

# ICT AND TECHNOLOGY POLICY AND ADOPTION FOR SMALL AND MEDIUM ