the intensity of the knowledge input (OECD, 1999b: 18). Examples of a knowledge-based industry include the aircraft, pharmaceuticals, electrical machinery, crude oil refinery, e-commerce, tourism, educational services and ICT industries

leading cluster for information technologies. Local and foreign ICT-based companies are encouraged to join MSC Malaysia and those certified are known as the MSC Malaysia status (henceforth, MSC-status) companies. These companies enjoy a host of privileges backed by a ten-point Bill of Guarantees from the Malaysian Government, which includes world-class physical and information infrastructure and numerous financial incentives. To qualify for the status, companies must, among others, be a provider or heavy user of multimedia products and services and employ a substantial number of 'knowledge workers'.

With *Vision 2020* and MSC Malaysia in place, Malaysia officially began its transformation towards becoming a knowledge-based economy. Since human capital development is an important issue in a knowledge-based economy, a study on training among knowledge workers in Malaysia (or knowledge worker training, for brevity) is attempted.

1.2. Objectives of the Study

The purpose of this study is to investigate the current situation and extent of knowledge worker training in Malaysia. Using a sample of companies and knowledge workers in MSC Malaysia, training will be examined from two perspectives – its provision by the MSC-status companies and its participation among the knowledge workers. Specifically, this study seeks:

1. To compare the quantity and quality of training between local and foreign companies in MSC Malaysia
2. To compare the incidence of training participation between knowledge workers employed at local and foreign MSC-status companies

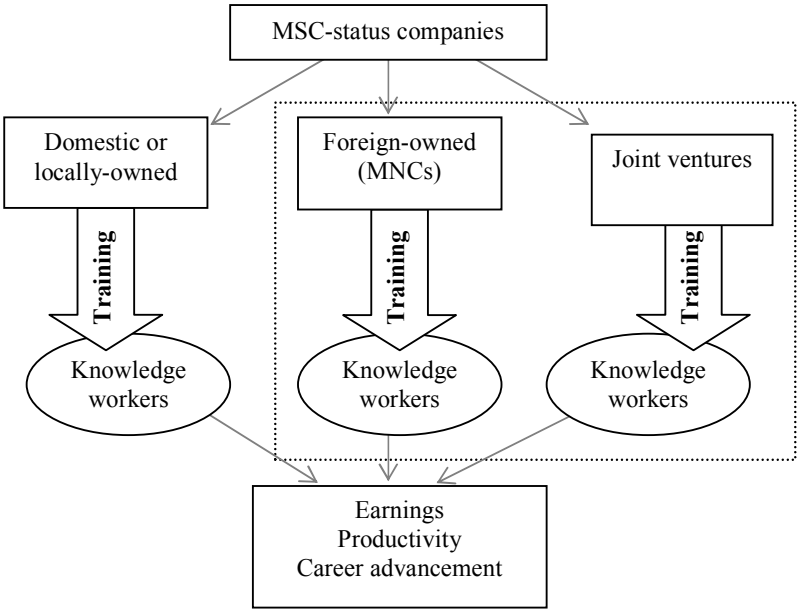
3. To analyze the factors affecting the occurrence and magnitude of training for companies in MSC Malaysia
4. To examine the impacts of training participation on the knowledge workers' earnings and productivity level
5. To determine the relationship between training participation and likelihood of receiving a promotion within the organization
6. To analyze whether or not training would affect the knowledge workers' intention to look for a new job

The first two objectives provide an overall description of human capital development in MSC Malaysia as they will evaluate various aspects of training among local and foreign MSC-status companies. A distinction is made on the ownership of the firms as foreign and local firms may differ in the way they develop their workers' human capital. In the case of MSC Malaysia, the presence of MNCs may have some impact on workforce human capital development. As these companies often transmit some of their home technologies to the host countries in the form of new machines or skills, they will need to provide training for their local knowledge workers to be accustomed with those technologies. This can be portrayed visually by comparing the training arrows in Figure 1.1. For the purpose of analysis, foreign-owned and joint venture companies are pooled together and known collectively as "foreign MSC-status companies" (the dotted rectangle in Figure 1.1).

The third objective will extend the previous analysis by looking in more detail at the determinants of training among companies in MSC Malaysia as a whole. It seeks to explain the factors that affect the occurrence and magnitude of training by MSC-status companies. This too is represented by the training arrows in Figure 1.1.

The last three objectives will complete the analysis on human capital development in MSC Malaysia as they investigate training from the recipients' point of view. These objectives examine the relationship between training participation and the knowledge workers' earnings and productivity level as well as career advancement. This part of the analysis refers to the shaded box in Figure 1.1.

Figure 1.1 Visual representation of the research objectives



Source: Author

1.3. Significance of the Study

The issue of human capital development has long been recognized in Malaysia. However, most of the studies conducted in this area have been limited to education or on training in the manufacturing sector.[7] Studies on training in the knowledge-based

[7] Past studies have largely adopted formal education measures, such as school enrolment and average years of schooling, as proxies for human capital. Despite their indisputable contributions, many have begun to realise that not all education produces human capital and, even more importantly, not all of human capital is produced by education (Knight, 1996).

industry are still lacking, perhaps due to the unavailability of firm-level data and that no Malaysian Standard Industrial Classification (MSIC) contains distinct ICT sector headings since those goods and services are produced and distributed by businesses classified under a number of different industrial sectors. Due to differences in the nature of business and worker characteristics between the manufacturing and knowledge-based industries, the determinants and effects of training are also likely to vary. Thus, the main contribution of this study is that it addresses the lack of empirical research on training in Malaysia, especially among companies and knowledge workers in the knowledge-based industry.

The next contribution arises from the specific interest on training in MSC Malaysia. Despite being the main catalyst in shifting Malaysia towards a knowledge-based economy, studies on the extent of human capital development in MSC Malaysia are extremely limited.[8] Those that examined the lack of required human resources in MSC Malaysia (*e.g.* Harris, 1998; Indergaard, 2006; Reid, 1998; Vicziany and Puteh, 2004) merely addressed the issue and at most, linked the low level of human capital with the nation's education system. An exception is Ramasamy, Chakrabathy and Cheah (2004)'s qualitative evaluation of MSC Malaysia, where training is said to play a role in filling the shortfall of knowledge workers. But since no empirical analyses were made to substantiate their claim, this paved the way for the current study to examine the matter in more detail.

[8] Available studies on MSC Malaysia mostly describe the project and its background (Harris, 1998; Indergaard, 2003; Reid, 1998; Vicziany and Puteh, 2004); investigate knowledge management practices among the MSC-status companies (Goh *et al*., 2006; Mat Nor and Rosline, 2005; Raja Kassim, 2005); examine issues related to knowledge transfer in Malaysia (Awang *et al.*, 2009; Mhd Sarif and Ismail, 2006; Shapira *et al*., 2006) and evaluate its infrastructure and physical construction (Bunnell, 2002; Indergaard, 2003; Mohan *et al.*, 2002). Other aspects of MSC Malaysia that are commonly evaluated are the incentives or flagships offered (Kaliannan *et al.*, 2007; How, 2006) and its impact on the Malaysian economy in shifting towards the K-economy (Abdulai, 2001; MDeC MSCIS, 2008; Mustapha and Abdullah, 2004).

The undertaking of this study is also timely and in line with the Malaysian Government's focus on human capital in recent years. As the nation currently lacks this critical element to support its transition towards knowledge-based economy (Mustapha and Abdullah, 2004 citing Govindan, 2000), the third contribution relates to the expected benefits of the research findings to training providers and participants as well as policy-makers in MSC Malaysia. The MSC-status companies may improve their training provision if they know which factors affect their propensity to train whereas the knowledge workers may be encouraged to participate in more training once they become aware of the benefits that training gives them. As for policy-makers, they may be able to evaluate the effectiveness of their policies in terms of the incentives and Bill of Guarantees given to the MSC-status companies, by looking at the incidence of training among these companies.

The fourth contribution is the research method used to acquire data in this study. Following the tradition of most training-related research, the current study utilizes a survey research design as a means of data collection. However, it adds to the volume of existing survey research as the current survey is administered online to the respondents. An online survey was chosen based on the characteristic of the MSC-status companies and their knowledge workers. The unique, first-hand data obtained from the online survey may be used to represent all companies in MSC Malaysia or other technology parks in Malaysia.

Fifth, this study includes new dimensions in the analysis of training outcomes. Given the respondents' involvement in knowledge work, the usual measure of labour productivity, such as the ratio of output per labour hour, may not be appropriate in the current context as there is not necessarily a direct link between units of labour and units of output (Gordon, 1997). Productivity is, thus, measured subjectively in this

study. In addition, past studies are often limited to the analysis of earnings and productivity effects of training. This study extends the analysis of training outcomes to include the impact of training on the knowledge workers' career advancement.

Finally, this study offers a comprehensive analysis of human capital development in MSC Malaysia as it looks at three aspects of training, namely, (1) the incidence of training by firm ownership, (2) the determinants of training and (3) the impacts of training. When analysing the development of human capital on knowledge workers, it is essential to assume that they do not begin with zero or minimal level of human capital. Quite often, they already possess good academic qualifications or have many years of experience working in the field prior to joining their current companies. This matter is addressed in the first analysis where the knowledge workers' initial level of human capital, as measured by education level, is compared between those working at local and foreign MSC-status companies. In addition, the training process itself is examined by way of investigating the determinants of training in the second analysis as well as the outcomes of training in the third analysis.

1.4. Scope of the Study

The following terms are defined to give clarity to this study:

Human capital development is analysed from the training perspective only and disregards other sources of human capital such as education. Training is more relevant in the current context because institutions of higher learning were not identified as critical players in the initial conceptualisation of MSC Malaysia as the focus then was to make the private sector more dynamic in addressing Malaysia's skilled manpower needs (Vicziany and Puteh, 2004). With training, companies have the autonomy to decide on the type of skills needed to upgrade their workers (Heng *et al.,* 2006). In

addition, training is essential in improving the quality of a knowledge-based workforce at the workplace (EPU, 2002).

Training is limited to company-provided training because it constitutes more than three-quarters of training in the private sector (Bartel and Sicherman, 1998; Shields, 1998).[9] Within the scope of this study, training refers to both formal and informal training that are provided internally and externally by the MSC-status companies. This broad definition is adopted for three reasons; first, for flexibility given that no similar study has been conducted in the past. Second, knowledge workers do not function like conventional workers (Ramírez and Nembhard, 2004). They are often 'trained' whether they realize it or not since the application of knowledge tends to be informal and go beyond working hours. Finally, workers will generally not be able to recall or distinguish between informal and formal training (Tan, 2001), hence, disregarding informal training altogether would understate the development of a worker's human capital since formal training accounts for only a small fraction of on-the-job learning (Sicherman, 1990; Bishop, 1996; Barron, Berger and Black, 1997). In terms of analysis, this study evaluates formal training in more detail compared to informal training due to the difficulty of obtaining accurate information on the quantity of the latter. For instance, while analysis on formal training may utilize the number of days of training or training expenditures, analysis on informal training is limited to the existence and type of such training.

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[9] Training can be provided either privately or publicly. There are also studies that view training as apprenticeship programs (Lynch, 1992; Acemoglu and Pischke, 1998) or obtained from outside of the workplace (off-the-job training) such as seminars, correspondence courses and vocational and technical training. Company-provided training is also known in a variety of other terms, such as workplace training, enterprise training, employer-sponsored training, vocational training and personnel training. For simplicity and consistency throughout this study, only the term 'training' will be used.

Foreign MSC-status companies refer to companies in MSC Malaysia that are wholly or predominantly foreign-owned. According to the Organization for Economic Co-operation and Development, foreign direct investment is defined as the ownership or control of 10 percent, or more, of assets by a foreign company (OECD, 1999a). Many studies have demonstrated the importance of foreign ownership with regards to training provisions (Gershenberg, 1987; Parker and Coleman, 1999; Orychshenko, 2006). Following Root (1994), where MNCs exercise direct control over the policies of their affiliates, it can be assumed that any activities undertaken by the MNCs, including training, will be decided externally or foreign from the host countries. For that reason, the term 'foreign-owned companies' is used interchangeably with MNCs in this study since training decisions are normally determined by the foreign head offices. In addition, the term maintains consistency with the classification of companies in the MSC Malaysia website, that is, "local companies", "joint venture companies" and "foreign-owned companies".

1.5. Organization of the Thesis

This study is organized into six further chapters. Chapter 2 gives relevant background of the Malaysian economy, the events that lead to the establishment of MSC Malaysia and a description of MSC Malaysia itself.

Chapter 3 explains the research method adopted, providing a description of the online survey research design including the sampling procedure, survey instruments and data collection method.

Chapter 4 provides a descriptive analysis of the survey results, focusing on the incidence of training among companies in MSC Malaysia. Various aspects of training are compared between local and foreign MSC-status companies as well as between

knowledge workers at those entities to see whether foreign ownership plays an important role in the development of human capital in MSC Malaysia.

Chapter 5 applies econometric techniques to examine the factors influencing the decision to train, both in occurrence and magnitude, by MSC-status companies. Chapter 6 complements this analysis by examining the impact of training on the knowledge workers' level of earnings, productivity and career advancement. These are the substantive chapters and both include a relevant literature review and discussion of the techniques applied.

Chapter 7 summarizes the research findings, acknowledges limitations and suggests some ideas for future research.

CHAPTER 2

THE MALAYSIAN BACKGROUND

2.1. Introduction

Some background on Malaysia is necessary to understand the importance of the topic in question. This chapter gives an overview of the Malaysian economy in the last five decades, the nation's *Vision 2020* and its transition towards the knowledge-based economy. A brief account of the Malaysian labour market and MSC Malaysia is also provided before ending the chapter with some concluding remarks.

2.2. Overview of the Malaysian Economy

Located at the heart of Southeast Asia, Malaysia is a federation of thirteen states and three federal territories.[10] It has a total landmass of 330,252 sq km (EPU, 2009), which is separated into the Peninsular and East Malaysia by the South China Sea. The nation's capital is Kuala Lumpur and Putrajaya is the administrative capital of the federal government aimed to ease the growing congestion within the capital city. Population in 2009 was 28.3 million and is ethnically diverse, consisting of 60 percent Malays and other indigenous people (collectively known as *bumiputera* or 'sons of the soil'), 22.5 percent Chinese, 7 percent Indians and 10.5 percent 'others', which include a high proportion of non-Malaysian citizens (EPU, 2009).

A former colony of the British Empire, the country gained its independence through peaceful negotiations on August 31st 1957 as the Federation of Malaya. In

[10] The thirteen states are Perlis, Kedah, Pulau Pinang, Perak, Selangor, Negeri Sembilan, Malacca, Johore, Pahang, Kelantan, Terengganu, Sabah and Sarawak. The three federal territories are Kuala Lumpur, Labuan and Putrajaya. See Appendix A for a map of Malaysia.

1963, the Borneon provinces of Sabah and Sarawak, now known as East Malaysia, joined the Federation, along with Singapore, to form Malaysia. Singapore later left the federation due to political differences with the Tunku Administration (after the first Prime Minister, Tunku Abdul Rahman) and became an independent country in 1965. Malaysia underwent several phases of economic development in the last fifty-three years of independence (see Figure 2.1). The development efforts are fundamentally steered by successive five-year Malaysia Plans, which are complemented by long-term Outline Perspective Plans (OPPs) beginning in 1970.

From independence until the 1960s, the Malaysian economy still relied heavily on agriculture, which was inherited from its colonial days and its industrial development was mainly towards the processing and exporting of primary commodities such as tin, natural rubber, palm oil and timber. It was only after the enactment of the Pioneer Industries Ordinance 1958 that industrialization became a firm policy objective (Osman-Rani, Toh and Ali, 1986).

Between 1966-1970, the First Malaysia Plan was drawn and the country embraced import-substitution (IS) as its industrialization policy to create more jobs, encourage the growth of domestic industry and to divert the economy to minimize its dependence on primary products following the unstable commodity prices. IS is a trade and economic policy based on the premise that a nation should attempt to substitute imported products (mostly finished goods) with locally produced substitutes. The strategy sought to encourage foreign investors to set up production, assembly and packaging plants in the country (Jomo, 2007). The IS, however, had limited success as it benefited only resource-based industries (Salih, 2002). Critics attributed this to the policy's two major shortcomings. Firstly, the IS industries were heavily protected with trade barriers that they inadvertently became inefficient.

During that time, the Malaysian Tariff Advisory Board introduced 396 tariffs that eliminated all Commonwealth preferential rates and the effective rate of protection also rose from 25 percent in 1962 to 65 percent in 1972 (Abdulai, 2001 quoting the results of Fong (1989) and Jomo and Edwards (1993)). Secondly, the size of the domestic market was too small that it cannot sustain the requirements of such strategy in the long-run.

These limitations prompted policymakers to switch to an export-oriented (OE) strategy to expand Malaysia's market and enable the country to achieve economies of scale. The shift to EO was reflected by the Investment Incentives Act 1968, which was set up to encourage investments to manufacture exports. Accordingly, the stage of growth throughout the 1970s and 1980s was manufacturing-based. Numerous measures were adopted by the Government to enhance the growth of EO industrialization. Among them is the opening of Free Trade Zones (FTZ) to provide better security, coordination and control for export processing activities (Jomo, 2007); the enactment of tax incentives such as the Pioneer Status and investment tax credits to attract EO firms and the implementation of 'open door' trade strategy to facilitate FDI (Salih, 2002; Okposin, Abdul Hamid and Ong, 1999). Compared to IS, the incentives offered under the export-led strategy as opposed to controls, benefited the industries in all sectors of the economy, which in turn, contributed to the development of the country (Jomo, 2007).

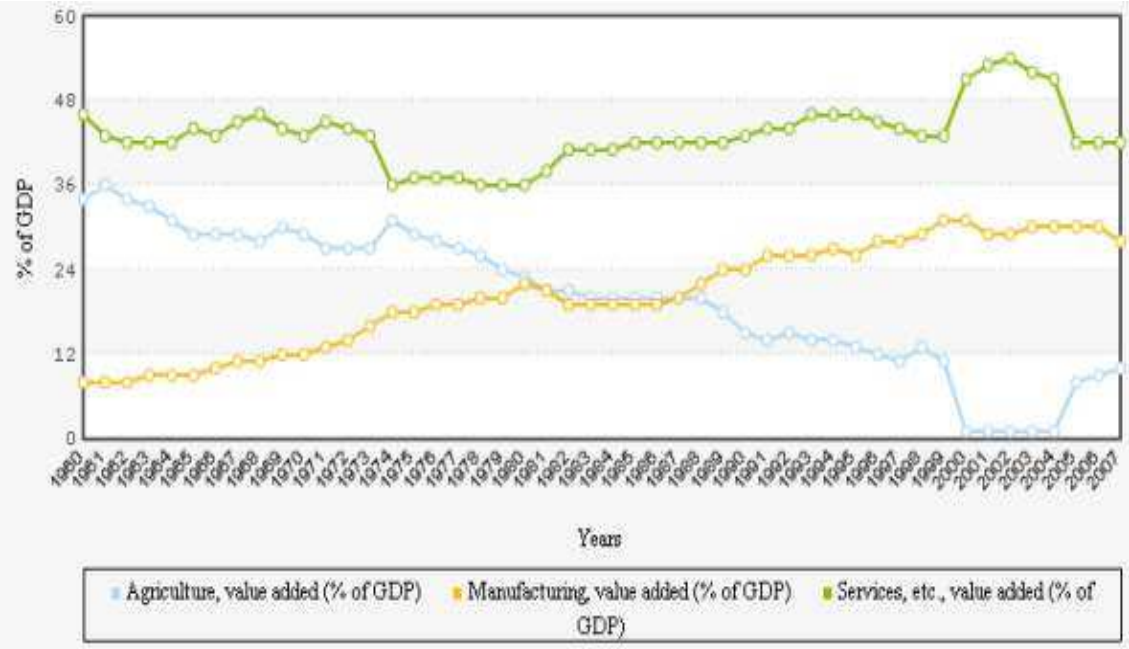
By the 1980s, substantial EO sectors had developed and Malaysia entered the league of exporting countries. The strategy then began to focus more on non-resource based industries, such as the electronics and machinery appliances, indicating the Government's switch to heavy industrialization (Jomo, 2007). During this stage, investments were made in high-tech industries and the first automobile was

manufactured to ignite the growth of the engineering industry. To facilitate the nation's shift from an industrial-driven economy to a productivity-driven economy, the Heavy Industries Corporation of Malaysia (HICOM) was established in 1983. Among its role was to further diversify the manufacturing activities, develop more linkages (which both IS and EO failed to do), lead technological development by collaborating with foreign firms and invest in local research and development (R&D) (Jomo, 2007).

Following these efforts, manufactured goods began to surpass commodities as Malaysia's main export. The liberalization and deregulation measures adopted brought in substantial inflows of FDIs, resulting in manufactured products accounting for more than half of Malaysia's total exports. The contribution of the manufacturing sector to GDP increased from 8.3 percent in 1963 to 21.1 percent in 1988 (MOF, various years), exceeding agriculture for the first time (see Figure 2.1). Since then, the manufacturing sector has been the backbone for Malaysia's economic growth and it is also the main sector that advanced Malaysia's active role in the world market. The most important manufacturing exporters are electronic producers, food companies and textiles and apparel producers.

This fast expansion in the manufacturing sector placed a big strain on the agricultural sector mainly because demand for labour, land, capital and other inputs was in direct competition with the former. As a result, output from the agricultural sector took its toll during the periods 2000-2004. Fortunately, by the end of 2004, rubber and oil palm productivity, which are the two mainstays of the Malaysian agriculture sector, improved and there has been a slight upward trend in the agriculture output since.

Figure 2.1 Changes in the structure of the Malaysian economy, 1960-2007



Source: World Development Indicators database by World Bank (2009)
Note: The services sector includes most knowledge-based industries.

Concurrent to the EO strategy is the adoption of the New Economic Policy (NEP), which aimed at eradicating poverty and restructuring the economy so as to promote growth with equity. Both the NEP and EO strategy formed the underlying principles behind the Second through the Fifth Malaysia Plans that ran from 1971 to 1990. In turn, they were all part of a broader strategy called the First Outline Perspective Plan (OPP1).

Malaysia then entered into the next stage of growth in the 1990s, which saw further structural change as the country's main economic activities gradually became more modern and industrialised (Abdulai, 2001). Following the launch of the heavy industrialization program, the manufacturing industry began to move towards more capital-intensive and high-technology manufacturing industry. During this time, the Second Outline Perspective Plan (OPP2) was in operation from 1991 to 2000. The OPP2 period adopts the National Development Policy (NDP) – i.e. the successor of

the NEP, and the *Vision 2020* (details below), which aim to bring about a structural transformation of the Malaysian economy to attain a fully developed nation status by the year 2020.

The OPP2 covers the Sixth Malaysia Plan (1991–1995) and the Seventh Malaysia Plan (1996-2000). The former focused on the liberalization of trade and investment policies, privatization as well as human resource development whereas the latter concentrated on ICT and the knowledge-based industries. Both of these plans played a significant role in accelerating the nation's economic achievements and were considered a success because the period was marked with rapid economic growth. During this stage, it can be seen that while the emergence of knowledge and ICT as the new engines of growth in driving the economy is recognized, manufacturing remains an important part of the Malaysian economy.

The government then introduced the Third Outline Perspective Plan (OPP3) whose policies underlie the subsequent Eighth and Ninth Malaysia Plans. Efforts to develop a knowledge-based economy were intensified under the Eighth Malaysia Plan (2000-2005), which includes strengthening human resource development and the promotion of S&T; developing human resources to produce a pool of highly skilled knowledge workers; and expanding the use of ICT in all sectors of the economy by providing an environment conducive to support the development of ICT.

At present, the country is nearing the end of its Ninth Malaysia Plan (2006-2010). This plan embraced the strategies and programmes of the National Mission, which outlines the Government's agenda for the next fifteen years up to the year 2020. One of the main core areas of the Ninth Malaysia Plan is to raise the country's capacity for knowledge, creativity and innovation. Chapters 11 to 15 of the plan document the necessary policies that are in line with this thrust. Here the importance

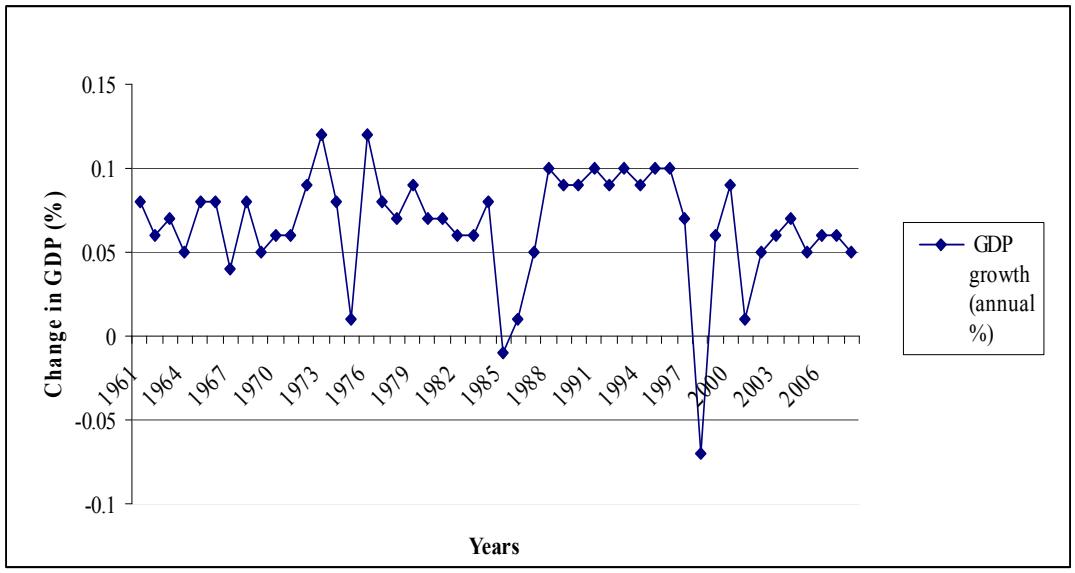
of human capital is re-emphasized and efforts are made to develop the skills of the workforce. Among the strategies adopted during this period is to increase the capacity for knowledge (via education and training) and to further strengthen the nation's capabilities in sciences, R&D and innovation.

One of the main arguments that propelled Malaysia into focusing on the knowledge-based sector was that it had lost its advantages in manufacturing due to increasing costs of production compared to cheaper alternative locations (EPU, 2002). But looking at Figure 2. above, it is evident that output from manufacturing has been growing faster than services in the last fifty years. This seems to indicate that Malaysia's comparative advantage may still lie in its manufacturing sector. If Malaysia was to concentrate on this comparative advantage, then efforts would have been channelled towards manufacturing to develop this sector further and to produce more quality products. However, the nation has chosen a different route and that is to focus on the knowledge-based sector as a new source of economic growth. As this strategy is currently underway, continued efforts must be undertaken to ensure its successfulness and that includes the development of human capital among the workforce.

In terms of economic growth, the Malaysian economy grew at an average rate of 6 percent in the 1980s and this accelerated to 9 percent during most of the 1990s. However, the economy was adversely affected by the contagion effect of the East Asian financial crisis and Malaysia went through its worst recession in 1998, in which the nation's GDP contracted by 7.4 percent (MOF, 2000: xi). Several recovery measures were undertaken in response to the crisis, namely, the easing of monetary policy to lower interest rates; the establishment of Danaharta and Danamodal to address non-performing loans of the banking system and to recapitalise and

consolidate the banking sector, respectively; and the introduction of selective capital control, which includes the pegging the Malaysian Ringgit at RM3.80 to USD 1 (Malaysia, 2001). These measures succeeded in resuscitating the economy and generated an average growth of 7.2 percent during the period 1999 to 2000 (Malaysia, 2000). See Figure 2.2 for Malaysia's trend in GDP growth.

Figure 2.2 Annual GDP growth, 1960-2009



Note: Malaysia encountered six economic crises since independence in 1957, namely the "early commodity crisis" between 1956 and 1972, the first oil crisis of 1973-74, the second commodity/oil crisis of 1980-81, the electronic/third commodity crisis of 1985-86 and the 1997-1998 financial and currency crisis (Okposin and Mingyu, 2000). At present, the nation is showing signs of recovery from the latest global financial crisis.
Source: World Development Indicators database by World Bank (2009)

To conclude, Malaysia has transformed its economy from one that was dependent on agriculture to a broader economy that emphasizes on manufacturing and export-orientation. This strategy has served the nation well as it enabled Malaysia to place itself among the middle-income countries. But due to the risks associated with the cyclical demand of the electronics industry (Malaysia, 2001: 5) as well as the changing nature of global trade as a result of globalization and wide application of

ICT, Malaysia began to shift its attention to the knowledge-based sector to remain competitive. Nonetheless, the nation's comparative advantage in manufacturing should not be disregarded. This sector should also be given duly emphasis by the Government next to the current focus on high-tech services and the knowledge-based sector, as together, this may improve Malaysia's prospect of becoming a developed nation by the year 2020.

2.2.1. The Malaysian Labour Market

Malaysia experienced a strong performance in the labour market as employment grew from 5.65 million in 1985 to 11.5 million in 2009 (see Table 2.1). As a result of changes in employment patterns and rapid job growth in the manufacturing sector, the unemployment rate contracted to 3.0 percent in 2000 but increased slightly over 3.5 percent, on average, during 2005 to 2009.[11] At the same time, labour participation rate grew steadily with an increasing share of women into the labour force.

The Malaysian labour force is generally educated. This is because youths who enter the labour market would have undergone at least 11 years of schooling. Furthermore, the proportion of labour force with secondary and tertiary education has risen over the years (see Table 2.2), making them easier to be trained and to learn new skills. Nonetheless, it has been argued that there is a shortage of skilled labour in Malaysia. As reported in the Investment Climate Survey Report by the World Bank (2005), the deficiencies are specifically apparent in the areas of ICT skills, technical and professional skills as well as the English language proficiency. This shortfall in

[11] Labour market policies in Malaysia have traditionally been linked to the transition of the economy. As the nation transforms itself from having a primary sector base to being industrial-based in the 1980s and 1990s, the structure of the labour market has also changed.

skilled labour was believed to be one of the causes for the tightness in the Malaysian labour market during the 1980s and 1990s, alongside a mismatch between demand for and supply of labour (Said and Haris, 2008 quoting Lin, 1988). Malaysia's response to this matter is one of the reasons for the nation's focus on human capital development in recent years.

Table 2.1 Basic labour market indicators for Malaysia, 1985-2009

	1985	1990	1995	2000	2005	2006	2007	2008	2009[1]
Population (million)	15882	18102	20772	23495	26447	26869	27232	27882	28073
Labour force (millions)	5990.1	7000.2	7893.1	9556.1	11291	11545	11775	11968	12142
Employed (millions)	5653.3	6685.0	7645.0	9269.2	10893	11159	11398	11525	11547
Unemployment rate (% of labour force)	5.6	4.5	3.1	3.0	3.5	3.3	3.2	3.7	4.5
Labour force participation rate (% of working age population 15-64 years)	65.7	66.5	64.7	65.0	66.7	66.9	67.0	67.0	66.9

Source: Economic Planning Unit and Department of Statistics, Malaysia
Note: [1]Estimates

Table 2.2 Percentage of labour force by educational attainment, 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
No formal education	5.1	5.3	4.8	4.7	4.6	3.8	4.0	4.4
Primary	24.1	23.5	22.4	21.7	20.6	20.4	19.3	18.3
Secondary	55.4	54.5	55.3	55.1	55.7	56.4	56.3	56.0
Tertiary	15.4	16.7	17.5	18.4	19.2	19.4	20.3	21.2

Source: Department of Statistics, Malaysia, June 2009

Malaysia has a tripartite labour system. The Ministry of Human Resources (MOHR) is the government agency responsible for labour issues in Malaysia. It formulates labour policy, monitors compliance with and implementation of the Constitution and the labour law as well as promotes job creation and job-related training. In performing its tasks, the MOHR solicits and receives advice from, among others, the National Labour Advisory Council (NLAC), the National Council for Occupational Safety and Health (NCOSH), the National Vocational Training Council

and representatives of employers and workers. The MOHR actively participates in the International Labour Organization (ILO) and manages responsibilities associated with the nation's participation in the Association of the South East Asian Nations (ASEAN) and the Asia Pacific Economic Cooperation (APEC) forum on labour and social issues.

To promote and safeguard the rights and interests of employers, the Malaysia Employers Federation (MEF) was established in 1959.[12] It provides members with advice, guidance and assistance in regards to the labour law and industrial relations matters and has created an Industrial Relations Panel, comprised of personnel and industrial relations practitioners, to formulate industrial relations policies. The MEF assists members in negotiating collective agreements, represents members at Industrial Court hearings and can make representations on behalf of members at the Labour Courts. Additionally, it conducts training courses on a regular basis. The MEF is a member of NLAC, NCOSH, and the board of the Employees Provident Fund (EPF). It also participates in the Social Security Organization (SOSCO), the National Productivity Corporation (NPC) and the Human Resources Development Council (HRDC). Other groups representing the employers are the Federation of Malaysian Manufacturer (FMM) and the National Chamber of Commerce and Industry of Malaysia (NCCIM).

As for employees' interests and rights, the most representative workers' organization in the country is the Malaysian Trades Union Congress (MTUC). Founded in 1949, MTUC is the oldest trade union in Malaysia and represents

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[12] It was originally founded in 1959 as the Federation of Malaya Industrial & Commercial Employers' Consultative Association but subsequently changed its name to the Malayan Employers' Consultative Association (MECA). In 1977, MECA was renamed the MEF.

approximately 500,000 workers from all major industries and sectors. It has three main objectives, which are (1) to promote the interest of its affiliate unions to improve the economic and social conditions of workers; (2) to ensure that policies are developed and action are taken towards ensuring full employment, establishing a minimum wage (which is currently not available in Malaysia), a legal maximum working hours of 44 hours and training centres for workers, and (3) to establish Social Security measures that provide retirement benefits as well as protection against sickness, unemployment, old age, and injury. Other prominent unions include the National Union of Plantation Workers (NUPW), the National Union of Bank Employees (NUBE), the Congress of Unions of Employees in the Public and Civil Services (CUEPACS) and its largest member, the National Union of the Teaching Profession (NUTP).

Despite the existence of numerous trade unions, the Government continues to receive criticisms of its policies with regards to freedom of association and the right to organize. These policies include the prohibition of union formation in "pioneer industries" during the first ten years of operation and the ban of national unions from representing workers in the electronic sector. In explaining this scenario, Anantaraman (1997) argues that trade union and workers rights in Malaysia are seen as "subordinate elements" to the greater goal of economic development of the country. Thus, the Government's policy towards labour is geared to control trade unions rather than to solicit their cooperation in the effort of the nation becoming a fully industrialized country in 2020.

2.3. Vision 2020

In 1991, a long-term program known as *Vision 2020* was introduced by former Prime Minister, Tun Dr Mahathir Mohamad.[13] It is a national agenda, which aspires for Malaysia to become a fully developed nation by the year 2020. To achieve this vision, a sustained growth rate of 7 per cent per annum is required for the 30 years between 1991 and 2020 (Mohamed, 1991).[14] Although Malaysia has succeeded in shifting its economy from a primary producer to an industrialized one at this point, the nation may still lack the ability to meet the required growth rate due to globalization and rapid technological advancement involved in the knowledge and information era. To meet these challenges, a highly-skilled workforce was deemed necessary to manoeuvre the economy. But given Malaysia's focus on manufacturing at the time, it made little contribution to economic sustainability as this sector produced only low-skilled job scopes (Jomo, 1990). For that reason, Malaysia believed that it needed to go beyond "simple assembly and production" and instead, be "an economy that is technologically proficient, fully able to adapt, innovate and invest, and increasingly technology-intensive".

Realizing the importance of science and technology (S&T) in this regard, Malaysia capitalized on the development of ICT in its strategy towards achieving *Vision 2020*. As a first step, the National IT Agenda (NITA) was launched in December 1996 to provide the foundation and framework for the utilisation of ICT in Malaysia. The second, and most prominent, initiative was the construction of a multi-

[13] Tun Mahathir Mohamad announced the vision in his speech at the Malaysian Business Council on 28.2.1991. Any quotes made in this section are excerpts from his speech.
[14] However, in view of the conditions amid the global financial crisis of 2007-2009, the current PM Najib Tun Razak declared that there is now a need to redefine and recalibrate the *Vision 2020* in terms of its timeline and how to achieve it. Among others, the country has to grow at an annual rate of 8 percent over the next 10 years instead of the initial 7 percent (Zalkapli, 2009).

billion dollar technology park, known as MSC Malaysia, to revolutionize the Malaysian information technology (IT) and multimedia industries.[15] The massive corridor was set to provide an environment conducive for local and international companies wanting to harness the full potential of ICT and multimedia technologies. The MSC Malaysia was modelled after the Silicon Valley and was reported to incur an initial investment of RM 45.7 billion by the Malaysian government in developing its infrastructure and facilities (Malaysia, 1996a: 465). Although faced with criticisms at the initial stage of development, the Government maintained its position on this large amount of public spending as it believed that MSC Malaysia will bridge the digital gap between the nation and its capability to conduct e-commerce and, eventually, contribute to the economic development of the country in the future.

2.4. Transition towards a Knowledge-based Economy

Since the mid-1990s, Malaysia has entered into a phase where new emphasis and demand for high technology and knowledge-based industries were in place (Abdulai, 2001). A change in the Malaysian economic policies was, therefore, needed in order to maintain the nation's competitiveness. As highlighted by Malaysia's then Finance Minister, Tun Daim Zainuddin in his Budget 2000 speech:

> "We must now make a paradigm shift from a production-based economy (P-economy) to a K-based economy. This is in line with the Government's efforts to intensify the development of high technology industry as well as make IT the catalyst for growth in the 21st century (Zainuddin, 2000, point no. 48)"

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[15] MSC Malaysia is Malaysia's most eminent technology park. Currently, there are six other technology parks in Malaysia – the Technology Park Malaysia (TPM), Cyberjaya, Selangor Science Park, Seri Iskandar Technology Park, Johor Technology Park and Kulim High Technology Park. The TPM and Cyberjaya are both clusters within MSC Malaysia. For a background on the technology parks in Malaysia, see Mhd Sarif (2008).

The OECD defines a knowledge-based economy as one that is "directly based on the production, distribution and use of knowledge and information… towards growth in high technology investments, high-technology industries, more highly skilled labour and associated productivity gains" (OECD, 1996: 7). Malaysia adopted this definition into its *Knowledge-based Economy Master Plan*, which defines a knowledge-based economy as "an economy where knowledge, creativity and innovation play an ever-increasing and important role in generating and sustaining growth" (EPU, 2002: 1). The Master Plan was developed to provide a strategic framework outlining the required changes to the fundamentals of the Malaysian economy. Since the concept of a knowledge-based economy revolves around knowledge and information as the key contributors to economic growth and development (Abdulai, 2001), the move towards a knowledge-based economy is expected to provide Malaysia with the necessary competitiveness in order to achieve a developed nation status and meet the objectives of *Vision 2020*.

Why should Malaysia move towards a knowledge-based economy?

Several reasons were given as to why Malaysia should move into the knowledge-based economy (EPU, 2002: 2-5). First, the nation has lost its global competitiveness in attracting FDI when it fell from the 18th place in 1994 to the 29th spot in 2001, as reported the World Competitiveness Yearbook (IMD, various years). Related to this is the increasing competition for the country's products from other developing countries, such as China, India, Vietnam and Indonesia that enjoy cheaper labour and more abundant resources. This is especially true in the case of China, where it has been reported that cheaper and equal quality goods from this new economic power, mainly

in labour intensive textiles, would bring about stiff competition to Malaysia's export goods in its domestic and international markets (The *Economist,* 2001).

Third, Malaysia's economic policies have been affected by globalisation and liberalisation as barriers and protective walls that help sustain local industries are slowly removed and brought down. As a result, Malaysia, like all other developing economies will have to search for new products and services that are feasible in the emerging global market where the distinction between local and world markets is gradually disappearing. Such goods and services like aircraft, pharmaceuticals, e-commerce, tourism and educational services and ICT industries are common in the knowledge-based industries.

Fourth, as Malaysia strives to become a developed nation by the year 2020, this would result in its current edge in producing goods and services for the global market, which hinges on low wages, to be eroded. This is because its cost levels would approach those of developed countries. To face this anticipated escalating labour cost, Malaysia needs to ensure higher value is added to its products in order for its industries to remain viable. Thus, for Malaysia to be competitive, it must produce goods and services to compete at comparable levels as those in developed countries. Again, such high value-added is generally provided by knowledge-based industries.

Fifth, Malaysia needs to move into more profitable and wealth-generating stages of production. In other words, it has to make its manufacturing sector more profitable.[16] To do so, Malaysian firms have little choice but to move into the pre-

[16] The creation of MSC Malaysia was initially faced with criticisms as it seemed to be too large and costly for a small country like Malaysia and also because the nation has a comparative advantage in manufacturing. However, investments in human capital (which MSC Malaysia entails) may prove to be beneficial not only for the intended knowledge-based industries but also in improving Malaysia's manufacturing sector and in making it more competitive and profitable in the future.

production stage (which includes product conceptualization, research and design, prototyping etc) and/or post-production stage (packaging, branding, marketing, retailing etc) of manufacturing, because there is less profit to be made from the core production process. These pre- and post-production stages also happen to be more knowledge-intensive compared to the existing core production process stage.

Sixth, Malaysia needs to find new sources of growth in its economy as the old sources of growth have become less productive. A knowledge-based economy will provide some of these new sources of growth to enable Malaysia to sustain growth and dynamism. Finally, Malaysia needs to improve the contribution of the "total factor productivity" (TFP) in terms of improving the quality of workers, methods of doing things and other delivery activities (EPU, 2002: 5).

Knowledge workers and the importance of training

A key element in a knowledge-based economy is the workforce, known as knowledge workers. According to Drucker, knowledge workers are those whose work primarily requires the use of mental power than muscle power (Zidle, 1998). The International Labour Organization (ILO) has identified five special characteristics of knowledge workers – i.e. they acquire their position through formal education; they are involved in highly specialized knowledge work; they undergo a lifelong process of knowledge acquisition; they are highly mobile, indicating that knowledge is portable; and due to this nature, knowledge workers are harder to retain in service (ILO, 1997).

From these characteristics, it is apparent that knowledge workers differ substantially from the conventional manufacturing workers and given the difference between a production-based economy and a knowledge-based economy, training is

expected to play a vital role in the development of human capital among the knowledge workers.

While training has always been an important means of human capital development for the average worker, it is even more important for knowledge workers given their circumstances. Abdulai (2001) has identified several reasons for this. The first is the dynamic nature of a knowledge-based economy. In a production-based economy, it takes time to combine all the necessary resources (*e.g.* labour and capital) to create wealth; however, advancement in ICT makes it easier and a lot faster for agents to create wealth in a knowledge-based economy. With training, the knowledge workers may improve their skills and respond better to technological changes.

In addition, the work structure is more flexible in a knowledge-based economy and as a result of the rapid change in technology; the skills of knowledge workers can become obsolete quickly if they do not undergo frequent training and update themselves with the latest knowledge in their fields.

Finally, since knowledge is the source of economic growth in a knowledge-based economy, ideas must be generated to produce new products or services. Training and continuous learning at the workplace is, thus, essential for knowledge workers to develop these new ideas and become more innovative.

The Government has undertaken numerous measures to promote training among the knowledge workers and to increase the number of knowledge workers in Malaysia. This includes the introduction of a training-levy reimbursement scheme called the Human Resource Development (HRDF) in 1993. Under the HRDF scheme, eligible employers with at least 50 workers are required to contribute 1 percent of payroll to the fund. They are then eligible to claim a portion of allowable training expenditures up to the limit of their total levy payments for any given year. Another

training initiative is the National Dual Training System (NDTS), which is an apprenticeship programme introduced in 2005 to produce knowledge workers in the country (see Tan, 2001 and Othman, 2005 for more discussion on these initiatives).

The *Ninth Malaysia Plan 2006-2010* also contains a policy thrust that places high importance on training and skills upgrading. A total of RM 45.1 billion is allocated during this period to implement various education and training programmes, with training being allocated an additional RM 200 million compared to the previous plan. Furthermore, under the current administration of Prime Minister Najib Tun Razak, the 1Malaysia concept and the 'new economic model' focus on innovation, creativity and high value; all of which re-emphasize the nations' commitment in human capital development in order to achieve the *Vision 2020*.[17]

In terms of physical manifestation, the establishment of MSC Malaysia marks the nation's official transition from a production-based economy to a knowledge-based economy. The project has also been widely cited as the national landmark for Malaysia's ICT industry (Mohan, Omar and Aziz, 2002; Ramasamy *et al.*, 2004). The following sections describe MSC Malaysia in more detail.

2.5. MSC Malaysia

MSC Malaysia (formerly known as the Multimedia Super Corridor) is a national initiative spearheaded by the Malaysian government to promote both the national ICT

[17] The 1Malaysia concept is an attempt by the Government to boost national unity. The basic idea is about making all Malaysians of different ethnicities and religions to fully understand and respect each other's cultures, to live together, work hand in hand and the sharing of responsibilities to achieve a better future for Malaysia in terms of socio-economy and political stability

industry and provide a test-bed for the global ICT industry (MDeC, 2008).[18] By this, it seeks to nurture and promote growth of local ICT industry, attract foreign and local ICT investment and promote greater usage of ICT by the community. Conceptualized in 1996, the ultimate vision of MSC Malaysia is to transform the country into a knowledge-based society. With this commitment, MSC Malaysia provides numerous facilities and technical skills for local and foreign businesses through its flagship applications and services within its capability development programmes (MDeC, 2009).[19]

A 'corridor' due to its initial area of 15 by 50 square kilometres, the MSC Malaysia used to stretch southwards from the Petronas Twin Towers to the Kuala Lumpur International Airport (KLIA). But the area has since been expanded to include the entire Klang Valley. The Klang Valley is an area in Malaysia comprising Kuala Lumpur and its suburbs, which also adjoin cities and towns in the state of Selangor. See Appendix B for a map of MSC Malaysia.

Concurrent to the launch of MSC Malaysia, a government-backed corporation known as the Multimedia Development Corporation (MDeC) was established to lead the future development and management of MSC Malaysia. MDeC is also responsible in shaping specific laws, policies and practices for MSC Malaysia as well as to work closely with companies that want to set up their operations there (MDeC, 2008). MDeC is under the purview of the Ministry of Science, Technology and Innovation

[18] The concept of MSC Malaysia is similar to the Free Trade Zones (FTZ) concept developed earlier in the late 1960s, which was to assist MNCs in exporting their products. The only difference is that MSC Malaysia is concentrated on knowledge-based and ICT-related products. The change in name was part of an effort to revitalise and empower MSC Malaysia as a national initiative to be taken to the global stage (The Star, April 8th 2006).

[19] The current four flagship applications are MyKad (the national ID card system), Smart School (to enhance the quality of education through the reinvention of the teaching-learning processes), E-Government (an internet-based procurement system that enables the buying and selling of goods and services to the Government) and Telehealth.

(MOSTI) and funded by the Ministry of Finance (MOF). In its daily operations, MDeC works closely with MOSTI, the Malaysian Communications and Multimedia Commission (MCMC) and other relevant Government agencies on ICT issues.

The MSC Malaysia project spans over twenty years and its implementation is divided into three phases (MDeC, 2009). In Phase 1 (1996-2003), efforts were made to attract 50 world-class companies to set up their operations in MSC Malaysia by launching the flagship applications and establishing two new cities i.e. Putrajaya and Cyberjaya, a Cybercity that houses ICT industries, research centres and the Multimedia University. Four other Cybercities were also successfully developed, namely, KLCC, Technology Park Malaysia, UPM-MTDC and KL Tower. In the current phase (2004-2010), known as the 'Next Leap', a web of similar corridors consisting of Cybercities and Cybercentres (designated areas with world-class physical and information infrastructures and conducive business environment that provides the ecosystem to attract ICT investors and promote the growth of local ICT companies) are being developed throughout Malaysia.[20] The government has also launched 'Outsourcing Malaysia' to promote and develop Malaysia's outsourcing industry and position it as a major global hub for high value Shared Services and Outsourcing (SSO). By end of Phase 3 in year 2020, the MSC Malaysia will be extended to the whole country, marking the nation's transformation to a knowledge-based economy and society, as envisaged in the *Vision 2020*.

[20] Currently, there are eight Cybercities and eight Cybercentres nationwide

2.5.1. Factors supporting MSC Malaysia

For a huge initiative like MSC Malaysia to become successful, the presence of several factors is required. These factors are external in nature and necessitate the support of numerous parties, mainly the Malaysian Government. This section briefly describes four factors that are deemed necessary in the implementation of MSC Malaysia, namely, political, economic, institutional and comparative advantage.

Political factors – As MSC Malaysia is, by far, the largest initiative undertaken by the Malaysian Government, it is highly dependent on the authority. In the past, Malaysia has had a very stable political history as the same government ruled the country since its independence. Thus, it was believed that a change of the government in favour of the opposition parties may lead to changes that will adversely affect the development of MSC Malaysia. However, this political threat did not occur because despite the change in several of the state governments in 2008, the development of MSC Malaysia remained on track.[21] This is largely due to the efforts of the federal government, which remained unchanged and the fact that the country has too much to lose if this massive investment is not continued.

Economic factors – to encourage FDI inflows, Malaysia has provided a favourable environment for companies through its trade export zones, relatively low

[21] In the 12th Malaysian general election 2008, although the incumbent Barisan Nasional (BN) coalition was able to form the next government, it only won with a simple majority in parliament. This general election is said to be BN's worst performance since independence in 1957, winning only 63.5% (140 out of 222) of parliamentary seats that were contested. Component parties in BN, including the Malaysian Chinese Association (MCA), Malaysian Indian Congress (MIC) and Gerakan, saw its number of state and federal seats severely reduced by half or more. The results of five states (Selangor, Kedah, Perak, Penang and Kelantan) have been rather surprising as most of these states are located on the western coast of Peninsular Malaysia where BN has traditionally focused most of its attention to. These states experienced more development and investment than other states and account for much of the country's population. The remaining states that have given BN its simple majority are states that are economically weaker than what the opposition has gained.

corporate tax and good facilities. The nation was also fortunate to have a relatively low price level and competitive cost of locating. But Malaysia began to face obstacles at the turn of the new millennium, which prompted it to focus on ICT and the knowledge-based sector (refer to the last section). One of the reasons for the creation of MSC Malaysia was to keep FDI flowing into the country and this seems effective as MSC Malaysia has brought in hundreds of foreign companies into the country. Still, there are those who remain sceptical with its success rate. As with other investments, it will take many years before MSC Malaysia can yield its optimal returns and to the sceptics, it is not certain whether this will ever materialize. This is because for a small open economy like Malaysia, long-term investments the size of MSC Malaysia may be too heavy for the economy to bear as it would make the country more vulnerable to external effects and may trigger new crisis. Nonetheless, the Government is optimistic that with proper planning, marketing and constant monitoring of the MSC Malaysia performance (through MDeC), the project will benefit the nation well and contribute to the achievement of *Vision 2020*.

Institutional factors – these relate to numerous physical infrastructure, institutions and human capital that support the development of an initiative. While the physical infrastructure within MSC Malaysia is well developed, the electronic infrastructure may be further improved.[22] Additionally, MSC Malaysia requires the support of research institutions like universities for informal networking among entrepreneurs and to become facilitators of technology transfer by establishing spin-off companies (Ramasamy, 2004 noting the works of Stefensen *et al.*, 1999).

[22] Informal interviews conducted with the Managers revealed that many were not that satisfied with the inconsistent broadband speed and internet performance within the Cyberjaya area.

Although several universities and institutions of higher learning are located within MSC Malaysia, their involvement in active research has only begun in the last few years. Prior to that, they only acted as providers of knowledge workers to new and established firms and research facilities. Among the universities that have strong links with the local industries are the Multimedia University, Universiti Putra Malaysia (UPM) and Universiti Kebangsaan Malaysia (UKM). The Multimedia University campus in Cyberjaya, in particular, is crucial in MSC Malaysia as it was built for the purpose of conducting IT and multimedia-based courses at the undergraduate and postgraduate levels.

As for human capital, Malaysia has a serious lack of substantial human resource pool to fill the demands of the ICT and multimedia industries compared to other countries in South East Asia such as Japan and Singapore.[23] Several long-term efforts in the field of education have been initiated by the Government, especially in the tertiary level, which includes increasing the capacity of tertiary education with more places in current universities and the setting up of new public universities and polytechnics; encouraging the entry of foreign universities into the country and the development of private local universities; and encouraging the setting up of private colleges that offer both local and foreign university courses via twinning programs.

Another area where the Government should look into in improving Malaysia's pool of human capital is to address the brain drain problem as many educated and professional Malaysians leave the country for jobs in other countries. Most recently, it

[23] An article that appeared in the *Far Eastern Economic Review* on March 16, 2000 identified the lack in the local skill base as the biggest problem facing MSC Malaysia (Ramasamy *et al.*, 2004)

was reported that almost one million Malaysians have emigrated, or worked abroad (The Star, 2010).

Comparative advantage factors – it can be argued that the theory of comparative advantage does not really support the idea of MSC Malaysia. Although Malaysia has perceived to have lost its advantages in manufacturing due to increasing costs of production factors compared to other countries, this does not mean that the country is ready to embrace the knowledge-based industries and automatically gain advantages in them. As discussed in the last section, Malaysia may still have a comparative advantage in its manufacturing. If Malaysia had developed this sector further, it may find a niche between low cost manufacturing and high technology industry. Over the years, the country's level of human resource may have improved and only then can Malaysia transfer itself to a knowledge-based economy. Nonetheless, all is not lost for Malaysia in choosing the present strategy to keep its economy growing. Statistics have shown a promising rise in the number of foreign companies entering the country, either through formation of subsidiaries or by setting up R&D centres (MDeC MSCIS, 2008). Studies conducted by MDeC have also revealed that MSC Malaysia has contributed much to the Malaysian economy (see below). As of now, MSC Malaysia must receive full and steady support from all relevant parties to ensure that it has a chance to succeed and achieve its full potential.

2.5.2. MSC Malaysia Status Companies

Companies certified by MDeC are known as 'MSC Malaysia status' (or MSC-status) companies. This status is awarded to both local and foreign companies that develop or

use multimedia technologies to produce or enhance their products and services, and for process development (MDeC, 2009).[24] To qualify for the status, the companies must fulfil several eligibility criteria, as follows, and those successful must observe the conditions attached to the MSC-status recognition (MDeC, 2009):

- Be a provider or heavy user of multimedia products and services[25]
- Employ a substantial number of knowledge workers (at least 15 percent of total employment) i.e. individuals who hold either a degree qualification from an institute of higher learning in any field, OR a diploma in multimedia/ICT or specialized ICT certification plus at least 2 years' relevant experience in multimedia/ICT or in a field that is a heavy user of ICT, OR a professional, executive, management and technical, work categories in IT-enabled services.[26]
- Strong value propositions specifying how operations will contribute to the development of the MSC Malaysia and the nation
- Establish a separate legal entity for MSC Malaysia-qualifying activities
- Comply with environmental guidelines

The MSC-status companies enjoy a host of privileges including world class physical infrastructure, advanced communications infostructure, cyberlaws and financial as well as non-financial incentives that are backed by the Government's Bill of

[24] This status is awarded to three types of business entities i.e. companies, incubators and institutes of higher learning (IHLs), each with different application criteria and guidelines. For the purpose of this study, only MSC-status companies are considered

[25] Activities that are not eligible for the MSC-status are manufacturing (activity referring to the production of goods and services in large quantities, usually undertaken in a factory environment) and trading (activity of buying and selling especially off-the-shelf hardware and software)(MDeC, 2007)

[26] There are various definitions of knowledge workers. The one used in this study is defined by MDeC for the purpose of MSC Malaysia classification.

Guarantees.[27] The financial incentives are guided by the Malaysian Promotion of Investment Act 1986, which includes Pioneer Status (100 percent exemption from taxable statutory income for five years); a 100 percent Investment Tax Allowance; eligibility for R&D grants; freedom to source capital and borrow funds globally and duty free importation of multimedia equipment.

As for the non-financial incentives, they include unrestricted employment of foreign knowledge workers; freedom of ownership from local ownership requirements;[28] no censorship of the Internet; provision of an effective one-stop agency i.e. MDeC; globally competitive telecommunication tariffs, high quality urban development and excellent R&D facilities if located within MSC Malaysia.

As of October 2008, over 2,000 companies were verified with the MSC-status. Of this, approximately 91 percent of the companies are still active. The remaining attrition rate is consistent with the normal rate recorded in any other industries in Malaysia (MDeC MSCIS, 2008). The majority of these companies are small and medium-sized enterprises (SMEs) (MDeC MSCIS, 2003; 2004).

Revenue generated by the MSC-status companies (excluding IHLs and Incubators) grew at a compound annual growth rate (CAGR) of 23 percent from 2003 to 2007 (MDeC MSCIS, 2008). Over the same period, the overall value of gross output of the Malaysian ICT industry increased at a CAGR of about 16 percent. As for MSC Malaysia, its contribution was recorded at 1.2 percent of Gross Domestic Output in 2007. In terms of its contribution to the labour market, a total of 79,005 jobs

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[27] The Bill of Guarantees is part of the Malaysian Government's commitment to ensure the success of MSC-status companies, see http://www.mscmalaysia.my/topic/MSC+Malaysia+Bill+of+Guarantees for more information

[28] A variety of regulations related to *Bumiputera* equity exists for both foreign and domestic firms located in Malaysia. For *e.g.*, there must be at least a 30 percent *Bumiputera* equity shareholding in companies listed in the Main Board or Second Board of Bursa Malaysia

were created by MSC Malaysia in 2007, accounting for approximately 19 percent of the total ICT workforce in Malaysia (MDeC MSCIS, 2008). From the total jobs created, 67 percent of the knowledge workers employed are Malaysians. Locally-owned MSC-status companies contributed to 60 percent of the total jobs created in 2007, followed by foreign-owned MSC-status companies (39 percent). In terms of intellectual property, greater awareness on having their works protected and patented has encouraged more MSC-status companies to register their IPs. A total of 2,600 IPs have been registered by MSC-status companies to date with 785 new IPs registered in 2007. Companies involved in the Application Software cluster contributed to the highest number of IPs registered in 2007 with 284 IPs (36 percent), followed by Creative Multimedia with 243 IPs (31 percent) and Mobility, Embedded Software and Hardware (MeSH) with 161 IPs (21 percent) (MSCIS, 2008).

2.5.3. Human Capital Development in MSC Malaysia

As mentioned earlier, a pool of highly-skilled knowledge workers is crucial to support the development of a knowledge-based economy. Knowledge workers who succeed in enhancing productivity and competitiveness of a nation ensure its ability to face the challenges of globalization and sustain economic growth. In the case of Malaysia, this refers to achieving the *Vision 2020*.

As part of its effort to develop the human capital of knowledge workers in MSC Malaysia, MDeC offers various programmes and facilities to the MSC-status companies under its Knowledge Workers Development Initiative (KDI) and Capability Development Programmes (CDP). While the KDI is targeted towards fresh graduates and/or undergraduates, the CDP is catered to more experienced knowledge workers or local ICT professionals (MDeC, 2009).

The KDI aims to ensure a sufficient supply of quality knowledge workers to meet the needs of local and global investors in MSC Malaysia and the ICT industry; and to develop a broad stream of knowledge workers by providing them with high level and in-demand ICT skills training in enhancing their employability. The facilities offered under the KDI structure include:

- Undergraduate skills programme – designed for fresh undergraduates to gain relevant industry skill sets and encourage their employability.
- Graduate trainee programme – designed for MSC-status companies who wish to lower their cost of initial training and to fresh graduates who seek employment opportunities in MSC Malaysia
- Job camp – designed for available knowledge worker (who are currently unemployed, in-between jobs, changing fields or retrenched) wanting to improve or expand their current ICT skills and knowledge.

The CDP Professional Development, on the other hand, offers professional certification and training courses for more experienced knowledge workers or local ICT professionals. For more information on these programmes and other initiatives provided by MDeC, refer to the MSC Malaysia website.

2.6. Concluding Remarks

Malaysia has undergone numerous transitions in its economy in the last fifty years – from having a primary sector base to being industrial-based and now shifting towards the knowledge-based economy.

The nation's journey towards becoming a knowledge-based economy began when *Vision 2020* was launched in February 1991. The vision is a blueprint strategy, which states that Malaysia must be a fully developed and knowledge-rich society by

the year 2020. Although the term knowledge-based economy was not explicitly mentioned at that time, *Vision 2020* committed Malaysia, among others, to become a "scientific and progressive society", "an economy that is ...fully able to adapt, innovate and invent, that is increasingly technology-intensive..." and "an economy driven by brain power, skills and diligence, in possession of a wealth of information...". In other words, Malaysia has launched a new strategy to switch to high-tech capital intensive industries with a special focus on ICT-based industries. To achieve this vision, a multi-billion dollar initiative known as MSC Malaysia was established in 1996 to provide an environment conducive for local and international companies to create, distribute and employ IT and multimedia products and services.

Given the relative stability of the political and economic conditions in Malaysia, it is highly probable that the implementation of MSC Malaysia may proceed as planned in the future. However, transition into a knowledge-based economy not only requires extensive investments in physical infrastructures, but most importantly, it requires the development of intangible infrastructure such as human capital among the knowledge workers. Accordingly, it is crucial for all players involved –MDeC, the Malaysian Government, the MSC-status companies and their knowledge workers, to undertake appropriate measures in this regard.

Despite the current focus on ICT and the move towards the knowledge-based economy, Malaysia still has some comparative advantage in its manufacturing industries. Accordingly, this sector should not be totally disregarded as development in this sector, together with the knowledge-based sector may improve Malaysia's prospect of becoming a developed nation by the year 2020.

CHAPTER 3

RESEARCH METHODOLOGY: ONLINE SURVEY RESEARCH

3.1. Introduction

The aim of this study is to investigate the current state and extent of knowledge worker training in Malaysia. Taking the case of MSC Malaysia, an online survey was conducted on a sample of companies and their knowledge workers. This chapter discusses in more detail the research method used. It specifies the working population, sampling procedure, survey instrument, data collection process as well as the data analyses techniques adopted. The chapter includes an overview of the different types of research designs and provides justification on the use of an online survey.

3.2. Types of Research Designs

A research design is an "architectural blueprint for research, linking data collection and analysis activities to the research questions and ensuring that the complete research agenda will be addressed" (Bickman, Rog and Hendrick, 1998: p.11). It specifies the methods and procedures for the collection, measurements and analysis of data (Cooper and Schindler, 2001) to ensure the quality of the research in terms of its credibility, usefulness and feasibility (Bickman *et al.,* 1998). The three most common types of research design are exploratory, descriptive and causal (Churchill and Brown, 2007; Cooper and Schindler, 2001).

Exploratory research is conducted to explore a relatively new issue (Babbie, 1999; Henry, 1990). Its purpose is usually to develop hypotheses or questions for future research (Cooper and Schindler, 2001). Exploratory research often utilizes secondary data and relies more on qualitative techniques such as interviews,

observation and focus groups to meet its objectives (Cooper and Schindler, 2001; Babbie, 1999).

Descriptive research, on the other hand, is concerned with discovering the 'who, what, where, when or how' relating to the issue under investigation. It aims to describe situations or events by testing a particular hypothesis (Babbie, 1999); consequently, it is also used to make specific predictions (Churchill and Brown, 2007). Descriptive research is much more rigid than exploratory research as it requires clear definitions of the variables before data collection can begin (Churchill and Brown, 2007). Descriptive research can be further classified into cross-section (one set of data observations over a period) or longitudinal (observations on each unit of the sample for a number of points in time) studies (Sekaran, 2003). If a study is concerned with why or how one variable affects another, it is causal in nature. *Causal research*, or experimental research, aims to test the cause and effect relationships among different aspects of the issue under study (Babbie, 1999). It involves the manipulation of one or more independent variables to determine the effects that it has over the dependent variables. There are two classifications of experimental design, which are laboratory and field experiment (Sekaran, 2003).

Most studies have elements of all these designs and are analysed either qualitatively, quantitatively or using a combination of both. Since there is no single or correct method of conducting research, the appropriate design to be adopted ultimately depends on the objectives of the research (Babbie, 1999; Bickman *et al.,* 1998).

3.3. Research Design for the Present Study: Online Survey

Following the tradition of previous studies on training, this study adopts a survey research design as a means of data collection. Specifically, an online survey was used to obtain information from the MSC-status companies and their knowledge workers.[29] To understand the merits as well as limitations of online surveys, it may be useful to review the general survey process first.

A survey is a quantitative research method that provides numeric description of trends, attitudes or opinions for a population by studying a sample of that population (Babbie, 1999). When using the Internet as a medium, surveys may be conducted via electronic mail (email) or Web surveys (Schonlau, Fricker and Elliot, 2002). For the former, the survey instrument is contained either in the body of the email message or as an attachment. Web surveys, on the other hand, are 'hosted' or reside on a website. The respondents may enter the website either by clicking on a hyperlink given in an email or by typing the URL (web address) directly into the address box in the browser window (Schonlau *et al.,* 2002).

A survey is most suited for the current analysis for several reasons. Firstly, due to the lack of studies conducted on knowledge-based companies in Malaysia, information on training for individual companies in MSC Malaysia is neither available nor accessible to the public.[30] Thus, the only data source that allows the investigation of company training is via surveys or case studies. The former was

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[29] A matched employer-employee data set was initially planned but this could not materialize due to the lack of response and policies of confidentiality of the responding companies. Instead two separate surveys were conducted on the MSC-status companies and knowledge workers, respectively.

[30] The only available study that reflects economic and technological aspects of the MSC-status companies is the annual impact studies conducted by MDeC i.e. the MSC Impact Survey (MSC IS). These studies outline the key effects of the MSC Malaysia initiative to the country. However, detailed information on individual companies and their training activities are not included; thus, independent researchers must conduct surveys of their own to obtain such information.

preferred since surveys enable the collection of quantitative, first-hand data from more than one company. For this study, a cross-section survey was deemed reasonable as it is difficult and costly to obtain information from the same companies for a succession of years.[31] Such research design is useful not only for descriptive purposes but also for the determination of relationships between variables at the time of investigation (Babbie, 1999). Although a cross-section survey may give rise to several methodological problems such as reliability of the data and measurement error, past empirical studies have employed a 'standard' set of variables and estimation techniques that yield fairly robust relationships between training and other factors. This study adopts most of these standard practices, whenever possible, while augmenting them with factors that are suited for the current case of MSC Malaysia.

Secondly, surveys enable the characteristics of the entire population to be generalised, particularly when the units of analysis are people or organizations (Babbie, 1999). In this case, the sampled companies represent not only the traits of MSC-status companies as a whole but also for knowledge-based companies in other technology parks in Malaysia. Thirdly, surveys can also be implemented in a timely fashion depending on one's budget and, most importantly, well-structured surveys may generate data that are amenable to quantification and consequent computerized statistical analysis (Rea and Parker, 1997).

As mentioned, the surveys in this study were self-administered online where the respondents have the option either to reply to the questionnaire via email or to answer a Web-based survey. The decision to use an online mode was based primarily

[31] Given the need to keep the questionnaire as short as possible to facilitate a high response rate, it was not practical to include many recall or retrospective questions.

on the characteristics of the sample. Since the MSC-status companies are involved in multimedia and high-tech industries, the employees are used to regular ICT usage. As such, an online survey makes it more convenient for them to respond despite hectic and irregular work schedules.[32] Moreover, given the need to acquire as many responses as possible to yield a fairly acceptable estimate, an online survey was deemed more practical especially when there are time and financial constraints involved.

Despite these advantages, the drawbacks of relying on the Internet as a research tool are recognized.[33] Perhaps the biggest concern with an online survey is that it leads to coverage bias or bias due to sampled individuals not having or choosing not to access the Internet (Kaye and Johnson, 1999; Solomon, 2001). Fortunately, the use of an online survey in this study does not pose a biased sample because only those with Internet access are of interest; otherwise, they will not be eligible for the MSC-status in the first place. As Schmidt (1997) argues, electronic methodologies can only be considered a valid alternative to traditional techniques for research that targets specific and narrowly defined populations with easy access to the Internet and email.

Another possible drawback of this mode was highlighted by the pilot study. Due to the informal nature of online surveys, the respondents may not feel 'obliged' to answer them, and this may lead to missing or unclear information. In fact, Thach (1995) argues that email messages can be deleted as quickly as they were sent and unlike the standard mail questionnaires, the respondents can discard email at the touch

[32] According to Schaefer and Dillman (1998), a faster response rate is obtained with e-mail. In their study, respondents took on average of 9.16 days to return the questionnaires by e-mail versus an average of 14.39 days by postal mail.
[33] A number of issues concerning web-based surveys were discussed by Solomon (2001)

of a button. One way to address this problem is to offer the respondents some kind of incentives to motivate them into participating in the survey (Cook, Heath and Thompson, 2000; Schonlau *et al.,* 2002).

3.3.1. The Online Survey Research Process

In conducting the online survey, four phases were undertaken (see Appendix C). In the first phase, a general understanding of human capital development and theories related to training was acquired to identify possible issues of interest in relation to MSC Malaysia. Links were established to investigate potential areas that were previously undiscovered. This phase is crucial for the formulation of the research questions, objectives, hypotheses and the direction of research design, which include specifying the population of interest and identifying the type of data to be collected.

Once the survey objectives were set and the appropriate research method was selected, the second phase focuses on determining the method of sample selection (either probability-based or convenience-based), creating a sampling frame, selecting the sample and designing the questionnaire. Here the key variables were identified along with the appropriate levels of measurements. After the survey instrument was drafted, a pilot study was conducted to review the survey questions and amendments were made, wherever necessary.

The third phase of the study involves the actual data collection. A field study was conducted from March 2008 to November 2008, where during this period information was gathered using an online survey together with visits to the business premises of the MSC-status companies. Concurrent with data collection, the keying-in of data and data screening were also carried out during this period.

In the final phase, data were analysed and the results were synthesized with past findings. Justifications were given for unexpected results and recommendations for future research were also included at the end of the research.

3.3.2. Population and Sample

This study focuses on companies in the Malaysian knowledge-based industry. Specifically, it targets MSC-status companies because they represent a discernible portion of all knowledge-based companies in Malaysia. To qualify for the 'MSC-status', companies must be heavy users of multimedia products and services, and employ a substantial number of knowledge workers. So by definition, the MSC-status companies give direct access to knowledge workers and may provide a sound representation of other companies of a similar nature but not registered with MSC Malaysia. In addition, since the 'MSC-status' is awarded to both local and foreign companies, it provides a good mix of entities for the purpose of analysis.

Although a total of 2173 MSC-status companies were certified as of October 2008 (MDeC, 2008), not all of these companies were contactable (see below). Therefore, there is a need to establish a 'working population' to ensure consistency throughout the study. A working population is the operational definition of the general population from which the researcher can reasonably identify as complete a list as possible of members of the general population (Rea and Parker, 1997). After deciding on a suitable cut-off date, the working population for this study is all companies registered up to October 6th, 2008, which amounts to 1878 MSC-status companies.

Due to time and financial constraints on the part of researchers, a census is usually disregarded as unfeasible, that is, not all members of the population are being

surveyed. A subset of the population or the 'sample' is, thus, used to gain information about the entire population (Henry, 1990). A relatively small sample if appropriately selected can be informative about the total population. The following explains in more detail the procedures used to select the current sample.

3.3.2.1. Sampling Frame

A sampling frame is a list of the working population from which the sample is selected (Babbie, 1999). In this study, the prospective respondents were identified from a company directory available at the MSC Malaysia website (see http://www.mscmalaysia.my/topic/Company+Directory). However, this directory has two major shortcomings, which prevents it from being used as the current sampling frame. Firstly, not all of the companies in the directory have valid contact details. These companies may have discontinued their businesses due to poor performance but have yet to be revoked of their 'MSC-status' as MDeC still hopes that they will continue to survive in future (Mat Nor *et al.,* 2006). Secondly, the directory changes quite often as MDeC frequently updates the total number of certified companies following successful applications for the status.[34] Both of these shortcomings may overstate the actual number of operational companies, and as a result, a new sampling frame must be created.

In the MSC Malaysia website, the MSC-status companies are categorised into six sub-sectors or technology clusters, namely, Creative Multimedia (CM), Software Development (SWD), Support Services (SS), Hardware Design (HW), Internet-based

[34] This is the main reason why not all of the MSC-status companies can be surveyed. During the fieldwork, the total number of registered MSC-status companies was frequently changing, hence, the need for a cut-off point in selecting the working population.

Business (IBB) and Shared Services and Outsourcing (SSO). But some variations exist with regards to these categories when compared to other MDeC publications, such as the annual Impact Surveys. With the exception of IBB and SSO, the clusters were renamed as Creative Multimedia Companies (CMC), Application Software (AS), Mobility, Embedded Software and Hardware (MeSH) and Institutes of Higher Learning (IHL) & Incubators.

Enquiries made to MDeC on this matter verified that no discrepancies exist between these classifications and that the new sub-sectors are in fact comparable to the existing ones, as shown in Table 3.1.

Table 3.1 Existing and new categories of the sub-sectors in MSC Malaysia

Existing Categories	New Categories
Creative Multimedia (CM)	Creative Multimedia Companies (CMC)
Software Development (SWD)	Application Software (AS)
Support Services (SS) Hardware Design (HW)	Mobility, Embedded SW & HW (MeSH)
IBB	IBB
SSO	SSO
	Institute of Higher Learning (IHL) & Incubators

Source: Author's comparison based on information from the MSC Malaysia website

Several issues were considered before constructing the sampling frame. In order to remain consistent with the categories in the MSC Malaysia website, the cluster labelled as 'IHLs and Incubators' were excluded from the sampling frame.[35] Companies that were found to be 'inactive' or 'status unknown' were also excluded from the sampling list. These refer to companies that did not provide any valid contact details, whose phone lines have been disconnected or emails bounced and who did not respond to any phone calls, emails or faxes made by the researcher. Finally, MSC-

[35] 'IHLs and Incubators' were also excluded from the sample as the current study is more interested on companies.

status companies located outside of the Klang Valley were also excluded due to time and financial constraints. After all these considerations were made, the actual number of operational companies included in the sampling frame is only 1560 from the total working population of 1878 MSC-status companies. See Table 3.2 for a breakdown of these MSC-status companies by sub-sector and ownership as at October 6th, 2008.

Table 3.2 Breakdown of the MSC-status companies as at October 6th, 2008

Sub-sector	Local companies	Foreign-owned companies	Joint venture companies	Total companies
Creative multimedia	129	23	22	174
Software development	635	136	86	857
Support services	61	15	8	84
Hardware design	95	14	13	122
IBB	141	20	23	184
SSO	43	85	11	139
Total	1104	293	163	1560

Source: Author's calculation from the MSC Malaysia company directory

3.3.2.2. Sample Size

To determine the appropriate sample size for the study, a calculation was made based on the sample formula for small population size in Rea and Parker (1997), with a confidence level of 95 percent assumed to an acceptable margin of error i.e. half the width of the confidence interval.[36]

$$n = \frac{Z^2\left[p(1-p)\right]N}{Z^2\left[p(1-p)\right] + (N-1)c^2}$$

where:

n = the size of the sample
Z = Z value (e.g. 1.96 for 95% confidence level)
N = the size of working population i.e. 1560
c = confidence interval, expressed as decimal (e.g. 0.05 = $\pm 5\%$)

[36] Following Cochran (1977), the margin of error refers to the risk that the researcher is willing to accept, while the confidence level (or alpha level) refers to the level of acceptable risk the researcher is willing to accept that the true margin of error exceed the acceptable margin of error.

p = percentage of respondents picking a choice

In questionnaires with multiple questions such as the present survey, the proportion of respondents corresponding to each of them varies. In this situation, it is not possible to have an estimation of (p), therefore, the least favourable case ($p = 0.5$) was considered (Rea and Parker, 1997: 119).

The above resulted in a sample size of 308 MSC-status companies. To verify, an online calculator (http://www.surveysystem.com/sscalc.htm) was used and a similar figure was obtained. Since response from knowledge workers is also needed, several knowledge workers from each responding company were required.[37] While every effort was made to select the knowledge workers randomly, most of the responding companies do not allow the researcher to approach their knowledge workers directly. Hence, these workers were mainly chosen by their Managers so there is the possibility that the knowledge workers were not selected at random.[38] The response rate for online surveys that use telephone calls to contact potential respondents is as low as 36.3 percent (Dillman *et al.,* 1998). Thus, in prudence, 848 companies were contacted for this study.[39]

3.3.2.3. Sampling Procedure

Survey research is concerned with making inferences about a population on the basis of information from a sample. The basic idea of sampling is to use appropriate

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[37] The researcher had requested for at least one knowledge worker from each participating organization to respond to the worker survey (SQ2). The number of knowledge workers who responded varies from nil to six for each participating MSC-status company.

[38] On rare occasions, it was possible to obtain email addresses of some random knowledge workers. These emails were obtained by the researcher from attending ICT conventions organized by MDeC. As such, knowledge workers from non-responding companies were also included to increase the number of responses. This is permissible given that the questions posed to the knowledge workers are independent of the ones posed to the Managers.

[39] This technique of 'over sampling' is commonly used in an attempt to attain the required sample size for a particular confidence level (Sheehan and Hoy, 1999).

techniques so that a sample can be drawn, which allows for statistical inference and generalization back to the population. The two main types of sampling method are probability sampling and non-probability sampling. A probability sampling is called a random sample that consists of simple random sample, systematic random sample and stratified random sample (Cooper and Schindler, 2001). Meanwhile, non-probability sampling is used when probability sampling is inappropriate and impossible to be used in particular research. Examples include convenience sample, judgmental samples, quota sampling and snowball sampling (Babbie, 1999).

For this study, a *stratified random sampling* technique was used to select the sample as it is known to reduce the errors in the statistical estimates calculated from the sample and allows the creation of a sample that is representative of the various sub-groups of interest in the population (Rodeghier, 1996; Sekaran, 2003). The first step in stratified sampling is to identify the relevant stratum and its actual representation in the working population. The MSC-status companies were firstly stratified by their ownership. Random sampling is then used to select a sufficient number of subjects from the stratum. For this study, a proportionate stratified sample is adopted where the size of the sample in each stratum is proportional to the size of the stratum in the population (see Table 3.3).

Table 3.3 Sample size stratified by firm ownership

Ownership	Proportional allocation	Sample size (n)
Locally-owned companies (LO)	(1104/1560) x 100 = 71%	71% x 848 = 600
Foreign-owned companies (FO)	(293/1560) x 100 = 19%	19% x 848 = 159
Joint venture companies (JV)	(163/1560) x 100 = 10%	10% x 848 = 89
Total	100%	848

Source: Author's calculation

For a more representative sample, the companies were also stratified by the six sub-sectors in MSC Malaysia, as shown in Table 3.4. For each sub-sector, the names of all the MSC-status companies were arranged in an Excel worksheet according to the sequence found in the MSC Malaysia website. Each company was then assigned a random number by using the "Random" function and a sample is selected on the basis of the sample size established for each ownership and sub-sector, as calculated below.

Table 3.4 Stratified MSC-status companies by ownership and sub-sectors

Sub-sector	Local companies	Foreign-owned companies	Joint venture companies	Total companies
Creative multimedia	70	12	12	94
Software development	345	74	47	466
Support services	33	8	4	45
Hardware design	52	8	7	67
IBB	77	11	13	101
SSO	23	46	6	75
Total	600	159	89	848

Source: Author's calculation from the information in Tables 3.2 and 3.3

3.3.3. Survey Instrument

3.3.3.1. The Design and Structure of the Questionnaires

Apart from the size and representativeness of the sample, an equally important aspect that ensures quality of data is the design of the survey questions. This is because questions that do not produce reliable and valid answers may be a major source of error in survey estimates (Sudman and Bradburn, 1974).[40] A questionnaire is a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives (Sekaran, 2003). For a quantitative study

[40] 'Reliable' refers to the extent to which the answers are consistent and 'valid' is the extent to which the answers correspond to some hypothetical true value of the variable. Refer to Fowler (1995) for a detailed discussion on the evaluation of survey questions designs.

like this, one of the biggest challenges in question design is to ensure that every response can be expressed numerically, for the simple reason, statistics and econometrics perceive those variables as a stronger measure in analysis. If a variable yields a nominal response, a single number would need to be assigned to it so that it represents the respondent's overall attitude or belief.[41]

The language used for the survey questionnaires was English (see the Appendix for a copy of the questionnaires). The questions were kept direct and structured, with minimal open-ended questions to encourage participation. An advantage of closed-ended questions is that the answers are uniform, which will permit the direct transferral data from the questionnaire to the computer without intermediate stages. Additionally, the fixed list of responses tends to make the question clearer to the respondents (Rea and Parker, 1997). Several filter or screening questions were also posed to determine whether succeeding questions apply to certain respondents. For certain questions, responses like 'Don't Know' or 'Not Applicable' were allowed. Likewise, the option 'Other, please specify_____' was also included as it is a logical answer to questions of opinions and it is an excellent way to address the drawback of closed-ended questions (Rea and Parker, 1997). Since this study focuses on the companies' existing training practices (and likewise, on training participation by the knowledge workers), questions were posed retrospectively in that they cover training over the last 12 months and were confined to current knowledge workers.

Separate questionnaires were designed for the Human Resource (HR) Managers, or equivalent, and the knowledge workers.[42] The former were given the

[41] More details on levels of measurements in the next section

[42] Some of the MSC-status companies did not have anyone in particular as a HR Manager. In this case, the *SQ1* was targeted towards anyone who was in charged with the company's HR and training matters.

Survey Questionnaire on MSC-status Companies (SQ1) whereas the *Survey Questionnaire on Knowledge Workers (SQ2)* was intended for the knowledge workers (see Appendices D and E, respectively). In designing both of these surveys, reference was made to similar existing questionnaires such as the Workplace and Employee Survey (WES), the National Longitudinal Surveys of Youth (NLSY) and the British Household Panel Survey (BHPS) as a guideline.

The *SQ1* is divided into four sections. Section A inquires about the background of the company and includes the following elements – legal establishment of the company; ownership of the company; year of establishment and year awarded the MSC-status; motivations for setting up operations in MSC Malaysia; sub-sectors involved in; perceived level of domestic and overseas competition ; innovative actions taken since joining MSC Malaysia; extent of technologies adopted from other companies and possible channels of knowledge and technology transfer.

Section B involves the financial performance of the company, namely inquiring about the turnover and exports of the company, profits, and expenditures in total and in R&D. All figures refer to the year 2007, unless stated otherwise. Section C relates to the company's employment and includes information on overall workers (by gender, by level of education and those in R&D); knowledge workers by nationality and by work status; annual worker turnover; new recruitment factors; how vacancies are filled and movement of former workers to other companies.

Section D requires information on the company's training that involves training policy and training provision; amount spent on training; average hours and

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The answers provided by these personnel are considered reliable as they would normally require an approval from their superiors before handing out information to external parties. For consistency, all the contact persons are called 'HR Managers' throughout the study

days spent on training; number of knowledge workers trained; type of training provided; existence of an induction training and informal training and mechanisms used to evaluate the effectiveness of training on worker productivity.

The *SQ2* is slightly shorter with only three sections. Section A relates to the knowledge workers' background, such as age, gender, level of education, local or overseas graduates and nationality. Section B inquires about the knowledge workers' employment, which includes information on current employment (status, type of occupation, job tenure, and relevance of education to line of work); past employment – experience working in an MNC, reasons for job change; number of days and hours worked in a week; current salary and promotion and/or salary increment

Section C relates to training and productivity of the worker. Questions were asked on the number of training participated in; type of training (OJT or off-site, in-house or external); average number of days and hours of training; nature of training; performance measures and the intentions of searching for a new job in the future

3.3.3.2. Levels of Measurement and Coding

Survey data are organized in terms of variables. A variable is a specific characteristic of the population that varies in value and is generally associated with a set of categories that describe the nature and type of variation associated with the characteristic. The variables used in surveys have distinct measurement properties, referred to as 'levels of measurement' (Rea and Parker, 1997) and are crucial in classifying the response options to the respondents. In the current surveys, the measurement scales used are nominal, ordinal and ratio.

A nominal scale simply classifies the observation into categories where no particular order is implied. These categories act only as labels or names, for *e.g.*

gender (male or female) and nationality. An ordinal or ranked data goes a step beyond nominal data where the names or labels can be ordered. However, these data do not indicate the magnitude of differences among these categories (Rea and Parker, 1997), that is, differences between any two categories are not necessarily the same or measurable. Examples include education level (bachelor, masters, PhD), the existence of a training policy (no, yes in written form, yes but not in written form, *ad hoc*) and the Likert scale (strongly agree, agree, neutral, disagree and strongly disagree) used to indicate the level of competition. Finally, ratio data has the greatest amount of information about the variable. Ratios are continuous in nature and are meaningful because there is a starting point, for *e.g* incomes, total sales and training expenditures.

For flexibility in managing quantitative information, continuous data was collected as much as possible in the surveys. This is because they can be expressed either as a whole amount or in a particular range, for *e.g.* wages. For this reason and also to minimize error, data were not converted during data entry. Data are entered in their original format as they were collected and were only converted into other forms using the relevant statistical software later when analyzed.

To assist in data entry, coding is essential. Coding refers to the assigning of numbers to the responses so they can be grouped into a limited number of categories (Cooper and Schindler, 2001). This can only be done when the different types of scales used to measure variables are understood. Coding facilitates data entry as the codes can be entered directly into the computer for further analysis. For the Web-based *SQ1* and *SQ2* surveys, pre-coding was done automatically. For the email versions, pre-coding was done manually by the researcher. The survey instruments adhered closely to the standard coding guidelines and were refined over the course of the pilot study. For *e.g.*, variables with nine or fewer categories were coded with a

single digit (1-9) whereas variables with more than nine categories were coded with two digits (01-99).

3.3.3.3. Pilot Study

To test the strength of the questionnaire design and provide sample data for the actual survey, a pilot study was carried out (Cooper and Schindler, 2001). In this study, two stages of pilot studies were conducted using a Web-based survey. The first stage was done on a non-random and 'convenience sampling' basis since the respondents were easily available to the researcher (Henry, 1990). A total response from 12 knowledge workers and one HR Manager were obtained from two companies. This was followed by a second stage of pilot study. This time the companies were selected at random and four companies from five of the sub-sectors participated in this pilot.

The small number of respondents for the pilot tests was not an issue because (1) the size of the population is also small, and (2) pilot studies are usually not concerned with statistical accuracy, rather, interest lies in feedback on the overall quality of the questionnaire construction (Rea and Parker, 1997).[43] Feedback was requested from the respondents at the end of the pilot studies and they proved to be very useful in preparing for the actual survey. The following highlights some of the main outcomes of the pilot studies:

[43] A pilot study is also crucial to measure the internal consistency of an instrument (Sekaran, 2003). The most common way to measure for internal consistency is by using the Cronbach's alpha. However, this measure is mainly useful for assessing questions that use a lot of the Likert scale. Since the questions in this study were mostly continuous in nature, internal consistency is not a major issue of concern.

- Several questions were added and refined for more clarity to ensure reliable future responses. In addition, these modifications may avoid too many undesired 'Don't Know' responses in the actual survey.
- When asked for their mode of preference in answering the survey, all respondents chose online over written or telephone surveys.
- When called and invited to be a part of the pilot study, all Managers requested for an email containing the survey to be sent to them instead of a face-to-face appointment. Likewise, when a walk-in approach was conducted, most of the companies require that a call be made first and/or an email be sent to the relevant Managers. None of the written questionnaires distributed during the random walk-in sessions were returned to the researcher.
- In the second phase of the pilot study, a summary of the research findings was offered to the respondents as a token of gratitude. When a poor response rate was received, this prompted the researcher to offer some form of souvenir and monetary incentive to encourage participation.

The above feedback provided the basis for the actual method of data collection, which is discussed in the next section.

3.3.4. Data Collection

The choice of data collection method depends on the available resources and how best the method can generate the required information from the selected sample (Cooper and Schindler, 2001; Sekaran, 2003; Babbie, 1999). In this study, data was collected using mainly an online survey and some informal interviews with the HR Managers. Prior to contacting the companies, support letters from the University of Nottingham and the Ministry of Science, Technology and Innovation (MOSTI) of Malaysia were

obtained as proof of research authenticity for the Managers, should it be required. Additionally, a great deal of credibility can be gained for the study if it was associated with a governmental body (Rea and Parker, 1997). Permission from MDeC was also sought but they declined to give any authorization letter saying that it was customary for researchers to approach the MSC-status companies directly. Some budget was also applied from the University to aid the process of data collection, particular when travelling is needed.

The MSC-status companies were approached in two ways. Those with valid email addresses were directly invited to participate in the survey. The emails were made as personalized as possible since this may lead to an increase in the response rate (Cook *et al.,* 2000; Schaefer and Dillman, 1998). For companies that do not readily provide valid email addresses of their HR Managers or contact persons, they were firstly contacted by telephone.[44] In both cases, the HR Managers were informed of the researcher's intentions and for the latter, permission was asked to send the questionnaire via email or fax (whichever preferred). This initiative is important to convince potential respondents that their participation is useful both to the researcher and to the respondents themselves (Rea and Parker, 1997). HR Managers who were not interested in the survey were labelled as companies that 'declined', whereas contact numbers that were vacant or not in service were excluded from the survey and labelled as companies that are 'inactive' or 'status unknown'.

[44] The problem with this approach was that the cost savings that could be realized through an entire Internet-based survey process are substantially reduced (as agreed by Schonlau *et al.*, 2002).

HR Managers who agreed to peruse the survey were emailed a survey pack.[45] This includes a cover email stating in more detail the purpose of the survey (Appendix F(1) and F(2)), support letters from the University and MOSTI (Appendices G and H), a document version of *SQ1* and a hyperlink to the Web-based survey of *SQ1*. The support letters were scanned and included as email attachments along with the Word form of the survey.

Once a response is obtained, a thank-you email was sent. The researcher then arranged for a visit to meet with the respondents at their offices. This visit serves three purposes: (1) to clarify any obscure answers given in the survey *(SQ1)*; (2) to request for at least two randomly selected knowledge workers to complete the worker survey *(SQ2)*, and finally (3) to present a token of appreciation to the respondents. In the event that the MSC-status companies do not allow their knowledge workers to be approached directly by the researcher, the HR Managers were asked to randomly select their workers to complete the survey. This avoids, to some extent, bias in sample selection because all workers will now have equal chance at being selected and not just those involved in training.[46] Once access to the knowledge workers is given by the HR Managers, they were then approached given a similar survey pack, but instead of the *SQ1* they were provided with the *SQ2*.

The invitation and cover letter via emails were sent to the HR Managers in several batches as it takes time to gather valid email addresses and to email the HR

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[45] This survey pack constitutes the invitation email given to the group of MSC-status companies with valid email addresses

[46] To the best of the researcher's knowledge, the respondents were randomly selected by the HR Managers since there are cases where no responses were obtained for questions related to training. Moreover, the survey invitation was mass emailed to the knowledge workers in the relevant departments so it would certainly be by chance for a knowledge worker to participate in the survey. Nonetheless, as mentioned, the possibility of non-randomness in the selection of knowledge workers is acknowledged.

Managers individually so as to appear more personal. For every batch, a different deadline was set to expedite the responses. Following Dillman *et al.* (1998), a token of appreciation was promised to each fully completed survey in order to improve the response rates. In addition, a cash reward will be given to one MSC-status company that responded in due time by way of a lucky draw (Frick, Bachtinger and Reips, 1999). Managers who did not respond were sent an email reminder after 2 to 3 weeks from the date of the original invitation.

While care has been taken to ensure that the survey goes according to plan, an unanticipated problem was encountered during the process that adversely affected the response rate. As the data collection progressed, it became apparent that obtaining participation from the MSC-status companies proved much harder than expected. HR Managers who were contacted either (1) declined to receive the email containing the survey, (2) accepted the email but did not respond to the survey even after two reminders were sent, or (3) could not participate because their HR and training matters were managed by foreign headquarters. As more and more MSC-status companies were contacted to replace those who declined participation, the sample survey eventually became a census.[47] However, due to non-response, the use of the census still does not guarantee that information was collected about all members of the population (Rodeghier, 1996). As a result, the data actually constitute a sample of the population and generalizations still had to be made back to the population.

The data gathering period took nine months (March 2008 – November 2008) given the time involved for requesting for the HR Managers' email addresses by

[47] In replacing the MSC-status companies that declined participation, the substitutes were ensured to be from the same strata i.e. ownership and sub-sector.

phone, emailing the MSC-status companies, rechecking that the emails were correct since quite a lot of failed emails were returned, as well as arranging and paying visits to the responding companies to get response from their knowledge workers.[48]

Table 3.5 summarizes the response obtained from the MSC-status companies. It can be seen that the number of companies who responded upon invitation and those who responded after a reminder was given was almost equal. In total, the response rate was 32.5 percent (100 respondents out of 308 recommended sample size), which is consistent with most past studies and is acceptable for the purpose of analysis.

Table 3.5 Survey responses obtained from the MSC-status companies

	Frequency (N)	*Percentage (%)*
Population as of October 2008	2173[a]	
Working population as of October 2008	1878[b]	
Sampling frame	1560[b]	
Sample size recommended	308[c]	*100.0*
Number of companies contacted	> 848	
Number of complete responses obtained from first email	41	*13.3*
Number of complete responses obtained after reminder	59	*19.2*
Total responses obtained	100	*32.5*

Note: [a] Recorded in the MSC Impact Survey 2008; [b] Identified by the author from the MSC Malaysia company directory as at October 6th, 2008; [c] Author's calculation

3.3.5. Data Entry and Analyses

This study utilizes both primary and secondary data. Primary data were obtained from the self-administered online surveys and informal interviews conducted with the respondents, whereas secondary data were compiled from various external sources, such as economic reports by the Economic Planning Unit (EPU), the Ministry of

[48] While most of the survey process was undertaken singly by the researcher, the help of four assistants are acknowledged towards the end of the survey period in visiting the business premises of the respondents at multiple locations.

Finance (MOF), MOSTI and publications from MDeC. The latter were used to provide an overall description of the Malaysian economy and MSC Malaysia.

Once the data were collected they were entered into a database created in SPSS and EViews.[49] All data entry was independently verified to ensure its accuracy. Responses for both *SQ1* and *SQ2* were numbered sequentially as they were received with each respondent being assigned a unique ID. The analysis of data begins with screening and editing the raw data to eliminate any errors and inconsistencies. This is to ensure that the minimum data quality standards are achieved (Cooper and Schindler, 2001).

Descriptive statistics were used to portray the incidence of training and other characteristics of the data collected. Subsequently, inferential statistics and regression analyses were employed when appropriate. Since this study consists of three main analyses on training, Chapters 4, 5 and 6 that follow will discuss in more detail the variables and methods used as well as the findings for each of the study. Table 3.6 provides a summary of the research questions and hypotheses, the corresponding variables as well as data analyses techniques used for each question.

3.4. Concluding Remarks

This chapter presents the research design and methodology of the current study. Following the tradition of past studies on training, a survey research design was adopted as a means of collecting data. However, the current method differs slightly in

[49] The Statistical Package for Social Sciences (SPSS) version 13 software is a commonly used package for survey data analysis whereas Eviews was used to supplement the former in more advanced econometric techniques

that an online survey was used as opposed to the conventional written or mail survey questionnaire. The reason is mainly due to the characteristics of the sample.

The responses obtained from the online surveys were used to answer three different issues regarding knowledge worker training, namely, (1) the role of foreign ownership in training, (2) the determinants of training and (3) the outcomes of training. The following chapters 4, 5 and 6 present the analysis of data and the empirical results of this study.

Table 3.6 Summary of the Research Questions, Dependent Variables, Hypotheses and Data Analysis

Research Questions	Objectives	Hypotheses	Dependant Variables	Data Analysis
1. Are there any differences or similarities between the quantity and quality of training provided by local and foreign MSC-status companies? 2. Are there are any differences in training participation between knowledge workers working at both entities?	1. To compare the quantity and quality of training between local and foreign companies in MSC Malaysia. 2. To compare the incidence of training participation between knowledge workers employed at local and foreign companies in MSC Malaysia	<u>Hypothesis H4.1</u> Foreign MSC-status companies provide *more training* for their knowledge workers than their local counterparts. <u>Hypothesis H4.2</u> Foreign MSC-status companies provide better quality training for their knowledge workers than their local counterparts.	Days of training Number of KWs trained Training intensity Training policy Informal training Induction training Training evaluation measures Training expenditures Trainer's experience Training sessions attended Number of days in training Nature of training Source of training Scope of training Type of training	Normality tests *t*-test on the normally distributed variables Mann-Whitney U test on non-normally distributed variables Chi-square test on categorical variables
3. What are the factors that affect the occurrence and magnitude of training for MSC-status companies	3. To analyse the factors that affect the occurrence and magnitude of training MSC-status companies	<u>Hypothesis H5</u> Companies are more likely to provide training (and in greater magnitude) for their KWs when they: -are larger in size -have low worker turnover rates -have weak internal labour markets -are R&D oriented -are competitive -have a training policy -have a higher share of full-time KWs -undertake training grants -have a higher share of graduate workers	Training provision LN(KWs trained) LN(Training expenditures)	Chi-square tests Logistic regression Multiple OLS regression

4. What are the impacts of training on the knowledge workers' earnings and productivity level? 5. What are the impacts of training on the knowledge workers' career advancement?	4. To examine the impacts of training participation on the knowledge workers' earnings and productivity level. 5. To determine the relationship between training participation and likelihood of receiving a promotion within the organization 6. To analyze whether or not training would affect the knowledge workers' intention to look for a new job	<u>Hypothesis H6.1</u> There is a positive relationship between training participation and the knowledge workers' earnings level. <u>Hypothesis H6.2</u> There is a positive relationship between (different kinds of) training participation and the knowledge workers' productivity level. <u>Hypothesis H6.3</u> There is a positive relationship between training participation and the knowledge workers' likelihood of receiving a promotion or wage increment <u>Hypothesis H6.4</u> Training plays an important role in the knowledge workers' anticipated mobility decision	LN(monthly wages) Productivity outcomes Promotion receipt Job search	Chi-square test Multiple OLS regression Logistic regression Probit regression

CHAPTER 4

TRAINING IN THE MALAYSIAN KNOWLEDGE-BASED INDUSTRY: DOES FOREIGN OWNERSHIP MATTER?[50]

4.1. Introduction

This chapter presents the first analysis of knowledge worker training in Malaysia. Using a sample of companies and knowledge workers in MSC Malaysia, it tests the hypothesis that foreign ownership has a positive influence on the quantity and quality of training. As players in a globalized world MSC-status companies not only face competition from domestic and international markets, they also need to be flexible in times of rapid technological changes. Their capacity to do so depends on the abilities of their workforce; hence, the MSC-status companies (regardless of ownership) are expected to provide training for their knowledge workers. A highly skilled and knowledgeable workforce not only benefits the organization but will ultimately contribute to the nation's success in becoming a knowledge-based economy.

To provide some insights on the influence of foreign ownership in the development of human capital in MSC Malaysia, the analysis consists of two parts. The first examines whether there are any differences or similarities between the quantity and quality of training provided by local and foreign MSC-status companies. The second part of the analysis examines training from the recipients' perspective, that is, whether there are any differences in training participation between knowledge

[50] The first half of this chapter on training provision was part of an earlier paper, which has been published in the Indian Journal of Labour Economics (Volume 52, Issue 3, July 2009, pp.433-450)

workers working at both entities. Accordingly, two separate surveys were administered to the HR Managers (on behalf of the MSC-status companies) and knowledge workers, respectively. The remainder of this chapter includes an overview of related literature on training and company ownership, a description of the data and variables used, the methods of analysis adopted and the empirical results obtained from the two analyses. The chapter ends with some concluding remarks.

4.2. Training and Company Ownership

Studies examining how foreign ownership affects human capital development are part of a wider literature on the effects of globalization on the host country. In the past, such studies have often concentrated on the conventional route of spillovers from FDIs or technology transfer by MNCs to their foreign subsidiaries in host countries. These productivity or knowledge spillovers may occur via four channels: (1) when domestic firms learn by imitating some of the technologies used by foreign-owned companies (known as *demonstration effect*), (2) when domestic firms strive to improve their performance following severe competition from more productive and technologically advanced foreign-owned companies (*competition effect*), (3) when domestic firms interact with foreign-owned companies either as their suppliers or clients (*backward and forward linkages*) or (4) through *worker mobility*, that is, when workers trained in foreign-owned companies leave and later join domestic firms or open their own business (Aitken and Harrison, 1999; Görg and Greenaway, 2003; Görg and Strobl, 2005).

Numerous studies have attempted to explain these various spillover channels (see Blomström and Kokko, 1998 and Görg and Greenaway, 2001 for good reviews of those studies) and while results on their magnitude have been mixed, it is mostly

agreed that the activities of MNCs generate a positive productivity and knowledge spillover on the host countries (Görg and Strobl, 2001).[51]

While spillovers from all of the channels above may lead to an improvement in the human capital of local workers, the fourth channel i.e. training provision by MNC subsidiaries is most relevant to the current discussion. In developing workers' human capital, both domestic firms and MNC subsidiaries need to weigh the costs and benefits of training before deciding whether or not to undertake the investment. This involves evaluating several factors, which may differ between the two entities.

To analyze whether training decisions vary (and if so, to what extent) between domestic firms and foreign-owned companies, past studies often took the approach of estimating the effects of foreign ownership on the provision of training using regression models. Under this method, a measure of foreign ownership such as the share of foreign equity in a firm (as used by Alba-Ramirez, 1994; Oryshchenko, 2006; Turcotte and Rennison, 2004; Zeufack, 1998) or a binary variable to indicate whether or not foreign ownership exists in a firm (Barry *et al*., 2004; Rogers and Tseng, 2000; Sousa, 2001; Tan and Batra, 1996) is included along with other control variables to see if it has any significant effect on the likelihood that a company provides training. A positive relationship is mostly found in these studies indicating that foreign-owned companies are more likely to provide training than domestic firms.

Besides using regression models, an alternative approach to examining the role of foreign ownership in training provision is by comparative analysis. In a detailed interview of 72 top and middle-level managers in 41 manufacturing firms in

[51] The mixed results are mainly due to differences in firm-level and country characteristics (Lipsey and Sjöholm, 2001) and differences in the estimation techniques adopted (Görg and Strobl, 2001)

Kenya, Gershenberg (1987) discovered that MNC subsidiaries provide more training for Kenyan managers than local firms. Similar evidence is found in India where MNCs provide more intensive training for their workers than local firms (Yadapadithaya, 2001). In terms of training quality, however, evidence is much less available. Using a combined data set of companies in the UK, Parker and Coleman (1999) found that foreign-owned companies not only train a greater proportion of their workers but may also train them to a higher standard than local firms.

The literature provides a number of explanations as to why foreign ownership affects training provision positively. For one, MNC subsidiaries are presumed to have access to firm specific assets and possess superior knowledge base (Caves, 1996) compared to domestic firms.[52] Therefore, they are less likely to face credit constraints since they usually have wider access to foreign capital via their parent companies (Yudaeva *et al*., 2003). As a result, foreign-owned companies can accumulate R&D capital easier, which may encourage the training process. It is also suggested that these companies are more likely to have a production advantage (Parker and Coleman, 1999) and more experienced management systems with information on techniques and organization of training. They can also reduce the probability of labour turnover by providing more attractive compensation packages to retain the workers after training them. Furthermore, Almeida (2007) shows that foreign-owned companies often "cherry pick" domestic firms to be acquired, choosing those with a higher educated workforce. If an educated workforce is more likely to be trained, or if

[52] These firm-specific assets come in the form of superior production technique, know-how and management strategy, all of which have characteristics of a public good. As a result spillover of knowledge and technology is possible to domestic firms

"cherry picked" firms tend to be high-technology firms that require training, foreign-owned companies are more likely to train than local companies.

But there are also those who disagree. In their study of Irish manufacturing industries, Barry *et al*. (2004) found no clear evidence that foreign firms provide more training than domestic firms. Similarly, Sousa (2001) found no evidence to support the claim that training by foreign firms is more extensive or in better quality than training in local firms.

Evidence in Malaysia is much less available. Only one study, to the best our knowledge, has attempted to analyse the effect of foreign ownership on training provision. In a study conducted on 2,200 manufacturing firms (World Bank, 1997) it was found that firms with foreign capital provided more training and trained a greater proportion of local workers than the local firms. For companies in the knowledge-based sector such as those in MSC Malaysia, however, no such study has been carried out. Having established the expected effects of foreign ownership on the provision of training, the following hypotheses are tested for the current sample:

Hypothesis H4.1

Foreign MSC-status companies provide *more training* for their knowledge workers than their local counterparts.

Hypothesis H4.2

Foreign MSC-status companies provide *better quality* training for their knowledge workers than their local counterparts.

As for participation in training, this concept is analogous to training provision but now the decision is made by the recipients.[53] Training participation occurs when workers partake in any form of work-related training programs, either sponsored by the employer or undertaken independently (self-sponsored). Since workers in foreign-owned companies are provided with more training opportunities than their peers at local companies (Alba-Ramirez, 1994; Bishop, 1996; Gershenberg, 1987; Görg, Strobl and Walsh, 2002; Parker and Coleman, 1999; Tan and Batra, 1996; Yadapadithaya, 2001), it is also likely that participation in training among these workers is higher.

4.3. Data, Variables and Methods

Data used in this study were drawn from two independent surveys.[54] The first survey contains information from the HR Managers on behalf of the MSC-status companies (aptly called the *Survey Questionnaire on MSC-status Companies* or *SQ1*) and is used for the first analysis on training provision. The second survey is administered to the knowledge workers, hence called the *Survey Questionnaire on Knowledge Workers* (*SQ2*) and contains information for the second analysis on training participation. To describe the data obtained from these surveys and to identify relationships between

[53] This study conducts a separate analysis on training from the provider and recipient perspectives because (1) different training issues are examined in each analysis and (2) the provision of training does not necessarily lead to participation in training among the knowledge workers. Moreover, the number of respondents is insufficient to carry out an otherwise 'ideal' linked employer-employee analysis of training.

[54] While a matched employer-employee data set is much desired as it enables a more detailed analysis to be conducted, the small number of respondents prohibits such analysis from taking place

the variables, two types of analysis i.e. descriptive tabulations and statistical tests are conducted.[55] These are explained in more detail below.

4.3.1 Foreign Ownership and Training Provision

To test the hypotheses, the MSC-status companies were initially categorised by ownership, that is, locally- or foreign-owned.[56] Nine training measures consisting of both continuous and categorical data were then used to compare the quantity and quality of training provided by these entities. The quantity of training is measured by the number of days in training, number of knowledge worker trained and the intensity of training. For training quality, the number of measures used was slightly more given its abstract nature. These include the existence of a formal training policy (following Blandy *et al*., 2001), the importance of informal training, the provision of induction training, the adoption of a multi-dimensional training evaluation measure, the amount of training expenditure incurred in the last year and the experience of internal trainers. See Table 4.1 for a full description of the variables used in the first analysis.

[55] Given the descriptive nature of this chapter, no econometric analyses are conducted but are reserved for subsequent chapters.

[56] There are in fact three categories of MSC-status companies but for the purpose of analysis, joint ventures and foreign-owned companies are grouped together and known collectively as 'foreign-owned MSC-status companies', as there are insufficient companies to enable analysis to be conducted if they were taken separately.

Table 4.1 Summary of the quantitative and qualitative training indicators

Variable Name		Measure	Explanation	Variable type
Training quantity indicators	Training days[1]	Number of days of training	Longer training periods indicate more training is being provided	Continuous
	KWs trained	Number of KWs trained	More KWs trained indicates that more training is being offered by the company	Continuous
	Intensity of training	The number of days of training provided multiplied by the number of KWs trained	Greater intensity of training indicates that more training is being provided by the company	Continuous
Training quality indicators	Training policy	1 if there exists a training policy, 0 otherwise	Policies generally entail monitoring of progress to ensure that certain objectives are met	Categorical
	Informal training	1 if informal training is considered important, 0 otherwise	Informal and induction training further enhance the quality of training to KW	Categorical
	Induction training	1 if induction training is given, 0 otherwise		Categorical
	Training evaluation measure	1 if the company adopts a multidimensional training evaluation measure, 0 otherwise	Companies with many evaluation measures care more about the effectiveness and quality of their training	Categorical
	Training expenditures	Training expenditures	More training expenses indicate better quality training (assuming no wastage and companies are efficient)	Continuous
	Trainers' experience	Trainers' years of experience	More experienced trainers indicate better quality training	Continuous

Note: [1]Analysis using number of hours in training was also tested with similar results
Source: Survey Questionnaire on MSC-status Companies (*SQ1*)

The continuous training measures were then tested for normality, as further statistical tests would depend on whether or not the data are normally distributed. The Kolmogorov-Smirnov and Shapiro-Wilk normality tests were employed for this purpose.[57] Both tests basically compare the scores of the sample data to a set of normally distributed scores that have the same mean and standard deviation. If the test

[57] Normality is an important concept in statistical inference. A distribution is "normal" when it is a symmetric bell-shaped curve with zero mean (average) and a constant variance (variability) (Greene, 2008). Most statistical tests rely upon the assumption that the data is "normal". These tests, called parametric tests are more powerful than non-parametric tests as the former have more ability to detect real variability in the data. There are generally two ways of testing normality (Park, 2008), namely, the graphical and numerical methods. The former includes, among other, the histogram, stem-and-leaf plot and P-P plot, whereas the latter includes the Shapiro-Wilk test, Kolmogorov-Smirnov test (Lillefors test), Jarque-Bera test and Skewness-Kurtosis test.

is non-significant (p>0.05), it indicates that the scores in the sample data do not significantly differ from a normal distribution. Although this value is arbitrary, it is widely accepted in social sciences that any probability below 0.05 is statistically meaningful and indicative of genuine effect (Field, 2005: 126). Otherwise, if the test is significant, the sample data is not normally distributed. For indicators that follow a normal distribution, an independent sample *t*-test is conducted to compare their means for local and foreign companies.[58]

The non-normal continuous data, on the other hand, were analysed using the Mann-Whitney *U* test as it is suitable to test differences in two independent groups within the same sample and when the data is ordinal or higher (Sheskin, 2000). This non-parametric test is equivalent to the independent sample *t*-test but looks at the differences in the ranked position of the scores between two conditions, which in this case are firm ownerships, when different groups are used in each condition.

For the remaining categorical training measures, a chi-squared test was conducted to check whether foreign ownership has any significant association with a company's quality of training provision. Prior to this test, the training variables were cross tabulated against company ownership to ensure that each cell does not fall below five expected counts since variables with too few observations might invalidate the chi-square test result.

[58] Most of the raw data were non-normally distributed possibly due to the small number of responses. The natural log transformation was, thus, taken to normalize their distribution. A list of these variables (both before and after transformation) is presented in Table 1 in Appendix I.

4.3.2. Foreign Ownership and Training Participation

The analysis on training participation utilizes information from the knowledge workers via *SQ2*. In this survey, the scope of training was not limited to whether it was formal or informal. Rather, the knowledge workers were asked about their involvement in different aspects of training to provide a more comprehensive account of training participation. This includes the total number of training sessions attended in the last year (as used by Bishop (1994), Groot (1999) and Sørensen (2000), the average number of days participated in training (Barron, Black and Loewenstein, 1987; Black, Noel and Wang, 1999; Lynch, 1992; Sousa, 2001), nature of training (specific or general), source of training (whether in-house or external), scope of training (whether training was directly or indirectly related to the job scope) and type of training (management, communication or IT-related training).

These multiple aspects of training form the basis of comparison in the second analysis, where seven groups of indicators were used to compare training participation between knowledge workers at local and foreign MSC-status companies. On top of these measures, a broader category of training was also included to indicate whether or not any participation in training was reported in the last twelve months, as used by Altonji and Spletzer (1991), Bartel (1994), Booth (1991), Barrett and O'Connell (2001). See Table 4.2 for a description of all the training variables in the second analysis.

For this second analysis, the respondents were firstly categorized into those working with local or foreign MSC-status companies. Then a cross tabulation analysis was performed to see whether there is some degree of association between the training variables and the ownership of MSC-status companies to which the trainees belong to. In other words, do different aspects of training participation vary greatly

between knowledge workers at local and foreign MSC-status companies? The chi-square tests were then used to determine the significance of the associations between those variables.

Table 4.2 Description of the training participation measures

Training variable		Measure
No training	*TRAIN0*	1 if the KW did not participate in any training in the last 12 months, 0 otherwise
Total number of training sessions attended in the last 12 months	*TRAIN1*	1 if the KW participated in only 1 training session in the last 12 months, 0 otherwise
	TRAIN2	1 if the KW participated in 2 to 3 training sessions in the last 12 months, 0 otherwise
	TRAIN3	1 if the KW participated in more than 3 training sessions in the last 12 months, 0 otherwise
Total number of days participated in training in the last 12 months	*DAYS1*	1 if the KW participated in only 1 day of training in the last 12 months, 0 otherwise
	DAYS2	1 if the KW participated in 2 days of training in the last 12 months, 0 otherwise
	DAYS3	1 if the KW participated in 3 days of training in the last 12 months, 0 otherwise
	DAYS4	1 if the KW participated in more than 3 days of training in the last 12 months, 0 otherwise
Nature of training	*SPECIFIC*	1 if the KW participated in specific training, 0 otherwise
	GENERAL	1 if the KW participated in general training, 0 otherwise
Source of training	*INHOUSE_LOC*	1 if the KW participated in in-house training with local trainers, 0 otherwise
	INHOUSE_FOR	1 if the KW participated in in-house training with foreign trainers, 0 otherwise
	EXTERNAL	1 if the KW participated in external training, 0 otherwise
Scope of training	*JOBSCOPE1*	1 if the training is directly related to the KWs' job scope, 0 otherwise
	JOBSCOPE2	1 if training is both directly and indirectly related to the KWs' job scope, 0 otherwise
Type of indirect training	*MGMT*	1 if the KW participated in management-related training, 0 otherwise
	COMM	1 if the KW participated in communication- related training, 0 otherwise
	IT	1 if the KW participated in IT-related training, 0 otherwise

Note: The above refers to training participation in the last twelve months; the descriptive statistics for the training variables is provided in Table 2 in Appendix I; 'In-house training' refers to training that is provided within the premise of the firms and 'external training' is training provided by external training institutions. Source: Survey Questionnaire on Knowledge Workers (*SQ2*)

4.4. Findings and Discussion

4.4.1. Descriptive Analysis and Cross Tabulation Analysis on Training Provision

4.4.1.1. Characteristics of the MSC-status Companies

A total of 100 MSC-status companies responded to the *SQ1*, of which 69 companies are locally-owned and the remaining 31 companies are foreign-owned. Table 4.3 provides a profile of the respondents. The majority of companies, as expected, are privately established for both types of ownership. In terms of sub-sector within MSC Malaysia, the bulk of the companies belong to 'software development' (over half of local firms and some 40 percent of foreign firms). Foreign MSC-status companies outnumber local companies in only the 'SSO' sector (and almost 20 percent of foreign firms are in this sector, compared to less than five percent of local firms), indicating a preference to outsource their business activities in this region. Similar numbers of foreign and local companies are present in 'hardware design', whereas foreign companies are less likely to be in Creative Multimedia or the 'IBB' sub-sectors.

The size of the MSC-status companies ranges from micro organizations with annual total revenues less than RM 200,000 to large organizations with annual sales of over RM 5 million. Almost half of the local MSC-status companies and over 60 percent of foreign MSC-status companies are small and medium in size. This is consistent with the trends recorded by MDeC in previous years where the majority of MSC-status companies are SMEs (MDeC MSCIS, 2003, 2004).

As for the length of time operating in MSC Malaysia, only a small fraction of the companies have set up business for more than ten years. In contrast, over 45 percent of the respondents in both ownerships applied for the status in the last five

years, indicating the successfulness of MDeC's marketing strategies in promoting MSC Malaysia to the public in recent years.

Table 4.3 Profile of the MSC-status companies, by ownership (N=100)

		MSC-status companies by ownership[a]			
		Local		Foreign	
		N	*%*	N	*%*
Legal establishment of the company	Public company	6	*8.7*	4	*12.9*
	Private company	63	*91.3*	25	*80.6*
	Branch of a foreign company	-	-	2	*6.5*
Sub-sector involved in MSC Malaysia	Creative multimedia	12	*17.4*	4	*12.9*
	Hardware design	4	*5.8*	3	*9.7*
	Internet-based business (IBB)	9	*13.0*	1	*3.2*
	Shared & services outsourcing (SSO)	3	*4.3*	6	*19.4*
	Software development	36	*52.2*	13	*41.9*
	Support services	5	*7.2*	4	*12.9*
Size of the company[b]	Micro (>RM200,000)	12	*18.5*	3	*11.5*
	Small (RM200,000 - RM 1million)	17	*26.2*	6	*23.1*
	Medium (RM1 million - RM5 million)	15	*23.1*	10	*38.5*
	Large (>RM5 million)	21	*32.3*	7	*26.9*
Duration in MSC Malaysia	1 - 5 years	33	*47.8*	14	*45.2*
	6 - 10 years	28	*40.6*	15	*48.4*
	More than 10 years	8	*11.6*	2	*6.5*
Share of KWs from total workforce	Up to 50 percent	8	*11.9*	3	*10.0*
	Between 50 to 80 percent	17	*25.4*	8	*26.7*
	Between 80 to 99.99 percent	27	*40.3*	8	*26.7*
	Entire workforce consist of KWs (100%)	15	*22.4*	11	*36.7*

Notes: [a]Notwithstanding the missing data, the total number of respondents are 69 and 31 for local and foreign-owned MSC-status companies, respectively; [b]The grouping is based on annual sales turnover for the services sector, which includes ICT
Source: *SQ1*

Table 4.3 also highlights the share of knowledge workers from total workforce for both local and foreign ownerships of companies. As mentioned in the previous chapter, one of the basic qualifying criteria of becoming an MSC-status company is to ensure that at least 15 percent of total workforce consists of knowledge workers. From the data, it appears that all of the respondents have met this requirement. In fact, knowledge workers form at least 80 percent of the total workforce for more than half of the responding MSC-status companies.

The respondents were also asked what motivated their companies to join MSC Malaysia. The 'pioneer status' incentive, which offers total tax exemption is found to be the major motivating factor for both local and foreign MSC-status companies at 87 percent each. Other popular incentives include the unrestricted employment of local and foreign knowledge workers, which attracted 57 percent of local MSC-status companies and 71 percent of their foreign counterparts; MSC grant schemes (favoured by 71 percent and 39 percent of local and foreign MSC-status companies, respectively) as well as the physical and info-structures offered (chosen by around 50 percent of companies in both ownerships). For other motivating factors that were mentioned, see Table 4.4.

Table 4.4 Motivations for joining MSC Malaysia, by ownership

	MSC-status companies by ownership			
	Local		Foreign	
	N	*%*	N	*%*
Physical and information infrastructure	36	*52.2*	15	*48.4*
Unrestricted employment of local and foreign KWs	39	*56.5*	22	*71.0*
Exemption from local ownership requirements	11	*15.9*	9	*29.0*
Pioneer status (100% tax exemption)	60	*87.0*	27	*87.1*
Investment tax allowance	33	*47.8*	8	*25.8*
No censorship of the internet	12	*17.4*	5	*16.1*
MSC grant schemes (MGS)	49	*71.0*	12	*38.7*
MSC venture capital	28	*40.6*	6	*19.4*
Human resource development fund	11	*15.9*	3	*9.7*

Note: The respondents were allowed to choose more than one motivating factor
Source: *SQ1*

In relation to training, the *SQ1* contains a wealth of information. Table 4.5 shows that almost 70 percent of local MSC-status companies have a policy to guide their training practices. Out of this, the share of companies are almost equal between those that have the training policy in writing (25 percent), not in writing (23 percent) and on an *ad hoc* basis (22 percent). As for foreign MSC-status companies, although a

greater share (78 percent) has a training policy, more than half of these companies do not have them in writing. In terms of actual training provision, it is promising to see that over 80 percent of MSC-status companies, regardless of ownership, provided training for their knowledge workers in the last 12 months.

Table 4.5 Training profile of the MSC-status companies in 2007, by ownership

		MSC-status companies by ownership	
		Local	Foreign
Existence of a training policy	Companies that have a formal, written policy	17 *(24.6)*	3 *(9.7)*
	Companies that have an unwritten training policy	16 *(23.2)*	15 *(48.4*)
	Companies that have policies on an ad-hoc basis	15 *(21.7)*	6 *(19.4)*
	Companies that do not have a training policy	21 *(30.4)*	7 *(22.6)*
Companies that provide training in the last 12 months		57 *(82.6)*	26 *(83.9)*
Source of training[a]	In-house training with foreign trainers	13 *(19.1)*	17 *(54.8)*
	In-house training with local trainers	64 *(92.8)*	21 *(67.7)*
	External training	44 *(64.7)*	20 *(64.5)*
	On-the-job (OJT)[b]	57 *(83.8)*	31 *(100.0)*
Type of training provided[a]	Technical training	49 *(72.1)*	20 *(64.5)*
	IT-related training	41 *(60.3)*	15 *(48.4)*
	Systems-related training	41 *(60.3)*	16 *(51.6)*
	Managerial or management training	29 *(42.6)*	16 *(51.6)*
Companies that provide informal training		66 *(95.7)*	29 *(93.5)*
Source of informal training	Mentoring	42 *(63.6)*	20 *(69.0)*
	Knowledge sharing	59 *(89.4)*	27 *(93.1)*
	On-the-job (OJT)[b]	59 *(89.4)*	27 *(93.1)*
	Quality circles	16 *(24.2)*	8 *(27.6)*
	Via social interactions	33 *(50.0)*	15 *(51.7)*
	Internship	0 *(00.0)*	1 *(3.4)*

Note: Percentage in parentheses; [a]The respondents were allowed to choose more than one source and type of training; [b]OJT could either be formal or informal
Source: *SQ1*

The findings imply that although training is regarded as an important element in workforce development in MSC Malaysia, many companies still have not made its implementation explicit but preferred to adopt a more informal approach to training (that is, either no training policy is in existence or such policy is not in written form or executed on an *ad hoc* basis). Nonetheless, the existence of a training policy in

general does have a positive link with actual training provision for the current sample, as shown in Table 3 in Appendix I. From the cross tabulation between training provision in the last 12 months and the existence of a training policy, the chi-square test reveals a highly significant association ($p<0.01$) between the two variables.

Looking at the source of training, or where the training was obtained, it can be seen that all of the respondents rely on more than one way to train their knowledge workers. Most of the local MSC-status companies (93 percent) prefer to train their workforce internally by hiring local trainers instead of foreigners. This is perhaps motivated by the cost factor or simply because local trainers can relate to the knowledge workers better. This is followed by on-the-job training (OJT), which is practised by 84 percent of the local respondents. In contrast, all of the foreign MSC-status companies favour OJT as their main source of training, followed by in-house training. For the latter, local trainers are also preferred over foreign trainers (perhaps for similar reasons) but the difference is only slight. The third most popular source of training is external training, which is practised by nearly 65 percent of both local and foreign MSC-status companies, respectively. This high proportion may be due to certain types of training in which no experts are available from within the companies; thus, the personnel must be trained by an external organization. As shown by the cross tabulation in Table 4 in Appendix I, most of the technical, IT-related, systems-related and managerial skills training were trained by external parties. A significant association was even found between technical and managerial skills training with external training ($p<0.05$).

Among these different types of training, technical training is most commonly provided i.e. by 72 percent and 65 percent of local and foreign MSC-status companies, respectively. Much emphasis was also placed on informal training, in

which knowledge sharing and OJT are found to be the main sources of informal training for both local and foreign MSC-status companies.

In line with the significant link that exists between training policies and actual training provision by the respondents (Table 3 in Appendix I), subsequent breakdown of the data by sub-sector shows that a greater part of MSC-status companies not only have a training policy but also provide training for their knowledge workers in the last 12 months (refer to the first two columns in Table 4.6). This is evident for all the six sub-sectors with companies in 'software development' having the most training policies in existence and all of the companies in 'hardware design' actually provide training for their knowledge workers in the last year. An exception is, perhaps, companies in the 'IBB' sub-sector where only 40 percent have a training policy. Even so, majority of the 'IBB' companies (90 percent) still provided training for their knowledge workers in the last year. These figures are not surprising since MSC-status companies are involved in high technologies and multimedia that require their knowledge workers to be constantly in touch with rapid developments.

Even more noticeable is the employers' reliance on informal training, which is practiced by at least 88 percent of the MSC-status companies in all the sub-sectors. This might be explained by the nature of knowledge work. Quite often, knowledge workers are 'trained' whether they realize it or not since the application of knowledge tends to be informal and go beyond working hours. Further evidence that training is highly emphasized by the MSC-status companies can be seen when at least half of the respondents provide induction training programs for their new recruits.

In terms of company size, the larger the company the more training is being provided to knowledge workers. Likewise, the existence of a training policy and induction training are more common among larger companies. This is in accordance

with the human capital theory, which suggests that bigger companies would have more resources to provide training for their workers. For informal training, however, its existence is much more profound among small-sized companies.

Table 4.6 Training profile of the MSC-status companies in 2007, by sub-sector and company size

		Existence of a training policy	Provision of training to KWs in the last 12 months	Existence of informal training	Existence of an induction training to new KWs
Sub-sector in MSC Malaysia	Creative multimedia	11 *(68.8)*	12 *(75.0)*	15 *(93.8)*	9 *(56.3)*
	Hardware design	4 *(57.1)*	7 *(100.0)*	7 *(100.0)*	5 *(71.4)*
	Internet-based business (IBB)	4 *(40.0)*	9 *(90.0)*	10 *(100.0)*	5 *(50.0)*
	Shared & services outsourcing (SSO)	7 *(77.8)*	8 *(88.9)*	8 *(88.9)*	7 *(77.8)*
	Software development	39 *(79.6)*	41 *(83.7)*	47 *(95.9)*	32 *(65.3)*
	Support services	7 *(77.8)*	6 *(66.7)*	8 *(88.9)*	5 *(55.6)*
Size of the company	Micro (>RM200,000)	9 *(60.0)*	10 *(66.7)*	13 *(86.7)*	8 *(53.3)*
	Small (RM200,000 - RM 1m)	13 *(56.5)*	17 *(73.9)*	23 *(100.0)*	10 *(43.5)*
	Medium (RM1m - RM5m)	17 *(68.0)*	23 *(92.0)*	23 *(92.0)*	15 *(60.0)*
	Large (>RM5m)	24 *(85.7)*	26 *(92.9)*	27 *(96.4)*	24 *(85.7)*

Note: Percentage in parentheses
Source: *SQ1*

4.4.1.2. Training Provision by Firm Ownership

The majority of the respondents (83 percent) provided training for their knowledge workers 12 months prior to the survey period, of which 57 companies are local and 26 are foreign MSC-status companies. Results of the normality test in Table 4.7 show that all but one of the continuous training variables has a normal distribution for both company ownerships (the non-shaded cells).[59] The testing of hypotheses H4.1 and H4.2 is undertaken in three ways: (1) use parametric tests on the normally distributed

[59] For prudence, a variable is considered to be normally distributed only if both tests are non-significant (generally with significance value less than 0.05) for both local and foreign MSC-status companies.

variables; (2) use non-parametric procedures on the non-normally distributed variables, and (3) use chi-square test on the categorical variables.

Table 4.7 Tests of normality on continuous variables

Variable Name	Ownership of the MSC-status companies	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Days of training	Local	0.118	55	0.054	0.958	55	0.053
	Foreign	0.152	22	0.200*	0.912	22	0.053
Number of KWs trained	Local	0.118	56	0.050	0.959	56	0.053
	Foreign	0.140	26	0.200*	0.940	26	0.138
Intensity of training	Local	0.082	49	0.200*	0.968	49	0.195
	Foreign	0.093	20	0.200*	0.963	20	0.615
Training expenditures	Local	0.096	51	0.200*	0.978	51	0.456
	Foreign	0.141	19	0.200*	0.949	19	0.377
Trainers' experience	Local	0.197	61	0.000	0.917	61	0.001
	Foreign	0.238	19	0.006	0.895	19	0.039

Note: * This is a lower bound of the true significance; [a] Lilliefors Significance Correction.
Source: *SQ1*

To compare the *quantity of training* provided between local and foreign MSC-status companies, an independent sample *t*-test was conducted on their 'days of training', 'number of knowledge workers trained' and 'intensity of training'. Results of the Levene's Test in Table 4.8 reveals that the variances for both types of ownership are equal (when $p>0.05$), in which case the top line will be referred to when analyzing the *t*-test results.[60] As for the *t*-test, no significant result was found so the null hypothesis that the two group means are equal cannot be rejected. In other words, there is no significant difference in the average number of training days, average number of knowledge workers trained and the average amount of training

[60] The Levene's test (Levene, 1960) is an inferential statistic used to assess the equality of variance in different samples. It tests the null hypothesis that the population variances are equal. If the resulting *p*-value of Levene's test is less than some critical value (typically 0.05), the obtained differences in sample variances are unlikely to have occurred based on random sampling. Thus, the null hypothesis of equal variances is rejected and it is concluded that there is a difference between the variances in the population. The Levene''s test is often used before a comparison of means such as the *t*-tests.

intensity between local and foreign MSC-status companies. Hence, there is no evidence to suggest that foreign MSC-status companies provide more training than their local counterparts.

Table 4.8 Independent sample *t*-test for local and foreign MSC-status companies

	Ownership of the MSC-status companies	N	Mean	Std. Deviation	Std. Error Mean
Days of training	Local	55	2.12627	1.283955	0.173128
	Foreign	22	2.18007	0.798132	0.170162
Number of KWs trained	Local	56	2.06292	1.068715	0.142813
	Foreign	26	2.34334	1.574721	0.308828
Intensity of training	Local	49	4.1304	1.61009	0.23001
	Foreign	20	4.4111	1.80724	0.40411
Training expenditures	Local	51	10.17954	1.310253	0.183472
	Foreign	19	9.71174	1.750407	0.401571

Note: Foreign MSC-status companies provide longer days of training, train more knowledge workers and have a higher intensity of training than their local counterparts. However, local MSC-status companies incur more training expenditures. The test statistics for these variables are presented below.

		Levene's Test for Equality of Variances		*t*-test for Equality of Means				
Variable Name		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Days of training	Equal variances assumed	3.671	0.059	0.183	75	0.856	0.053799	0.294760
	Equal variances not assumed			0.222	61.395	0.825	0.053799	0.242752
Number of KWs trained	Equal variances assumed	3.694	0.058	0.946	80	0.347	0.280419	0.296421
	Equal variances not assumed			0.824	36.085	0.415	0.280419	0.340250
Intensity of training	Equal variances assumed	0.827	0.366	0.634	67	0.528	0.28072	0.44269
	Equal variances not assumed			0.604	31.977	0.550	0.28072	0.46498
Training expenditures	Equal variances assumed	1.540	0.219	-1.209	68	0.231	-0.467802	0.387013
	Equal variances not assumed			-1.060	25.893	0.299	-0.467802	0.441499

Note: The results of the t-test show that the above differences are not significant, because if the null hypotheses are rejected (i.e. there is no difference in each of the training variables between local and foreign MSC-status companies), there is at least a 23.1 percent chance of being wrong.

There are two possible reasons for this. Firstly, while past studies have examined the differences in training among local and foreign firms in the

manufacturing sector (Gershenberg, 1987; Parker and Coleman, 1999; Yudaeva *et al*., 2003), the current analysis is based on companies in the knowledge-based sector. The fact that the sample of local MSC-status companies in this study is more technologically sophisticated compared to the traditional domestic firms may suggest that these companies are intrinsically more alike with their foreign counterparts as opposed to firms in the manufacturing sector. A comparison made between the respondents lends support to this notion as local MSC-status companies are found to be very similar in characteristic with foreign MSC-status companies (see Table 5 in Appendix I).[61] Secondly, since MSC-status companies are involved with high technology, they are expected to be familiar and up-to-date with the latest ICT advancements to facilitate their daily operations. Thus, it is very likely for the companies to have similar training practises regardless of ownership.

However, in terms of the *quality of training* provided, a significant difference is found. From the survey, foreign MSC-status companies appear to have more experienced internal trainers compared to local companies. This was shown by the Mann-Whitney test in Table 4.9, where the null hypothesis that there is no difference in the trainers' median (Mdn) years of experience between local and foreign MC-status companies is rejected. Therefore, there is evidence to suggest that the internal trainers at foreign MSC-status companies (Mdn = 56.00) have significantly more years of experience compared to the internal trainers at local MSC-status companies (Mdn = 35.67), U=285, p<0.01.

[61] The comparison was made in terms of the firms' size, innovativeness, use of own technology, existence of training policy, training provision in the last year, adaptability of workers, existence of informal training, level of competition and R&D-orientation.

Table 4.9 Mann-Whitney *U* test: Ranks and test statistics for local and foreign MSC-status companies

Ranks

Variable Name	Ownership of the MSC-status companies	N	Mean Rank	Sum of Ranks
Trainers' years of experience	Local	61	35.67	2176.00
	Foreign	19	56.00	1064.00
	Total	80		

Test Statistics[a]

	Trainers' experience (years)
Mann-Whitney U	285.000
Wilcoxon W	2176..000
Z[b]	-3.428
Asymp. Sig. (2-tailed)	0.001

[a]Grouping variable: Ownership of the MSC-status company, [b] As a sample becomes larger (n>20), the distribution of U approaches the normal curve and *U* is interpreted using the Z statistic. Absolute Z scores of less than 1.96 indicate that the two samples come from the same underlying distribution at the 5 percent significance level

In addition, a cross tabulation between firm ownership and the existence of a training policy in Table 4.10 reveals that there are more foreign MSC-status companies with a training policy than there are in local companies (58 percent compared to 48 percent). As existence of a training policy often entails constant reviews by the top management, it can be implied that companies with such guidelines will most likely meet their training objectives and this, in turn, will ensure the quality of their training. A chi-square test was also carried out and although the difference is not significant at the 5 percent level, the result is borderline and the lack of statistical significance may be due to the small sample.

Table 4.10 Cross tabulation for firm ownership and the existence of a training policy

		Ownership of the MSC-status companies		
		Local	Foreign	Total
The existence of a training policy	Yes, in written form	17 *(24.6)*	3 *(9.7)*	20 *(20.0)*
	Yes, but not in written form	16 *(23.2)*	15 *(48.4)*	31 *(31.0)*
	Ad-hoc (as and when needed)	15 *(21.7)*	6 *(19.4)*	21 *(21.0)*
	No	21 *(30.4)*	7 *(22.6)*	28 *(28.0)*
Total		69 *(100.0)*	31 *(100.0)*	100 *(100.0)*

Note: Percentage in the parentheses

Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.304[a]	3	0.063
Likelihood Ratio	7.351	3	0.062
Linear-by-Linear Association	0.011	1	0.917
N of Valid Cases	100		

[a]0 cells (.0%) have expected count less than 5. The minimum expected count is 6.00.
Source: *SQ1*

As for the rest of the training quality measures, the results of the chi-square tests and the independent sample *t*-test were found to be insignificant. This implies that MSC-status companies, regardless of ownership, consider informal training to be important; provide induction training to their new recruits; adopt multi-dimensional training evaluation measures and incur more or less the same amount of training expenditures in the last 12 months.

Given all these findings from the analysis on quality of training, it is important to note that while the former two results provide some evidence to suggest that quality of training is better among foreign MSC-status companies, the conclusion is still ambiguous. This is mainly due to the measure used i.e. 'experience of internal trainers', which serves only as a proxy indicator of quality. Contrary to its positive findings, there is no statistically significant difference in the 'expenditure of training' between local and foreign MSC-status companies, which may be a more tangible and reliable measure of training quality.

4.4.2. Descriptive Analysis and Cross Tabulation Analysis on Training Participation

4.4.2.1. Background of the Knowledge Workers

A total of 151 knowledge workers responded to the *SQ2*. The main demographic characteristics of the respondents are shown in Table 4.11. It can be seen that the majority of respondents are young workers with more than half aged between 26 and 35 years but only three percent are 46 years and older. [62] This age distribution was expected as there may be a tendency for skilled knowledge workers to be younger and more dynamic. One possible reason is that younger workers are often associated with greater intensity of training (Bartel and Sicherman, 1998; Greenhalgh and Stewart, 1987; Lynch, 1992; Mincer, 1989), which results in them being perceived as more skilled and susceptible to learn new things compared to older workers.

The composition of male (52 percent) and female (48 percent) respondents, however, is almost equal and while both local and foreign knowledge workers were targeted for this survey, only eight percent of the respondents are non-Malaysian. The main explanation for this is that most Managers were less cooperative in permitting their foreign knowledge workers to be surveyed. Although no specific reasons were given, it was felt that their reluctance has to do with maintaining the confidentiality of their company policies regarding foreign knowledge workers.

[62] The mean age of the sample is 31. The descriptive statistics of all the main demographics of the knowledge workers can be found in Table 6 in Appendix I.

Table 4.11 Demographic characteristics of the knowledge workers (N = 151)

Description	Category	Frequency (N)	*Percentage (%)*
Age[a]	25 years and below	37	*24.7*
	26 to 35 years	84	*56.0*
	36 to 45 years	24	*16.0*
	46 years and above	5	*3.3*
Gender	Male	78	*51.7*
	Female	73	*48.3*
Nationality	Malaysian	139	*92.1*
	Non-Malaysian	12	*7.9*
Education[a]	Diploma	25	*16.7*
	Bachelor degree	103	*68.7*
	Master degree	13	*8.7*
	Professional certificate	9	*6.0*
Employment status[a]	Permanent, full-time	127	*84.7*
	Contract, full-time	23	*15.3*
Occupation	Manager/administrator	54	*35.8*
	Executive	45	*29.8*
	Engineer	8	*5.3*
	Content developer	3	*2.0*
	Programmer	24	*15.9*
	Designer	5	*3.3*
	Consultant	3	*2.0*
	Others	9	*5.9*
Tenure	Less than 2 years	77	*51.0*
	2-5 years	60	*39.7*
	6-10 years	10	*6.6*
	More than 10 years	4	*2.6*
Experience[b]	Less than 2 years	14	*9.9*
	2-5 years	65	*46.1*
	6-10 years	38	*27.0*
	More than 10 years	24	*17.0*

Note: [a]Total frequency is 150 due to missing data; [b]Total frequency is 141 due to missing data; Tenure is number of years with the present employer
Source: *SQ2*

In terms of the highest level of education achieved, as expected, most of the respondents hold a Bachelors degree (69 percent) while those without it have at least a diploma qualification (17 percent).[63] Other than the first degree, 9 percent of the workers have a Masters degree and 6 percent are professional certificate holders. All of the respondents work full-time with 85 percent working on a permanent basis while the rest are contract workers. Occupation wise, 36 percent of the respondents hold a

[63] By definition, knowledge workers must possess at least a diploma qualification. Therefore, those without any tertiary education were excluded from the analysis.

managerial post in their organization, followed by executives (30 percent) and other types of technical occupations.

With regards to tenure, the average length of stay with the current employer is about two years. But this does not imply that the knowledge workers are mostly fresh graduates or lack in experience. A cross tabulation of the knowledge workers' tenure and work experience (Table 7 in Appendix I) reveals that although most of the respondents have only worked with their current companies for less than two years, over 40 percent of them have 2 to 5 years of work experience in total, while another 38 percent have at least six years of experience in the profession. As for more senior knowledge workers (those with more than ten years of work experience), only 17 percent of them have remained with the same organization since the beginning. These figures indicate that it is common for knowledge workers not to stay with one organization for too long and that the occurrence of 'job hop' is widespread in the private sector should the workers be motivated to move.

Looking at the knowledge workers' past employment in more detail, 77 percent of the respondents (117 out of 151) have worked with other companies prior to their current employer.[64] A cross tabulation between the ownership of their former employers and the type of industries they were involved in (Table 8 in Appendix I) shows that most of the knowledge workers (62 percent) have worked with only local companies, 21 percent with only foreign companies whereas 17 percent have worked with both local and foreign companies. It is interesting to find that only 35 percent of the respondents have worked solely in the same field while the rest of the knowledge

[64] There is actually 118 knowledge workers with previous employment, but one response suffers from missing data so it was excluded from the analysis

workers come from different occupational backgrounds, with most being in manufacturing (12 percent), IT/computer/software (12 percent), media (10 percent), banking/finance (8 percent) and retail/wholesale (8 percent).[65] These figures support the notion that knowledge workers have high absorptive capacity and are easily adaptable to new environments.

4.4.2.2. Training Participation by Firm Ownership

From the total respondents, 65 percent (N = 98) participated in training in the last twelve months.[66] However, only 90 responses (or 60 percent of total responses obtained) were 'usable' due to missing information on employer ownership for eight of the training participants.[67] Sixty-six percent of the training participants are employed by local MSC-status companies (N = 58) while the rest are attached with foreign MSC-status companies (N = 32). The variations in the incidence of training for these knowledge workers by their characteristics are shown in Table 4.12.

The results reveal several familiar patterns with past studies. Knowledge workers between 26 to 35 years of age are most likely to participate in training (over 60 percent for both local and foreign MSC-status companies). This finding is similar to O'Connell (2004), although only half of his sample aged between 25 to 39 years was trained. Training participation declines substantially when the knowledge

[65] Those with previous experience in IT/computer/software are currently holding managerial posts in their current employment

[66] This proportion is slightly lower compared to past findings for *e.g.*, Betcherman, Leckie and McMullen (1997) reported 70.3 percent of their respondents participated in training

[67] While every possible step was taken to ensure that all information was obtained, only 89 percent of the total 151 respondents could be traced back to the organizations they work for in MSC Malaysia. The remaining respondents did not specify the identity of their employers and, as a result, the researcher was unable to identify whether they worked for local or foreign MSC-status companies. This void of information, however, would not affect any of the results as no analyses that require linked employer-employee data were attempted.

workers reach 36 years and above, supporting the view that the 26-35 age bracket is presumably the most productive, efficient and most able to absorb new skills acquired through training. Also similar to the findings of O'Connell (2004) is gender, where slightly more male knowledge workers participate in training than women. This is evident in both local and foreign MSC-status companies.

Table 4.12 Incidence of training participation by firm ownership and knowledge worker characteristics (N = 90)

		Local MSC-status company (N = 58)		Foreign MSC-status company (N = 32)	
		N	*%*	N	*%*
Age[a]	25 years and below	14	*24.6*	5	*15.6*
	26 to 35 years	35	*61.4*	20	*62.5*
	36 years and above	8	*14.0*	7	*21.9*
Gender	Female	28	*48.3*	14	*43.8*
	Male	30	*51.7*	18	*56.3*
Education	Diploma	11	*19.0*	1	*3.1*
	Bachelor degree	42	*72.4*	25	*78.1*
	Master degree	5	*8.6*	3	*9.4*
	Professional certificate	-	-	3	*9.4*
Employment status[a]	Permanent, full-time	51	*89.5*	25	*78.1*
	Contract, full-time	6	*10.5*	7	*21.9*
Tenure (years)	Less than 2 years	28	*48.3*	17	*53.1*
	2 to 5 years	22	*37.9*	13	*40.6*
	6 to 10 years	6	*10.3*	1	*3.1*
	More than 10 years	2	*3.4*	1	*3.1*
Experience (years)[b]	Less than 2 years	6	*11.3*	3	*9.4*
	2 to 5 years	22	*41.5*	15	*46.9*
	6 to 10 years	16	*30.2*	7	*21.9*
	More than 10 years	9	*17.0*	7	*21.9*

Note: [a]Total frequency is 89, due to missing data; [b]Total frequency is 85 due to missing data
Source: *SQ2*

The human capital theory postulated a close relationship between training and educational attainment. Since by definition knowledge workers must possess at least a diploma qualification, those without any tertiary education were excluded from the current study. Accordingly, the training-education relationship is analysed in terms of ascending levels of education instead of 'with or without' tertiary education like in

most studies. For the knowledge workers as a whole, only 16 percent of those with diplomas participated in training compared to 71 percent of those with a Bachelors degree. Given that there are considerably more degree holders than Masters or professional certificate holders, it comes as no surprise that the latter groups have fewer training participants. The descriptive statistics also reveal that the proportion of degree holders is more among foreign than local MSC-status companies, indicating that the initial human capital level is higher for the former.

The terms of employment are also important. As expected, those with permanent employment status participate in more training than contract workers. Likewise, tenure and experience are also important as they are indirect measures of training. More junior knowledge workers (less than two years of tenure) are the biggest group to participate in training, followed closely by those with 2 to 5 years of tenure with the company. In contrast, more senior knowledge workers are not trained as much. In terms of work experience, those with 2 to 5 years of experience participate in more training than those with 6 years and more of work experience. From Table 4.12, it can be seen that the proportion of knowledge workers in both local and foreign MSC-status companies are similar in almost all aspects; thus, comparison of training participation between the two can be conducted without concern over unbalanced responses.

To analyse the incidence of training participation by firm ownership, a cross tabulation is first presented in Table 4.13. In terms of the total number of training sessions, more than half of the knowledge workers in local MSC-status companies attended, on average, two to three training sessions in the last year, whereas the majority of those employed by foreign MSC-status companies attended more than three sessions on average. The duration of training, however, was undertaken longer

by knowledge workers in local MSC-status companies, where they commonly participated in more than three days of training. On the other hand, most of the knowledge workers in foreign MSC-status companies trained for two days on average.

For the knowledge workers as a whole, both specific and general training were largely undertaken with the latter having a slightly higher share of training participants. When training was analysed by its source, two interesting patterns were found. Firstly, knowledge workers in local MSC-status companies participated in more external (71 percent) than in-house training (53 percent). In contrast, their peers in foreign MSC-status companies participated to a similar degree for in-house training (69 percent) and external (63 percent) training. This suggests that foreign companies have sufficient expertise to train their personnel internally whereas local companies still depend, to some extent, on outsiders to train their workers.[68]

The second interesting finding concerns the instructors of these in-house training, as both foreign and local trainers were employed by foreign MSC-status companies. While the engagement of foreign experts is expected, the appointment of local trainers by foreign MSC-status companies indicates that they have already begun to rely on local talents in developing their knowledge workers' human capital. The fact that more native trainers were employed (53 percent compared to 44 percent of foreign trainers) is probably because they have a better understanding of the local culture, hence could relate with the workers better.

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[68] This argument is supported with the findings of the previous section where quality of training provided by foreign MSC-status companies was found to be relatively better than their local counterparts

With regards to the scope of training, the majority of the respondents participated in training that was both directly and indirectly related to their jobs. That is, apart from undergoing the usual training that revolves around their areas of expertise, the knowledge workers also participated in training that fell outside of their job scope, known as 'indirect training'. As for the type of indirect training, it was found that more than half of the knowledge workers in local MSC-status companies participated in training that is IT-related while those employed by foreign MSC-status companies participate mostly in management and communication-related training.

Table 4.13 Cross tabulation of knowledge workers' training participation and firm ownership in MSC Malaysia (N = 90)

Measures of training participation		Employer ownership: Local MSC-status company (N = 58)	Foreign MSC-status company (N = 32)	Chi-square test Pearson $\chi 2$	*p*-value
No training reported[a]		29 *(33.3)*	16 *(33.3)*	N/A	N/A
Number of training sessions attended	Only 1 training session	23 *(39.7)*	10 *(31.3)*	0.627	0.428
	2 to 3 training sessions	31 *(53.4)*	10 *(31.3)*	4.097	0.043
	More than 3 training sessions	4 *(6.9)*	12 *(37.5)*	13.213	0.000
Days of training	Only 1 day	13 *(22.4)*	5 *(15.6)*	0.594	0.441
	2 days	12 *(20.7)*	15 *(46.9)*	6.733	0.009
	3 days	11 *(19.0)*	4 *(12.5)*	0.621	0.431
	More than 3 days	22 *(37.9)*	8 *(25.0)*	1.552	0.213
Nature of training[b]	Specific training	28 *(48.3)*	16 *(50.0)*	0.025	0.876
	General training	33 *(56.9)*	19 *(59.4)*	0.052	0.820
Source of training[b]	In-house training[c]	31 *(53.4)*	22 *(68.8)*	1.994	0.158
	External training	41 *(70.7)*	20 *(62.5)*	0.633	0.426
	**In-house with local trainers	24 *(41.4)*	17 *(53.1)*	1.147	0.284
	**In-house with foreign trainers	14 *(24.1)*	14 *(43.8)*	3.701	0.054
Scope of training	Directly related to job scope	21 *(36.2)*	16 *(50.0)*	1.621	0.203
	Indirectly related to job scope	4 *(6.8)*	0 *(00.0)*	2.199	0.138
	Directly and indirectly related to job scope	33 *(56.9)*	16 *(50.0)*	0.395	0.529
Type of indirect training[b,d]	Management	15 *(40.5)*	10 *(62.5)*	2.161	0.142
	Communication	10 *(27.0)*	10 *(62.5)*	5.982	0.014
	IT	20 *(54.1)*	1 *(6.3)*	10.670	0.001

Note: Percentage in parentheses; [a] The percentage is calculated based on the total number of knowledge workers for each ownership i.e. 87 and 48, respectively; [b] Totals do not add up to 100.00 because the respondents were allowed to choose more than one answer; [c] In-house training is instructed by local or foreign trainers (marked by asterisks); [d] The total frequency is 53; the percentages are based on the totals of the shaded cells i.e. 37 and 16, respectively.
Source: *SQ2*

Chi-square tests of association

From the cross tabulations, it is evident that there exist some variations between training participation of knowledge workers at local MSC-status companies and those working at foreign MSC-status companies. But whether or not these differences are significant depends on the corresponding chi-square tests for each of the variables (see the last two columns of Table 4.13). Nonetheless, it should be noted that these tests merely detect any significant association between two categorical variables and do not indicate how strong the association might be. Results show that the differences are only significant in terms of the total number of training sessions attended, the average number of days participated in training and the type of indirect training undertaken.[69] For these cases, the null hypothesis that there is no relationship between training participation and whether the trainees were employed by local or foreign companies can be rejected.

When comparison was made on the total number of training sessions attended, it was found that knowledge workers in local MSC-status companies were more likely to have attended two to three training sessions in the last twelve months ($p<0.05$). However, knowledge workers in foreign MSC-status companies were more likely to have attended more than three sessions in the last twelve months ($p<0.01$).

In terms of the number of days in training, a significant difference was found between the two groups of knowledge workers, where those employed by foreign MSC-status companies were more likely to undertake training for two days ($p<0.01$), but less likely in other lengths of training.

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[69] Similar results are found using the non-parametric Mann-Whitney *U* test, the results of which are presented in Table 9 in Appendix I.

A significant difference also exists with regards to the types of training these knowledge workers engaged in. It was found that training related to communication skills was more common among knowledge workers in foreign MSC-status companies ($p<0.05$) whereas those in local MSC-status companies participated more in IT-related training ($p<0.01$). One reason for this trend is that foreign employers may stress more on soft skills to facilitate the knowledge workers' communication with their associates from all over the world. As for local MSC-status companies, given their desire to 'catch up' with foreign competitors in the technological sphere, they may inadvertently drive their knowledge workers to concentrate more in developing their skills in IT.

The above results contradict the findings of the previous analysis on training provision. It is rather surprising that while training incidence differs by foreign ownership in the knowledge workers' survey (*SQ2*); it does not in the managers' survey (*SQ1*). There are two possible explanations for this inconsistency. The first lies in the origin of the respondents, that is, not all of the knowledge workers and managers who responded to the surveys belong to the same MSC-status company. To illustrate, from the 90 knowledge workers who reported training participation in the *SQ2*, only 44 percent have a matching response from their employers. These knowledge workers may, in turn, encounter 'recall' problems associated with survey responses or have different perceptions of training from their employers. As for the remaining respondents, they may report high training incidence from local or foreign MSC-status companies that did not respond to the *SQ1*. In some cases, knowledge workers may also participate in independent work-related training programs that are not sponsored by their employers. As a result of all this, the reported training

incidence by the knowledge workers may be very different from the managers and even overstated for a particular firm ownership.

Secondly, the inconsistent findings may be due to the use of different measurements of training. The first analysis using the managers' information (*SQ1)* adopted a continuous measure of training incidence via 'number of days in training'. On the other hand, the second analysis with information from the knowledge workers (*SQ2*) used an ordinal scale of training where incidence was broken down into 1 day, 2 days, 3 days or more than 3 days of training.[70] As these different levels of measurement entail different types of statistical tests, the results may also be different.

4.5. Concluding Remarks

This chapter discusses the role of foreign ownership in knowledge worker training in Malaysia. Using two independent surveys, data were collected from 100 MSC-status companies and 151 knowledge workers via *SQ1* and *SQ2*, respectively. The general results of this chapter are as follows:

1. All of the MSC-status companies adhered to the basic qualifying criteria that at least 15 percent of their total workforce is knowledge workers.
2. Although training is regarded as an important means of workforce development (83 percent of the respondents provide training for their knowledge workers), many companies still have not made its implementation explicit but preferred to adopt a more unofficial approach to training i.e. either

[70] Training incidence from *SQ1* could not be analyzed using contingency tables as there was insufficient number of sample. On the other hand, when training incidence from *SQ2* was analyzed using parametric tests, the results were insignificant, thus, similar to the findings of the managers. However, the current findings are presented in this study to offer more discussion on the differences in training participation trends among knowledge workers in Malaysia.

no training policy is in existence or such policy is not in written form or executed on an *ad hoc* basis.

3. There is great reliance on informal training among the MSC-status companies, which in understandable given the non-routine nature of knowledge work (Davenport and Prusak, 2000; Gregerman, 1981).
4. There is no evidence to suggest that foreign MSC-status companies provide more training than local counterparts in terms of the number of training days, number of knowledge workers trained and the amount of training intensity provided.
5. But differences were found in the quality of training provided, that is, foreign MSC-status companies appear to have more experienced internal trainers compared to local companies and they are more inclined to have a training policy compared to local companies.
6. Training participation differs significantly between knowledge workers at local and foreign MSC-status companies in terms of the total number of training sessions attended, the number of days participated in training and the type of indirect training undertaken. For the latter, knowledge workers at local MSC-status companies should realize the importance of soft skills in business and strive to improve their communication alongside IT-related skills.

To conclude, the findings of this chapter do not support Hypothesis H4.1 but gives some support for Hypothesis H4.2. In the next chapter, further analysis is conducted to determine what influences the MSC-status companies to provide training for their knowledge workers. To do so, several models are estimated using logistic and linear regressions.

CHAPTER 5

DETERMINANTS OF TRAINING AMONG COMPANIES IN MSC MALAYSIA[71]

5.1. Introduction

According to the human capital theory (Becker, 1962), training is an investment undertaken by both firms and their employees. For the former, the likelihood of providing training depends on the relative costs and benefits of undertaking such investment (Stevens, 1994). In doing so, companies need to evaluate the factors that may influence their training decision. This chapter provides an analysis of human capital development in Malaysia. Focusing on the knowledge-based industry, it examines the determinants of the occurrence and magnitude of training among MSC-status companies. To set the stage for the current discussion, the chapter begins with an overview of the human capital concept and the role of training in the human capital theory. A review of past research is also presented, followed by a description of the data and variables used in this study, corresponding methods of analysis and empirical results obtained. The chapter ends with some concluding remarks.

5.2. Human Capital

The concept of 'human capital' has long been recognized in economic literature.[72] Adam Smith recognized man as a form of capital when he suggested that an educated

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[71] An earlier version of this chapter was published in the Indian Journal of Labour Economics (Volume 52, Issue 3, July 2009, pp.433-450)

[72] For a historical survey on the human capital concept, see Blaug (1976) and Kiker (1966)

worker could be likened to an expensive machine as his skills has a genuine cost and yields a profit, which can be 'rented out' to employers (Smith, 2007: p.107). Similarly, J.B Say asserted that since skills and abilities are acquired at a cost and tend to increase worker productivity, they should be regarded as capital (Say, 1821: 92-94). Even Sir William Petty placed value on labourers when he estimated the cost of life lost in war and other deaths (Kiker, 1966).

Despite its early recognition, the treatment of productive human beings as capital was not mainstream during the first half of the twentieth century since the majority of economists, like Alfred Marshall, tend to apply the concept of capital only to material, non-human and man-made stock of wealth that is utilized directly in future production (Shaffer, 1961). Emphasis on human capital was only revived in modern neoclassical economics literature in the 1960s following the writings of prominent authors like Schultz (1961), Becker (1962, 1993) and Mincer (1962; 1974).[73] Schultz argued that both knowledge and skill are capital as they are "deliberate investments" undertaken by individuals to become productive members of society (Schultz, 1961). Becker (1993) analyzed these investments further by estimating their rates of return while Mincer (1962; 1974) used his earnings function to explain how human capital investment accounts for the diverse patterns of earnings, inequality and wage growth over the life cycle.[74]

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[73] Most early economists have shied away from explicitly analysing human resources as capital because it was deemed socially and ethically unacceptable. J.S Mill, for *e.g*., insisted that the people of a country should not be looked upon as wealth because wealth existed only for the sake of people (Shultz, 1961, citing J.S Mill, 1909: 8). Alfred Marshall discarded the notion as being 'unrealistic', arguing that it would be out of touch with the market place to treat human beings as capital in practical analyses (Kiker, 1966)

[74] Becker's book "Human Capital" (originally published in 1964) was, and still is, a standard reference on human capital analyses for many years. Mincer's work on human capital-induced wage differentials was the first major efforts to apply basic price theory to understand aspects of the labour market.

The OECD defines human capital as "the knowledge, skills, competences and other attributes embodied in individuals that are relevant to economic activity" (OECD, 1998: 9). Similarly in the field of human resource management (HRM), human capital is generally understood to consist of the workers' capabilities, knowledge, skills and experience that are relevant to the task at hand, as well as the capacity to improve them through individual learning (Dess and Picken, 1999). From these definitions, it can be seen that human capital is not only a major source for sustained competitive advantage at the firm level but, more importantly it is a critical resource that contributes to the macroeconomic growth of nations to which those companies belong to. As increasing number of world economies, including Malaysia, have shifted towards a knowledge-based one, human capital is also a central issue among policy-makers (OECD, 1996). All this necessitates further research on human capital development.

In the past, the majority of human capital studies have centred on formal schooling since education is perceived to be "the most important component of human capital" (Schultz, 1993).[75] But in a world of rapid technological changes and increased global competition, the importance of skills and adaptability of workers at the workplace becomes more evident, and thus, training takes precedence in research.[76]

Most studies on training have demonstrated a positive link between human capital investment and organisational performance (Teixeira, 2002), suggesting that

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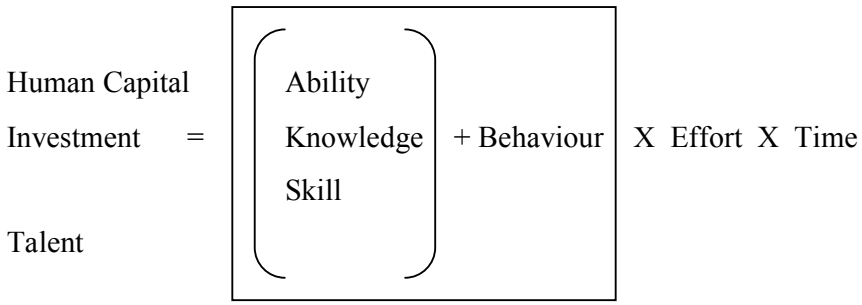
[75] Past theoretical models of economic growth have often emphasized on the role of human capital in the form of educational attainment (*e.g.* Lucas, 1988; Nelson and Phelps, 1966). On the empirical front, studies such as those of Barro and Lee (1993), Benhabib and Spiegel (1994), Mankiw *et al.* (1992) and Romer (1990) used proxies for human capital.

[76] It is worth mentioning that human capital is also developed via learning-by-doing (Arrow, 1962), but this branch of literature will not be reviewed in the current study.

companies with superior human capital tend to be more competitive and profitable. This situation may be explained by Davenport (1999)'s model of human capital investment, which shows how "ability, behaviour, effort and time" –i.e. elements of human capital investment, produce the firm's required level of performance (Figure 5.1). The model highlights how the abundance or lack of one of these elements will affect the total human capital of a company, and subsequently, its performance level.

Figure 5.1 Davenport's model of human capital investment



Source: Davenport (1999: 19)

Davenport (1999) also asserts that by visualizing employees as owners of human capital, they become investors in the business that pays for human capital and expect a return on their investments. This concept can be tied to Adam Smith's notion that workers can 'rent' out their talents. Similarly, Acemoglu and Pischke (1999) also referred to workers as investors in general and specific skills and demonstrate how these investments help to create ownership in human capital.

5.3. Training and the Human Capital Theory

There are many ways to invest in human capital. But as discussed in Chapter 1, the current emphasis is on training due to its relevance to companies and their workforce. Research on training is evident in both labour economics and HRM. Most if not all studies usually begin with Becker's (1962, 1993) pioneering analysis on human

capital. Although Becker did not define human capital, he explained the concept in terms of the *investments* made in human capital as "expenditures on education, **training**, medical care […] produce human, not physical or financial, capital because you cannot separate a person from his or her knowledge, skills, health, or values the way it is possible to move financial and physical assets while the owner stays put" (Becker, 1993: 16). By focusing on investments, Becker was able to suggest that decisions on whether or not to invest in training are determined by weighing the benefits against the costs of such an investment.[77] As with investments in physical capital, training will only be undertaken by the wealth maximizing firm or individual if the discounted present value of training benefits exceeds its costs.

In his training model, Becker made several assumptions. Each employee is hired for a specified time period in which case his analyses are often limited to a two-period model. Information in the market is assumed to be perfectly available and most importantly, both labour and product markets are perfectly competitive. The model predicts that investment in training will be made at the beginning of the period and the returns will then be received in the subsequent period(s).

With regards to who pays for the training, Becker made the crucial distinction between general and specific training. "General training" is assumed to be transferable between different firms as it raises the worker's productivity at many companies in addition to the training firm. Since rational firms will seek to maximise their profits (Donaldson and Eaton, 1976; Hashimoto, 1981; Barron, Berger and Black, 1999), they will only provide general training if they do not have to pay for it

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[77] It should be noted that the reason for Becker's focus on OJT compared to other sources of human capital is because training clearly illustrates the effects of human capital investment on earnings, employment, productivity and other economic variables (Becker, 1962: 10)

(Becker, 1962) as wage rates (*w*) paid by a firm in a perfectly competitive labour market are determined by the marginal productivity of labour (*MP*) in other firms. As training is general, the value of a worker's marginal productivity is the same in the training firm as well as other firms in the market. A firm will only make profits if its $MP > w$. But if this happens, a competitor may offer a higher wage to the firm's trained workers and recruit them instead. This will cause the training firm to lose and as a result, it is expected that workers will be the ones who fully pay for general training.

Workers pay for training either by incurring their own 'out-of-pocket' expenses or by receiving lower wages than they could have earned elsewhere during the training period (this is owing to their lower productivity). Since training is expected to increase future productivity, workers assume that they will collect the returns from their investment in later periods through higher marginal products and higher wages. All this shows that the economic value of trainees would increase with age (see Figure 5.). Similarly on the part of the firms, the decision to train is made on the expectations about the benefits in the form of increased post-training productivity against the costs for lost productivity by trainees during the training period.

"Specific training", on the other hand, is assumed to be non-transferable as it increases a worker's productivity only at the companies that provided them with the training. Hence, companies and workers will share in both the costs and returns for specific training. Here, Becker introduced the concept of 'worker turnover' in his analysis.[78] The reason for this joint cost is that both the firm and worker are exposed

[78] Hashimoto (1981) contributed to formalizing Becker's conjecture using a systematic analysis of firm-specific human capital model with transactions costs

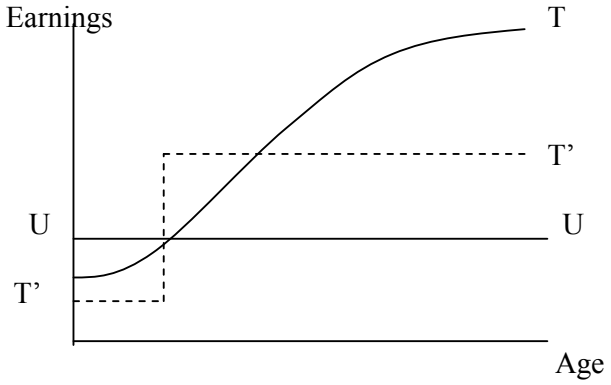
to risks if employment is terminated after the training is given, since it is specific to one worker at a particular firm. If, for instance, the firm pays for all of the specific training and reaps the entire benefits of training, the firm will lose out if the trained worker changes jobs after receiving the training. To retain the worker, he/she must be given part of the future returns, and one way to do so is by sharing the training cost. Another case is if the worker pays for all specific training. The worker will lose out if dismissed by the firm after the training period since the skills acquired will be of no use to other firms. By sharing the investment, both the company and the worker will have a greater incentive not to cancel the employment contract.

Other implications of the human capital theory are as follows. Rational firms are believed to pay specifically trained workers a higher wage than generally trained workers because if the former switch jobs, the company loses its investment on them. Thus, the premium is offered to reduce their turnover. Comparably, workers with specific training have less incentive to quit compared to workers with no or general training as their skills will be of no use elsewhere. As a result, turnover will be least for workers with specific training.

It is also predicted that workers who pay for specific training face similar wage reductions during the training period, but over time their earnings grow much faster compared to those with only general training. It can be seen in Figure 5.2 that a worker without any training is assumed to receive an unchanged wage rate of *UU*. A trained worker, on the other hand, will receive *TT* (*T'T'* is the extreme case). The wage curve for the trained worker is below the untrained worker's wage at the beginning of the period as this represents that training is being paid for through a wage cut. Over time, the trained worker will receive higher earnings as the return to training is being collected. This increase in wage is higher and faster depending on

whether the training received was general or specific. Specific training makes a worker's age-earning profile steeper and more concave, i.e. the rate of increase in earnings is affected more at younger ages. In the event that a firm experiences an unexpected temporary decline in demand, those with specific training are also less likely to be laid off even when their marginal products fall below their wage. This is because the firm will lose more if these workers took employment elsewhere. Even the worker would have less incentive to look for another job when temporarily laid off because he does not want to lose his investment at the training firm.

Figure 5.2 Worker's age-earnings profile under the human capital theory



Source: Becker (1962: 15)

Following Becker's seminal works, theoretical studies on human capital have attempted to investigate the consequences of relaxing some of the stringent assumptions on which the model was based.[79] As the labour market is not perfectly

[79] The literature on human capital is said to evolve along two essentially parallel patterns in economics (Haley, 1973). One follows the idea of Becker, which is the focus of this review and current study, where the theory of investment is placed upon individuals (and firms) and attempts to estimate the return to the investment by equating properly discounted costs and returns. The second path of human capital literature is exemplified by Ben-Porath (1967), who uses individual's life cycle earnings and production functions to determine the optimal human capital investment. The latter is an important topic but since it is a theme on its own, it is not included in this review.

competitive, most economists have taken this into account when augmenting the human capital theory. The majority of these works have found that with imperfect competition companies may also pay for general training (Acemoglu and Pischke, 1998; 1999; Bishop, 1988; Katz and Ziderman, 1990; Loewenstein and Spletzer, 1999; Stevens, 1994).

Using the German apprenticeship system and the U.S temporary help industry, Acemoglu and Pischke (1999) showed that firms do pay for worker's general training. There are two explanations for this. First, workers usually have limited opportunities to finance their own training as they have insufficient funds to self-finance or collateral to offer a lending institution.[80] In addition, banks would require the worker to pay a high interest rate as a result of the asymmetric information with regards to the worker's risk propensity and ability to repay their loans. Due to this, it is rational for the firm to act as a credit institution on behalf of the worker by giving the usual pay (i.e. no wage cut) during the training period and then postpone the subsequent wage increase. This leads to a remuneration pattern that is similar to that of specific training. The only difference now is that the firm will be exposed to the risk of losing out on the returns in general training if the worker resigns, which in this case calls for a risk premium. By this, the amount of training received by the worker is actually less than could be acquired should he be able to borrow from the bank in the first place.

Apart from liquidity constraints on the part of workers, the second explanation for company-sponsored general training is the existence of a 'compressed wage

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[80] Apart from that, the employer usually has control over workers' time. Despite paying a lower wage during the training period, it is possible that the workers also engage in regular production activities. This contractual difficulty between firms and their workers are additional constraints on the workers' ability to finance their training.

structure'. This is a situation where companies who are in a stronger position in pay negotiations with the worker may negotiate a pay level less than *MP*. As a result, the workers' wage level will rise more slowly than the value of their *MP* after training. The employer is more willing to finance general training in this instance as their capacity to capitalise on the training investment is improved. There are two main causes for wage compression, namely, the presence of transaction costs in the labour market and asymmetric information.

In practice, it is not that easy for workers to quit their existing jobs and find new employment. Likewise, firms will incur costs to replace their workers. Transaction costs like matching and search frictions will, therefore, create a bilateral monopoly in wage determination (Acemoglu and Pishke, 1999).

As for informational asymmetries between the training firm and potential future employers, the improvement in the workers' skills by way of the amount of training and human capital acquired is not clear to the latter. As a result, the worker will not receive the full social value of the investment in training if he changes jobs. As demonstrated by Katz and Ziderman (1990) and Acemoglu and Pischke (1999), firms will be willing to finance, either partly or fully, the costs of general training based on the argument that if potential recruiters have poor information on the extent and type of training received by workers, they will tend to place a lower value on the recruited worker's skills compared to the firm that trained them

In addition to the above, there are other alternative theories as to why firms invest in general training. Glick and Feuer (1984), for instance, argue that by financing general training, firms can "safeguard joint investments in specific training", that is, induce workers to stay so they can recoup their investments in firm-specific human capital (Garcia, Arkes and Trost, 2002 citing Glick and Feuer, 1984).

In Loewenstein and Spletzer (1998)'s shared investment model, the firm shares the general training investments with the worker as a result of the latter's inability to credibly commit to future wages. Instead, the firm commits to a minimum guaranteed wage and shares the investment in general training and realizes the returns to the training if the minimum wage guarantee is binding. Autor (2001), on the other hand, proposes a model in which firms offer general training to induce self-selection and perform screening of workers' ability. In this model, the training of general skills and ability are complementary and it is assumed that workers who are more able will self-select to receive general training to a greater extent than low ability workers.

A more recent development includes the effects of globalization. Gersbach and Schmutzler (2006) considered how market integration affects firms' incentives to provide general training. They found that firms invest in productivity-enhancing training and later make wage offers for each other's workers. With globalization, markets will be integrated and this will create greater demand and more firms, therefore, training will increase provided that the individual markets were initially sufficiently concentrated.

Becker's theory on human capital has also initiated many developments in the empirical domain. These studies are mainly devoted to three issues pertaining to human capital investment at the workplace, namely, the propensity of firms to provide for general training, the determinants of training and the effects of training on worker earnings (Guidetti and Mazzanti, 2004).[81] The following section reviews the first two issues while the latter is reserved for the next chapter.

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[81] The human capital theory poses several implications that are widely discussed, such as the type of workers who are most likely to receive training, the amount spent on training, the duration of training

5.4. Past Research

5.4.1. The Importance, Source and Type of Training

Training is an important issue for economic investigation. This is because the skills on which an economy depends are largely shaped by the processes of education and training (Greenhalgh and Stewart, 1987). Given that it is companies and not countries that compete in the market place, training is more relevant than education in improving the quality of the workforce at the workplace especially for firms that are involved with high-end use of technology.

Companies provide training for several reasons. First, training improves the performance of workers on the job (Acton and Golden, 2003; Bartel, 1995; Black and Lynch, 1996) as it may determine how much and what kind of skill upgrading is needed within the firm and across the workforce (Lynch and Black, 1998). Second, training encourages worker commitments to the enterprise (Heyes and Stuart, 1996; Rainbird, 1994). The third reason for providing training is that it strengthens the organization's competitiveness (Hughey and Mussnug, 1997; Burden and Proctor, 2000). These findings are in line with two of the most prominent theories of training, namely, the human capital and HRM theories. While the former stresses the importance of training in improving productivity at the individual and firm level, the latter views training as part of a strategy to increase workers' commitment to the company. Fourth, the training of workers is also believed to expand the knowledge base of the company (Barry *et al*., 2004; Potterfield, 1999). This is particularly

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and the effects of training on workers' wages (through productivity). For the purpose of this study, it joins the ranks of the latter two issues of empirical research given its stated objectives.

important for knowledge-based companies like those in MSC Malaysia where training is needed to stimulate the implementation of superior technologies as well as to improve the absorption capacity of the knowledge workers (Barry *et al*., 2004). It can be seen that regardless of the underlying theory adopted, training is a necessary endeavour for firms to become more effective, efficient and productive.

In evaluating training, two aspects are normally considered; the source and type of training provided. Following Lillard and Tan (1986), the source of training refers to where the training was obtained whereas the type of training refers to the nature or context of the training. Training can be acquired either at the workplace (OJT) or elsewhere (offsite or off-the-job training) and may be formal or informal in nature. The Bureau of Labour Statistics has defined formal training as "training that has a structured, formal and defined curriculum" (BLS, 1996), whereas informal training is "training that is typically unstructured, unplanned, and easily adapted to situations or individuals" (BLS, 1996).[82]

Most studies tend to focus on formal training, as it is easier to observe and measure (Sicherman, 1990). But some authors believe investigating formal training alone is insufficient. In his study, Mincer (1989) estimated that formal training is only a fifth of total training provided by the private sector in the U.S. economy, and as pointed out by Barron *et al*. (1997), informal training takes place when workers learn from watching other workers or share information during breaks. They are even trained 'indirectly' whenever a supervisor constructively criticizes their work. Therefore, it is crucial for empirical analysis to include information on informal training (Sicherman, 1990).

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[82] For a review of the characteristics of personnel training, see Ericsson (2005)

As for the types of training provided, the common job skills training include management training, professional and technical skills training, computer training, clerical and administrative support skills training, sales and customer relations training, service-related training and production-related training (BLS, 1996).

5.4.2. Measures of Training

Studies on training have always been constrained by data limitations (Altonji and Spletzer, 1991; Lynch and Black, 1998); thus, most empirical works have employed data from readily available surveys.[83] These surveys may be directed to the employer, with questions on the incidence and extent of training provided and/or to the employee, with questions about the type of training attended (Ericson, 2005). Additionally, data may be acquired from household surveys or a single firm. But despite the wide array of information available, estimates on training provision are far from unambiguous perhaps due to the various ways in which training is defined or measured in the surveys. Moreover, survey responses are sensitive to the period covered and may differ from one sample to another (Ericson, 2005; Leuven, 2004).

While most studies examine training provision in its entirety, some studies do distinguish between the occurrence and magnitude of training, as the factors that affect the decision to train workers are not necessarily the same as the factors that determine the amount of training to be provided (Hansson, 2007; Orrje, 2000). Training occurrence refers to the incidence of at least one form of training activity and is seen as the crudest measure of training provision. Training magnitude, on the

[83] A list of these studies and their corresponding surveys can be seen in Appendix J.

other, refers to the extent of the training provided and is usually measured in terms of the duration of training (Quinlan, 2004).

The most direct measure of training occurrence is whether or not training is provided at the workplace. This measure takes on a binary form, with value one assigned if the company provides training and zero if otherwise. Studies adopting this training measure includes Alba-Ramirez (1994), Baldwin and Johnson (1995), Bartel (1989), Frazis, Gittleman and Joyce (2000), Lynch and Black (1998), Sousa (2001) and Tan and Batra (1996). Similarly from the standpoint of the workers, the value one is assigned if they had participated in training over a predetermined period and zero otherwise (Bartel, 1995; Booth, 1991, 1993; Green, 1993; Greenhalgh and Stewart, 1987; Holtmann and Idson, 1991; Lynch, 1992; Orrje, 2000). A variant of this dichotomous measure is whether or not the company has undertaken any expenditure on training, as adopted by Barry *et al*. (2004).

Some authors prefer a more continuous measure of training occurrence, such as the number or proportion of workers trained during a certain period. This variable often doubles as a measure for the magnitude of training (*e.g.* Alba-Ramirez, 1994; Baldwin and Johnson, 1995; Chowhan, 2005; Hansson, 2007; Holzer *et al*., 1993; Lynch and Black, 1998; Turcotte, Léonard and Montmarquette, 2003; Zeufack, 1998).[84] Other ways to gauge the magnitude of training investments are to measure the amount spent on training (Baldwin and Johnson, 1995; Barry *et al*., 2004; Forrier and Sels, 2003) and for how long the training was provided (Bartel, 1995; Barron *et al*., 1987; Frazis *et al*., 2000; Holzer *et al*., 1993; Simpson, 1984; Sutherland, 2004;

[84] This is following the argument that continuous variable is more reliable and flexible as it commonly follows a normal distribution and can be estimated using least squares to produce robust estimates.

Veum, 1993; Zeufack, 1998). In addition, a growing number of studies have begun to use discrete numbers as a measure of training magnitude, which includes the number of days spent on training (Orrje, 2000) and the number of training courses attended by the workers (Ariga and Brunello, 2002; Arulampalam and Booth, 1997; Sørensen, 2000).

The above measures mostly refer to formal training. This is due to the manner in which most survey questionnaires are formatted, that is, few questions actually capture informal training (Ericsson, 2005). An exception is the Panel Survey of Income Dynamics (PSID) as used in Brown (1989), where answers to the question: *"On a job like yours, how long would it take the average new person to become fully-trained and qualified"* are used as a proxy for informal training. Another example is the Workplace and Employee Survey (WES), which distinguishes between classroom and OJT, where the former corresponds to formal training and the latter includes informal training.

From the above, it is evident that various measures are used to evaluate training and their selection in studies primarily depends on the objectives of the researcher. Although survey responses may be subject to measurement error (as expected from recollection problem in self-reported training questions), which may lead to endogeneity in training and self-selection bias problems; these are well-recognized in literature and, to some extent, dealt with in the analysis of data using standard econometric techniques. Once the training measures are chosen, estimates on the probability of occurrence and magnitude of training can then be carried out. For this, it is pertinent to decide on the relevant factors that may influence training provision.

5.4.3. Factors that Influence the Provision of Training

The human capital theory perceives training as an investment that enhances future productivity of workers. Thus, the likelihood of firms providing training for their workforce depends on the relative costs and benefits of undertaking such investment (Stevens, 1994). In doing so, companies need to evaluate the factors that may influence their training decision. These factors or 'determinants of training', however, are not always well defined despite being widely discussed in the literature (Smith and Hayton, 1999). A possible reason for this is that most studies on training often rely on surveys or case studies in their collection of data causing the results to depend on the information collected from the sample or companies in question.[85]

Even so, the human capital theory provides guidance on the choice of these explanatory variables (Booth, 1991) and reviews of past studies conducted over the last two decades such as Asplund (2005), Bishop (1996) and Smith and Hayton (1999) have also identified a range of 'common' factors used to predict the likelihood of the occurrence and magnitude of company-provided training. The decision to train workers is largely influenced by the nature of the firm (and the job) as well as the characteristics of the workers employed. The determinants of training under consideration are discussed below.[86]

Company size is an important determinant of training provision. It is usually measured by the firm's total number of workers (Barron *et al*., 1987; Bartel, 1989;

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[85] According to Ericsson (2005), information about training is seldom recorded in a register format, hence the popular usage of surveys

[86] Some covariates are excluded from this study, such as union status, legal organisation, the type of industry, location and category of workers. While unions are important in the manufacturing industries, the same is not evident among knowledge workers and professionals or white-collar workers. Since the sample is restricted to MSC-status companies, all of the respondents are involved in the same industry, located at MSC-approved locations, privately owned and employ knowledge workers.

Holtmann and Idson, 1991; Oryshchenko, 2006; and Sousa, 2001).[87] Some studies use the firm's gross revenue (Simpson, 1984) or construct categorical variables (Sutherland, 2004) instead. The age of a firm can also represent its size (as used in Barry *et al*., 2004) with the assumption that older companies have ample time to expand its workforce; hence, is larger in size. A significant positive association is often found between firm size and training provision (Alba-Ramirez, 1994; Baldwin and Johnson, 1995; Barron *et al*., 1987; Booth, 1991; Frazis *et al*., 2000; Green, 1993; Harris, 1999; Holtmannn and Idson, 1991; Shields, 1998; Simpson, 1984; Smith and Hayton, 1999; Sousa, 2001; Sutherland, 2004; Turcotte *et al*., 2003; Oryshchenko, 2006). This is due to a number of reasons. Larger firms are able to provide more training as they have greater ability to absorb losses from turnover and better capacity to screen potential employees before hiring them (Holtmann and Idson, 1991; Harris, 1999). Larger size also reflects the firm's economies of scale in training provision, greater access to training resources, better access to capital markets, and unobserved attributes associated with improved management capabilities. All this may lower the marginal costs of training and enable larger firms to provide more training to their workers (Barron *et al*., 1987; Booth, 1993; Green, 1993).

Worker turnover is also an important factor, which may affect training either positively or negatively.[88] Companies with high turnover rates may invest in more training to replace the skills and competencies of outgoing personnel and/or to increase employment loyalty in the future (Turcotte *et al*., 2003). Simpson (1984) also

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[87] Employment size and plant age are typically taken in number or log form. Some authors also include the square value of the number of workers to check whether the correlation follows a convex or concave shape (Baldwin and Johnson, 1995; Forrier and Sels, 2003).

[88] Likewise, training may also affect turnover. As shown in Sieben (2005), participation in training among male workers increases their likelihood of searching for a new job. This possibility of reverse causality is studied in the next chapter.

found that turnover increases the amount of training provided. Alternatively, turnover may be seen as a deterrent to training investment. This view is in line with the human capital theory. As investment in training is the result of an optimal decision made by workers and employers, employers are faced with the risk of not being able to recoup their (general) training investment in the event that their trained personnel leave. This usually arises when these trained workers are 'poached' by competing firms. Therefore, firms with high turnover rates are not inclined to sponsor training. Past studies confirm this association. Frazis *et al*. (2000), for instance, found turnover to have a significant negative effect on training intensity. Hansson (2007) and Baldwin and Johnson (1995), on the other hand, do not find turnover to be a significant factor that determines training incidence.

In the traditional labour economic theory, wages are determined individually in a spot market (Baker, Gibbs and Holmstrom, 1994). Alternatively, wages may also be governed by an administrative unit that lays out the rules and procedures for the pricing and allocation of labour within firms. This concept is known as the *internal labour market* made popular by Doeringer and Piore (1971). In relation to this study, promotion of employees from within the organization reflects the firm's strength in its internal labour market. Promotion is often seen as a way to reduce worker turnover (Hansson, 2007), thus, may also be related to firms' training decision. From the literature, it is found that companies focusing more on internal promotion provide lesser training (Hansson, 2007). This differs from Bartel's (1989) findings where a strong internal labour market provides a more conducive environment for training. Additionally, Forrier and Sels (2003) established no connection between training investment and the strength of the internal labour market.

The capacity to train may also be influenced by the firm's level of *R&D expenditures*. Quite often, R&D is interrelated with technology and innovation; hence, these elements are analysed concurrently in this study.[89] Past studies have generally found a positive link between R&D expenditures and training provision (Barry *et al*., 2004; Oryshchenko, 2006). According to Baldwin and Johnson (1995), this arises because changes in R&D and technological advancements would require the firm to constantly upgrade its existing workforce via training. R&D is a highly significant contributor on the likelihood of training in developing countries (Tan and Batra, 1996) as well as developed countries. In their study on Irish manufacturing firms, Barry *et al*. (2004) found that companies that are active in R&D not only provide more training than others but in terms of magnitude, they also spend more on training, suggesting that R&D and training are complements for the firms in their sample. This is in agreement with Lynch and Black (1998) who discovered that in the U.S, companies that were relatively R&D intensive were more likely to train a higher proportion of their workers.

Competition is also a driver for companies to improve their human capital. Yadapadithaya (2001) found that high pressure for increased quality, innovation and productivity due to worldwide competition acts as a major driving force for training programs. Companies invest on training as they must adapt their business strategies to take into account the new realities of global and domestic competition. Their

[89] In an alternative regression, "innovativeness" was included as an independent variable. The result contradicts past findings in that innovative MSC-status companies were found less likely to provide training. However, this relationship was not significant and the results of the other factors were unaffected. Given the small sample size employed, this variable was excluded from the final model to allow other factors to be analyzed. Nonetheless, an auxiliary investigation on the relationship between training and innovation was conducted given their perceived importance to one another (Baldwin and Johnson, 1995; Hansson, 2007; Oryshchenko, 2006). A description of this analysis and its findings are presented in Appendix K.

corporate cultures must also be changed as they were previously formed in a regulated environment. Competition from imports or external markets is equally important. Using a subjective measure of importance of competition from imports for the firm's main products, Oryshchenko (2006) found that competition from imports affects training provision for managers and professionals although the magnitude is rather low. This contradicts the findings of Turcotte *et al*. (2003) who do not find competition to have a significant effect on the decision to train, except for companies with a small number of competitors (at most 5). This difference is perhaps due to their adoption of a dichotomous variable that indicates whether or not a company is profitable.

Firms that have a written *training policy* or an induction programme for newly hired workers are also more likely to provide training for their workers.[90] According to Sutherland (2004), when a company has an induction programme, it increases the likelihood of its workers to receive training by 11 percent. Nonetheless, training policies do not necessarily have any association with the magnitude or how much training is provided to workers (Hansson, 2007).

Firms may receive some support in the form of *training grant* or assistance from the government when providing training for their workers. They are typically measured as log of the real annual amount of training grants received by a firm. It is hypothesized that if training grants were effective, then a positive effect would be expected on the provision of training. Among those attempting to examine the effects of training grants on training, three studies are of particular interest. Barry *et al*.

[90] Bartel (1989) identified the types of companies more likely to have formal training programs as those that are large in size, those introducing new technology and those with a high proportion of internal promotions

(2004) did not find any robust evidence that training grants improve training activity in Irish manufacturing industries since training expenditures per worker amongst companies that do not receive grants are substantially larger than those that do receive training grants. This is in contrast to the findings for the U.S by Holzer *et al*. (1993) where companies that receive training grants substantially increase the amount of training investment by nearly 100 percent in terms of the number of hours provided. Their reason was that grants reduce the costs of training to companies. Likewise, a study by Simpson (1984) also found that government training assistance has a positive significant effect on training provision i.e. it increases specific training by three months on average but has an insignificant negative effect on general training.

One of the important characteristics of the workforce is whether they are employed on a full-time or part-time basis. This refers to their *employment status*. From a labour market perspective, the relationship between a worker's employment status and his or her willingness to participate in training can be explained by the traditional income-leisure model. But since this study focuses on the provision of training, the employee's status will be analysed from the point of view of the employers. Compared to full-time workers, part-timers receive lesser training incidence and intensity (Frazis *et al*., 2000). Using Swedish data, Orrje (2000) also found that the probability of receiving training is about 5 percent lower for part-time workers. A possible reason is that part-timers have a shorter working time thus reduces the company's incentives to invest on them. Interestingly, Frazis *et al*. (2000) also found that contract workers seem to be associated with greater training expenditures, both because of higher incidence and greater expenditures per worker.

The reason for this scenario may warrant further research as it may depend on the establishment's motivation for relying on contract workers.[91] This is supported by Alba-Ramirez (1994) who found that contract workers are more likely to be provided with training. These findings seem to suggest that a worker is better off working on a contractual basis rather than work permanently but on a part-time basis.

Education level is another important characteristic of the workforce, since it indicates their initial level of human capital. The literature provides two views on the relationship between education and training. One strand argues a positive relationship between the two (Lynch and Black, 1998; Bishop, 1996; Lillard and Tan, 1986). The theoretical explanation for this rests on the worker's capability. More educated workers have higher stocks of knowledge and skills; thus, they have greater willingness to be trained and would benefit more from the training than less educated worker (Green, 1993). In terms of which education level correlates best to training, Orrje (2000) found that completion of high school would significantly increase the probability of receiving training by about 10 percent. Additionally, Harris (1999) found that workers with a degree and high-level qualification were more likely to receive training by 5.5 percent and 2.3 percent respectively. These estimates are much less compared to Sutherland's (2004) findings in which workers possessing a degree are ten percent more likely to receive training than those without any educational qualifications. Education level also benefit women in both developed and developing countries, as shown in Chung (2004), Booth (1991) and Kawaguchi (2006) who found that higher education level leads to greater probability of a woman to be sent for

[91] According to Frazis et al. (2000), contract workers are employed to reduce the firms' labour turnover during times of fluctuating demands. By relying on contract workers, employers can protect their workers from layoffs during slack periods. Because of this, the firms are expected to provide training for them as the contract workers are considered to be a low-turnover group.

training. A second strand, however, disagrees with these findings. Sicherman (1990) and Hersch (1991) argued that overeducated individuals receive less training compared to individuals with less education because the former are less willing to learn, which increases the marginal costs of training.

5.5. Model Specification

Two specifications were adopted in this study. To examine the factors that affect the occurrence of training, a discrete and limited dependent variable was used as training occurrence is usually measured with a simple yes or no answer by the firms (Alba-Ramirez, 1994; Baldwin and Johnson, 1995; Bartel, 1995; Booth, 1991; Frazis *et al*., 2000; Kawaguchi, 2006). On the other hand, a linear regression is typically used to examine the factors that affect the magnitude, or extent, of the training provided given the continuous nature of the dependant variable. Examples of such studies include Baldwin and Johnson (1995); Holzer *et al*. (1993) and Lynch and Black (1998).

Accordingly, two methods were used to estimate the specifications above. A binary logistic (or logit) regression model was used to estimate the determinants of training occurrence following Bartel (1989), Booth (1991, 1993), Lynch and Black (1998) and Shields (1998), whereas ordinary least squares (OLS) was used to examine the factors that influence the magnitude of training provided, as found in Frazis *et al*. (2000), Hansson (2007) and Veum (1996). For both of these models, attention was given on their goodness-of-fit, diagnostic tests and the significance of each estimated parameters.

A summary of the estimation procedures and corresponding significance tests is provided in Table 5.1 below, followed by a brief explanation of the Logistic regression procedure.

Table 5.1 Estimation methods and statistical tests

Dependant Variables	*Type*	*Method*	*Significance and diagnostic tests*
Training occurrence (TRAINING)	Binary (0/1)	Logistic Regression	Model chi-square; LR test H-L goodness-of-fit; multicollinearity; SPeciication error;; Pseudo R^2
Training magnitude (LNKWTRAIN, LNTRAINEXP)	Continuous	OLS	Adjusted R^2, F-statistic; Normality; Heteroscedasticity; Multicollinearity

5.5.1. The Logistic Regression

The theoretical basis for discrete and limited choice dependant variable methods has been discussed in literature (Cameron and Trivedi, 2005; Greene, 2008; Maddala, 1983; Woolridge, 2002); hence, this study follows the conventional practice of using a logistic regression model to analyze the determinants of training occurrence.[92] For the question *"Does your company provide any training to your knowledge workers in the last twelve months?"* 83 percent of the 100 MSC-status companies mentioned they provided training in the last twelve months.

A company either provides training (T = 1) or not (T = 0). The decision to train can be modelled as:

$$T_i^* = X'\beta + u_i \qquad (5.1)$$

where X is a set of explanatory (independent) variables, and u the error term. The independent variables are selected based on theory and past studies, which have been reviewed in the last section. In practice, T_i^* is unobservable, but what can be observed is a dummy variable T_i defined by

[92] The probit model was also used in the analysis and due to the equivalency of logistic and probit models (Greene, 2008; Maddala, 1983), only the logistic regression results are presented here. For the OLS regression, the White's tests for heteroscedasticity failed to reject the null hypothesis of homoscedasticity at conventional confidence levels.

$T_i = 1$ if $T_i^* > 0$ i.e. company provides training

$T_i = 0$ if otherwise (5.2)

From the relationships expressed in (5.1) and (5.2), the probability of training occurrence can be expressed as a logit model:

$$\begin{aligned} prob(T = 1) &= prob(u > -X'\beta) \\ &= 1 - \Lambda(-X'\beta) \\ &= \Lambda(X'\beta) \end{aligned} \quad (5.3)$$

where $\Lambda(.)$ is the cumulative distribution function (CDF) for u with logistic distribution. Specifically,

$$\Lambda(X'\beta) = \frac{\exp(X'\beta)}{1 + \exp(X'\beta)} \quad (5.4)$$

In the logistic setting, the observed values of training occurrence T are just realizations of a binomial process with probabilities given by (5.3) and varying from one observation to another, depending on vector X_i. Hence, the likelihood function is

$$L = \prod_{T_i = 0} \Lambda(X'\beta) \prod_{T_i = 0} [1 - \Lambda(X'\beta)] \quad (5.5)$$

The set of parameters β reflects the impact of changes in X on the probability. From (5.3), (5.4) and (5.5), if training occurs, it is expected that

$$prob(T_i = 1) = \Lambda(X'\beta) = \frac{\exp(X'\beta)}{1 + \exp(X'\beta)} \quad (5.6)$$

The equation for probability of training not occurring is then

$$prob(T_i = 0) = 1 - \Lambda(X'\beta) = \frac{1}{1 + \exp(X'\beta)} \quad (5.7)$$

Using a maximum likelihood estimate (MLE) procedure to estimate the parameters β, the signs of the estimated coefficients can be interpreted in the similar

manner as for general regression coefficients (Hunt and White, 1983). Since the MLE is used to derive parameters, logistic regression often relies on a larger sample size than OLS as too few cases in relation to the number of variables may not to converge on a solution. Adequate sampling size is also important to enable the goodness-of-fit measures to work properly. As a rule of thumb, Peduzzi *et al*. (1996) recommended that the smaller of the classes of the dependent variable should have at least ten events per parameter in the model. Due to this restriction, not all of the predictors were utilized in the logistic regression despite strong theoretical underpinnings.

Results of the logistic regression are normally presented in odds ratio. Alternatively, the marginal effects of each independent variable on the probability of moving to a particular training decision can also be calculated. The latter is chosen in this study for ease in interpretation.[93]

5.5.2. The Multiple Linear Regression

To investigate the factors influencing the magnitude of training, two linear regressions were employed with the following dependent variables: the total number of knowledge workers trained in the last 12 months and the amount of training expenditures incurred in the last 12 months. Both of these variables are expressed in natural log form although proportions would have been a more ideal form (see below). Some changes were also made on the independent variables in these models. Firstly, the existence of training grants was used instead of training policy. The former was deemed more appropriate as availability of grants or funding may

[93] Further explanation of the odds ratio and marginal effects are given in Section 6.4.2 and Section 6.5.3 of the next chapter, respectively

influence the amount of training provided. Secondly, the share of graduate workers was included in the training magnitude models instead of the share of full-time knowledge workers.

These model specifications were necessary for several reasons: (1) the natural log forms of the dependant variables were used instead of proportions of workers trained and proportion of training expenditures because the former has more data available for analysis. Furthermore, the use of proportions did not lead to a better fit of the models (very low adjusted R^2 and high Akaike information criteria) and the residuals were not normally distributed, which may affect the unbiasedness and reliability of the estimates, (2) to ensure a better fit of the models and that the number of valid cases per independent variable is maintained.

5.6. Data and Variable Description

Data used in this analysis were obtained from the HR Managers via *SQ1*. The acquired information is particularly useful in examining whether or not training was provided and to what extent it was provided by the MSC-status companies. Following the above model specification, a binary variable was used as the dependent variable to analyze the occurrence of training, where value one is assigned if the MSC-status company provided any training for its knowledge workers in the last twelve months and zero otherwise. To investigate the magnitude of training, two continuous variables were adopted, namely, the total number of knowledge workers trained and total training expenditure incurred in the last year. Both of these variables are expressed in their natural log forms with the reasons given above.

The independent variables were chosen based on theoretical justifications discussed earlier and their relevance to MSC Malaysia. These variables can be

divided into two groups. The first encompasses characteristics of the firms that reflect their tendency to train. This includes the size of the company, worker turnover, internal labour markets, training policy, competition, R&D expenditures and training grants.[94] As for worker characteristics, these are represented by the share of full-time knowledge workers and the share of graduates (or professional certificate holders) in the company.

Company size (SIZE) – to measure the size of the MSC-status companies, the natural log of total number of employees was adopted following Alba-Ramirez (1994) and Barry *et al*. (2004). This measure was preferred over the actual figures to compress the variance and reduce heteroscedasticity in the data (Gujarati, 2004).

Worker turnover (TURNOVER) – the annual worker turnover rate was obtained by dividing the total number of separations that occurred in the last twelve months with the total number of workers at year end in the MSC-status companies.

Internal labour market (INTERNAL) – to roughly assess the strength of the firms' internal labour market, the HR Managers were asked how vacancies are normally filled in their companies. In a past HRM study conducted on MSC-status companies, it was revealed that "internal contacts" seem to be the preferred method for recruiting new knowledge workers (Mat Nor and Rosline, 2005). A list of four options was given: internally, recruitment by head-hunters or agencies, advertisement and word of mouth.[95] The respondents were able to choose more than one answer. Following Hansson (2007), the proportion of vacancies filled from within the organization was then calculated by dividing the number of checks for "internally"

[94] Following the results of the previous chapter, firm ownership is not a significant factor that influences the companies' training decision (in terms of quantity or amount) for the current sample. Therefore, 'foreign ownership' was excluded from the current analysis to make way for other variables.
[95] Several respondents gave other ways of recruiting new knowledge workers, but the number is small.

over the total checked answers. This information was then converted into a binary variable, where value one is assigned to firms that have a strong internal labour market beyond a certain cut-off point (that is, if at least 25 percent of the vacancies were filled internally), and zero otherwise.

R&D expenditure (RND) – this variable was measured by calculating the share of spending on R&D from total expenditures incurred by the MSC-status companies. This variable along with employment status and education level is expressed in proportion instead of a log transformation because the former yields a better fit of the regression model.

Level of competition (COMPETITION) – in the *SQ1*, a five-point categorical variable (from no competition to very high competition) was used to reflect the firms' perceived level of competition from local and overseas companies for their products and services. For instance, a firm that faces high competition from local companies but low competition from overseas companies has a total score of six (6). A binary variable is then constructed from this information to indicate whether or not the firms have a high level of competition. For this purpose, those with a total score of at least 7 out of 10 are considered as having high level of competition.

Training policy (POLICY) – the existence of a training policy in an organization gives a preliminary indication of the firms' willingness to provide training for their knowledge workers. The respondents were asked whether or not their organizations have a training policy (a binary variable). Those who answered yes were further probed on its nature i.e. whether it exists in a formal (written) form, not in written form or if it existed only on an *ad hoc* basis. For the purpose of the regression, however, only the basic yes/no answer was utilized to indicate whether or not there is a training policy for the MSC-status companies.

Training grants (GRANTS) – this refers to the undertaking of the Human Resource Development Fund or HRDF, which is a training levy reimbursement scheme where eligible companies may claim a portion of allowable training expenditures (refer to Chapter 2). A binary variable was used to indicate whether the MSC-status companies have received the HRDF or not.

Employment status (FULLTIME) – the knowledge workers were distinguished between those working on a full-time basis and those working part-time. To obtain a measure of employment status, the share of full-time knowledge workers employed was calculated from total number of workers in the MSC-status companies.

Education level (GRADUATE) – the respondents were also asked for the number of graduates or professional certificate holders among their workforce. To obtain a measure of education for the MSC-status companies, the share of graduates or those with professional certificates was calculated from total workforce.

A summary of all these variables along with their expected signs is presented in Table 5.2.

Table 5.2 Summary of all the variables used in the regression models

Dependent variables	Measurement	
TRAINING	1 if training is provided to KWs in the last 12 months, 0 otherwise	
LNKWTRAIN	The (natural) log of trained KW in the last 12 months	
LNTRAINEXP	The (natural) log of training expenditures in the last 12 months	
Independent Variables	**Measurement**	**Expected Sings**
SIZE	The (natural) log of total number of workers employed	Positive
TURNOVER	Annual worker turnover rate	Negative
INTERNAL	1 if the company has a strong internal labour market, 0 otherwise	Negative
RND	The share of R&D expenditures from total expenditures	Positive
COMPETITION	1 if firm perceives high competition from imports, 0 otherwise	Positive
POLICY	1 if there exists a training policy, 0 otherwise	Positive
FULLTIME	The share of full-time KWs from total workers employed	Positive
GRANTS	1 if the company took HRDF grant in the last 12 months, 0 otherwise	Positive
GRADUATE	The share of graduates from total workers employed	Positive

Prior to settling on these nine correlates of training, two issues were considered. Firstly, due to the small sample size of the current study, there is a need to limit the number of independent variables to preserve the degrees of freedom. In other words, the minimum number of valid cases per independent variable must be observed. For the logistic regression, the minimum number of cases for each explanatory variable is ten (Hosmer and Lemeshow, 2000; Peduzzi *et al*., 1996) while the minimum ratio of valid cases to independent variables for multiple regressions is 5 to 1. The second issue relates to the process of selecting the variables itself. Given the lack of this type of studies in the knowledge-based industry, a stepwise method was initially employed to narrow down the possible factors that may affect training decision by these companies. According to Field (2005: 161), the stepwise regression is the best method for exploratory purposes. Under this method, variables are selected in the order in which they maximize the statistically significant contribution to the model, as measured by the adjusted R^2 and model chi-square for the OLS and logistic regressions, respectively. But as this method relies purely on statistical criteria, the final choice of variables was informed by theory and discretion.

5.7. Results and Discussion

The regression results are presented in Table 5.3. In assessing the goodness-of-fit of the logistic model, several robustness tests are adopted as there is no widely accepted measure that is analogous to the R^2 used in OLS. The likelihood ratio test and its alternative, the Hosmer and Lemeshow (H-L) test conclude that there is adequate fit of the data to the model, implying that at least one of the predictors is significantly

related to the dependent variable.[96] Even the pseudo R^2, which measures the strength of association, shows that the estimated models have a relatively good fit as they range between 0.2 to 0.4 (McFadden, 1979).

Table 5.3 Parameter estimates for the logistic and OLS regression models

	Logistic estimates	OLS estimates	
Variables	Any training provided in the last 12 months Exp(B)	LN(trained KWs in the last 12 months) B	LN(training expenditure in the last 12 months) B
CONSTANT	0.012***	-1.303***	7.466***
	(1.668)	(0.312)	(0.802)
SIZE	2.895**	0.843***	0.774***
	(0.470)	(0.074)	(0.186)
TURNOVER	0.083*	-0.432	-1.162
	(1.282)	(0.312)	(0.713)
INTERNAL	0.446	-0.279	-0.498
	(0.848)	(0.162)	(0.346)
RND	3.392	0.649**	1.022**
	(1.219)	(0.249)	(0.504)
COMPETITION	3.014	-	-
	(1.121)		
POLICY	16.437***	-	-
	(0.954)		
FULLTIME	40.813**	-	-
	(1.487)		
GRANTS	-	0.447**	0.429
		(0.193)	(0.420)
GRADUATE	-	0.943***	0.425
		(0.319)	(0.738)
N	84	69	65
LR stat	25.389***		
H-L statistic	8.2147		
Prob (H-L stat)	0.4128		
McFadden R^2	0.335		
Adjusted R^2		0.715	0.299
F-statistic		29.384***	5.549***

Note: robust standard errors in parentheses; ***statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level

[96] The H-L test is most recommended for small sample size and when the model contains continuous covariates. For the current model, the test reveals non-significance implying that at least one of the predictors is significantly related to the dependent variable (Hosmer and Lemeshow, 2000).

The OLS regression models too have a relatively good fit with the models predicting around 30 to 70 percent of the variations in the respective dependent variables, as shown by the adjusted R-square.[97] For both specifications of the OLS models, diagnostic tests are conducted on the residuals to ensure that the assumptions of a linear regression model are met. As for the logistic model; ML estimates with robust variance estimator (the Huber or White estimator of variance) are presented.

From the entire list of independent variables, only the size of the company significantly affects both training occurrence and magnitude. Larger MSC-status companies are not only three time more likely to provide training for their knowledge workers but they also train at a greater magnitude compared to smaller companies. An additional 10 percent increase in firm size is associated with an 8 percent increase in both the number of knowledge workers trained and training expenditures incurred.

Three other factors are found to be major determinants of training occurrence. The biggest effect comes from the share of full-time knowledge workers employed. As seen from the result, firms with greater share of full-time knowledge workers employed increases their odds of providing training by over forty times ($p<0.5$). While there is no clear explanation for this huge effect, it should be noted that full-time knowledge workers constitute the majority of the workforce for 90 percent of the MSC-status companies in the sample. Thus, it is expected that these companies train this group of workers for they generally work longer hours than part-timers and may bring returns to the company in the form of higher post-training productivity.

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[97] As recommended by Greene (2008: 35-36), it is a good practice to find the adjusted R-square value because it explicitly takes into account the number of variables included in the model.

The next noticeable effects come from the existence of a training policy and worker turnover. As expected, the existence of a training policy significantly increases the likelihood of a company to provide training. In this case, the odds of MSC-status companies providing training for their knowledge workers are 16 times higher when a training policy is in place compared to companies without it ($p<0.01$). Also in line with theoretical expectation is worker turnover; firms would be less inclined to train workers who would most likely leave after being trained as this may render the training firm to be at a loss, both in terms of investment and time used to train those workers. Higher worker turnover rates are negatively associated with both training occurrence and magnitude, although the effect is only significant for the former. It can be seen that higher worker turnover rates reduces the odds of MSC-status companies to provide training for their knowledge workers than those with lower turnover rates.

As for the determinants of the magnitude of training, three factors are also found to be significant in addition to firm size. One relates to R&D expenditure. For every 10 percentage point increase in the share of R&D expenditure, MSC-status companies are not only training 6 percent more of their knowledge workers but they are also investing 10 percent more on training expenditure (both significant at the 5 percent level). This strong positive association supports the notion that training and R&D are complements as suggested in Barry *et al*. (2004).

The share of graduates and professional certificate holders from the entire workforce also contributes significantly to the companies' extent of training provision. MSC-status companies with greater share of graduates and professional certificate holders are found to train 9 percent more knowledge workers and incur over 4 percent more amount of training expenditure for every 10 percent increase in

the share of graduates employed. The effect, however, is significant (at the 1 percent level) only for the number of knowledge workers trained. Lastly, the amount of training provided is also influenced by whether or not some funding is received. MSC-status companies that undertake the HRDF to subsidize training for their local knowledge workers are found to train almost 45 percent more knowledge workers and incur over 40 percent more training expenditures compared to companies that did not take the grant. However, only the former is significant at the 5 percent level.

5.8. Concluding Remarks

The findings of this chapter indicate that training is recognized as an important part of human capital development among MSC-status companies. Slightly more than half of all the companies surveyed have a training policy and an even higher percentage actually provide training for their knowledge workers. To address the objective set at the beginning of the chapter, there are indeed several factors that significantly affect the occurrence and magnitude of training by MSC-status companies. Specifically, it was found that:

1. There are some differences in the factors influencing the decision to train and how much of training provided. All of the determinants have the expected signs as in theory and past studies although their significance may vary.
2. The size of the MSC-status company plays a decisive factor in both training occurrence and magnitude.
3. Worker turnover negatively affects the occurrence and magnitude of training for the MSC-status companies but the effect is only significant for the former.

4. Expenditures on R&D positively influence both training occurrence and its magnitude for MSC-status companies, although the effect is only significant for the latter.
5. The existence of a training policy and the undertaking of training grants are significant factors that affect the occurrence and magnitude of training, respectively.
6. Worker characteristics are also important in training investment decisions. While a greater share of full-time knowledge workers is positively associated with training occurrence, a higher level of human capital (as measured by the share of graduates and professional certificate holders among the workforce) is positively associated the magnitude of training provided.

Although the findings are based on a relatively small sample, they give a good indication on the level of human capital development among MSC-status companies. It is hoped that more studies can be conducted in this area, as MSC Malaysia is an important vehicle for Malaysia's transition to become a fully developed nation by the year 2020. Closer monitoring by the relevant authorities is needed to ensure that the MSC-status companies maintain a quality workforce to remain competitive and achieve the goals envisioned for MSC Malaysia.

CHAPTER 6

IMPACTS OF TRAINING ON KNOWLEDGE WORKERS' EARNINGS, PRODUCTIVITY AND CAREER ADVANCEMENT

6.1. Introduction

Training constitutes an important part of human capital investments for the workforce (Becker, 1962). Like any form of investment, training will only be undertaken if its benefits exceed the costs. For individuals, these benefits are typically in the form of increased earnings, higher productivity and better prospect of career advancement. Information regarding these outcomes is particularly important for making training decisions. Taking the standpoint of recipients of training, this chapter investigates the impacts of training on the knowledge workers' earnings and productivity (as captured by their own perception of the effect on ability to perform job tasks) as well as career advancement. It includes an overview of, mainly empirical, past studies related to the effects of training on the individuals, variables description, estimation techniques and the results obtained for each of the analysis. Some remarks conclude the chapter.

6.2. Past Studies on Wage and Productivity Effects of Training

Studies on the effects of training have traditionally centred on worker earnings. This is largely because wages are the most tangible form of benefit that workers can gain from undertaking training. Compared to other benefits of training such as increased motivation, job satisfaction and improvement in skills; changes in earnings can be measured quantitatively. Furthermore, information on earnings is quite easily obtained from personnel database and survey questionnaires. Furthermore, Leuven (2004) noted, in his review of wage returns to private sector training, that

understanding wage growth is important as it increases one's understanding of how the labour market works in addition to being a measure of workers' welfare and displacement.

According to the human capital theory, variations in wages and increasing wage profiles are often explained by differences in the workers' human capital and by skills obtained from experience and frequent training (Becker, 1962; Mincer, 1974).[98] Following this theory, training can either be of general or specific character. Thus, past studies often distinguish between the effects of general and specific training on wages (such as Blundell *et al.,* 1999; Lynch, 1992; Loewenstein and Splezer, 1999 and Pischke, 2001). While this approach gives a more accurate depiction of the returns to training, Lazear (2003) argued that there is no firm-specific training but that only the composition of skills needed by the firm may be specific. This is true in the case of knowledge work where it is difficult to distinguish between general and specific training as the training received often comprises both types of skills.[99]

In terms of research findings, the general consensus among studies in the US is that there is a significant positive relationship between training and wage growth, as shown in Altonji and Spletzer (1991), Bartel (1995), Barron, Black and Loewenstein (1989), Brown, (1989), Parent (1999), Lynch (1992), Lillard and Tan (1986) and Krueger and Rouse (1998). Similar results are found in the UK (Greenhalgh and Stewart, 1987; Booth, 1991, 1993; Blundell, Dearden and Meghir, 1996) and other

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[98] There are other explanations on why wages are relatively upward-sloping. Stiglitz (1975) and Lazear (1981), for instance, discuss how firms offer upward-sloping wage profiles to discourage "shirking" among their workers. Others have also examined the importance of job matching (Jovanovic, 1979) in explaining upward-sloping wage profiles.

[99] From the informal interviews conducted with the knowledge workers, most of them perceived the skills obtained from training to be quite general in nature or transferable to other employers, despite acknowledging that the training received is related to their job scope

European countries as shown in Barth, (1997), Goux and Martin, (2000) and Regner (2002) for Norway, France and Sweden, respectively.

Some studies in this branch of literature also examine the impact of training on starting wages. The human capital theory predicts a negative relationship between training and starting wage. But results obtained from empirical studies are generally mixed. Sicillian (2001) and Barron *et al.* (1999) found that training lowers the starting wage; Parsons (1989. as quoted by Barron *et al.*, 1999) finds a positive relationship whereas Bishop (1988) and Holzer (1990) find no statistically significant relationship between training and starting wage.

Another reason why previous studies on training effects often focus on wage growth is because under the human capital theory, wages fundamentally reflect worker productivity. In a perfectly competitive labour market, workers are paid the value of their marginal productivity; thus, wages are an acceptable proxy for productivity. Studies that opt for this approach, such as Lillard and Tan (1986), Bartel (1995), Black and Lynch (1996), Barron *et al.* (1997) and Blundell *et al.* (1999) all report positive impacts of training on worker productivity.

But despite its wide application, this approach has several shortcomings. Firstly, the labour market is not perfect and in practice wages may not necessarily reflect the workers' productivity level.[100] The presence of frictions, such as deferred compensation, for instance, may cause the wages paid to the workers to be different than their actual marginal productivities. The restrictive assumption of a perfect labour market is also inconsistent with the observation that companies do provide

[100] Alternatively, there are other theories that attempt to explain why wage and productivity profiles may not be equal, such as the 'incentive-based' theory (Lazear, 1981), the 'self-selection' theory (Salop and Salop, 1976) and the 'job matching' theory (Jovanovic, 1979).

general training. As noted in the last chapter, Acemoglu and Pischke (1998) showed that when wages are compressed, firms are able to pay a wage rate different than the workers' marginal productivity level. Secondly, the use of self-reported training data in itself has been met with several criticisms. As mentioned, workers may not be able to recall accurately their earnings or training activities, and there may also be some bias in responses, all of which may lead to an inaccurate depiction of productivity.

Following these limitations, several studies have taken the approach of measuring productivity directly in their examination of training effects. An example would be the use of productivity ratings by Barron *et al.* (1989) and Groot (1999) where productivity is compared before and after training, or between employees who have and have not participated in training. But this approach, too, has its drawbacks in that the measures tend to be subjective in nature and comparison between companies or within companies over time is not possible. Moreover, since information is commonly obtained from the managers' subjective evaluations, some bias in response may also arise.

One way to avoid these problems is to use firm-level data, such as total output or value-added per employee, and to estimate the effects of training via the Cobb-Douglas production function. Studies adopting this approach constitute the bulk of the literature, which among others, include Alba-Ramirez (1994), Bartel (1989), Ballot, Fakhfakh and Taymaz (2001), Barrett and O'Connell (2001), Black and Lynch (1996), Conti (2005), Dearden, Reed and Van Reenan (2005), Tan and Batra (1996),

Turcotte and Rennison (2004), Rogers and Tseng (2000). Most of these studies found a positive significant effect of training on productivity.[101]

In Malaysia, from the limited number of studies on training (Hashim, 2001; Tan and Batra, 1996; Wan, 2001; Wan Abdullah, 1994; World Bank, 1997), only one, to the best of our knowledge, analyzes the effects of training on the individuals. Using two waves of the Malaysian Family Life Survey (MFLSs), Chung (2004) augmented the Mincerian earnings function with information on training experience to estimate the private returns to training for Malaysian women in the 1980s. Training was found to be positive and highly significant, indicating a 32 percent increase in earnings if the individual woman had participated in a job-related training programme. This large return to training is possibly due to an upward bias should training participation be associated with unobserved characteristics possessed by women that are positively correlated with earnings.

The current study examines both earnings and productivity effects of training. In the first analysis, simple OLS estimations are used to see whether or not a positive relationship exists between training and earnings. In the second analysis, a qualitative measure of productivity based on the knowledge workers' perception of their ability to perform certain tasks (details below) is adopted. This qualitative measure seems relevant to indicate the features of knowledge work and to understanding how training affects the productivity of knowledge workers in MSC Malaysia. However, this analysis differs slightly in that it seeks to examine the impacts of different kinds of

[101] As no quantitative measure of productivity is available, this approach is beyond the scope of the current study. For a review of these literatures, see Asplund (2005).

training participation on productivity. The reason being, productivity is observed only for trained knowledge workers in this case. Specifically, the hypotheses are:

Hypothesis H6.1

There is a positive relationship between training participation and the knowledge workers' earnings level.

Hypothesis H6.2

There is a positive relationship between (different kinds of) training participation and the knowledge workers' productivity level.

Before presenting the variables, methods and results for each of the two outcomes of training, it is important to comment on several aspects of the data set that prevent the analyses from being more detailed and that could raise bias concerns. First, given that the study is based on cross-section data for a period of one year only, the focus is restricted to the levels rather than growth of the training outcomes. Second, the problem of endogeneity of training and selectivity bias cannot be dealt with due to the use of cross-section data and the difficulty of finding a suitable instrument to implement the instrumental variable (IV) method. Third, given the limited number of respondents, the analysis is performed on the knowledge workers as a whole and not differentiated by gender or the firms' ownership.

Finally, while it is common for analyses of training impacts to utilize a linked employer-employee dataset, the current study does not trace the knowledge workers back to their firms mainly because (1) the number of respondents is small for both surveys *SQ1* and *SQ2*; (2) the results of the pilot study indicated that it would be difficult and unfeasible to collect information on earnings and productivity as knowledge work is unstructured and hard to measure; and (3) furthermore, an attempt

to gain data on productivity from the Managers yields inconsistent information (see Section 6.4). Thus, analysis on the impacts of training is only conducted from the standpoint of the recipients.[102]

6.3. Impact of Training on Earnings Level

6.3.1. The Model and Empirical Specifications

To examine the impact of training on wages, a Mincer earnings function augmented by a measure of training is estimated:[103]

$$w_i = \beta X_i + \alpha T_i + \varepsilon_i \qquad (6.1)$$

where the subscript i denotes the individual knowledge worker, w is the natural logarithm of monthly wages, T is a dummy variable reflecting training participation, X is a vector of other variables that include individual, job and workplace characteristics deemed to affect earnings and ε is the error term. Given the purpose of this study, interest is placed on the sign and significance of the parameter α. A positive and significant estimated coefficient would indicate that participation in training is associated with higher earnings, and thus, supports hypothesis H6.1. Conversely, a negative and significant estimated coefficient would indicate a negative correlation between earnings and training participation.

A consistent measure of α, however, is often difficult to obtain due to endogeneity in training. Endogeneity occurs when an independent variable included

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[102] As mentioned in Chapter 3, some knowledge workers who responded to the *SQ2* do not have a matching response from their employers.

[103] The Mincer equation is a standard tool in human capital theory to explain earnings. In the original wage regression, potential experience (measured by age - years of schooling divided by school starting age) and its squared value are used. Other studies commonly use age and its squared value as proxy. In this study, however, only the variable age is included as the squared value of age has an extremely high standard error.

in the model is potentially correlated with the error term (Wooldridge, 2001). Here training may be endogenous if the decision to participate in training or not is correlated with unobservable characteristics that affect wages. For instance, more able knowledge workers or those with higher degree of work commitment may be more likely to participate in training and therefore receive higher wages, ceteris paribus. Likewise, employers may offer training (and consequently, higher wages) to personnel with greater prospect of high productivity. The effect of training is, thus, a mixture of the participants' propensity to attend training and the effects of the training itself. As a result, the estimates of the training effects will tend to overestimate the actual impact of training on the knowledge workers' earnings. Failure to control for this correlation will yield an estimated training effect on wages that is biased upward (or positively biased) in that the observed value is higher than the true value. Such is the case for knowledge workers in MSC-status companies; while most are randomly assigned by their superiors to undergo training, some have the opportunity to do so on their own preference. The latter often takes place in larger companies with more resources to provide training for their workers on a regular basis.

Given this possibility of self-selection into training programmes, the variable T will be correlated with the error term, ε in equation 6.1, hence the endogeneity problem, causing the OLS estimation of α to be inconsistent and biased. The effect is that there will be unobserved differences between participants and non-participants of training that are also correlated with their earnings. If these unobserved differences are not accounted for, then an empirical analysis of the relationship between training participation and earnings will reflect the bias of the unmeasured differences; thus, it will not be possible to draw conclusions as to how training participation affects worker earnings.

The common approach to control for endogeneity is to use the instrumental variable (IV) method.[104] Although it would be ideal to be able to address this issue, the current data set does not permit one to do so. Firstly, none of the existing variable is a credible or satisfactory instrument for training and a new instrument (such as lagged training) could not be created due to the cross-section nature of the data. This is an important condition since the magnitude of the IV standard errors depends, among other things, on the quality of the instruments and has a tendency to be larger than the OLS standard errors (Wooldridge, 2002: 102). Secondly, researchers often rely on large samples to justify the use of IV method such as the two stage least squares (2SLS). One of the reasons for this is that the IV estimator does not have an expected value when the number of instruments equals the number of explanatory variables (Wooldridge, 2002: 101). Since the current analysis was restricted by a small sample to work with, the IV method is not deemed feasible and eventually, concentration was made on the OLS analysis.

For the purpose of this analysis, ten models are regressed using the OLS method. The basic specification (Model 1) controls for the knowledge worker and firm characteristics. These characteristics are then augmented with two broad measures of training to analyze the impact of training on worker earnings –one is participation in *any* training and the other is participation in more than three training sessions (Model 2 and 3, respectively). The rest of the models incorporate alternative measures of training (details below) to examine whether or not each of them have any significant impact on the knowledge workers' earnings level. For these models, the sample size is smaller ($n = 76$) as information was only obtained from respondents

[104] Given that the data set is not a panel, fixed effects cannot be performed.

who had undergone training and with known firm ownership. Accordingly, the number of predictors included in the models was reduced to maintain the degrees of freedom.

6.3.2. Variable Descriptions

A description of all the variables used in this analysis is provided in Table 6.1. Earnings are measured by the knowledge workers' natural log of monthly wages following Bartel (1995), Lynch (1992) and Rosholm, Nielsen and Dabalan, (2007).[105] This dependant variable is regressed on a set of socio-economic characteristics, which include age, gender, education level, the worker's hierarchical position, tenure and number of hours worked.[106]

Age (*AGE*) is measured in years whereas tenure (*TENURE*) is measured in months to take into account knowledge workers who have just recently started working with their current employer. The squared terms for age (*AGESQ*) and tenure (*TENURESQ*) are included to see whether the correlation between these variables and earnings follow a concave or convex line. To measure education (*DEGREE*), a binary variable is used with value 1 if the knowledge worker has at least a degree qualification (this includes professional certificate) and 0 if otherwise.

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[105] Similar results are obtained when using the log of hourly wages

[106] Other important variables such as experience, experience squared, employment status and overseas qualification were also included in alternative versions of the regression model. These variables, however, were dropped from the final model as they do not contribute to the goodness-of-fit of the models and lead to lower AICs compared to when the current variables are used.

Table 6.1 Model specification for training and earnings

Dependent variable	Measure	
LNWAGE	Natural log of monthly wages	
Independent variables	**Measure**	**Expected sign**
AGE	Age of the KW (in years)	Positive
AGESQ	Squared age of the KW	Negative
GENDER	1 if male, 0 if female	Positive (male)
DEGREE	1 if the KW has at least a degree (including professional certificates), 0 if otherwise	Positive
MANAGER	1 if the KW holds any management or managerial position, 0 if otherwise	Positive
TENURE	The total number of months working with the current employer	Positive
TENURESQ	Squared tenure of the KW	Negative
HOURSPM	The total number of hours worked in a month	Positive
OWNERSHIP	1 if employer is a foreign MSC-status company, 0 otherwise	Positive (foreign company)
TRAINED	1 if the KW participated in any training during the last 12 months, 0 otherwise	Refer to Hypothesis H6.1
TRAIN3	1 if the KW participated in more than 3 training sessions in the last 12 months, 0 otherwise	
INHOUSE_FOR	1 if participated in in-house training (with foreign trainers) provided by the employer, 0 otherwise	
INHOUSE_LOC	1 if participated in in-house training (with local trainers) provided by the employer, 0 otherwise	
EXTERNAL	1 if participated in external training, 0 otherwise	
SPECIFIC	1 if participated in specific training, 0 otherwise	
GENERAL	1 if participated in general training, 0 otherwise	

The next variable relates to the hierarchical position of the knowledge workers. Past studies often classify workers into "lower" or "higher" level position. This kind of distinction, however, does not apply to knowledge workers as they perceive themselves as equal with total authority in deciding "how to do what" (Gregerman, 1981; ILO, 1997). Thus, the so-called ranks of the knowledge workers are differentiated by whether or not they hold any management or managerial post in the organization (*MANAGER*).

Following past studies (Alba-Ramirez, 1994; Barron *et al.,* 1999; Dearden *et al.,* 2005), a worker's earnings may also be affected by how long he or she works. But unlike manual workers whose remunerations may be attached to the number of hours worked, knowledge workers are not explicitly paid according to how long they work.

This is because the conduct in knowledge work is hard to measure, which explains why most of them do not receive additional payment when working overtime.[107] Nonetheless, given the lack of studies on this matter, the current study adopts the conventional view that wages are often measured by the hourly wage (*HOURSPM*).

Firm ownership (*OWNERSHIP*) is also included to capture any difference in wage levels between knowledge workers at local and foreign MSC-status companies. A binary variable is used to indicate whether or not the firm is foreign-owned.

The remaining variables in the shaded cells relate to training. These include participation in *any* training (*TRAINED*), participation in more than three training sessions (*TRAIN3*), whether the training was externally provided (*EXTERNAL*) or internally provided by either foreign trainers (*INHOUSE_FOR*) or local trainers (*INHOUSE_LOC*) and whether or not the training received was general or specific in nature (*GENERAL* and *SPECIFIC*, respectively). All of these training variables are expected to have a positive relationship with earnings.

6.3.3. Empirical Results

Appendix L presents the descriptive statistics of all key variables in this study. From the total knowledge workers who responded to the *SQ2*, sixty-five percent participated in training in 2007. The average 'trained' knowledge worker is 30 years old, a Malaysian male working on a permanent contract and has a Bachelor degree qualification. Knowledge workers who participated in training are mostly young (less than 45 years), have a longer tenure than non-participants, earn slightly more and are

[107] Informal interviews with the knowledge workers (mainly engineers and designers) reveal that their monthly salaries remain the same regardless of how long they worked during the month. What motivates them to work long hours is their passion for their work and to gain recognition on the job, which may spin-off from their exerted efforts.

even found to be promoted more than those who did not participate in any training. These trends seem to be in line with the human capital theory.

In this section, the impact of training participation during the last twelve months prior to the survey on the natural log of monthly wage levels of knowledge workers in MSC Malaysia is presented. For all the OLS estimations, the White's test failed to reject the null hypothesis of homoscedasticity at conventional confidence levels and the normality assumption of the error term is met. In the basic model (Model 1), age, gender, education level, managerial position, tenure and number of hours worked all have the expected signs and play a significant role in influencing earnings. Foreign ownership is also associated with higher earnings but this factor is not significant.

The human capital theory suggests that trained workers should receive higher earnings than workers who do not participate in training. This is observed for the current sample where participation in any training leads to an increase in earnings by 3 percent; however, the effect is not significant. In fact, the inclusion of this training variable reduces the overall fit of the model slightly (adjusted R^2 is reduced from 0.722 to 0.720). But when training is measured in terms of the number of training sessions attended in the last 12 months (Model 3), earnings increase by 10 percent and the overall fit of the model improved slightly to 0.726 although the effect is also insignificant.

Given these non-significant relationships between training and earnings, additional models incorporating alternative measures of training are also regressed to examine whether or not each of these different aspects of training have any significant impact on the knowledge workers' earnings level (Models 6 to 10). But given the

smaller sample size used in these models, some the variables are excluded to preserve the degrees of freedom. These variables are age squared, tenure and tenure squared.[108]

Table 6.2 reports the regression results for all the OLS models. It can be seen that all of the training variables have the expected signs except for *EXTERNAL* where participation in external training is found to have a negative return to earnings. This association can be explained by the fact that when sent for training that is conducted outside of the organization, knowledge workers may incur a loss of productivity as they are not able to perform their usual jobs and thus, receive lesser pay for that duration of time. Nonetheless, this effect is not significant.

The rest of the training variables adhere to theoretical expectation and have a positive impact on training but only one has a significant relationship, that is, when training is conducted internally by foreign trainers (*INHOUSE_FOR*). From the analysis, it was found that knowledge workers who received training from foreign trainers increase their earnings by 17 percent ($p < 0.05$). Interestingly, their counterparts who participated in similar training but with local trainers only have increased earnings by 11 percent and this association is not significant. These findings seem to suggest that foreign trainers are more experienced or better at conveying technical ideas compared to local trainers. This is not that surprising as most of these trainers are expatriates brought in by the MNCs from their countries of origin.

[108] Although ideally the same independent variables should be maintained in all the models, these variables are excluded based on the justification that they reduce the overall fit and AIC of the models when the respective training variables are included.

Table 6.2 Regression results of the impact of training participation on knowledge worker earnings

Dependent variable: natural log of monthly wages

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CONSTANT	3.820***	3.885***	4.003***	5.744***	5.820***	5.352***	5.211***	5.348***	5.280***	5.208***
	(0.418)	(0.405)	(0.404)	(0.288)	(0.288)	(0.348)	(0.440)	(0.382)	(0.386)	(0.412)
AGE	0.167***	0.162***	0.157***	0.050***	0.048***	0.065***	0.067***	0.066***	0.065***	0.068***
	(0.024)	(0.023)	(0.023)	(0.009)	(0.008)	(0.009)	(0.012)	(0.011)	(0.011)	(0.011)
AGESQ	-0.002***	-0.002***	-0.002***	-	-	-	-	-	-	-
	(0.000)	(0.000)	(0.000)							
GENDER	0.209***	0.206***	0.206***	0.154**	0.163**	0.141*	0.139	0.133	0.139	0.142
	(0.062)	(0.064)	(0.061)	(0.067)	(0.065)	(0.083)	(0.086)	(0.084)	(0.085)	(0.085)
DEGREE	0.258***	0.251***	0.243***	0.244***	0.240***	0.344***	0.374***	0.355***	0.348***	0.329***
	(0.076)	(0.078)	(0.080)	(0.079)	(0.078)	(0.097)	(0.120)	(0.129)	(0.111)	(0.117)
MANAGER	0.292***	0.301***	0.304***	0.322***	0.318***	0.303**	0.279*	0.304*	0.269*	0.293*
	(0.099)	(0.105)	(0.097)	(0.115)	(0.107)	(0.149)	(0.158)	(0.157)	(0.158)	(0.155)
TENURE	0.007**	0.007**	0.007*	-	-	-	-	-	-	-
	(0.003)	(0.003)	(0.003)							
TENURESQ	-0.000**	-0.000**	-0.000**	-	-	-	-	-	-	-
	(0.000)	(0.000)	(0.000)							
HOURSPM	0.002**	0.002**	0.002*	0.002**	0.002**	0.002	0.002*	0.002	0.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
OWNERSHIP	0.013	0.016	0.005	0.026	0.009	0.114	0.114	0.137	0.140	0.144
	(0.069)	(0.069)	(0.068)	(0.070)	(0.069)	(0.1002)	(0.103)	(0.104)	(0.094)	(0.095)
TRAINED	-	0.033	-	0.104	-	-	-	-	-	-
		(0.071)		(0.076)						
TRAIN3	-	-	0.105	-	0.170**	-	-	-	-	-
			(0.065)		(0.069)					
INHOUSE_FOR	-	-	-	-	-	0.172**	-	-	-	-
						(0.084)				
INHOUSE_LOC	-	-	-	-	-	-	0.118	-	-	-
							(0.089)			
EXTERNAL	-	-	-	-	-	-	-	-0.065	-	-
								(0.084)		
SPECIFIC	-	-	-	-	-	-	-	-	0.064	-
									(0.072)	
GENERAL	-	-	-	-	-	-	-	-	-	0.116
										(0.083)
N	113	113	113	113	113	76	76	76	76	76
R^2	0.744	0.745	0.751	0.688	0.700	0.696	0.687	0.679	0.679	0.687

Adjusted R^2	0.722	0.720	0.726	0.667	0.680	0.665	0.654	0.646	0.646	0.654
F-statistic	33.294	29.762	30.717	33.039	35.000	22.254	21.292	20.593	20.594	21.274
Prob (*F*-statistic)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: White standard errors in parentheses; ***statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level

To confirm the impacts of the two broad training measures earlier i.e. *TRAINED* and *TRAIN3*, these variables are regressed again under the alternative specification (Models 4 and 5). It was found that while the effect of participation in *any* training remains insignificant, participation in more than three training sessions brings about a positive and significant impact on earnings ($p < 0.05$). In other words, training has a significant positive impact on earnings if seniority between the knowledge workers is ignored. Otherwise, an increase in earnings may not only be due to training but more significantly, due to the fact that the knowledge worker has longer tenure with the company.

Apart from training, other factors that significantly affect wage levels are the knowledge workers' age, gender, education level, managerial position, tenure and total hours worked. Older knowledge workers are expected to earn more than their younger counterparts as every additional year relates to an increase in earnings between 5 to 17 percent but at a decreasing rate. In terms of academic qualification, knowledge workers with at least a degree qualification earn 24 percent or higher wages than their colleagues without a degree.[109]

As expected, monthly wages are also significantly higher among knowledge workers with managerial posts (who earn around 30 percent more) and among those with longer tenure. Additionally, the earnings of knowledge workers appear to be significantly different for men and women but only in Models 1 to 6. However, no significant

[109] An alternative measure of education i.e. overseas degree was also regressed in all the models, which resulted in a similar significant impact on earnings. This seems to support the general impression that Malaysian employers prefer recruiting workers with a foreign qualification (Gomez, 2008) as they are believed to be more productive and skilled.

difference was found in earnings between knowledge workers employed at foreign and local MSC-status companies.

Knowledge workers who work for longer hours are also rewarded with higher earnings although the effect is small. Informal interviews with the respondents suggest that their wages do not depend on, or commensurate with, working hours. However, the study result shows that more payment is received the longer the knowledge workers worked; hence, this additional income is in tune with the literature that wages are measured by the number of hours worked. An alternative explanation for this is to view the higher payment as a 'reward' for the knowledge worker for their extra efforts beyond what is required of him/her at the workplace.

Overall, it is encouraging to see that most of the estimated coefficients (except training) remain comparable in magnitude, sign and significance between alternative models. This indicates that results are somewhat robust and that the training variables add explanation without altering other coefficients. Furthermore, the *F*-statistics are significant and the models fit the data well as indicated by the adjusted *R*-squared.

To conclude, although training generally bears no significant impact on the earnings of knowledge workers, in certain cases where participation in training is high (i.e. more than three training sessions) and when training is conducted internally with foreign trainers; training does have a positive significant impact on the knowledge workers' earnings level. Therefore, Hypothesis H6.1 is partially supported.

6.4. Impact of Training on Productivity Level

6.4.1. Measuring Productivity for Knowledge Workers

In a conventional setting, productivity is measured by output per labour hour. Unfortunately, no data is available from the current sample to derive this standard measure of worker productivity because in knowledge work, there is not necessarily a direct link between labour input and units of output (Gordon, 1997). Moreover, the non-routine nature of knowledge work makes it harder to observe and measure (Davenport and Prusak, 2000; Gregerman, 1981) although efforts have been made to measure knowledge worker productivity (Thomas and Baron, 1994).[110] Compared to studies on the productivity of manual workers that have existed for nearly a century since Frederick Taylor's (1911) work on scientific management, literature on knowledge worker productivity is still in its nascent stage. Researchers have based their methods for measurement on a number of productivity dimensions, such as quality, outcome and cost, but the only common agreement to date is that there are no effective and practical methods to measure knowledge worker productivity (Drucker, 1999; Schroeder, Anderson and Scudder., 1985).

Responses obtained from the *SQ2* support this as most of the knowledge workers themselves were unsure of how their productivities are being 'measured' by their employers. Some gave more than one measure, while others gave contradictory measures

[110] There are, in fact, questions on the measures of productivity (Questions C14 and C15) which attempt to provide a numerical account of worker productivity. Unfortunately, the responses are insufficient to enable proper analysis, due to the knowledge workers' uncertainty on how their productivities are being measured by the employers.

even when they are employed by the same company. Table 6.3 summarizes the main productivity measures employed by the MSC-status companies.

Table 6.3 Measures of productivity for knowledge workers in MSC Malaysia[a]

	Employer Ownership			
	Local MSC-status companies		Foreign MSC-status companies	
Productivity measure	N	%	N	%
Number of projects completed per worker	27	*32.5*	22	*46.8*
Number of hours worked per worker	8	*9.6*	3	*6.4*
Number of output produced per worker[b]	41	*49.4*	18	*38.3*
Amount of sales generated	5	*6.0*	2	*4.3*
Key Performance Index (KPI)	1	*1.2*	-	-
Number of tasks performed on time	1	*1.2*	2	*4.3*
Total[c]	83	*100.0*	47	*100.0*

Note: [a] As provided by the knowledge workers based on their experience with current employers; [b]'Output' is measured in terms of tasks that are expected from the knowledge workers, such as analytical reports and submission of graphic designs; hence, it is also known as the "number of tasks completed" in the main text; [c]Total respondents include those that did not participate in any training in the last twelve months

The most common productivity measures adopted are *number of projects completed* and *number of tasks completed*. As seen in Table 6., the scope of the productivity measures adopted is broad and ambiguous. Due to this, the conventional output measure is inappropriate for the current analysis, and thus, a qualitative measure of productivity was used as the dependent variable.

To measure productivity, the knowledge workers were asked how participation in training affected their productivity in terms of ability to undertake various tasks, via the question: *"In your opinion, which of the following are the outcomes of training that you participated in?"* Four non-mutually exclusive categories of productivity outcomes are provided to measure the knowledge workers' perceptions on how participation in training has affected their productivity level in terms of their ability to: (1) reduce mistakes on the job (*NOMISTAKE*); (2) complete tasks on time (*ONTIME*); (3) carry out more workload

than required (*WORKLOAD*) and (4) refresh existing knowledge and skills (*REFRESH*).[111]

The respondents are able to choose more than one answer. Although these categories measure different aspects of knowledge worker productivity, they all imply increased job performance (or productivity). For instance, knowledge workers who admit to being evaluated using 'output produced' or 'projects completed' may find that training reduces their mistakes on the job. This refers to increased efficiency, which could lead to an increase in job performance.[112] Compared to conventional measures of production, these measures are more appropriate in the current context as they capture the essence of productivity in knowledge work (and not the value of output produced), despite being perceived by the knowledge workers' themselves.[113]

This technique (but not the categories) is similar to the one used in Heng *et al.* (2006). However, the current study differs in three aspects. Firstly, this analysis focuses on a specified target respondent (knowledge workers) and not on the general labour market. Secondly, it looks at both the productivity and wage effects of training whereas the former study measures only the productivity effects of training for workers in

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[111] There are initially five options to choose from including the "ability to improve job performance". Compared to the other four categories of productivity outcome, which are distinct and objective, this option is more subjective in nature, thus, provides an overall evaluation of what the knowledge worker *thinks* as the effect of training on their productivity. In addition to the five options, the respondents are also able to provide their own responses under 'Other', but the numbers of such answers were negligible to enable new categories to be created.

[112] Some knowledge workers, however, perceive these two items separately. Even when they have managed to reduce mistakes on the job, they may not feel that they have improved in their job performance. For instance, they may execute their jobs as usual but compared to their peers who are less productive, they may appear to be more productive to their superiors.

[113] Ideally, a reported task performance from the Managers is more relevant in indicating the knowledge workers' productivity; unfortunately, this information is not readily available and the scope of the *SQ2* was restricted to the knowledge workers only.

Singapore. Third and most importantly, while the former study focuses on the effects of personal and job characteristics, this study also examines the effects of training on the probability of experiencing the training outcomes.

6.4.2. Estimation Procedure

The purpose of this analysis is to examine the impacts of different kinds of training participation on knowledge worker productivity. Since each of the four categories of productivity outcome (the dependent variable) is measured by a binary variable, a logistic regression model is used:

$$\ln\left[\frac{p}{1-p}\right] = \alpha + \beta X + e \qquad (6.2)$$

where p is the probability that the event occurs, that is, if the trained knowledge worker experiences the productivity outcome; $\frac{p}{(1-p)}$ is the "odds ratio", where it compares the probability of knowledge workers experiencing the productivity outcome (event occurs) with the probability that they do not (event did not occur); $\ln\left[\frac{p}{(1-p)}\right]$ is the log odds ratio or "logit" of the event occurring and X is the matrix of personal, work-related and training-related factors described earlier.

Given that the logistic distribution constrains the estimated probabilities to lie between 0 and 1, the estimated probability is

$$p = \frac{1}{\left[1+\exp(-\alpha-\beta X)\right]}. \qquad (6.3)$$

The Maximum Likelihood Estimator (MLE) is the statistical method used to estimate the coefficients of this model. The likelihood function (L) measures the probability of observing the particular set of dependent variable values ($p_1, p_1, ...p_n$) that occur in the sample i.e. $L = \Pr ob(p_1, p_2, ...p_n)$, so the higher the L, the higher the probability of observing the ps in the sample.

The MLE also finds the coefficients (α, β) that make the log of the likelihood function $(LL < 0)$ as large as possible, or in other words, that make -2 times the log of the likelihood function (-2LL) as small as possible. As $\ln\left[\frac{p}{1-p}\right] = \alpha + \beta X + e$, the slope coefficients (βs) are interpreted as the rate of change in the "log odds". However, a more intuitive interpretation is the use of "odds ratio", that is, $\left[\frac{p}{1-p}\right] = \exp(\alpha + \beta X)$ where $\exp(\beta)$ predicts the change in odds (event) for a unit increase in the corresponding independent variable.[114]

Initially, the forward LR method is used to determine automatically the variables that significantly improve the probability of the observed results. As a data-driven method, this stepwise procedure runs the risk of modelling noise in the data and is considered useful only for exploratory purposes. To resolve this problem, other variables that are not deemed significant by the algorithm but have strong theoretic basis are also included in the model. The rationale behind this approach is to allow the current sample

[114] In the results section, the marginal effects of the estimated coefficients are also provided to supplement the interpretation of the odds ratios

of 80 plus observations to meet the minimum 10 to 1 ratio (Peduzzi *et al.*, 1996), which is necessary to validate the results. A total of four models are constructed, each representing one category of productivity outcome. In the results section, these models are presented in their final forms where only the best predictors are included in each model. To evaluate the impact of each training variable, the sign and magnitude of the coefficients assigned to each variable is examined.

A word of caution regarding the interpretation of results where selection bias exists i.e. the dependent variable is observed only for restricted and non-random samples, which in this case, are trained workers (Greene, 2008; Heckman, 1979). This problem arises when there is non-random sampling of training participants, that is, when workers can choose whether or not to participate in training based on unobserved personal characteristics, for *e.g.* enthusiasm and flexibility. Normally, selection bias can be corrected using the Heckman procedure but such method cannot be adopted here as the production equation is not linear in nature. Most importantly, training participation in this analysis is not measured by a single binary variable; rather, it is measured by six alternative indicators, which represents the different kinds of training that the knowledge workers participated in the last 12 months.

The fixed effects model is another method that is commonly used to correct for selection bias. This method assumes that the individuals' unobserved abilities do not vary with time. However, panel data is needed as information from before as well as after the training is required. Since the data in this study are cross-section, this rules out the use of the fixed effects model. Similar to Sørensen (2000), it is recognized that the results

obtained from this study will be the upper limits of the actual effects of training on the knowledge workers' productivity.

6.4.3. Description of the Variables

A description of all the variables used in this analysis and their expected signs are presented in Table 6.4. The independent variables are classified into two main groups. The first group shows the personal and work-related traits of the knowledge worker, which includes their age, gender, job tenure and firm ownership.[115] The last variable (*OWNERSHIP)* allows for differences in training participation between knowledge workers at local and foreign MSC-status companies. This variable was used instead of splitting the sample into local and foreign MSC-status companies because the latter would not yield robust estimates due to the small number of respondents.

The second group of independent variables is training-related. Previous studies often adopt a broad measure of training, namely a binary variable that takes the value 1 if a worker participated in training and 0 otherwise (Booth, 1993; Budria, 2004; Chung, 2004; Greenhalgh and Stewart, 1987; Heng *et al.,* 2006; Kawaguchi, 2005; Renaud, Lakhdari and Morin, 2004). Others prefer a more detailed measure, such as the number of courses attended (Arulampalam and Booth, 1997; Sørensen, 2000); the number of days participated in training (Bartel, 1995; Booth, 1991; Orrje, 2000) and the average hours of training (Frazis *et al.,* 2000; Veum, 1993; 1996).

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[115] Other personal and work-related variables were also included in the alternative models: education; occupation type; employment status; tenure; sub-sectors involved and number of hours worked. But due to the small sample size, these factors yield high standard errors and were not significant. Thus, they are excluded from the final model.

Table 6.4 Variable descriptions on training and productivity

Dependent variable	Measure	
PRODUCTIVITY OUTCOME	1 = Able to reduce mistakes on the job (nomistake) 2 = Able to complete tasks on time (ontime) 3 = Able to carry out more workload than required (workload) 4 = Able to refresh existing knowledge and skills (refresh)	A binary variable for each category of the productivity outcome
Independent variables	**Measure**	**Expected sign**
AGE	Age of the knowledge worker	Positive
GENDER	1 if male, 0 if female	Positive (male)
TENURE	The total number of months working with the current employer	Positive
OWNERSHIP[a]	1 if employer is a foreign MSC-status company, 0 otherwise	Positive (foreign company)
JOBSCOPE	1 if participated in training that is directly related to job scope, 0 otherwise	Refer to Hypothesis H6.2
EXTERNAL	1 if participated in external training, 0 otherwise	
INHOUSE	1 if participated in in-house training, 0 otherwise	
GENERAL	1 if participated in general training, 0 otherwise	
TRAIN2	1 if participated in 2-3 training sessions , 0 otherwise	
TRAINDAYS	The average number of days participated in training	

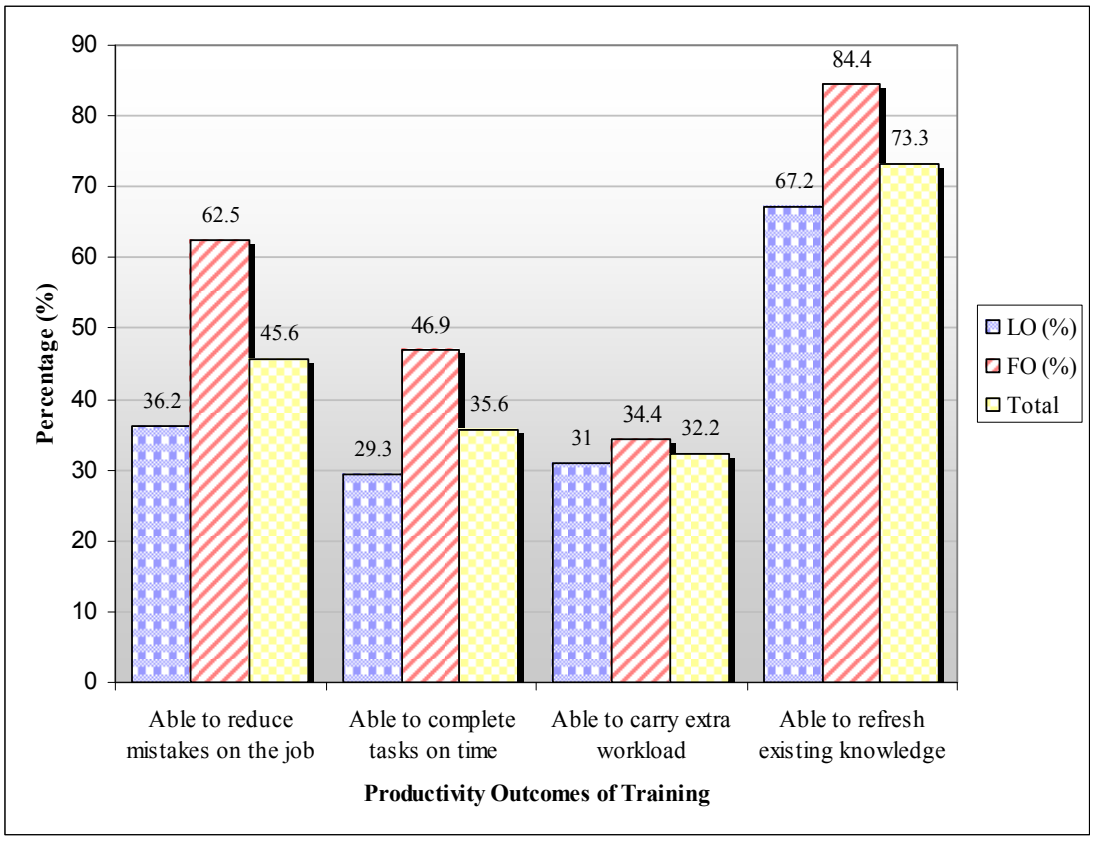
Note: [a]Includes Joint Venture companies

In this study, since information is collected only from the trained knowledge workers, the use of a dummy variable to indicate participation in training becomes redundant. Accordingly, emphasis is placed on multiple aspects of training participation. These include whether or not training is directly related to the knowledge workers' job scope, whether training is conducted in-house or external, whether training is general in nature, the number of training sessions attended and the number of days participated in training. These indicators were discussed in the previous section as well as in Chapter 4 with some of the variables slightly modified for the current analysis. The modified variables include *INHOUSE* (internal training is now not distinguished between local or foreign trainers), *TRAIN2* (as opposed to the use of *TRAIN3* in the previous analysis) and *TRAINDAYS* (initially a categorical data used in Chapter 4 but is transformed into a count data in the current analysis).

6.4.4. Findings

Figure 6.1 shows the percentage of positive responses i.e. those who responded 'yes' to each of the four productivity outcomes of training. The knowledge workers are clustered by firm ownership with multiple responses as to how participation in training has affected their productivity.

Figure 6.1 Productivity outcomes of training, by ownership of employer



Note: The percentage of positive response is calculated from total response (including 'no') for that particular productivity outcome. Total responses for local and foreign employed knowledge workers are N = 58 and N = 32, respectively. Total responses for each productivity outcomes are 41 (able to reduce mistakes on the job), 32 (able to complete tasks on time), 29 (able to carry extra workload) and 66 (able to refresh existing knowledge and skills), respectively.

The most frequently observed impact of training is in refreshing the participants' existing knowledge and skills (more than 70 percent of total respondents). This is

followed by improved abilities to reduce mistakes on the job (46 percent), to complete tasks on time (36 percent) and to carry extra workload (32 percent). Although these results are perceptive and subjective in nature, the incidence of *any* of these outcomes indicates that the knowledge workers have experienced improvement in their productivity as a result from training participation during the last 12 months.

Another interesting finding displayed in Figure 6.1 is that knowledge workers in foreign MSC-status companies (FO) seem to report higher productivity than their peers in local MSC-status companies (LO). This observation is supported by a chi-square test of the firms' ownership and the productivity outcomes in Table 6.5. From the table, it is apparent that knowledge workers in foreign MSC-status companies are more productive than those in local MSC-status companies after training participation, although the difference is only significant for their "ability to reduce mistakes on the job" (p<0.05). Little evidence of an association (significant only at the 10 percent level) was shown between firm ownership and the knowledge workers' ability to "complete tasks on time" and "to refresh existing knowledge and skills".

Table 6.5 Cross tabulation between productivity measures and firm ownership

	Ownership of MSC-status company:		Chi-square test	
Productivity measure	Local (N = 58)	Foreign (N = 32)	Pearson χ^2	p-value
Able to reduce mistakes on the job	21 (36.2)	20 (62.5)	5.748	0.017
Able to complete tasks on time	17 (29.3)	15 (46.9)	2.777	0.096
Able to carry extra workload	18 (31.0)	11 (34.4)	0.105	0.745
Able to refresh existing knowledge	39 (67.2)	27 (84.4)	3.096	0.078

To examine the impact of training on each of the productivity outcomes in more detail, a logistic regression is conducted. The estimation results are given in Table 6.6.

Table 6.6 Logistic regressions of the impact of training participation on knowledge worker productivity

	Dependent variable							
	NOMISTAKE		ONTIME		WORKLOAD		REFRESH	
Variables	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)
CONSTANT	-3.257	0.039	-4.683**	0.009	-3.644	0.026	0.613	1.846
	(2.213)		(1.863)		(2.221)		(1.913)	
	[-0.796]		[-0.993]		[-0.691]		[0.105]	
AGE	-0.071	0.931	-0.030	0.970	-0.077	0.926	-0.008	0.992
	(0.071)		(0.062)		(0.070)		(0.061)	
	[-0.017]		[-0.006]		[-0.015]		[-0.001]	
GENDER	0.713	2.040	1.239**	3.452	0.638	1.893	-0.734	0.480
	(0.590)		(0.596)		(0.598)		(0.576)	
	[0.174]		[0.263]		[0.121]		[-0.125]	
OWNERSHIP	1.176*	3.241	0.357	1.429	-0.334	0.716	1.506*	4.509
	(0.634)		(0.590)		(0.622)		(0.812)	
	[0.287]		[0.076]		[-0.063]		[0.258]	
TENURE	0.025**	1.025	0.008	1.008	0.032**	1.033		
	(0.010)		(0.012)		(0.014)			
	[0.006]		[0.002]		[0.006]			
JOBSCOPE	1.465**	4.328	1.894***	6.646	1.296**	3.655		
	(0.705)		(0.586)		(0.581)			
	[0.358]		[0.402]		[0.246]			
EXTERNAL	1.190	3.287	1.223*	3.397	1.071	2.918		
	(0.822)		(0.728)		(0.687)			
	[0.291]		[0.259]		[0.203]			
INHOUSE	3.277***	26.496	2.597***	13.423	3.099***	22.176	-0.385	0.680
	(0.843)		(0.732)		(0.824)		(0.595)	
	[0.801]		[0.551]		[0.588]		[-0.066]	
GENERAL	0.242	1.274	1.007*	2.737	0.943*	2.568	1.076**	2.933
	(0.586)		(0.525)		(0.569)		(0.547)	
	[0.059]		[0.214]		[0.179]		[0.184]	
TRAIN2							1.211*	3.357
							(0.721)	
							[0.207]	
TRAINDAYS							-0.036	0.965
							(0.029)	
							[-0.006]	
N	89		89		89		89	
H-L statistic[a]	3.968		8.506		7.346		6.629	
Prob (H-L stat)	0.860		0.386		0.500		0.577	
Model χ^{2b}	40.001		30.880		32.880		17.902	
Prob (Model χ^2)	0.000		0.000		0.000		0.012	
Log likelihood[c]	-41.234		-42.691		-39.737		-42.929	
McFadden R^2	0.327		0.266		0.293		0.173	

Note: robust standard errors in parentheses; marginal effects in square brackets calculated at the mean; ***p<0.001; **p<0.01; *p<0.1; [a]The H-L test for overall fit (also known as chi square test) is most recommended for small sample size and when the model contains continuous covariates. A finding of non-significance indicates that the model adequately fits the data. [b]The model chi-square (or the Omnibus test) is an alternative to the H-L test. It checks if the model with the predictors is significantly different from the model with only the constant. A finding of significance indicates that there is adequate fit of the data to the model. [c]The -2 log likelihood (-2LL) is the negative of the likelihood of the observed results, given the parameter estimates. It is analogous to the use of sum of squared errors in OLS regression and reflects the significance of the unexplained variance in the dependent variable (Menard, 1995).

All four models have significant model chi-square and good overall fit, as measured by the Hosmer and Lemeshow (H-L) test. The latter is preferred as it is recommended for small sample size and when the model contains continuous covariates. Since the H-L test reveals non-significance, it implies that at least one of the predictors is significantly related to the dependent variable. Additionally, the pseudo R-square, which measures the strength of association, also shows a relatively good fit of the model (McFadden, 1979). For each estimated coefficient, both the odds ratios and marginal effects are presented. The marginal effects, which are calculated at the mean, are provided since these give the change in the probability of moving to a particular productivity outcome. For binary variables, the marginal effects are calculated as the effect of a change in the variable from 0 to 1.

Specific results are discussed as follows. The positive signs for the gender coefficient for three of the productivity outcomes indicate that male knowledge workers are more likely to reduce mistakes on the job, complete their tasks on time and carry extra workload following participation in training. However, only the association with completing tasks on time is significant ($p<0.05$), where male knowledge workers are 26 percent more likely to experience this productivity outcome. As for job tenure, the present study found a strong positive relationship between the lengths of time (in months) employed by the current company with the probability of experiencing the productivity outcomes. Knowledge workers with longer tenure are 1 percent more likely to reduce mistakes on the job and to carry out extra workload (both significant at the 5 percent level).

Given the interest on firm ownership, it is interesting to find that knowledge workers employed by foreign MSC-status companies are 29 percent more likely to reduce mistakes on the job and 26 percent more likely to refresh their existing knowledge and skills from attending training than their peers at local MSC-status companies (both significant at $p<0.10$). As for age, the current study confirms that the older one gets the less likely for the individual to be more productive after training. Despite not being a significant factor on its own, this variable contributes to a better fit of all the models as it reduces the Akaike information criterion and the unexplained variance in the dependant variables.

With regards to training, the results show that different aspects of training affect different productivity outcomes significantly. When productivity is analyzed in terms of the knowledge workers' ability to reduce mistakes on the job (*NOMISTAKE*), only in-house and direct training are found to be significant. In particular, knowledge workers who participated in internal training (*INHOUSE*) are 80 percent more likely to reduce mistakes on the job ($p<0.01$). This is in sharp contrast with those who participate in external training (*EXTERNAL*) who are only 29 percent are more likely to experience this productivity outcome. A possible reason for this high probability is that in-house training may be more in line with the objectives of the company. In addition, the internal trainers may understand the knowledge workers better and be able to assist them in making greater progress upon completing their training sessions. Participation in training that is directly related to one's job scope (*JOBSCOPE*) is also positively related to this productivity outcome in that the knowledge workers are 36 percent more likely to make fewer mistakes on the job ($p<0.05$).

As for the impact on knowledge workers' ability to complete their tasks on time (*ONTIME*), all of the training variables included in the model are significant and with the expected signs. The most profound impact comes from attending training that is provided in-house (*INHOUSE*), 55 percent more likely to experience this productivity outcome compared to those who are not internally trained. The second biggest effect on productivity comes from training that is directly related to one's job scope (*JOBSCOPE*), where participants are 40 percent more likely to complete their tasks on time. Both of these effects are significant at $p<0.01$. External training (*EXTERNAL*) also plays a significant role here. It can be seen that participation in training that is provided externally increases the probability of experiencing this productivity outcome by 26 percent. This is followed by the impact of participating in general training (*GENERAL*) where it is associated with the knowledge workers being 21 percent more likely to complete their tasks on time. Both these effects, however, are only significant at the 10 percent level.

In terms of the knowledge workers' ability to carry extra workload (*WORKLOAD*), all but one of the training variables is found to be significant. Specifically, when knowledge workers attend in-house training (*INHOUSE*), they are 59 percent more likely to carry extra workload than required (significant at $p<0.01$). Additionally, participation in training that is directly related to job scope (*JOBSCOPE*) and one that improves general skills (*GENERAL*) increase the likelihood of a knowledge worker to carry extra workload by 25 percent ($p<0.05$) and 18 percent ($p<0.1$), respectively.

Finally, when productivity is measured by the knowledge workers' ability to refresh their existing knowledge and skills (*REFRESH*), only two training variables are significant.[116] One is participation in general training (*GENERAL*), where it increases the probability of experiencing this productivity outcome by almost 19 percent. This association is reasonable since general training may be regarded as a refresher course for the participants on skills that they have already acquired in the past. In addition, knowledge workers who participated in 2 to 3 training sessions (*TRAIN2*) were also able to refresh their existing skills and knowledge by over 20 percent compared to those without such training. The effects of these variables are significant at $p<0.05$ and $p<0.1$, respectively.

To conclude, there is a significant positive relationship between training and all the productivity outcomes, particularly training that is directly related to job scope, participation in 2 to 3 sessions as well as external, in-house training and general training. Therefore, the findings of this study fully support Hypothesis H6.2.

6.5. Impact of Training on Career Advancement

For some workers, achieving a certain position or rank within the organization is an important aspect of a job. Thus, apart from its impact on earnings and productivity, workers may also be concerned with how training affects their prospect for career advancement. The third analysis of training participation investigates this matter. While it is not possible to evaluate the progress of careers in this study since observations from

[116] For the fourth model, some adjustments were made with regards to the training variables to ensure a proper fit of the model to the data.

different points in time are required, it is possible 1) to determine the relationship between training participation and likelihood of receiving a promotion within the organization, and 2) to analyze whether or not training would affect the knowledge workers' intention to look for a new job.

6.5.1. Relevant Literature

Economic theories have long recognized the link between training and mobility of workers either between or within firms (promotion). To proceed with the discussion, it might be useful to start with the neoclassical view of the labour market. According to this model, the interaction between workers and firms determine the amount of wage (price) and employment (quantity) in the market. In equilibrium, workers are paid the value of their marginal productivities which are assumed to be equal in all firms. But as workers aim to maximize their utilities, they may change jobs (greater turnover) in response to the differing wage rates.

For the employer, turnover may not be an issue if the firm only requires a workforce to perform homogenous tasks. In such a case, the firm may easily find replacement workers with similar level of skills or human capital. In the knowledge-based industry, the firm operates in a competitive environment that relies on fast changing technology and involves highly specialized tasks. Consequently, turnover is a major cause for concern especially when the firm has already provided its workers with a set of firm-specific skills.

In relation to the human capital theory (Becker, 1962), this type of skill is a result of specific training, in which case the firm has an added incentive to maintain a long-term

employment relationship with the worker in order to realize its share of the training investment.[117] Realizing that in most cases workers quit due to wages, the firm may offer these workers a higher wage rate that is not easily matched by other potential employers. An alternative way for a firm to prevent, or at least reduce, the likelihood of turnover among its workers is to give them promotions. As shown in Hassink (1996), companies that encourage more internal mobility (promotions) may reduce their turnover costs. A promotion not only rewards the workers for their past performance, but motivates them to continue improving their firm-specific skills.

While promotions are perceived as a consequence of training investment in human capital theory, it is interpreted rather differently under the tournament theory. The models developed by Lazear and Rosen (1981) and Rosen (1986) view promotion as the prize in a tournament that can only be won by workers who rank higher than their peers of new hires in terms of productivity over a given period. Winners in this tournament are moved to higher positions that entail higher earnings, higher prestige as well as more responsibility. Since the new hires know that not all of them will be promoted, the odds of winning serves as an incentive for them to work hard without the need for any formal contract between workers and firm. Although the role of training is not emphasized in this theory, it can be assumed that workers may have to undergo some form of training in order to exert more effort in their jobs.

A third view that relates training to promotion is related to the internal labour market approach described by Doeringer and Piore (1971). To start off, an alternative to

[117] As discussed in the last chapter, more recent developments of the human capital theory has recognized that firms also pay for the workers' general training.

Becker's (1962) classification of training is adopted. In a study using personnel records of a large manufacturing company, Bartel (1995) distinguishes training into two main categories – 'core training' refers to training that is necessary to fulfil the basic requirement of a job and 'worker development training', which prepares workers for subsequent career advancement as it identifies their potential productivity. The latter has two effects on promotion.[118] The first is consistent with the human capital theory in that training directly increases the workers' likelihood of getting a promotion. The second relates to the screening theory, that is, as employers do not have complete information on the workers' productivity, training may serve as a screening device for them to choose which workers are worthy of a promotion. This provides an alternative explanation as to why some workers get promoted while others do not even when they all seem to exert similar levels of efforts on the job. The reason is simply that there might not be sufficient promotion opportunities than there are workers attending training.

In the event that a promotion is not received as anticipated, the worker may seek employment elsewhere where there are better opportunities.[119] As opposed to promotions which depend on the employers' discretion, the decision to change jobs is directly determined by the worker to maximize his or her expected lifetime earnings (Sicherman and Galor, 1990). With respect to the impact of training on turnover, the human capital theory postulates that investment in specific training reduces the workers' incentive to

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[118] This view was first pointed out by Dekker, de Grip and Heijke (2002) in their study on the effects of training and overeducation on career mobility in a segmented labour market.

[119] Mobility of workers between firms falls under the literature on job turnover, which in turn, can be voluntary or involuntary. Its incidence is mainly explained by the theories of job search (Burdett, 1978), job matching (Jovanovic, 1979) and human capital (Becker, 1962). For the purpose of this study, focus is placed on voluntary turnover and concerns how training may affect its occurrence i.e. the third theory.

quit a job as they too hold a share of the training cost (Becker, 1962; Mincer, 1962). However, should there be no implicit contract between employers and workers regarding the share in training costs and benefits, or when wages do not increase after training is undertaken, then the risk of mobility arises. Similarly, the internal labour market theory suggests that the higher the firm's need and reliance on specific skills, the more motivated is the firm to discourage turnover among its workers.

Following the theoretical development on this topic, empirical work on mobility within and between firms is quite extensive. Studies on promotion are often focused on its determinants and/or consequences, especially on wage growth following a promotion (Ferreira, 2009; Francesconi, 2001; McCue, 1996; Melero, 2004; Pergamit and Veum, 1999; Parent, 1999). There are also several studies examining promotion differences by gender (Cobb-Clark and Dunlop, 1999; Hersch and Viscusi, 1996). The likelihood of receiving a promotion is generally found to increase with education, tenure and firm size. With regards to tenure, however, studies such as Blundell *et al.* (1996) have pointed out the issue of endogeneity between promotions and tenure.

In terms of data, past empirical studies mainly focus on the internal labour markets or use data from individual firms (Baker *et al*., 1994; Dolton and Kidd, 1998; Hersch and Viscusi, 1996; Krueger and Rouse, 1998). While this sort of data set provides a clearer definition of promotion, the findings may not be representative of the entire labour market. Thus, others use longitudinal data on a sample of large firms (Topel and Ward, 1992; McCue, 1996; Francesconi, 2001).

Studies examining the impact of training on promotion, however, are limited where, to the best of the author's knowledge, only two have incorporated training among

the variables of interest. Pergamit and Veum (1999) found training to be significantly related to promotion through their analysis on the 1989 and 1990 samples of the National Longitudinal Survey of Youth (NLSY) in the US. Melero (2004), for twelve waves of the British Household Panel Survey (BHPS) found that training received by female workers boosts significantly their chances of being promoted in the near future. Others like Francesconi (2001) acknowledge that training opportunities may be a consequence rather than a determinant of promotion.

Most studies on worker mobility between firms have focused on the determinants of turnover (Shah, 2009; Topel and Ward, 1992; Weiss, 1984) and its role in workers' career development (Sicherman and Galor, 1990; Topel and Ward, 1992). Compared to studies on promotions, however, there are slightly more studies within this strand of literature that investigate the impact of training (*e.g.* Dolton and Kidd, 1998; Green *et al.,* 2000; Greenhalgh and Stewart, 1987; Goux and Maurin, 2000; Krueger and Rouse, 1998; Loewenstein and Spletzer, 1999; Lynch, 1991; Parent, 1999; Sieben, 2005; Zweimüller and Winter-Ebmer, 2000). Although most findings are consistent with theoretical expectation in that training reduces turnover, others found it to have little impact on mobility especially when training is measured on an aggregate level (Goux and Maurin, 2000; Green *et al*., 2000).

Based on the above arguments, the third hypothesis seeks to test whether or not participation in training has any impact on career advancement for knowledge workers in MSC Malaysia:

Hypothesis H6.3

There is a positive relationship between training participation and the knowledge workers' likelihood of receiving a promotion or wage increment

Hypothesis H6.4

Training plays an important role in the knowledge workers' anticipated mobility decision

6.5.2. On the Odds of Being Promoted or Receiving a Wage Increment

6.5.2.1. Model Specification

To measure career advancement, knowledge workers are asked in the *SQ2 "did you receive any promotion or wage increment in the last 12 months?"* Although a distinction between the two is ideal, both promotions and wage increments are assumed to be similar in terms of having improved one's position in his or her career. The decision to include wage increment also stems from the fact that knowledge workers may have encountered either one or the other circumstance in the last year. By broadening the concept of career advancement, more responses were able to be collected from the sample. The dependent variable, thus, takes the value 1 if the respondent was promoted or received a wage increment within the last twelve months and 0 otherwise.

Based on the findings of previous empirical works a positive relationship between training participation and promotion is expected. To test this hypothesis, a logistic model is used following Melero (2004):

$$\ln(ODDS) = \ln\left[\frac{p}{1-p}\right] = \alpha + \beta X + e \tag{6.4}$$

where $\ln\left[\frac{p}{1-p}\right]$ is the natural log odds ratio of the probability that the knowledge worker received a promotion or wage increment in the last twelve months and X is a vector of independent variables, including training, that is expected to affect career advancement. The logistic model is constructed by three blocks. The first estimates the likelihood of a promotion or wage increment based only on the traits of the knowledge workers such as age, gender and education; the second includes other characteristics of their jobs and firm such as tenure, employment status, total number of hours worked and firm ownership; and finally training participation is included.

Age and age squared are measured in years. Education is measured by a three-point categorical variable with *higher than degree* used as the reference category. Tenure refers to the knowledge workers' length of service with the same employer and is measured in months to take into account respondents who have only recently started working with their current employers. Employment status is measured by a binary variable, taking the value 1 if the knowledge worker is employed on a permanent contract basis and 0 otherwise. The total number of hours worked is used as a proxy for the knowledge workers' productivity level and commitment as it is assumed that workers who work longer hours are more likely to be rewarded by their superiors (Lazear and

Rosen, 1981; Rosen, 1986).[120] Both gender and firm ownership are binary variables taking the value 1 if the knowledge worker is male or if the firm is foreign-owned and 0 otherwise.

The main variable of interest is training attended by the knowledge worker within the last year, measured as a three-point categorical variable where the reference category is *no training*.[121] A description of all the variables used in the econometric analysis including their expected relationships with promotion or wage increment is presented in Table 6.7.

Table 6.7 Variable descriptions on training and promotion receipt

Dependent variable	Measure	
PROMOTION	1 if the KW received a promotion or wage increment in the last twelve months, 0 if otherwise	
Independent variables	**Measure**	**Expected sign**
AGE	Age (in years)	Negative
AGESQ	Age squared	Uncertain
GENDER	1 if male, 0 if female	Positive (male)
EDUCATION	Diploma	Positive
	Bachelor degree	
	Master degree or professional certificate (ref)	
TENURE	Tenure (in months)	Positive
TENURESQ	Tenure squared	Uncertain
PERMANENT	1 if the KW works on a permanent contract, 0 if work on temporary contract	Positive
HOURS WORKED	The total number of hours worked in a month	Positive
OWNERSHIP	1 if the KW works in a foreign MSC-status company, 0 if otherwise	Positive
TRAINING ATTENDED	No training (ref)	Positive
	Only 1 training session attended	
	More than 2 training sessions attended	

[120] This variable is used instead of 'overtime' because for most knowledge workers, such as engineers and consultants, they are not remunerated should they work more hours than required. Furthermore, working overtime is the norm rather than the exception for most knowledge workers.

[121] Several specifications of the training variables were initially tested in the model but only the categorical measure fits the data of the current sample well.

The model follows an iterative maximum likelihood procedure, which starts with arbitrary values of the regression coefficients to construct an initial model for predicting the observed data. It will then evaluate errors in such prediction and change the regression coefficients so as to make the likelihood of the observed data greater under the new model. This procedure is repeated until the model converges i.e. until the differences between the newest model and the previous model are insignificant.

6.5.2.2. Results

Almost two-thirds of the respondents reported that they received either a promotion or wage increment in the last year and out of this figure, over 70 percent have participated in at least one training session during the period (see Appendix L). To analyze the relationship between training participation and career advancement in more detail, a cross tabulation between the total number of training sessions attended and whether or not a promotion or wage increment has taken place is firstly constructed (see Table 6.8).

From the table, it is interesting to see that the proportion of respondents who received a promotion or wage increment is similar between those with no training and those who participated in only one training session (around 57 percent). However, the chance of being promoted increases notably for those who participated in more than two training sessions. As seen, over 80 percent of this group of knowledge workers receive a promotion or wage increment in the last year. These figures seem to support the highly specialized nature of knowledge work and that a certain amount of training is required for one to be considered competent in the area. In other words, knowledge workers would need to undergo quite a substantial amount of training before they can be deemed as

knowledgeable in their line of work and worthy of a promotion. Otherwise, those with minimal training (in this case, those who participated in only one training session) are not perceived any differently from those without any training.

Table 6.8 Cross tabulation between the total number of training sessions attended and whether or not a promotion or wage increment was received

Total number of training sessions attended		Received promotion or wage increment: No	Yes	Total
No training	Freq	22	30	52
	%	*42.3*	*57.7*	*100.0*
Only 1 training session	Freq	15	20	35
	%	*42.9*	*57.1*	*100.0*
More than 2 training sessions	Freq	12	49	61
	%	*19.7*	*80.3*	*100.0*
Total	Freq	49	99	148
	%	*33.1*	*66.9*	*100.0*

Chi-square tests

Pearson Chi-square	df	N	p-value
8.462	2	148	0.015

A chi-square test is also performed to assess the degree of association between the two variables. Since the observed significance level ($p = 0.015$) is less than the customary 0.05, the null hypothesis of no relationship between training participation and career advancement can be rejected.

To analyze this relationship further, a logistic regression model is used. The estimated coefficients and their corresponding odds ratios are presented in Table 6.9.

Table 6.9 Logistic regressions of the impact of training participation on the odds of being promoted or receiving a wage increment

	Model 1		Model 2		Model 3	
Variables	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio
CONSTANT	-4.856 (3.515)	0.008	-4.122** (3.684)	0.021	-2.515 (3.759)	0.081
AGE	0.310 (0.195)	1.363	0.035 (0.213)	1.035	-0.062 (0.219)	0.940
AGESQ	-0.004 (0.003)	0.996	-0.001 (0.003)	0.999	0.001 (0.003)	1.001
GENDER	-0.550 (0.391)	0.577	-0.541 (0.435)	0.582	-0.709 (0.458)	0.492
EDUCATION						
Diploma	0.631 (0.754)	1.879	0.975 (0.830)	2.650	1.050 (0.848)	2.857
Degree	0.275 (0.580)	1.317	0.297 (0.627)	1.346	0.208 (0.639)	1.231
TENURE			0.064*** (0.024)	1.066	0.066*** (0.024)	1.068
TENURESQ			0.000 (0.000)	1.000	0.000** (0.000)	1.000
PERMANENT			0.631 (0.623)	1.879	0.597 (0.639)	1.816
HOURS WORKED			0.014* (0.007)	1.014	0.012* (0.007)	1.012
OWNERSHIP			0.464 (0.472)	1.590	0.391 (0.485)	1.478
TRAINING ATTENDED						
Only 1 session					0.386 (0.544)	1.471
More than 2 sessions					1.195** (0.537)	3.302
LR statistics	5.804		21.155		26.524	
Prob (LR stat)	0.326		0.020		0.009	
-2LL	158.416		143.066		137.696	
Nagelkerke R^2	0.061		0.210		0.258	

Note: n=129; ***, **, * denote significant at the 0.01 level, 0.05 level and 0.1 level respectively; (ii) the reference knowledge workers are those below 25 years of age, those who have a Master degree or professional certificate, those who have worked with the current employer for a year or less and who did not participate in any training

From Model 1, it can be seen that worker characteristics alone are insufficient to influence the prospect of being promoted or receiving a wage increment. The first model did not have a very good fit, as shown by the LR statistic and likelihood ratio suggesting that other aspects of one's job, such as tenure, number of hours worked and participation

in training are also essential in career advancement. When these other factors are included in the analysis, the overall fit of the models improved tremendously. The goodness-of-fit of the more comprehensive Model 3 is higher than that of Models 1 and 2, indicating that investment in training is also an important factor of promotion or wage increment receipt for the current sample. The pseudo R^2 of Model 3 also shows that the model applied well to the sample data as it explained over 25 percent of the probability of receiving a promotion or wage increment. Even the likelihood ratio (-2LL), which is analogous to the sum of squared errors in OLS regression, is reduced in Models 2 and 3 with the inclusion of these other characteristics.

Specific results are as follows. The estimated coefficients are interpreted as odds ratios, where a one-unit change in the independent variable represents the factor by which the odds of a promotion or wage increment change.

The variable age follows the expected sign in the third model where the odds of being promoted or receiving a wage increment are reduced as one becomes older, which is consistent with past findings (Cobb-Clark and Dunlop, 1999). Additionally, similar to Hersch and Viscusi (1996), men are less likely to receive a promotion or wage increase than women for the current sample. The associations for both age and gender, however, are insignificant. Likewise, the coefficient on education is also insignificant.

In contrast, other aspects of the knowledge workers' job, namely tenure and number of hours worked are significant with the expected signs. According to Sicherman and Galor (1990), firm tenure has a positive effect on promotions. In line with this view, the odds of knowledge workers receiving a promotion or wage increment are higher for those with longer tenure compared to those with shorter tenure. This association is highly

significant at the 1 percent level. Meanwhile, knowledge workers who engage in longer working hours also increase their likelihood of being promoted or receiving a wage increment from their employers ($p<0.1$).

As for employment status and firm ownership, although these factors are not significantly associated with promotion receipt or wage increment, they show that knowledge workers on permanent contracts and those employed by foreign MSC-status companies are more likely to experience career advancement than those working on a temporary basis and those employed by local employers.

The result on training participation is consistent with past findings (Pergamit and Veum, 1999; Melero, 2004) where those who attended training have a higher odds of receiving a promotion or wage increment compared to those who do not participate in any training (reference category). Specifically for the current sample, the impact of training is greater for those who participated in more than two training sessions ($p<0.05$), where they are over three times more likely to receive a promotion or wage increment than those who do not participate in any training. This finding is in line with the cross tabulation result presented earlier (Table 6.8), where almost half of knowledge workers who received a promotion or wage increment in the last year consist of those who participated in more than two training sessions. Also similar to Pergamit and Veum (1999), the significant effects of both tenure and training in this study suggest that the acquisition of job-specific skills is strongly associated with promotion or wage increment.

It must be mentioned that the above so-called training impacts on promotion may not be a true effect as promotions may, in turn, be associated with periods of training. As noted by Francesconi (2001), training may be a consequence of promotion rather than its

determinant. Nonetheless, since the current data set is cross-sectional, such a distinction is difficult to be made in the analysis and thus, ignored.

6.5.3. On the Likelihood of Searching for a New Job

6.5.3.1. Estimation Procedure and Variables

Apart from promotions, knowledge workers may also improve their career paths by moving to employment elsewhere. Since most training related to knowledge-work is transferable to other employers (i.e. general in nature), knowledge workers may not hesitate to search for another job if a promotion is not received as anticipated. This study investigates whether or not training received at the current job has any significant influence on the knowledge workers' mobility decision. As actual mobility consists of voluntary quits and involuntary layoffs that are difficult to distinguish given the unavailability of such information from the MSC-status companies, this study examines mobility in terms of the knowledge workers' intention to look for another job.[122]

In the *SQ2*, those who underwent training are asked whether or not training had made them 'more likely', 'less likely' or 'neutral' to look for another job. Focusing on the first response, a probit regression model is used to estimate the impact of training on the knowledge workers' intended mobility. Past studies with similar specification include Loewenstein and Spletzer (1999) and Zweimuller and Winter-Ebmer (2000).[123]

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[122] Past studies that adopt this approach include Green *et al.* (2000) and Zweimüller and Winter-Ebmer (2000)

[123] The decision to use either the Logit or Probit specification is a matter of preference. As noted by Greene (2008), these models are essentially the same in terms of predictions. Alternatively, a multinomial logistic

To explain the mechanics of a probit model, it is often useful to start with the latent (unobservable) variable y^* where

$$y^* = x\beta + e \tag{6.5}$$

In this case, say that $y = 1$ if the knowledge worker who underwent training is more likely to search for another job and $y = 0$ otherwise. The variable y^* can be viewed as a propensity to search for another job whenever y^* exceeds a certain threshold (typically zero):

$$y = 1 \ \ if \ \ y^* > 0, \ \ y = 0 \text{ otherwise} \tag{6.6}$$

Under the assumption that e follows a standard normal distribution,

$$\begin{aligned} \Pr(y = 1|x) &= \Pr(y^* > 0) \\ &= \Pr(e > -x\beta) \\ &= 1 - \Phi(-x\beta) \\ &= \Phi(x\beta) \end{aligned} \tag{6.7}$$

But unlike in the case of OLS, β in the probit model cannot be interpreted as the impact of a small change of x on the outcome variable y. Using the chain rule, it follows that the marginal effect of x is

$$\frac{\partial \Pr(y = 1|x)}{\partial x} = \frac{\partial G(x\beta)}{\partial x} = g(x\beta)\beta \tag{6.8}$$

where $g(.)$ is the probability density function (standard normal in probit i.e. $g(x\beta) = \phi(x\beta)$). To know how a small increase in x affects the probability of choosing

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model could be estimated given the nature of the response. But given that the current analysis simply aims to describe whether or not training has any impact on the workers' intended job search decision, the ease of interpretation of the probit estimates makes it preferable to this alternative.

$y = 1\left(\Pr\left(y = 1|x\right) = G\left(x\beta\right)\right)$, the estimated β must be multiplied by the density evaluated at $x\beta, g\left(x\beta\right)$. Since $g\left(x_i\beta\right)$ takes on different values for different individuals i, a popular method used to compute marginal effect is to evaluate $g\left(x\beta\right)$ at the mean value of x.

The probit model for the current analysis is as follows:

$$y_i = x_i\beta + \alpha TRAIN_i + \varepsilon_i \qquad (6.9)$$

where y_i is a binary variable that takes the value 1 if the knowledge worker is more likely to look for another job and 0 if otherwise; x_i is a vector of the control variables and β is the corresponding vector of coefficients. The parameter of interest is α which measures the estimated impact of five different aspects of training by individual i. ε_i is an error term that satisfies the usual assumptions. See Table 6.10 for a summary of the variables used in this analysis.

Table 6.10 Variable descriptions on training and intended job search

Dependent variables	Measurement	
JOB SEARCH	1 if the knowledge worker is more likely to look for a new job after participating in training, 0 otherwise	
Independent Variables	**Measurement**	**Expected sign**
INHOUSE_FOR	1 if participated in in-house training (with foreign trainers) provided by the employer, 0 otherwise	Negative
JOBSCOPE	1 if participated in training that is directly related to one's job scope, 0 otherwise	Uncertain
SPONSOR	1 if training is sponsored (either fully or partially) by the employer, 0 otherwise	Negative
SPECIFIC	1 if training creates firm-specific skills, 0 otherwise	Negative
PERFORMANCE	1 if training improved current job performance, 0 otherwise	Uncertain
AGE	Age of the knowledge worker	Negative
GENDER	1 if male, 0 if female	Uncertain
MANAGER	1 if the knowledge worker holds a managerial position, 0 otherwise	Negative
LNSIZE	The (natural) log of total workforce	Negative

To test the hypothesis that training plays an important role in the knowledge workers' intended mobility decision, three probit models are estimated. Training is observed from five different angles. Two of the variables, *INHOUSE_FOR* and *JOBSCOPE,* are included in all three models whereas the effects of *SPONSOR, SPECIFIC* and *PERFORMANCE* are analyzed independently with each variable included in one model.

The first two training variables are chosen based on the characteristics of the current sample. Employers that provide training for their workers are assumed to care about their personal development. This is because training not only increases productivity but also informs workers what they need to know about their jobs. This in turn motivates workers to be attached to their jobs and such a sense of belonging in the organization may reduce the likelihood of searching another job elsewhere. From this HR stance, participation in in-house training with foreign trainers (*INHOUSE_FOR*) is negatively related to the workers' future mobility decision.[124] On the other hand, the undertaking of training that is directly related to one's job scope (*JOBSCOPE*) may have an uncertain impact on the workers' mobility decision. The reason is that although this type of training is similar to general training, its application depends on the scope of the job rather than the needs of the employer.

Following Green *et al.* (2000), training is also expected to discourage workers from leaving their employers when it is less transferable to other firms i.e. specific in

[124] Other measures of in-house training were initially tested, such as in-house training with local trainers (INHOUSE_LOC) and in-house training as a whole (INHOUSE). However, only the current measure is significant and provides the best fit for the current data

nature (*SPECIFIC*), is sponsored by the employer (*SPONSOR*) and whose objective increases employee commitment to the company. These aspects of training are included in the current analysis; however, the last item is modified to suit the current sample. Instead of increasing employer-employee relationship, the objective of training is whether or not it improves the knowledge workers' performance level (*PERFORMANCE*). While the expected signs for the former two training variables are negative, the expected sign for the third measure is uncertain given that improved performance may or may not be a motivation for a knowledge worker to seek employment elsewhere.

To control for the knowledge workers' characteristics, information on age (*AGE*), gender (*GENDER*) and whether or not any managerial position is held in the organization (*MANAGER*) are included in all three models. Additionally, the size of the company (*LNSIZE*) is used to indicate the firms' characteristic.[125]

Before presenting the regression results, it must be mentioned that this analysis deals with a dependent variable that is only observed for trained knowledge workers. Thus, it potentially suffers from the same selection problem as in the previous analysis on the productivity effects of training. Although a Heckman procedure may easily correct this problem, the limited nature of the variable on career advancement (i.e. whether or not the knowledge worker is more likely to look for a new job) prevents the adoption of such

[125] Compared to all the previous analyses, firm ownership was not included as one of the independent variables here, since none of the respondents from foreign MSC-status companies indicated that they are more likely to look for another job after acquiring training. This lack of data causes the probit models to fail in prediction.

method. Consequently, the following results are recognized as the upper limits of the actual effects of training on the knowledge workers' anticipated job search decision.

6.5.3.2. Results

Results from the *SQ2* reveal that only 11 percent of the knowledge workers indicated that participation in training made them 'more likely' to search for a new job compared to 20 percent who are 'less likely' to do so. The majority of the respondents (67 percent), however, agreed that training made no difference to their future mobility plans. This is expected because an ideal working condition affects a worker's decision to remain with the employer more strongly than whether or not training was received. In fact, some workers may not leave their present employers despite not being offered a promotion or wage increment because for them the lack of promotion or even training opportunities are compensated with other benefits on the job, such as flexible working hours, a more relaxed working environment, health coverage etc.

Notwithstanding these views, the present analysis seeks to examine in more detail whether or not training has any impact on the knowledge workers' future job search decision. Results of the probit estimates in Table 6.11 have been transformed to show the effect of a one-unit change (starting from the mean) in an independent variable on the probability of intended job search. The marginal effect is, thus, the slope of the probability curve relating x_i to $\Pr(y = 1|x)$, holding all other variables constant.

Looking first at the knowledge worker and firm characteristics, the results reveal that only gender and size of the company are significant factors of intended job search decision. Male knowledge workers are 2 to 4 percent less likely to search for another job

compared to their female counterparts (significant at $p<0.01$). This finding is similar to Zweimüller and Winter-Ebmer (2000) although the magnitude of intended job search is much smaller for the current sample. In line with human capital theory, mobility of knowledge workers falls with company size indicating that larger companies offer better career opportunities within the firm. Although significant, the effect of company size is very small.

Table 6.11 Probit regressions of the impact of training participation on anticipated job search decision

Variables	Model 1		Model 2		Model 3	
	B	Marginal effects	B	Marginal effects	B	Marginal effects
CONSTANT	2.032 (1.627)	0.0196	1.098 (1.389)	0.0213	0.514 (1.416)	0.0107
AGE	-0.075 (0.053)	-0.0007	-0.045 (0.053)	-0.0009	-0.051 (0.054)	-0.0011
GENDER	-2.154*** (0.782)	-0.0208	-1.925*** (0.688)	-0.0374	-1.882*** (0.659)	-0.0394
MANAGER	0.824 (0.550)	0.0080	0.567 (0.579)	0.0110	0.649 (0.620)	0.0136
LNSIZE	-0.358* (0.208)	-0.0035	-0.498*** (0.169)	-0.0097	-0.458** (0.181)	-0.0096
INHOUSE_FOR	-1.444** (0.732)	-0.0139	-1.407** (0.643)	-0.0273	-1.307* (0.690)	-0.0273
JOBSCOPE	3.013*** (0.711)	0.0291	2.596*** (0.721)	0.0505	2.290*** (0.783)	0.0479
SPONSOR	-1.282* (0.738)	-0.0124				
SPECIFIC			-0.530 (0.549)	-0.0103		
PERFORMANCE					0.590 (0.586)	0.0123
N	71		72		72	
Log Likelihood	-12.622		-13.283		-13.401	
LR statistic	28.742***		27.690***		27.452***	
McFadden R^2	0.532		0.510		0.506	

Note: robust standard errors in parentheses; marginal effects are calculated at the mean; ***, **, * signify statistical significance at the 1%, 5% and 10% level respectively

Moving on to the impacts of training on intended mobility, it can be seen that all five training variables are consistent with theoretical expectations but only three are

significant. Similar to Lynch (1991) and Loewenstein and Spletzer (1999), knowledge workers who participate in in-house training and specific training are less likely to look for another job. The effects in this sample, however, are small (ranging from 1 to 3 percent) and significant only for the former. Another significant finding relates to training that was sponsored by the firm ($p<0.10$). As with Green *et al*. (2000), the impact is negative on the likelihood of intended mobility for the knowledge workers.

It is interesting to see that when knowledge workers participate in training that is directly related to their job scope, they are 3 to 5 percent more likely to search for a new job compared to their colleagues who did not participate in such training. The effect of this variable is highly significant at the 1 percent level. It should be noted that there is a difference between training that creates specific skills and training that is directly related to one's job scope and this distinction is particularly important in knowledge work. The former raises productivity of the trained workers with the current employer only, whereas the latter may increase productivity at the company providing the training as well as other companies, as long as the scope of the new job is similar to that of the old job. This phenomenon may be explained by the nature of knowledge work. While most knowledge workers remain attached with the specificity of their current employers, they are often engaged in jobs that are also useful in other companies. Take for instance, a web designer who is trained to create a design using a particular software by his employer; in the event that the worker quits and works for another company, he will still be able to apply the skills that he acquired as his job as a web designer is still the same and he may require the use of that same software despite working with a competitor.

Likewise, training that increases current performance on the job is found to increase one's likelihood of searching for another job, but this association is not significant. While there seems to be no support from past studies regarding this association, such training outcome may be perceived as a form of motivation for one to seek employment elsewhere. If one perceives that he has achieved a satisfactory level of job performance but was not rewarded with a promotion, then he may feel that quitting is a justifiable act.

The current findings support Hypotheses H6.3 and H6.4. Training is positive and significantly related to knowledge workers' likelihood of promotion receipt or wage increment. It also plays an important role in the knowledge workers' future job search or mobility decision. While most aspects of training reduce the likelihood of knowledge workers to search for a new job, some encourage them to seek employment elsewhere if the act is deemed justifiable.

6.6. Concluding Remarks

This chapter basically looks at human capital development from the viewpoint of those receiving training. Its main objective was to analyze the impacts of training on the knowledge works' earnings and productivity levels as well as career advancement. It was found that:

1. In line with the human capital theory, knowledge workers who participated in training were found to have more earnings than those who did not participate in any training. However, this result was only significant for participation in more

than three training sessions and when training is conducted internally with foreign trainers.

2. In terms of the productivity effects of training, knowledge workers in foreign MSC-status companies seem to report higher productivity than their peers in local MSC-status companies.
3. Different aspects of training participation affect the knowledge workers' productivity differently, but generally, there is a positive and significant relationship between productivity (captured as performance on tasks as perceived by the knowledge workers) and participation in 2 to 3 training sessions; in training that directly relates to job scope; in training that is in-house, external and general in nature.
4. In terms of career advancement, the more training sessions attended the greater is the likelihood of receiving a promotion or wage increment. In-house training sponsored by the employer is likely to reduce workers' intention of searching for a new job. However, participation in training that is directly related to job scope leads to higher probability of searching for a new job elsewhere. This seems to suggest that training in knowledge-based work is mostly general and transferable to other employers.

Although based on a relatively small sample for one year, the findings show that knowledge workers and their firms benefit from training, as training is associated with increased work performance. The analysis provides information on the effects of training on job performance and worker mobility that is scarce for Malaysia.

CHAPTER 7

CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH

7.1. Introduction

In this final chapter, a summary and discussion of the research findings are presented followed by their policy implications. The chapter ends with the limitations of the study and suggestions for future research.

7.2. Summary of Research Findings and Discussion

An increasing number of countries have shifted, or are shifting, towards the knowledge-based economy. In Asia, these include China, India, Republic of Korea, Singapore, Thailand and Malaysia. For these countries, the quality of knowledge workers is extremely important in determining the pace and success of such transition. To improve the quality and skills of knowledge workers at the workplace, training is often carried out. But despite its importance, research on knowledge worker training is extremely limited especially in Malaysia. Thus, the main purpose of conducting this study was to fill this gap in the literature. The findings of this study will provide a better understanding of the issues related to knowledge worker training in Malaysia, as well as the country's current efforts towards becoming a developed nation.

This study investigated three aspects of knowledge worker training in Malaysia. In Chapter 4, the influence of foreign ownership on the provision of, and participation in training was examined. After establishing that some variations in training do exist between local and foreign companies in MSC Malaysia, Chapter 5 further investigated

the determinants of training for these companies. To complement these findings, Chapter 6 examined the impact of training on the knowledge workers' level of earnings, productivity and career advancement. A summary of the results is tabulated in Table 7.1.

The reported findings confirm most of the theories underlying this study. In the first analysis, foreign-owned companies, or MNCs, are presumed to invest more in their workers' human capital compared to domestic firms. Among the reasons for this is that foreign affiliates have access to the parent companies' superior knowledge base (Caves, 1996) and have more funds available to them (Yudaeva *et al.*, 2003), all of which may support their R&D process and encourage more training to be undertaken. Past empirical studies have supported this view and likewise, the current study confirms this association as there is evidence to suggest that a positive relationship exists between the quality of training and the existence of foreign ownership in a firm. However, no significant difference in the amount (or quantity) of training was found between foreign-owned and local companies in this study. Such a discrepancy in the result is believed to be due to the small sample size. Yet, this finding may be valid if one looks at the nature of knowledge work. Given that knowledge work is often non-routine (Davenport and Prusak, 2000; Gregerman, 1981), employers rely more on informal rather than formal or structured training. As the former could not be easily measured, most survey respondents are not able to disclose their provision of such training and, thus, the extent of training provided is understated by the MNCs.

Compared to most studies that adopt regression analysis in assessing the impact of foreign ownership on training, the current study utilized statistical tests for this purpose. In particular, the *t*-test, Mann-Whitney *U* test and chi-squared test were employed as

these tests were found to be most suited for the data at hand, which are both continuous and categorical in nature. One advantage of this approach was that it enabled the researcher to examine various aspects of training, including the quality of training, which is often ignored in past studies.

This study also relies on human capital theory in its analytical framework. According to this theory, training will only be undertaken if the discounted net present value of training benefits exceeds the training costs.[126] For the employer (firm), the decision to train depends on whether or not the raised post-training productivity exceeds the lost productivity during the training period and the outlay of the training itself. In doing so, firms need to evaluate the factors that may influence their training decision. As for the individual worker, the decision to participate in training depends on whether or not the expected higher wages after training exceeds the lower wages received (or no wages) during the training period. All this provide the theoretical base for the remaining analyses of this study. In particular, the determinants of training provision and the outcomes of training participation were investigated using data from HR Managers on behalf of the employers and knowledge workers, respectively.[127]

For the analysis on the determinants of training, this study followed the conventional practice of using a logistic regression model to investigate the determinants of training occurrence (Alba-Ramirez, 1994; Baldwin and Johnson, 1995; Bartel, 1995; Booth, 1991; Frazis et al., 1998; Kawaguchi, 2005) whereas an OLS regression was

[126] This is notwithstanding the 'general versus specific training' debate, as discussed in Chapter 5.
[127] Alternatively, one may investigate the determinants of training participation and/or the returns to training using firm-level data (i.e. from the training provider's perspective). The selection of which analyses to be conducted is a matter of choice and also due to the availability of data.

employed to examine the factors influencing the magnitude of training (Bartel, 1995; Holzer et al., 1993 and Lynch and Black, 1998). The regression results yield the expected signs, although not all of the associations were significant. Consistent with past findings, companies are more likely to provide training when they are larger in size, have low worker turnover rates, a training policy and a greater share of full-time workers among the workforce. The factors influencing the magnitude of training, however, are slightly different. Apart from firm size, the likelihood of providing more training increases for companies that are R&D-oriented, undertake training grants and have a greater share of graduates among the workforce.

As for the analysis on the returns to training, the human capital theory postulates a positive relationship between training and the earnings and productivity of workers. Using the standard approach of augmenting a Mincer earnings function with training, the current study partially supports this hypothesis as workers who participated in training were found to have more earnings than those who did not participate in any training. However, this result was only significant for participation in more than three training sessions and when training is conducted internally with foreign trainers. Likewise, training participants were found to exhibit greater level of productivity, as captured by their own perception of the effect of training on their ability to perform job tasks. While it is customary for studies in this area to address the issue of endogeneity in training (via the IV method) or selection bias (via the Heckman method), the current data set does not permit one to do so. As such, the results for these analyses were discussed with a reservation in mind that there is the possibility of these issues to be present.

The qualitative approach of assessing worker productivity may also contribute to the existing methods used to analyze the impact of training on productivity. Compared to the standard measure of worker productivity, such as output per labour hour, a qualitative measure is more suited to evaluate the productivity of knowledge workers given that in knowledge work there is not necessarily a direct link between labour input and units of output (Gordon, 1997). Past studies adopting a similar subjective approach include Barron *et al.* (1989) and Groot (1999) who compared productivity ratings before and after training, or between employees who have and have not participated in training.

Another notable finding of the study is that training is an important element in the knowledge workers' career advancement. Based on theories that describe the link between training and worker mobility, this study examined the impact of training on two aspects of career advancement, i.e. on the workers' likelihood of receiving a promotion (mobility within the firm) and on their likelihood of searching for a new job elsewhere (mobility between firms or turnover). Both the human capital and internal labour market theories hypothesized that training directly increases the workers' likelihood of getting a promotion. As for the impact of training on turnover, the human capital theory postulates that investment in specific training reduces the workers' incentive to quit a job as they also hold a share of the training cost (Becker, 1962; Mincer, 1962).

The current results are consistent with these theories as a positive and significant relationship was found between training participation and the likelihood of receiving a promotion. Training was also found to play an important role in the workers' anticipated mobility decision. While certain aspects of training participation are likely to reduce workers' intention of searching for a new job, others like participation in training that is

directly related to job scope lead to higher probability of searching for a new job elsewhere. The latter seems to suggest that training in knowledge work is mostly general and transferable between firms. Again, it should be noted that the analysis on worker mobility deals with a dependent variable that is only observed for trained knowledge workers; thus, it potentially suffers from the same selection problem as in the analysis on the productivity effects of training. As mentioned in the text, the limited nature of the variable on career advancement (i.e. whether or not the knowledge worker is more likely to look for a new job) prevents the adoption of the Heckman procedure. Consequently, the results are recognized as the upper limits of the actual effects of training on the knowledge workers' anticipated job search decision.

Apart from the findings obtained, the method and data used in this study also offer some important contributions of their own. One, compared to past training-related studies that used readily available surveys, this study utilized an original dataset from a relatively untapped pool of respondents in order to investigate the specified issues on training. Although there are survey-based studies conducted on companies and knowledge workers in MSC Malaysia in the past, the studies were not used to address the issue of human capital development or training in particular. Two, the online medium used to collect data presents a viable alternative in obtaining information for training-related studies. While online surveys have been employed by many researchers, to the best of the researcher's knowledge, none has been used in training-related studies in Malaysia.

Table 7.1 Summary of hypotheses and findings of this study

Chapter	Research Questions	Hypotheses	Method	Main Results
4	1. Are there any differences or similarities between the quantity and quality of training provided by local and foreign MSC-status companies?	Hypothesis H4.1 Foreign MSC-status companies provide more training for their knowledge workers than their local counterparts. Hypothesis H4.2 Foreign MSC-status companies provide better quality training for their knowledge workers than their local counterparts.	*t*-test Mann-Whitney *U* test Chi-square test	No difference in quantity of training provided Foreign MSC-status companies provide better quality training than local MSC-status companies
	2. Are there are any differences in training participation between knowledge workers working at both entities?		Chi-square test	KWs at foreign MSC-status companies attend more training sessions and in longer duration; they also participate in more soft skills training, while KWs in local MSC-status companies participate in more IT training
5	3. What are the factors that affect the occurrence and magnitude of training for MSC-status companies	Hypothesis H5 Companies are more likely to provide training (and in greater magnitude) for their KWs when they: -are larger in size -have low worker turnover rates -have a weak internal labour market -are R&D oriented -are competitive -have a training policy -have a higher share of full-time workers -undertake training grants -have a higher share of graduate workers	Chi-square tests Logistic regression Multiple OLS regression	Training occurrence is significantly associated with the size of the MSC-status company, worker turnover, the existence of a training policy and share of full-time knowledge workers. Training magnitude is significantly associated with firm size, R&D expenditures, the undertaking of a training grant and share of graduate workers

6	4. What are the impacts of training on the knowledge workers' earnings and productivity?	Hypothesis H6.1 There is a positive relationship between training participation and the KWs' earnings level.	Chi-square test Multiple OLS regression Logistic regression	KWs who participate in training have higher earnings than those who do not (with selection bias)
		Hypothesis H6.2 There is a positive relationship between (different kinds of) training participation and the KWs' level of productivity.		Participation in 2-3 training sessions; in in-house training; external training; general training and training directly related to job scope are all more likely to increase productivity
	5. What are the impacts of training on the knowledge workers' career advancement?	Hypothesis H6.3 There is a positive relationship between training participation and the KWs' likelihood of receiving a promotion or wage increment	Chi-square test Logistic regression Probit regression	The more training sessions attended the greater is the likelihood of receiving a promotion or wage increment
		Hypothesis H6.4 Training plays an important role in the KWs' anticipated mobility decision		Training provided in-house and sponsored by the employer are likely to reduce KWs' intention of searching for a new job. But participation in training that is directly related to job scope leads to higher probability of searching for a new job elsewhere

7.3. Policy Implications of the Study

The results of this study also have some practical and policy implications. Firstly, it was revealed in Chapter 4 that while local MSC-status companies are at par with foreign counterparts in the quantity (or amount) of training provided, they still lack in providing quality training to their knowledge workers. As training quality is as important as quantity of training in the development of human capital, local MSC-status companies seeking to improve their performance might need to consider the design of a training programme. In terms of the study results, these companies could start by employing more experienced trainers in their organization to handle training activities or implementing a formal policy to guide their training practices.

An alternative way to tackle this issue would be to look into *why* local MSC-status companies do not provide good quality training in the first place. A possible reason is the lack of funding. Local MSC-status companies may not have sufficient financial backing as their foreign-owned counterparts who may receive financial assistance or advice from foreign headquarters (the parent company in some cases may design and deliver training). Similarly, since the majority of MSC-status companies are SMEs, they may not be able to provide as much training as bigger companies (or can only train their knowledge workers at a lesser magnitude) due to limited resources. One way to alleviate this problem is for these companies to access the Human Resource Development Fund (HRDF) offered by the Malaysian Government. As mentioned in Chapter 5, companies that contribute to this fund are eligible to apply for grants to pay or subsidize costs incurred in training their knowledge workers.

However, only 24 percent of the survey respondents (MSC-status companies) applied for the HRDF. Based on the informal interviews conducted with the HR

Managers, most of the respondents preferred not to undertake the HRDF as the application process takes too long or they wish to remain independent of the requirements (perceived as rigid) set by the Pembangunan Sumber Manusia Berhad (PSMB), the governing body of HRDF. The authority should look into this matter as red tape processes may hinder MSC-status companies from taking advantage of such a programme. In addition, since the HRDF has traditionally been targeted towards companies in the manufacturing industries, the existence of certain training schemes, such as the 'On-the-Job Training for SMEs' (SME OJT) are not known by some of the respondents. Therefore, the authorities should also keep the MSC-status companies well-informed of the various schemes available under HRDF that are applicable to them.

Secondly, the findings also reveal a lack of communication and 'soft skills' training being undertaken by knowledge workers at local MSC-status companies. This situation may be due to many reasons, such as ignorance on the part of the knowledge worker or simply because no such training is offered by the domestic employers due to shortage of suitable trainers. To address this matter, local MSC-status companies could resort to adopting the National Dual Training System (NDTS) in their company policy if they have not already done so. The NDTS is a sort of apprenticeship programme, which was started in 2005 by the Malaysian Government to resolve the issue of skilled knowledge workers being produced but not meeting the needs of the industry. By training their knowledge workers at the workplace and also sending them off to certified training institutions, the domestic employers can be assured that the training received by their knowledge workers are not only industry-driven but includes communication and other soft skills training.

On the part of MDeC, as the governing body of MSC Malaysia, their initiative of providing financial assistance to MSC-status companies and their knowledge workers who wish to increase their capabilities and skills should be lauded. However, it is recommended that in future, the application requirements for the CDP Professional Development programme be less stringent and that training could also be made available to individual applicants. This is because at present individual knowledge workers are eligible only for the 'Certification Track', so those wishing to seek financial assistance for training must apply through their employers. This may be time consuming as the individual would have to go through two levels of bureaucracy i.e. at his/her company and later at MDeC.

The third implication of this study relates to the MSC Malaysia R&D Grant Scheme (MGS). This scheme is offered by MDeC and specifically aimed at helping local MSC-status companies to develop their ICT/multimedia products. As shown in Chapter 4, most of the respondents perceived the MGS as a motivating factor for joining MSC Malaysia and coincidentally, expenditures in R&D is one of the significant factors in the provision of training among the MSC-status companies (as shown in Chapter 5). These findings seem to indicate that the current policy of providing such R&D grant schemes is beneficial to the MSC-status companies and should, therefore, be continued.

The final implication of this study relates to the positive and significant impact that training brings to the knowledge workers. As shown in Chapter 6, since training is associated with higher earnings, greater productivity and better career prospect; it can be suggested that training is necessary for knowledge workers to reach their full potential in these aspects. However, not everyone is equally motivated to participate in training due to selection bias. While the decision to undergo training ultimately

depends on the individuals, the Government may encourage training participation among knowledge workers by emphasizing the importance of creativity and innovativeness in their line of work and how these traits can be gained through training. Incidentally, these are the underlying principles of the recent "Four Pillars" agenda, which includes the 1Malaysia concept, the Government Transformation Programme (GTP), the New Economic Model and the impending 10th Malaysia Plan. Although most of the policies concerning this agenda are still underway, it is still worth mentioning as they may have a positive effect on the attitudes of knowledge workers towards training in the future.

7.4. Limitations and Suggestions for Future Research

Like most empirical research, the current study is not without limitations. First, because an online survey was used to collect cross-sectional data in a single period, similar to conventional written surveys, a major risk of conducting this type of research is if the targeted sample refuses to cooperate causing the response rate to be too low. This may hamper the achievement of favourable results. Although steps were taken to reduce this problem in the current study, including the provision of monetary incentives and support letters from the relevant authorities to the MSC-status companies, the responses obtained were still relatively low. As a result of this small sample size as well as the cross-section nature of the data, the analysis is restricted to the levels instead of growth of the variables. This, in turn, prevents the use of more

advanced econometric techniques such as fixed and/or random effects models in controlling for unobserved heterogeneity or endogeneity in training.[128]

The first suggestion for future research would be to **extend the scope of sample data**. In this study, the survey was conducted only on MSC-status companies located within Cyberjaya and most of the Klang Valley. While this is officially the designated area for the operations of MSC-status companies, in practice, however, there are many companies in other parts of the country, such as in Malacca, Johor and Penang. Additionally, 'IHLs and Incubators' were also excluded from the survey. There is, therefore, a need to widen the scope of the sampled companies to obtain a more accurate picture of their operations and whether or not location is a significant factor in training decisions.

Due to the limited number of respondents, the current study was unable to conduct other analyses that were initially planned. These 'intended analyses' provide extensions for future research and are outlined below:

(1) Training and innovation in MSC Malaysia

When MSC Malaysia was launched, it was intended to provide the necessary ICT infrastructure and supporting ecosystem for Malaysia to develop its knowledge economy objective. With its constant focus on R&D, MSC Malaysia is often regarded as an innovative initiative by the Government. Accordingly, the MSC-status companies should be able to demonstrate the traits of innovative firms by regularly exerting novel efforts in their activities. Innovation has an intricate link with training

[128] But despite these issues, the data compensates such limitations by providing first-hand information relevant to the questions at hand and the results can still be robust with the adoption of suitable econometric techniques

(Booth and Snower, 1996); a firm that fails to develop skills risks the inability to take advantage from innovations, or to promote innovations in the first place by, for example, not investing enough in those able to carry out R&D. In both instances, the lack of skills and training acts as a constraint (Mohnen and Röller, 2005). In tandem with the Government's current focus on innovativeness and creativity among Malaysians, a future study on training and innovation is both appropriate and necessary.

A preliminary analysis on this matter shows that most MSC-status companies have, in fact, undertaken innovative efforts since joining MSC Malaysia.[129] These initiatives include the development or upgrade of a major new product or line of service, the introduction of a new technology that improved production process and obtaining patents or copyrights for the company products. A cross tabulation between training and the innovative efforts reveal that when a training scheme is in place, innovation seems to be more important to the growth of the MSC-status company. To examine the link between training and innovation further, a simple regression was also conducted. The preliminary result shows that when training is undertaken, a positive influence is found on the company's innovative capability.

These analyses are far from complete due to the lack of data and also the imprecise definitions of innovation and training among the MSC-status companies. Nonetheless, the findings do indicate a positive association to exist between training and innovation among the companies. It is hoped that when more data become available, future research may adopt more state-of-the-art techniques such as the instrumental variable method or GMM to investigate this matter in more detail.

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[129] A description of this analysis and its findings are presented in Appendix K.

(2) Training and knowledge transfer in MSC Malaysia

The existence of technology parks, such as MSC Malaysia, may promote knowledge transfer between firms. This is because firms will be encouraged to communicate and collaborate with one another when located in clusters.[130] With many foreign-owned companies residing in MSC Malaysia, it would be interesting to investigate whether or not knowledge (or technology) transfer actually takes place between and within these companies. This enquiry is in line with the Malaysian Government's emphasis on knowledge and technology transfer taking place from MNCs to their local workforce.

In the current survey, foreign MSC-status companies (N = 31) were asked the extent of their technology adoption from other companies in their work process. 39 percent of them claimed to be 'not using' technology from others at all while 52 percent claimed to only 'fairly use' technology from other companies. For the former, knowledge transfer is very likely to take place as they may need to train their knowledge workers to be familiar with those technologies and to be able to put them into practice. In a separate analysis, the foreign MSC-status companies were also asked to specify their most important channels of knowledge transfer from parent to local affiliates.[131] Training of local personnel was found to be the most important means of knowledge transfer for the majority of the respondents (chosen by 92.9 percent of the respondents). This is followed by know-how (71.4 percent) and technical assistance (67.9 percent) from the parent company and

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[130] According to Porter (1998: 78), clusters are geographic concentrations of interconnected companies and institutions in a particular field. Technology parks have the characteristics of a cluster as they encompass an array of linked industries and other entities, such as providers of specialized infrastructure, universities, incubators and training providers, which are important to competition.
[131] The respondents were allowed to choose more than one channel

patents/trademarks/licensing (32.1 percent). All this suggest that knowledge transfer does take place among companies in MSC Malaysia and that training of knowledge worker is the most important means to do so.

Future studies on this matter may further examine the specific types and extent of knowledge transfer (both inflows and outflows) that takes place among the knowledge workers in foreign MSC-status companies. Alternatively, an investigation on the effect of training on the transferring of knowledge within these companies may also be carried out to substantiate the preliminary result of this study.

(3) Training, worker mobility and knowledge spillover in MSC Malaysia

Besides the intentional transfer of knowledge (or technology) from parent companies to workers at their local subsidiaries, knowledge may also spillover from these MNCs to domestic firms.[132] The literature has highlighted several ways in which spillovers from FDI and MNC activities may occur including worker mobility, where workers who received training from MNCs leave those companies to join domestic firms or set up their own business (Blomström and Kokko, 1998; Fosfuri, Motta and Ronde, 2001; Görg and Strobl, 2005). In these cases, knowledge spillover may take place when the trained workers unintentionally share their knowledge and/or experience with their new colleagues at the domestic firm through social interactions.

A preliminary analysis on the current sample shows that there is evidence of worker mobility with 119 knowledge workers (78.8 percent) disclosing that they have worked with other companies in the past. Out of this figure, 26 (17.2 percent) worked

[132] As pointed out by Fallah and Ibrahim (2004), if knowledge is exchanged with the intended people or organizations, it is "knowledge transfer" but any knowledge that is exchanged outside the intended boundary is "spillover".

with foreign-owned companies (including Joint Venture companies) and 20 (13.2 percent) had experienced employment with both local and foreign companies. In response to a separate question, 34 percent of the knowledge workers (N= 51) admitted to having been trained by a foreign-owned company in the past. As mentioned, these are possible circumstances where knowledge may be transferred unintentionally from the knowledge workers to their local colleagues.

To investigate this matter further, future studies may look into the impact of knowledge spillover by examining the directions (either positive or negative) and magnitude of the spillover on the domestic firms' productivities or even their knowledge workers' earnings.

A second limitation of this study is regarding the generality and replication of the findings. As this study examines knowledge worker training in MSC Malaysia only, the results may not be representative for knowledge-based companies and knowledge workers (i) operating outside technology parks in Malaysia, or (ii) in other developing countries. Although feedback from the MSC-status companies and knowledge workers is valid, it is not conclusive. Future studies should also **include knowledge-based companies that are not MSC-status** (or not located in technology parks) as their feedback may further explain the determinants and outcomes of training for knowledge-based companies outside the specially 'protected' environment.

Finally, due to the lack of past studies on knowledge worker training in general and especially in Malaysia, this study drew upon existing literature on company training and training participation in the manufacturing sector and in developed countries. This includes the references used in formulating the survey

questionnaires for this study. Given the differences between manufacturing and knowledge-based sectors, this may lead to some inaccurate depiction of the questionnaires to the respondents. Nonetheless, care was taken to ensure the relevance of the questions to the Malaysian setting and in addressing the specified issues of this study through the conduct of a pilot study.

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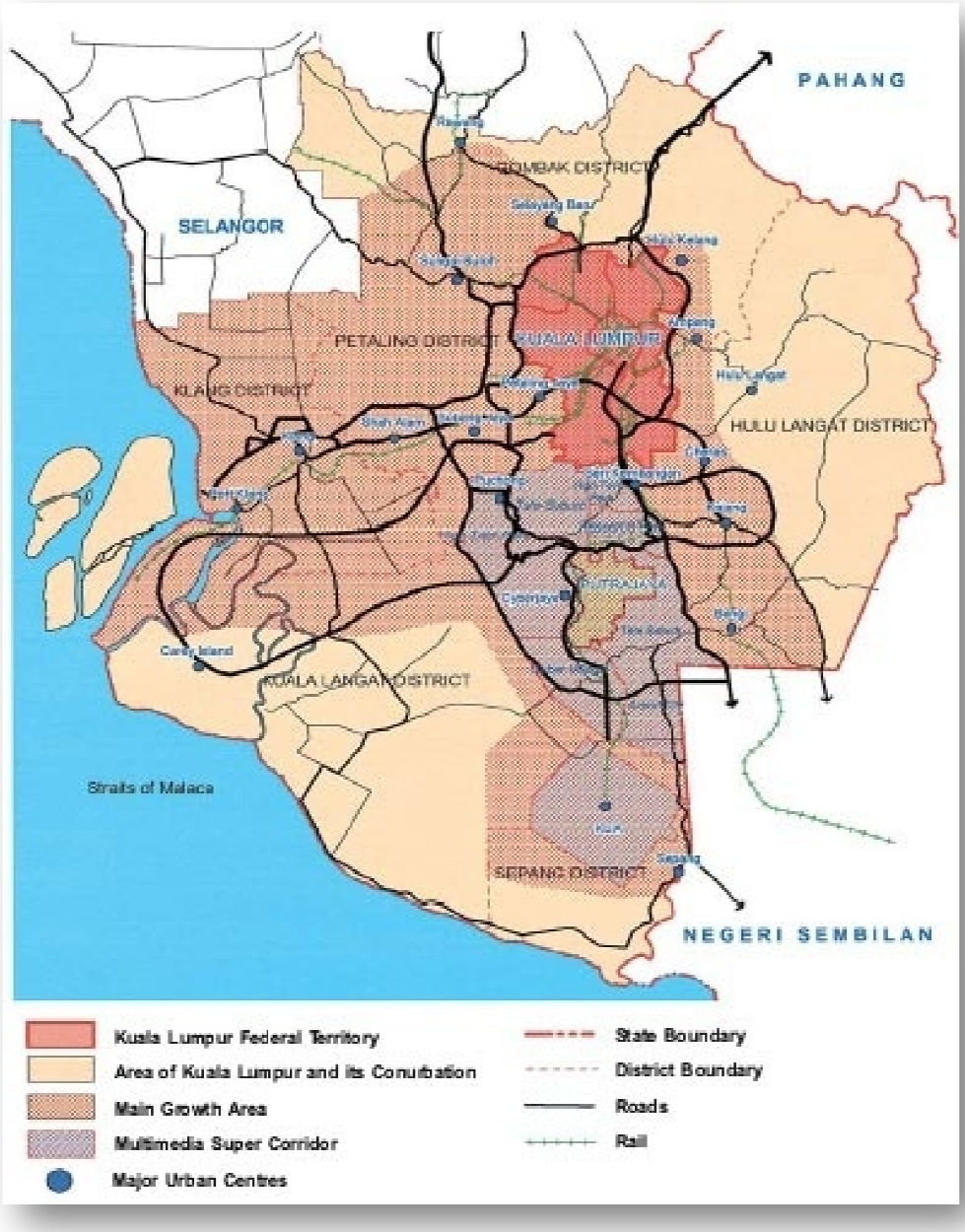
APPENDIX A

Map of Malaysia

Source: CIA World Factbook, 2007

APPENDIX B

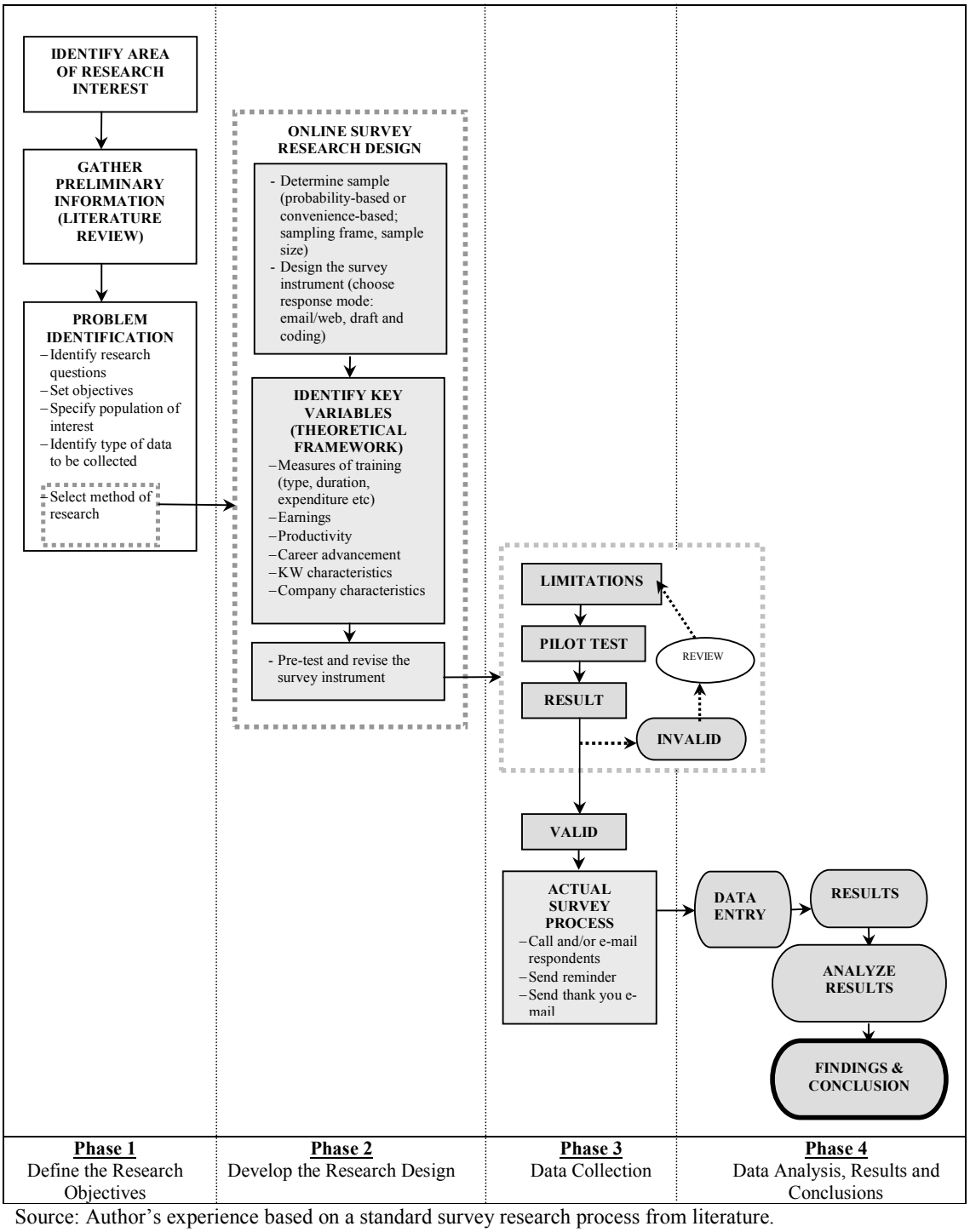
Map of MSC Malaysia



Note: Initially, the MSC Malaysia area was per the legend above. However, the area now refers to the whole of the Klang Valley (i.e. all the shaded areas above, as defined by the Population Distribution by Local Authority and Mukims, 2000) because from 7th December 2006, former Prime Minister Abdullah Ahmad Badawi has given the MSC-status to the entire Klang Valley metropolitan area
Source: Kuala Lumpur Structure Plan 2020

APPENDIX C

Framework of the Online Survey Research Process



Source: Author's experience based on a standard survey research process from literature.

APPENDIX D

SURVEY QUESTIONNAIRE ON MSC-STATUS COMPANIES (SQ1)

This survey is conducted to evaluate human capital development among MSC-status companies. The information you provide will be STRICTLY CONFIDENTIAL and used for the researcher's academic purpose only. Kindly take a few minutes to complete the questionnaire and fax it to 03-6185 4492. As a token of appreciation, each complete survey response will receive an exclusive corporate gift that will be personally delivered to your office. If you complete the survey by –insert deadline- you will also stand a chance to receive RM 1000 cash at the end of the survey period. For any inquiries, please do not hesitate to email me at lexiz@nottingham.ac.uk or call 012-6073707.

SECTION A: COMPANY BACKGROUND

1. What is the legal establishment of your company?
   ① Public Company (Bhd)
   ② Private Company (Sdn. Bhd.)
   ③ Branch of a foreign company
   ④ Company limited by guarantee
   ⑤ Unlimited company

2. Which of the following best describes the ownership of your company?
   ① Foreign-owned (100%) (Continue to A3)
② Predominantly foreign-owned (51%< of equity in foreign control) (Continue to A3)
   ③ Joint venture (10%-50% of equity in foreign control) (Go to A4)
④ Predominantly locally owned (<10% of equity in foreign control) (Go to A5)
   ⑤ Locally owned (100%) (Go to A5)

3. What is the nationality of your parent company? _____ (Go to A5)

4. Please specify the country partner and equity participation (in percentage) for your joint venture.

Malaysia	_____ %
Joint venture partner:	%
……	_____

5. In what year was your company (or parent company) established? _____

6. In what year was your company granted the MSC Malaysia-status? _____

7. What was your company's main motivation in setting up operations in MSC Malaysia? Choose all that applies.
   ① Physical and information infrastructure

② Unrestricted employment of local and foreign knowledge workers
③ Exemption from local ownership requirements
④ Pioneer status (100% tax exemption)
⑤ Investment tax allowance
⑥ No censorship of the Internet
⑦ MSC grant schemes (MGS)
⑧ MSC venture capital
⑨ Other, please specify: _____

8. In which sub-sector is your company involved with in MSC Malaysia?
① Creative multimedia
② Hardware design
③ Internet-based business
④ Shared services/outsourcing (SSO)
⑤ Software development
⑨ Other, please specify: _____

9. Please rate the perceived level of competition in the market for your company's products or services on the following aspects. (Choose ONE for each aspect)

	None	Low	Medium	High	Very high
a. Competition from local companies	1	2	3	4	5
b. Competition from imports (overseas companies)	1	2	3	4	5

10. Has your company taken any of the following initiatives since it joined MSC Malaysia? If YES, how important was this initiative for your company's growth over that period? Refer to the following scale.

Not important (1); Slightly important (2); Fairly important (3); Very important (4); Extremely important (5)

Initiatives	Yes	No
a. Developed a major new product or line of service		
b. Upgraded an existing product or line of service		
c. Introduced new technology that improved production process		
d. Obtain patents or copyrights for the company's products or services		
e. Certified to ISO 9000		
f. Opened a new plant or branch		
g. Agreed on a new joint venture with a foreign or local partner		
h. Obtained a new licensing agreement		
i. Outsourced a major production or service activity that was previously in-house		
j. Brought in-house a major production or service that was previously outsourced		

11. To what extent does your company adopt or use technology from other companies in your work process?

① Not using any technology from other companies
② Fairly using the technology from other companies
③ Using a lot of technology from other companies
④ Don't know

12. For foreign-owned and Joint Venture companies, which of the following are most important in transferring technology to your local company or local country partner? Choose all that applies.

① Know-how from the parent company (or foreign partner)
② Technical assistance from the parent company (or foreign partner)
③ Training for local personnel
④ Patents/trademarks/license
⑨ Other, please specify: _____

SECTION B: FINANCIAL PERFORMANCE

This section may require you to refer to your company's financial records. Kindly provide exact figures or the best approximate as much as possible.

1. What is your company's total turnover* or sales in 2007?

RM _____

2. Of this total turnover, how much was from exports or sales to overseas market?

RM _____

3. Did your company make profits in 2006? ①Yes ②No
Did your company make profits in 2007? ①Yes ②No

4. Approximately how much was your company's total expenditures in 2007?

RM _____

5. Out of total expenditures above, how much was spent on R&D in 2007?

RM _____

SECTION C: EMPLOYMENT

This section may require you to refer to your company's employment records. Kindly provide exact figures or the best approximate as much as possible.

1. How many workers in total were on your company's payroll by the end of December 2007? _____

2. Out of your total workers in above, how many are knowledge workers*?

_____

*Knowledge workers are those who possess at least a degree (in any discipline) or a graduate diploma (in multimedia/ICT) or have five or more years of professional experience in multimedia/ICT business or in a field that relies heavily on multimedia.

3. How many of your knowledge workers work full-time? _____

4. Are any of your knowledge workers Non-Malaysian?
① Yes (Continue to C5)
② No (Go to C6)

5. If YES, please specify the number of foreign knowledge workers in your company:
_____

6. Please provide the following information about your workforce. Write N/A if not applicable.

a. Annual worker turnover (in numbers) _____
b. The number of workers who are graduates or with professional certificates _____
c. The number of workers who are involved in R&D _____
d. The number of male workers _____

7. How would you rate the following factors when deciding to recruit new knowledge workers for your company? Choose ONE for each factor.

Factors	Not at all important	Slightly important	Fairly important	Very important
a. Academic qualification	1	2	3	4
b. Overseas graduate	1	2	3	4
c. Experience in the same or related field	1	2	3	4
d. Experience in other fields	1	2	3	4
e. Prior technical skills	1	2	3	4
f. Motivation	1	2	3	4
g. Personality or competency tests	1	2	3	4
h. Former worker of a MNC	1	2	3	4
i. Worker's age	1	2	3	4

8. How are vacancies of knowledge workers generally filled in your company? Choose as many as applicable.

① Internally
② Recruitment by head-hunters or agencies
③ Advertisement
④ Word of mouth
⑨ Other, please specify: _____

9. To the best of your knowledge, have any of your former workers joined a local or foreign company in the same field in the last year?

① No
② Yes, with a local competitor

③ Yes, with a foreign competitor
④ Not aware

SECTION D: TRAINING

This section may require you to check your company's training records. Training refers to formal training (conducted both internally and externally), unless stated otherwise. Kindly provide exact figures or the best approximate as much as possible.

1. Does your company have a training policy or strategy?
① No
② Yes, but not in written form
③ Yes, in written form
④ Ad-hoc (as and when needed)

2. Does your company provide any training to your knowledge workers in the last 12 months?
① Yes (Continue to D3)
② No (Go to D4)

3. How many of your knowledge workers participated in training over the last 12 months? Write in numbers.
_____

4. How much was spent on training in 2007? RM _____

5. Is there a standard induction training designed to introduce new workers to this workplace?
① Yes
② No

6. About how long does it normally take before new knowledge workers are able to perform their job as well as more experienced workers already working in your company?
① Less than 1 week
② More than 1 week but less than a month
③ More than 1 month but less than 6 months
④ More than 6 months but less than a year
⑤ More than a year

7. What is the average number of hours and days spent by a knowledge worker in any training for a given year? Write N/A if not applicable.
a. Number of hours of training per day, on average ____
b. Number of days of training, on average ____

8. What kind of training does your company provide for knowledge workers? Choose all that applies.
① In-house training by foreign trainers
② In-house training by local trainers
③ External training

④ On-the-job training (OJT))
⑤ Technical training
⑥ IT-related training
⑦ System-related training
⑧ Managerial skills/management training
⑨ Other, please specify: _____

9. If your company trains knowledge workers internally, how many years of experience must your internal trainers have before they can train others?
_____ years

10. Has your company undertaken any training grants from the Human Resource Development Fund (HRDF) to subsidise training costs for your Malaysian workers in 2007? If YES, how many workers were trained using HRDF?
_____

11. Does your company provide informal training in the workplace?
① Yes (Continue to D12)
② No (Go to D13)

12. What kind of informal training does your company provide for knowledge workers? Choose all that applies.
① Mentoring
② Knowledge sharing
③ On-the-job training (OJT)
④ Quality circles
⑤ Via social interactions
⑨ Other, please specify: _____

13. What is the mechanism for evaluating the effectiveness of training on your knowledge workers' productivity level? Choose all that applies.
① Number of projects completed by the worker
② Number of output produced by the worker
③ Number of hours worked in a week
④ Feedback from customers or suppliers
⑤ Management review
⑨ Other, please specify: _____

14. Does your company offer any incentive schemes to knowledge workers from leaving the company? If YES, what kind of incentives are they? Kindly answer in the space provided.
① Yes:
② No

Thank you for your valuable response.
Kindly provide a valid email address for the purpose of delivering the corporate gift later.

_____

APPENDIX E

SURVEY QUESTIONNAIRE ON KNOWLEDGE WORKERS (SQ2)

This survey comprises three sections and will take no longer than 10 minutes to complete. The information you provide will be STRICTLY CONFIDENTIAL. Kindly answer the questionnaire and fax it to **03-6185 4492**. As a token of appreciation, each **complete** survey response will be in the running to receive RM 500 cash at the end of the survey period. For any inquiries, please email lexiz@nottingham.ac.uk or call 012-6073707.

SECTION A: WORKER BACKGROUND AND PROFILE

1. What is your **age**? _____

2. What is your **gender**? ①Male ②Female

3. What is your **nationality**? ① Malaysian (Go to A5)
② Non-Malaysian (Continue to A4)

4. If you are Non-Malaysian, where is your country of origin? _____

5. What is your highest level of **education**?
① Diploma
② Bachelor Degree
③ Master Degree
④ PhD
⑤ Professional certificates
⑨ Other, please specify: _____

6. Were you an **overseas** graduate? ① Yes ② No

7. Have you acquired any professional certificates from abroad? ① Yes ② No

SECTION B: EMPLOYMENT

1. What is your current **status** of employment?
① Permanent, full-time
② Permanent, part-time
③ Contract, full-time
④ Contract, part-time

2. Which of the following category would describe your **current occupation**?
① Manager/Administrator
② Executive
③ Engineer
④ Content developer

⑤ Programmer
⑨ Other, please specify: _____

3. How long have you held your current position in this company?

_____ year(s) _____ month(s)

4. How long have you worked in this profession as of today? (Combine the time worked at your current and relevant past positions, if any)

_____ year(s) _____ month(s)

5. How **relevant** would you say that your educational background was to your industry of work? Kindly choose ONE.
① Definitely not relevant
② Mostly not relevant
③ Unsure/Not applicable
④ Mostly relevant
⑤ Definitely relevant

6. Have you worked with **other companies** prior to this one?
① Yes (Continue to B7)
② No (Go to B12)

7. Was your previous employer a
① Local company?
② Foreign-owned company?
③ Joint Venture Company?
④ Had experience with *both* local and foreign companies
⑤ Don't know

8. Which best describes your **immediate** previous employment?
① Involved in similar or related industry (Continue to B9)
② Involved in a different industry (Go to B10)

9. How many occupations in the **same industry** did you hold in the past (excluding this current job)?
① One occupation
② Two occupations
③ Three occupations
④ Four occupations
⑤ Five or more occupations

10. If you previously worked in a **different industry**, please specify the industry:
① Manufacturing
② Banking
③ Government
④ Wholesale/retail
⑤ Utilities
⑥ Logistics/transportation

⑨ Other, please specify: _____

11. What was the reason for your **job change**? Choose all that applies
① Salary
② Promotion
③ Career advancement
④ Open own firm
⑤ Training-related
⑥ Relocate
⑦ Dismissal
⑨ Other, please specify: _____

12. How many hours do you work **each day** on average? _____

13. How many days do you work in **a week**?
① 5 days
② 6 days
③ 7 days
⑨ Other, please specify: _____

14. What is your basic **monthly salary*** from this job? Write in RM. (*Basic monthly salary is pre-tax salary excluding bonus payment and overtime payment)

RM _____

15. Did you receive any **promotion** or wage increment in the last 12 months?
① Yes
② No

SECTION C: TRAINING AND PRODUCTIVITY

1. Can you specify the total number of training you went to within the last 12 months?
① None (Go to C11)
② Only one training (Continue to C2)
③ 2-3 training (Continue to C2)
④ 4-5 training (Continue to C2)
⑤More than 5 training (Continue to C2)

2. Did the training (or majority of training) take place during working hours?
① Yes
② No

3. Was the training conducted (circle all that applies)
① In-house with foreign trainers?
② In-house with local trainers?
③ External training?

4. How many days did you participate in training on average? _____

5. Did your company sponsor the training?

① Yes, sponsored fully
② Yes, sponsored partially
③ No

6. Was the training

① Directly and fundamentally related to your job scope? (Go to C8)
② Not directly related to your job scope? (Continue to C7)
③ Both directly and indirectly related to your job scope? (Continue to C7)

7. For training that was not directly related to your job scope, what was the nature of such training? Choose all that applies.

① Managerial/management skills
② Communication skills
③ Information technology (IT)
⑨ Other, please specify: _____

8. From the training, how many of the skills that you learned do you think could be (tick whichever relevant)

Useful only for work with the current employer? _____
Useful for work with employers in the same line of business? _____
Useful for employers in many lines of businesses? _____

9. In your opinion, which of the following are the outcomes of training that you participated in? Choose all that applies.

① Able to improve job performance
② Able to reduce mistakes on the job
③ Able to complete tasks on time
④ Able to carry out more workload than required
⑤ Able to refresh existing knowledge and skills
⑨ Other, please specify: _____

10. With the training that you received, are you (choose ONE)

① More likely to look for another job?
② Less likely to look for another job?
③ Neutral about looking for another job?

11. Have you received any other training by foreign companies in the past?

① Yes (Continue to C12)
② No (Go to C14)

12. Are there any differences on the training provided by a foreign employer? If YES, in what ways are the training different? Choose all that applies.

① No difference
② Duration
③ Content of training
④ Trainer's experience
⑤ Technology used
⑥ Training material
⑨ Other, please specify: _____

13. Was your previous foreign training experience within the same industry?

① Yes
② No

14. Which of the following is used as the productivity measure in your company? Choose one.

① Number of projects completed per worker
② Number of hours completed per worker
③ Number of output produced per worker
⑨ Other, please specify: _____

15. For the above measure, what was your average productivity level in 2007?

_____

Thank you for your valuable response.
Kindly provide a valid email address for the purpose of delivering the corporate gift later.

_____

APPENDIX F(1)

To Whom It May Concern:

Re: SURVEY ON Human capital development

I am a PhD candidate at the University of Nottingham undertaking research on human capital development by MSC-status companies. In particular, my study intends to compare the training incidence and the factors that affect training decisions by local and foreign companies in MSC Malaysia. Both local and foreign companies will benefit from this study as the findings may help them to better understand their competitive edge and to improve future development plans for their workforce.

For my data collection, a survey will be conducted on the person in charged with training and/or HR matters. Your company has been randomly selected to participate in this study. I would be very grateful if you could spare a few minutes of your valuable time to fill in the questionnaire since successful completion of this study is largely dependent upon obtaining an adequate and representative sample.

For your convenience, you may answer the survey online by clicking at the following link:http://www.eSurveysPro.com/Survey.aspx?id=c389bd08-fdf1-499a-9db4-989d8c74538f

Alternatively, you may fax the completed survey questionnaire to **03 - 6185 4492**.

As a token of appreciation, *each complete survey response will receive an exclusive corporate gift that will be personally delivered to your office*. If you complete the survey by –insert deadline- your company will also stand a chance to receive RM 1000 cash at the end of the survey period (refer to my University support letter for source of funding). Should you be interested, I can also provide you with a summary of my research findings at the end of the survey period.

Please be assured that any information provided in the survey will be strictly confidential and used for research purposes only. Results will only be reported in aggregate form and you and your organization will not be identified. Enclosed are the survey questionnaire *(SQ1)* and support letters from my University and the Ministry of Science, Technology and Innovation (MOSTI) for your perusal. If you have any inquiries, please do not hesitate to email me at lexiz@nottingham.ac.uk or call me at 012-6073707.

Thank you in advance for your time and cooperation.

Sincerely,

……..
Izyani Zulkifli
PhD Candidate (ID: 4060992)
School of Economics
The University of Nottingham, UK

APPENDIX F(2)

Dear Knowledge Worker,

Re: SURVEY ON HUMAN CAPITAL DEVELOPMENT

I am a PhD candidate at the University of Nottingham undertaking research on human capital development by MSC-status companies. Among others, my study intends to examine how training participation is related to the level of productivity, earnings and career advancement for knowledge workers in MSC Malaysia.

For my data collection, a survey will be conducted on knowledge workers who have had training experience in the last twelve months. Your company has been randomly selected to participate in this study. I would be very grateful if you could spare at most **10 minutes** to fill in the questionnaire since successful completion of this study is largely dependent upon obtaining an adequate and representative sample.

For your convenience, you may answer the survey online by clicking at the following link: http://www.eSurveysPro.com/Survey.aspx?id=0021e381-5eac-46b1-a4e1-8097d145e625

Alternatively, you may fax the completed survey questionnaire to **03-6185 4492**.

As a token of appreciation, ***each complete survey response will stand a chance to receive RM 500 cash at the end of the survey period*** (refer to my University support letter for source of funding). Alternatively I offer you a summary of my research findings, should you be interested.

Please be assured that any information provided in the surveys will be strictly confidential and used for research purposes only. Results will only be reported in aggregate form and you and your organization will not be identified.

Enclosed are the survey questionnaire and support letters from my University and the Ministry of Science, Technology and Innovation (MOSTI) for your perusal. If you have any inquiries regarding the survey, please do not hesitate to email me at lexiz@nottingham.ac.uk or call me at 012-6073707.

Thank you in advance for your time and cooperation.

Sincerely,

……..

Izyani Zulkifli
PhD Candidate (ID: 4060992)
School of Economics
The University of Nottingham, UK

APPENDIX G

The University of Nottingham

oliver.morrissey@nottingham.ac.uk

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www.nottingham.ac.uk/economics
Head of School:
Professor Chris Milner

TO WHOM IT MAY CONCERN

30 August 2007

RE: MS IZYANI ZULKIFLI

I write to confirm that Ms Izyani Zulkifli is a PhD student registered with the School of Economics and sponsored by the Malaysian Government under the Malaysia-Nottingham Doctoral Program (MNDP). She began her research studies in March 2007 and spent some six months at Nottingham preparing her thesis proposal. She will return to Malaysia in September to undertake fieldwork and continue her research with local supervision, making regular visits to Nottingham over the next few years.

Ms Zulkifli's research will look at training practices for workers employed in the Multimedia Super Corridor (MSC) as a study within the general topic of 'Globalization and Human Capital Development'. As an integral part of the research, Ms Zulkifli plans to conduct surveys of Managers and workers in MSC firms, and has been given some financial support from the School of Economics to cover survey costs.

This letter is to confirm that the surveys are part of an independent student research project and that any information gathered will be used purely for private research and will be completely anonymous. No information that could identify specific firms or individuals will be released in the public domain. I hope that you can provide Ms Zulkifli with the assistance required to undertake these surveys.

Yours sincerely,

PROFESSOR OLIVER MORRISSEY
Director of Studies for Postgraduate Research Students

APPENDIX H

MINISTER'S OFFICE
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION MALAYSIA
LEVEL 7, BLOCK C5, PARCEL C,
FEDERAL GOVERNMENT ADMINISTRATIVE CENTRE
62662 PUTRAJAYA, MALAYSIA
TEL : 603 - 8885 8007 FAX : 603-8889 1818

MSTI230.010Y038Vol.10
9 January 2008

To Whom It May Concern:

LETTER OF REFERRENCE

I write to confirm that Ms Izyani Zulkifli is a PhD student registered with the University of Nottingham, UK under the sponsorship of the Ministry of Higher Education. Ms Izyani's research will look at training practices for knowledge workers employed in the Multimedia Super Corridor (MSC Malaysia) as a study within the general topic of 'Globalization and Human Capital Development'. As an integral part of the research, Ms Izyani plans to conduct surveys of Managers and knowledge workers in MSC-status companies.

This letter is to confirm that the surveys are part of an independent student research project and that any information gathered will be used purely for academic research and will be completely anonymous. No information that could identify specific companies or individuals will be released in the public domain. I hope that you can provide Ms Izyani with the necessary assistance to undertake these surveys.

Thank you.

Sincerely,

(DR KAMARUDIN MIN)
Senior Private Secretary

APPENDIX I

Table 1. Summary of 'normal' and 'non-normal' continuous training variables

Variable names		Raw data is normally distributed	Normally distributed after natural log transformation
Training quantity indicators	Days of training	No	Yes
	Number of KWs trained	No	Yes
	Intensity of training	No	Yes
Training quality indicators	Training expenditures	No	Yes
	Trainers' years experience	No	Yes

Table 2. Descriptive statistics of the training participation variables for the knowledge workers

	N	Mean	Std. Deviation	Min/Max
Participated in any training	150	0.65	0.478	0/1
Only 1 training	150	0.24	0.429	0/1
2-3 training	150	0.30	0.460	0/1
More than 3 training	150	0.11	0.318	0/1
Days of training	150	3.31	7.006	0/60
Only 1 day	98	0.19	0.397	0/1
2 days	98	0.31	0.463	0/1
3 days	98	0.15	0.362	0/1
More than 3 days	98	0.35	0.478	0/1
Specific training	98	0.50	0.503	0/1
General training	98	0.58	0.496	0/1
On-the-job training (OJT)	98	0.93	0.259	0/1
In-house training with local trainers	98	0.47	0.502	0/1
In-house training with foreign trainers	98	0.31	0.463	0/1
External training	98	0.64	0.482	0/1
Direct training	98	0.41	0.494	0/1
Both direct and indirect training	98	0.55	0.500	0/1
Management	58	0.48	0.504	0/1
Communication	58	0.38	0.489	0/1
IT	58	0.38	0.489	0/1

Table 3. Cross tabulation of training provision in the last 12 months and the existence of a training policy

Provision of training to KWs in the last 12 months	Existence of training policy		
	Yes	No	Total
Yes	48 *(94.1)*	35 *(71.4)*	83 *(83.0)*
No	3 *(5.9)*	14 *(28.6)*	17 *(17.0)*
Total	51 *(100.0)*	49 *(100.0)*	100 *(100.0)*

Note: Percentage in the parentheses

Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.117[b]	1	0.003
Continuity Correction[a]	7.580	1	0.006
Likelihood Ratio	9.728	1	0.002
Linear-by-Linear Association	9.026	1	0.003
N of Valid Cases	100	1	

a 0 cells (.0%) have expected count less than 5.
The minimum expected count is 8.33.

Table 4. Cross tabulation of external training and the type of training provided

	External training		Chi-square test	
	Yes (N = 64)	No (N = 35)	Pearson $\chi 2$	p-value
Technical training	50 *(78.1)*	19 *(54.3)*	6.088[a]	0.014
IT-related training	40 *(62.5)*	16 *(45.7)*	2.595[b]	0.107
Systems-related training	39 *(60.9)*	18 *(51.4)*	0.838[c]	0.360
Managerial skills training	34 *(53.1)*	11 *(31.4)*	4.296[d]	0.038

Note: [a]0 cells (.0%) have expected count less than 5. The minimum expected count is 10.61; [b]The minimum expected count is 15.20; [c]The minimum expected count is 14.85; [d]The minimum expected count is 15.91

Table 5. Characteristics of local and foreign-owned companies in MSC Malaysia

		Ownership of the MSC-status Company			
		Local		Foreign	
		N	%	N	%
Size of the company[2]	Micro	12	18.5%	3	11.5%
	Small	17	26.2%	6	23.1%
	Medium	15	23.1%	10	38.5%
	Large	21	32.3%	7	26.9%
Innovative[1]		50	72.5%	19	61.3%
Use own technology		24	35.3%	12	38.7%
Existence of training policy		33	47.8%	18	58.1%
Provision of training to KW in the last 12 months		57	82.6%	26	83.9%
Adaptable workforce[3]		24	34.8%	16	51.6%
Existence of informal training		66	95.7%	29	93.5%
Face high competition from local & foreign companies		26	37.7%	12	38.7%
R&D-oriented		19	30.2%	8	30.8%

Note: [1]Innovativeness is measured by a firm's progress in undertaking a number of innovative efforts as defined in question A10 of the *SQ1*; [2]Based on annual sales turnover; [3]Worker adaptability is based on how long it takes for a new KW to perform similar tasks like older KWs

Table 6. Descriptive statistics of the knowledge workers' main demographics

Variable	N	Mean	Std. Deviation	Min/Max
Age (years)	150	30.54	6.710	21/62
25 years and below	150	0.25	0.433	0/1
Between 26 to 35 years	150	0.56	0.498	0/1
36 years and above	150	0.19	0.396	0/1
Gender	151	0.52	0.501	0/1
Malaysian	151	0.92	0.271	0/1
Diploma	150	0.17	0.374	0/1
Degree	150	0.69	0.465	0/1
Higher than a degree	150	0.15	0.355	0/1
Has overseas education	149	0.36	0.482	0/1
Permanent employment status	150	0.85	0.362	0/1
Holds a managerial position	151	0.36	0.481	0/1
Tenure (months)	151	29.94	28.892	1/152
Experience (years)	141	6.32	5.085	1/23

Table 7. Cross tabulation of tenure at current company and total work experience in the current profession

	Experience in current profession				
Tenure at current company	< 2 years	2-5 years	6-10 years	> 10 years	Total
Less than 2 years	14 *(20.6)*	28 *(41.2)*	16 *(23.5)*	10 *(14.7)*	68 *(100.0)*
2-5 years	0	37 *(62.7)*	14 *(23.7)*	8 *(13.6*)	59 *(100.0)*
6-10 years	0	0	8 *(80.0)*	2 *(20.0)*	10 *(100.0)*
More than 10 years	0	0	0	4 (*100.0)*	4 *(100.0)*
Total	14 *(9.9)*	65 *(46.1)*	38 *(27.0)*	24 *(17.0)*	141 *(100)*

Note: Percentages are in the parentheses

Table 8. Cross tabulation of previous firm ownership and industries involved with

	Ownership of previous company			
Previous line of work	Local employer	Foreign employer [a]	Local and foreign	Total
Same field	20 *(57.1)*	7 *(20.0)*	8 *(22.9)*	35 (100.0)
Different field	17 *(73.9)*	4 *(17.4)*	2 *(8.7)*	23 *(100.0)*
Both same and different fields	35 *(59.3)*	14 *(23.7)*	10 *(16.9)*	59 *(100.0)*
Total	72 *(61.5)*	25 *(21.4)*	20 *(17.1)*	117 *(100.0)*

[a]This includes JV companies; Percentages are in the parentheses;

Table 9. Mann-Whitney U Test

Training Participation	Firm ownership	N = 90	Mean Rank	Sum of Ranks	Mann-Whitney *U*	Wilcoxon *W*	Z	Asymp. Sig (2-tailed)
Only 1 training	Local	58	46.84	2717.00	850.000	1378.000	-0.788	0.431
	Foreign	32	43.06	1378.00				
2-3 training	Local	58	49.05	2845.00	722.000	1250.000	-2.013	0.044
	Foreign	32	39.06	1250.00				
More than 3 training	Local	58	40.60	2355.00	644.000	2355.000	-3.615	0.000
	Foreign	32	54.38	1740.00				
1 day	Local	58	46.59	2702.00	865.000	1393.000	-0.766	0.443
	Foreign	32	43.53	1393.00				
2 days	Local	58	41.31	2396.00	685.000	2396.000	-2.580	0.010
	Foreign	32	53.09	1699.00				
3 days	Local	58	46.53	2699.00	868.000	1396.000	-0.783	0.433
	Foreign	32	43.63	1396.00				
> 3 days	Local	58	47.57	2759.00	808.000	1336.000	-1.239	0.215
	Foreign	32	41.75	1336.00				
Specific training	Local	58	45.22	2623.00	912.000	2623.000	-0.156	0.876
	Foreign	32	46.00	1472.00				
General training	Local	58	45.10	2616.00	905.000	2616.000	-0.227	0.821
	Foreign	32	46.22	1479.00				
In-house with local trainers	Local	58	43.62	2530.00	819.000	2530.000	-1.065	0.287
	Foreign	32	48.91	1565.00				
In-house with foreign trainers	Local	58	42.36	2457.00	746.000	2457.000	-1.913	0.056
	Foreign	32	51.19	1638.00				
External training	Local	58	46.81	2715.00	852.000	1380.000	-0.791	0.429
	Foreign	32	43.13	1380.00				
Direct training	Local	58	43.29	2511.00	800.000	2511.000	-1.266	0.206
	Foreign	32	49.50	1584.00				
Both direct & indirect training	Local	58	46.60	2703.00	864.000	1392.000	-0.625	0.532
	Foreign	32	43.50	1392.00				
Management-related training	Local	37	25.24	934.00	231.000	934.000	-1.456	0.145
	Foreign	16	31.06	497.00				
Communication-related training	Local	37	24.16	894.00	191.000	894.000	-2.423	0.015
	Foreign	16	33.56	537.00				
IT-related training	Local	37	30.82	1140.50	154.500	290.500	-3.236	0.001
	Foreign	16	18.16	290.50				

Note: Grouping variable: Company ownership

Explanation for the Mann-Whitney U Test[133]

An alternative method used to test Hypothesis A3 is by a non-parametric Mann Whitney U test (also called the Mann-Whitney-Wilcoxon or Wilcoxon rank-sum test). This test is equivalent to the unpaired t-test and is used to compare two independent

[133] For a detailed and technical discussion, see Mann and Whitney (1947)

groups of sampled data. Unlike the parametric t-test, this test makes no assumption about the distribution of the data (for e.g. normality). It examines the null hypothesis that two independent samples come from the same population or, alternatively, whether observations in one sample tend to be larger than observations in the other.

The Mann Whitney U test uses the ranks of the data rather than their raw values to calculate the statistic, called U, whose distribution under the null hypothesis is known. When the sample size is small, the distribution is tabulated. Otherwise, if the sample size is above 20, the distribution can be approximated using the normal distribution. The procedure for carrying out the test (for larger samples i.e. n>20) is as follows:

- Firstly, the observations are arranged into a single ranked series. That is, the response (yes, participated in such training = 1 and 0 if otherwise) from each knowledge worker is ranked from zero up to the maximum number of responses obtained, irrespective of firm ownership.
- Then the ranks attached to each observation of one sample (say, local MSC-status companies) are added, known as the "sum of ranks" for that sample. Likewise, the sum of ranks for the second sample (foreign MSC-status companies) follows by calculation, since the sum of all the ranks equals $\frac{N(N+1)}{2}$ where N is the total number of observations.
- The U is then calculated by $U_1 = R_1 - \frac{n_1(n_1+1)}{2}$, where n_1 is the sample size for the first sample and R_1 is the sum of ranks in that sample. An equally valid formula for U in the second sample is $U_2 = R_2 - \frac{n_2(n_2+1)}{2}$. The smaller value

of U_1 and U_2 is the one used when consulting significance tables. The sum value of the two values is given by

$$U_1 + U_2 = R_1 - \frac{n_1(n_1+1)}{2} + R_2 - \frac{n_2(n_2+1)}{2}$$

- Since $R_1 + R_2 = \frac{N(N+1)}{2}$ and $N = n_1 + n_2$, after some algebra, this will yield the sum to be $U_1 + U_2 = n_1 n_2$.
- The "mean rank" for a particular group is obtained by dividing the sum of ranks with the total number of respondents, N, for that group.
- The test basically checks whether there are any significant differences in the mean ranks for each of the training measures between knowledge workers at local and foreign MSC-status companies. To interpret the results, as a sample becomes larger (more than 20 observations) the distribution of U approaches the normal curve and U is interpreted using the Z statistic. For example, absolute Z scores of less than 1.96 indicate that the two samples come from the same underlying distribution at the 5 percent significance level.

From Table A7, it can be concluded that there is evidence to suggest that training participation is different for knowledge workers at local and foreign MSC-status companies when it is analyzed in these categories: "2 to 3 training sessions attended", "more than 3 training sessions attended", "2 days", "communication-related training" and "IT-related training". As seen, these categories are similar to the results obtained from the cross tabulation analysis in Section 4.4.2.2.

APPENDIX J

Previous studies on (or related to) the determinants of training

Author(s)	Data Source	Country	Sample	Data type	Measures of training used	Method of analysis
Alba-Ramirez (1994)	Collective Bargaining in Large Firms (NCGE) Survey	Spain	Firms with over 200 employees	Panel	Binary variable - 1 if formal training exists, 0 otherwise; Proportion of employees trained	Probit model; Tobit model
Ariga & Brunello (2002)	Survey by Thailand Development Research Institute (TDRI) (2001)	Thailand	Employees in four industries (food processing, auto parts, HDD makers, IC/PC)	Cross-section (with retrospective (questions)	Binary variable - 1 if OJT (formal/informal) & off-the-job training was provided by their employer, 0 otherwise; # of training per event	Probit model; Count data model
Arulampalam & Booth (1997)	British National Child Development Study (NCDS)	UK	Individuals born in the week of 3-9 March 1958	Longitudinal	# of training courses attended	Hurdle & non-hurdle models
Baldwin & Johnson (1995)	Small firm survey (1992)	Canada	SMEs with less than 500 employees	Cross-sectional	Binary variable - 1 if any training/formal training/informal training is offered, 0 otherwise; # of workers trained; Training expenditure	Probit model; OLS model
Barron *et al.* (1987)	Employment Opportunity Pilot Project (EOPP) (2nd wave)	US	Firms	Longitudinal	# of hours observing others; # of hours receiving formal & informal training	OLS
Barry *et al.* (2004)	Annual Business Survey (ABS); Irish Economy Expenditures (IEE) survey	Ireland	Plants with at least 10 employees	Panel	Binary variable - 1 if (formal) training expenditures > 0, 0 otherwise; Training expenditure	Probit model, allowing for random effects; Random effects model
Bartel (1989)	1987 Columbia Business School HR Survey; COMPUSTAT files	US	Firms	Cross-sectional	Binary variable - 1 if formal training exists, 0 otherwise	Logit model
Bartel (1995)	A large manufacturing company (1986-90)	US	Employees	Panel	Binary variable - 1 if training is received during the time period, 0 otherwise; # of training days received	Logistic model; Tobit model

Booth (1991)	1987 British Social Attitudes Survey (BSAS)	UK	Employees	Cross-sectional	Binary variable - 1 when worker has reported formal training in the last two years, 0 otherwise; # of days training	Logit model
Booth (1993)	British National Survey of 1980 Graduates & Diplomats	UK	Employees	Cross-sectional	Binary variable - 1 when graduate has received any training in the current job, 0 otherwise	Logit model
Chowhan (2005)	Workplace and Employee Survey (WES)	Canada	Linked employer-employee	Longitudinal	Binary variable - 1 if workplace/ general professional/ technology training exists, 0 otherwise; # of trained employees	Logit model; OLS model
Chung (2004)	Malaysian Family Life Surveys (MFLS) (2 waves)	Malaysia	Female employees	Panel	Binary variable - 1 if worker participated in job-related training, 0 otherwise	Probit model
Forrier & Sels (2003)	Independent survey (1999)	Belgium	Firms with more than 40 employees	Cross-sectional	Training expenditure (as a % of total labour cost)	OLS model
Frazis *et al.* (2000)	1995 Survey of Employer-Provided Training (SEPT95)	US	Linked employer-employee	Cross-sectional	Binary variable - 1 if formal training is provided, 0 otherwise; Binary variable - 1 if the worker received formal training, 0 otherwise; # of hours spent in formal & informal training	Probit model; OLS model
Green (1993)	1987 General Household Survey (GHS)	UK	Employees	Cross-sectional	Binary variable - 1 if training participation exists, 0 otherwise; # of training hours (in ranks)	Logit model; Ordered Probit model
Greenhalgh & Stewart (1987)	National Training Survey (NTS)	UK	Employees	Cross-sectional (with retrospective questions)	Binary variable - 1 if undertook full-time vocational training, 0 otherwise	Logit model
Guidetti & Mazzanti (2004)	Two independent surveys (2002, 2003)	Italy	Survey 1: Employees Survey 2: Firms	Cross-sectional	Proxies for training (index capturing formal & informal training, general/specific content, indexes of training activities)	Bivariate Probit model ; Tobit model; OLS corrected for selection bias
Hansson (2007)	1999 Cranet Survey	26 countries	Firms with at least 200 employees in public & private sectors	Cross-sectional	% of wage bills spent on training; proportion of workers trained	OLS model

Harris (1999)	1995 Labour Force Survey (LFS)	UK	Employees	Cross-sectional	# of training received (in ranks)	Ordered Probit model
Holtmann & Idson (1991)	1972-73 Quality of Employment Survey (QES)	US	Employees	Cross-sectional	Binary variable - 1 if participated in employer-provided training, 0 otherwise	Logit model
Holzer *et al.* (1993)	Independent survey	US	Firms that applied for the Michigan Job Opportunity Bank-Upgrade (MJOB) in 1988-89	Panel	# of employees in formal training; # of training hours provided	OLS model
Kawaguchi (2006)	Japan Panel Survey of Consumers (JPSC)	Japan	Female employees	Panel	Binary variable - 1 if worker sent to a workshop/training session etc by her firm, 0 otherwise	Probit model
Lillard & Tan (1986)	1983 Current Population Survey (CPS); National Longitudinal Surveys (NLS); Employment Opportunities Pilot Projects (EOPP) Surveys	US	Employees	Cross-sectional; Panel	Binary variable - 1 if participated in training, 0 otherwise	Probit model for each source & type of training
Lynch (1992)	National Longitudinal Surveys of Youth (NLSY)	US	Employees	Longitudinal	Binary variable - 1 if received OJT/apprenticeship/off-the0job training, 0 otherwise	Probit model for each type of training
Lynch & Black (1998)	Educational Quality Workforce (EQW) National Employers Survey	US	Firms with more than 20 employees	Cross-sectional	Binary variable - 1 if formal training is provided, 0 otherwise; Proportion of workers trained	Logit model, by type of training; Tobit model
Orrje (2000)	Swedish Level of Living Survey 1991	Sweden	Employees between 18 to 64	Cross-sectional	Binary variable - 1 if received any formal OJT, 0 otherwise; # of days of OJT	Probit model; Count data model & hurdle model
Renaud *et al.* (2004)	A large Canadian financial services organization	Canada	Employees	Cross-sectional	Binary variable - 1 if participated in non-mandatory training, 0 otherwise	Logistic model
Shields (1991)	Labor Force Survey of 1984, 1989, 1994	UK	Employees	Cross-sectional	Binary variable - 1 if there is receipt of employer-funded training, 0 otherwise	Logistic model
Simpson (1984)	1979 Human Resources Survey	Canada	Employees	Cross-sectional	# of months in training programs for each occupation in firm	Tobit model
Smith &	Case studies; National	Australia	Employees	Cross-	Indices of training activities	Log-linear technique

Hayton (1999)	survey of enterprises			sectional	(training volume, diversity etc)	
Sousa (2001)	1998 Workplace and Employee Relations Survey (WRS98)	UK	Linked employer-employee	Cross-sectional	Binary variable - 1 if training is provided, 0 otherwise; Average # of days workers in the largest occupational group spent in formal training (in rank)	Probit model; Ordered multinomial logit model
Sutherland (2004)	1998 Workplace and Employee Relations Survey (WERS98)	UK	Linked employer-employee	Cross-sectional	Binary variable - 1 if off-the-job training is received in the last 12 months, 0 otherwise; Amount of off-the-job training a worker receives (in rank)	Probit model; Ordered Probit model
Tan & Batra (1996)	World Bank Survey	5 developing countries	Manufacturing firms	Cross-sectional	Binary variable - 1 if formal training is provided, 0 otherwise	Probit model for any formal training by skill group
Turcotte *et al.* (2003)	Workplace and Employee Survey (WES)	Canada	Linked employer-employee	Cross-sectional	Binary variable - 1 if location offers training, 0 otherwise; Proportion of workers trained	Bivariate Probit model; OLS corrected for selection bias
Veum (1993)	National Longitudinal Survey of Youth (NLSY)	US	Employees	Longitudinal	Average # of weeks spent in training; Average # of hours spent in training	Cross tabulation
Veum (1996)	National Longitudinal Surveys of Youth (NLSY)	US	Employees	Longitudinal	Binary variable - 1 if training is received, 0 otherwise; # of training events; # of hours spent in training; # of training hours per hour worked	Probit model; OLS model
Yadapadithaya (2001)	Database from the Confederation of Indian Industry	India	Firms of more than 500 employees	Cross-sectional	Indicators of corporate training (e.g. % of payroll spent on training; Average training hours etc)	Cross tabulation
Zeufack (1998)	Thai Industrial & Competitiveness Survey (TICS)	Thailand	Plants	Cross-sectional	Binary variable - 1 if formal training is provided, 0 otherwise; Proportion of workers receiving formal training	Probit model; Tobit model

Note: Most authors use the terms “panel data” and “longitudinal data” interchangeably.
Source: Own compilation

APPENDIX K

Training and Innovation in MSC Malaysia

As mentioned in Chapter 5, firms train their workers for various reasons. One in particular is emphasized in the human capital theory (Becker, 1962), where it states that training improves workers' skills and increases their productivity.[134] This, in turn, brings competitiveness to the firm especially in an environment where stiff competition exists among firms that produce similar products using similar inputs; in which case, a firm's only strategy to gain business is through price competition.[135] But as global economies progress to one that is more knowledge-based, this form of competition is no longer prevalent.

Joseph Schumpeter (1947) envisioned this situation decades before its time when he argued that this "is not the kind of competition which counts but the competition for the new commodity, the new technology, the new source of supply, the new type of organization (the largest-scale unit of control for instance) – competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms, but at their foundations and at their very lives" (p.84). With technology constantly evolving and opportunities to invest in R&D made more available, firms find themselves other options to be the least-cost producer. For one, training should not only be undertaken to make workers more productive, but to encourage them to be more innovative. While the former makes products abundantly by using existing technology, the latter may (1) find cheaper ways to make existing products, (2) make new products using existing technology, or (3) make new products using new technology. Thus, training not only generates innovation, but together with investments in R&D, it develops the firm's "absorptive capacity", a concept developed by Cohen and Levinthal (1989, 1990), which refers to the firm's ability to identify, assimilate and exploit knowledge from the environment. These are among the qualities needed for firms to remain competitive in the new age, a view that is supported by Ballot, Fakhfakh and Taymaz (2001) who found that training and its interaction with R&D are significant inputs in firms' productivity growth.

Looking at the concept of innovation, it basically refers to something that adds value to a firm (Bhaskaran, 2006). Innovation differs from invention because unlike the latter, innovation takes place when it transforms an invention into a commercially useable technique or product (Laplagne and Bensted, 1999). With innovation, firms are able to bring new technologies into the economy. Schumpeter is one of the first economists to define and draw attention on the importance of innovation. He distinguishes between "radical" and "incremental" innovations in which the former brings big changes in the world whereas the latter fills in the process of change continuously. Schumpeter also identified fives types of innovations (see OECD, 1997: p.16), that is, (1) introduction of a new good; (2) the introduction of a new method of

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[134] Studies that support this hypothesis include Bartel (1989, 1994), Barrett and O'Connell (2001), Black and Lynch (1996) and Bishop (1994).

[135] This is the standard neoclassical view, which assumes that competition prevents any individual firm from raising the price of its output to more that what covers the costs of its inputs.

production; (3) the opening of a new market; (4) the conquest of a new source of supply of raw materials and (4) the carrying out of a new organization.

The Oslo Manual produced by the OECD (1997) concentrates on the first two categories as they are relatively easier to understand and measure. These categories form the basis of the Manual's classification of innovation, namely, "technological product innovation", which involves either a new or improved product whose characteristics differ significantly from previous products, and "technological process innovation", which is the adoption of new or significantly improved production methods, including methods of product delivery (p.32).[136] Given this broad scope of innovative activities, the measurement of innovation is also likely to be difficult. Rogers (1998) distinguished the measures of innovation according to its inputs and outputs. Among the common input measures of innovation are R&D expenditures, intellectual property statistics and patents and licenses; whereas output measures of innovation are commonly in the form of firm performance, introduction of new or improved products or processes and percentage of sales from new or improved products or processes.

At the other end of the spectrum, many studies have also investigated why firms innovate. According to Schumpeter, the main reason is that firms seek rents. When a (process) innovation occurs, the firm gets a cost advantage over its competitors, which allows it to gain a higher mark-up at the prevailing market price or, depending on the elasticity of demand, to use a combination of lower price and higher mark-up than its competitors to gain market share and seek further rents. In the case of (product) innovation, the firm gets a monopoly position due either to a patent or to the delay before competitors can imitate it. This monopoly position allows the firm to set a higher price than would be possible in a competitive market, thereby gaining a rent. Other works have emphasized the significance of competitive positioning. Firms innovate to defend their competitive position as well as to seek competitive advantage. As shown in a model by Aghion *et al.* (2006), technologically advanced entry creates a competitive environment that forces incumbent firms to be innovative. In this environment, each potential entrant comes with leading-edge technology. If the incumbent is less technologically advanced, the entrant will replace the incumbent. Likewise, if the incumbent is also employing a leading edge technology, it can use its reputation advantage and block entry.

Innovation and training are, thus, intricately linked in today's economies (Booth and Snower, 1996). Innovation may sometimes precede training. A firm which fails to develop skills risks the inability either to take advantage from innovations, or to promote innovations in the first place by, for example, not investing enough in those able to carry out R&D. In both instances, the lack of skills and training acts as a constraint (Mohnen and Röller, 2001). Training of workers improves their skills and enables them to undertake more complex tasks or to complete tasks better or faster. In some cases, innovation and training reinforce each other, with the training of workers enhancing the profitability of innovative and more sophisticated technology. Training for managers is also an important strategy. In firms where managers have a strong management, there appears to be a higher degree of innovation and competitive advantage. Ballot *et al.* (2001) study the impact of the level of human capital and

[136] 'Product' refers to both goods and services

R&D expenditures on firm performance for French and Swedish data. They found that the impact of training hours and expenditures per employee on firm productivity depends strongly on the estimation technique. In their specification, training has a positive and significant impact in France, while in Sweden the effect is insignificant.

Model Specification

A Probit model is used to estimate the factors that influence whether or not an MSC-status company undertakes innovative efforts. Following Greene (2000), assume there is a latent variable y_i^* that describes a firm's propensity to innovate

$$y_i^* = X_i'\beta + u_i$$

where X_i' is a vector of explanatory variables with the associated β vector and u_i is the error term, which is assumed to be normally distributed. What is observed, however, is a binary variable defined as

$$y_i = \begin{cases} 1 \;\; if \;\; y_i^* > 0 \\ 0 \;\; otherwise \end{cases}$$

It follows that $y_i = 1$ indicates that the firm is innovative and $y_i = 0$ indicates otherwise. The conditional expectation of the binary variable y given x is, by definition, a probability:

$$E(y|x) = \Pr(y = 1|x_1 ... x_k) = p = \Phi(\alpha + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k)$$

where Φ represents the standard normal cumulative density function. β_i gives the marginal effect along the horizontal axis due to the increment in x. To translate this effect, the following calculation is needed:

$$\frac{\partial \Pr(y_i = 1|x_i;\beta)}{\partial x_{ij}} = \phi(x_i'\beta).\beta_j$$

In the last term, ϕ is the derivative of the CDF, which is the probability density function (PDF). Since this regression function is non-linear in nature, the Maximum Likelihood solution technique is employed in place of the usual OLS.

The ML estimation for the Probit model is given by:

$$\Pr(y_i = 1|x_i\beta) = \Phi(x_i'\beta);$$

$$\Pr(y_i = 0|x_i\beta) = 1 - \Phi(x_i'\beta)$$

An important issue to be discussed is the potential endogeneity between training and innovativeness. Some may argue that the decisions on major innovations should come prior to the decisions to train workers so that they will be able to utilize an innovated technology. But according to Chowhan (2005), the inclusion of training does not present an endogeneity problem if the decision on whether or not to provide training is made ex-ante. This is when firms make training decisions, particularly training expenditures into their operations, based on past budgets while adjusting for inflation and growth. Allocating expenditures to training based on past budgets reflects historical legitimacy, emphasis on current organizational and presumed performance (Cyert and March, 1963).

As for the issue of unobserved heterogeneity, it can be dealt with in a number of ways. If panel data with repeated observations on the binary outcome of interest are

available then unobserved heterogeneity is usually dealt with by either conditioning on the unobserved heterogeneity through random effects or by transforming the data to eliminate individual-specific fixed effects (see Halaby, 2004). These methods reduce the potential parameter bias from unobserved heterogeneity. Unfortunately, in studies that rely on cross-sectional data, such as this one, it is often difficult to deal effectively with potential bias from unobserved heterogeneity because there is only little information in the data that allows the researcher to identify and correct from the unobserved heterogeneity.

Variables Description

Data on innovation, training and other firm-level characteristics relevant to this study are generated from the SQ1. Innovativeness of a company is measured by its progress in undertaking a number of initiatives or 'innovative efforts' as defined in question A10 of the survey questionnaire. A list of ten initiatives was constructed based on two of Schumpeter's classification of innovation, namely, the introduction of a new product or a qualitative change in an existing product (product innovation) and process innovation new to an industry (process innovation). The companies were asked whether they had undertaken any of these innovative efforts since joining MSC Malaysia: "developed a major new product", "upgraded an existing product, "obtained patents or copyrights for products", "introduced new technology that improved production process", "certified to ISO 9000", "agreed on a new JV with a foreign or local partner", "obtained a new licensing agreement", "outsourced a major production activity that was previously in-house", "brought in-house a major production activity that was previously outsourced" or "opened a new plant or branch". The respondents are allowed to choose more than one form of innovative activity and upon answering 'yes', they are further asked to rank the importance of those initiatives on their companies' growth based on a five-point Likert scale (not important to extremely important).

For the purpose of the Probit regression analysis, innovation is a binary variable that takes the value 1 if a company had undertaken the first four innovative efforts and 0 otherwise *(INNOVATION*). These items are used to define innovation because they are primarily undertaken by most MSC-status companies and are also perceived to be important for their companies' growth (see below).

In the survey, training is measured in a number of ways, namely, by the amount of training expenditure spent, the number of knowledge workers trained, the average duration of days and hours of training, whether or not the company provides training in the last year and whether or not the company has a training scheme or policy in place. To test the hypothesis of whether training supports company innovations in MSC Malaysia, the last variable (*TRAINING*) is used, where it takes the value 1 if a company has a training scheme, including those on ad hoc basis and 0 otherwise.

This measure is chosen for two reasons. Firstly, it follows the same time line as the innovation measure, that is, since the inception of the business in MSC Malaysia (assuming that the company had established a training scheme right from the start). Secondly, companies with a training scheme regularly train their workers (Hansson, 2005; Smith and Hayton, 1999) or are, at least, consistent in providing training to their workers. Although the existence of a training scheme does not necessarily lead to an actual provision of training, there is a positive correlation between the two variables (0.251, $p<.05$) for the current sample. Furthermore, a cross tabulation of the variables also show that almost 90 percent of companies that have a

training scheme actually provide training in the last year. For the current sample, 72 percent of the MSC-status companies have a training scheme.

Other variables used to control firm-level characteristics are described as follows. According to Schumpeter (1947), innovations are more likely to be initiated by large rather than small firms, so the size of the company (*SIZE*) as measured by total workforce at the end of December 2007 is included in the model. MSC-status companies may also be characterized by whether or not there exists any foreign ownership (*FOWNERSHIP*) and by how long they have operated in MSC Malaysia (*DURMSC*). Innovation is also related to the level of technology usage as well as competition faced by the firm. To represent these factors, two binary variables are used with value 1 assigned to the company if it uses own technology (*OWNTECH*) and faces medium to high level of competition in the local and overseas market (*COMPETITION*), 0 otherwise. Following the literature, a workforce with high absorptive capacity too is an important source of innovation. In this analysis, such variable is measured by the workers' level of adaptability (*ADAPTABLE*) and higher education (*GRADUATE*). The former is measured by how fast new recruits are able to perform their jobs as well as more experienced workers already in the company whereas the latter refers to the share of knowledge workers with a degree or higher qualification.

Descriptive Statistics

Table I presents the incidence of innovation among MSC-status companies since joining MSC Malaysia. The percentage of companies that undertake each initiative ranges from 56 percent to 94 percent, indicating that most MSC-status companies are innovative. The majority of respondents perceived the first four innovative efforts to have either a "very important" or "extremely important" impact on their companies' growth. These efforts include the "development of a major new product", "upgrade of an existing product", "patents or copyrights for a product" and "introduction of a new technology that improved production process". The remaining six initiatives are not that popular among the respondents and those who did viewed those efforts as unimportant or just "fairly important" on their company growth.

Regarding the link between training and the companies' innovative efforts, a simple computation of the relative frequency suggests that when a training scheme is in place, it not only positively influences innovation but innovation seems to be more important to the growth of the MSC-status company. From Table II, it can be seen that for the first four innovative efforts that greatly affect the companies' growth, all but one instance are undertaken more when the company has a training scheme. An interesting pattern is also found for the least popular innovative efforts, where their absence seem to occur more among companies that have no training schemes. For instance, 37 percent of companies with a training scheme did not certify to ISO 9000 compared to 42 percent of their counterparts with no training scheme.

Table I. Innovation undertaken by MSC-status companies

	Importance to the Company's Growth						
Innovative efforts taken	Not important	Slightly important	Fairly important	Very important	Extremely important	Not Taken	Total
Developed a major new product or line of service	4 4.1	3 3.1	20 20.4	31 31.6	34 34.7	6 6.1	98 100.00
Upgraded an existing product or line of service	5 5.1	0 00.0	16 16.3	45 45.9	24 24.5	8 8.2	98 100.00
Obtain patents or copyrights for the company products	12 12.2	9 9.2	11 11.2	25 25.5	16 16.3	25 25.5	98 100.00
Introduced new technology that improved production process	7 7.1	4 4.1	17 17.3	32 32.7	23 23.5	15 15.3	98 100.00
Certified to ISO 9000	27 27.6	11 11.2	8 8.2	8 8.2	7 7.1	37 37.8	98 100.00
Agreed on a new JV with a foreign or local partner	13 13.3	11 11.2	19 19.4	18 18.4	11 11.2	26 26.5	98 100.00
Obtained a new licensing agreement	21 21.4	10 10.2	13 13.3	19 19.4	6 6.1	29 29.6	98 100.00
Outsourced a major production activity that was previously in-house	24 24.5	7 7.1	11 11.2	10 10.2	3 3.1	43 43.9	98 100.00
Brought in-house a major production activity that was previously outsourced	22 22.4	6 6.1	15 15.3	13 13.3	3 3.1	39 39.8	98 100.00
Opened a new plant or branch	26 26.5	14 14.3	10 10.2	10 10.2	6 6.1	32 32.7	98 100.00

Note: Percentage is in italics; “product” includes both good and services

Table II. Cross tabulation on training and innovation efforts

		Training scheme in place		Total
		Yes (N=71)	No (N= 27)	(N=98)
Developed a major new product	Not important	3 (4.2)	1 (3.7)	4 (4.1)
	Slightly important	2 (2.8)	1 (3.7)	3 (3.1)
	Fairly important	15 (21.1)	5 (18.5)	20 (20.4)
	Very important	20 (28.2)	11 (40.7)	31 (31.6)
	Extremely important	28 (39.4)	6 (22.2)	34 (34.7)
	Not taken	3 (4.2)	3 (11.1)	6 (6.1)
Upgraded an existing product	Not important	2 (2.8)	3 (11.1)	5 (5.1)
	Fairly important	10 (14.1)	6 (22.2)	16 (16.3)
	Very important	34 (47.9)	11 (40.7)	45 (45.9)
	Extremely important	20 (28.2)	4 (14.8)	24 (24.5)
	Not taken	5 (7.0)	3 (11.1)	8 (8.2)
Obtain patents or copyrights for a product	Not important	9 (12.7)	3 (11.1)	12 (12.2)
	Slightly important	8 (11.3)	1 (3.7)	9 (9.2)
	Fairly important	6 (8.5)	5 (18.5)	11 (11.2)
	Very important	19 (26.8)	6 (22.2)	25 (25.5)
	Extremely important	14 (19.7)	2 (7.4)	16 (16.3)
	Not taken	15 (21.1)	10 (37.0)	25 (25.5)
Introduced new technology that improved production process	Not important	4 (5.6)	3 (11.1)	7 (7.1)
	Slightly important	2 (2.8)	2 (7.4)	4 (4.1)
	Fairly important	8 (11.3)	9 (33.3)	17 (17.3)
	Very important	27 (38.0)	5 (18.5)	32 (32.7)
	Extremely important	20 (28.2)	3 (11.1)	23 (23.5)
	Not taken	10 (14.1)	5 (18.5)	15 (15.3)

Note: Percentage in parentheses

Regression Results

Two specifications of the hierarchical Probit model are adopted; the first controls for the firm characteristics while the second model includes the training variable. Both models are estimated using robust standard errors. The pseudo R^2 likelihood ratio and Hosmer-Lemeshow test statistics support a sound fit of the model. The results of the Probit regressions are presented in Table III.

Without training, an MSC-status company's propensity to innovate is higher when it is smaller in size ($p<0.1$), faces medium to high level of competition in the market ($p<0.01$) and when its workforce is adaptable ($p<0.1$). Inclusion of the training variable improves the fit of the model slightly. This effect, however, is only significant at the 10 percent level. The other significant coefficients influencing the company's propensity to innovate remain the same with the inclusion of foreign ownership and the share of graduates in the workforce (both at $p<0.1$).

While all the variables follow the expected signs, interestingly, the effect of company size does not seem to adhere to theory in that smaller MSC-status companies are more likely to be innovative than bigger companies.[137] It is plausible that this is due to the overwhelming share of SMEs in the sample (83 percent). A cross tabulation between innovation and company size also reveal that smaller companies involve in more innovative efforts compared to larger firms.

[137] Similar result is found when company size is measured by total revenue (turnover). This finding, however, is in line with Schumpeter's (1934) earlier hypothesis that small firms are best at innovating.

The potential problem of endogeneity bias is recognized in the model. This issue arises when a firm trains its workers because of an innovation that requires new skills of the firm's workforce (reverse causality). To reduce this problem, the training variable is measured by the existence of a training scheme, which was assumed to have existed since the inception of the company in MSC Malaysia. Related to this problem is sample selection bias, which refers to where the dependant variable is observed only for a restricted, non-random sample. In this case, one observes a firm's innovative propensity only if the firm provides training for its workers.

Table III. Estimation coefficients and marginal effects

	Model 1		Model 2	
Independent Variables	B	Exp(B)	B	Exp(B)
CONSTANT	-1.001*	0.368	-1.501**	0.223
	(0.607)		(0.651)	
SIZE	-0.003*	0.997	-0.003**	0.997
	(0.002)		(0.002)	
FOWNERSHIP	-0.449	0.638	-0.546*	0.579
	(0.299)		(0.301)	
DURMSC	0.061	1.063	0.054	1.055
	(0.047)		(0.046)	
COMPETITION	0.831***	2.296	0.819***	2.268
	(0.315)		(0.314)	
OWNTECH	0.514	1.672	0.499	1.647
	(0.315)		(0.314)	
ADAPTABLE	0.503*	1.654	0.558*	1.747
	(0.298)		(0.308)	
GRADUATE	0.784	2.190	1.05*	2.858
	(0.595)		(0.602)	
TRAINING			0.558*	1.747
			(0.305)	
N	96		96	
H-L statistic[a]	10.357		7.332	
Prob (H-L stat)	0.241		0.501	
LR statistic	13.595		16.501	
Prob (LR stat)	0.059		0.036	
McFadden R^2	0.116		0.140	

APPENDIX L

Descriptive statistics for training participants and non-participants in the sample

	Participated in training			Did not participate in training			All knowledge workers		
Variables	Mean	Min/Max	N	Mean	Min/Max	N	Mean	Min/Max	N
Age	30.052 (5.30)	21/45	97	31.423 (8.797)	22/62	52	30.540 (6.710)	21/62	150
Gender	0.531 (0.502)	0/1	98	0.481 (0.505)	0/1	52	0.517 (0.501)	0/1	151
Malaysian	0.949 (0.221)	0/1	98	0.885 (0.323)	0/1	52	0.92 (0.271)	0/1	151
Degree	0.837 (0.372)	0/1	98	0.824 (0.385)	0/1	51	0.83 (0.374)	0/1	150
Overseas	0.357 (0.482)	0/1	98	0.360 (0.485)	0/1	50	0.36 (0.482)	0/1	149
Permanent	0.856 (0.353)	0/1	97	0.846 (0.364)	0/1	52	0.85 (0.362)	0/1	150
Manager	0.327 (0.471)	0/1	98	0.423 (0.499)	0/1	52	0.36 (0.481)	0/1	151
Tenure (month)	31.847 (30.898)	1/152	98	26.596 (24.855)	1/120	52	29.94 (28.892)	1/152	151
Experience (year)	6.183 (4.730)	1/20	93	6.553 (5.815)	1/23	47	6.32 (5.085)	1/23	141
Adaptability	0.227 (0.421)	0/1	97	0.308 (0.466)	0/1	52	0.25 (0.436)	0/1	150
Monthly wage (RM)	3682.280 (1995.130)	1200/8250	82	3217.073 (1557.868)	1300/8000	41	3531.024 (1860.237)	1200/8250	124
Working hours	47.531 (9.647)	40/108	97	46.308 (15.458)	25/126	52	47.123 (11.923)	25/126	150
Promotion	0.719 (0.452)	0/1	96	0.577 (0.499)	0/1	52	0.67 (0.471)	0/1	149
Firm ownership	0.344 (0.478)	0/1	90	0.333 (0.477)	0/1	45	0.34 (0.476)	0/1	135

Note: Standard deviation in parentheses;

APPENDIX M

Result of the training participation equation

	Logit estimates	
Variables	Coefficient	Odds Ratio
CONSTANT	-18.145*** (5.654)	0.000
AGE	1.163*** (0.334)	3.200
AGESQ	-0.019*** (0.005)	0.981
GENDER	0.599 (0.477)	1.820
MALAYSIAN	2.107** (1.018)	8.224
DEGREE	-0.379 (0.560)	0.685
PERMANENT	-1.708** (0.830)	0.181
TENURE	0.022** (0.010)	1.022
EXPERIENCE	-0.005 (0.066)	0..995
ADAPTABILITY	-0.359 (0.478)	0.698
FORTRAINING	1.450*** (0.559)	4.263
N	137	
LR statistic	35.041	
Prob (LR stat)	0.000	
Log likelihood	-69.911	
AIC	1.181	
McFadden R^2	0.200	

Note: Robust standard errors in parentheses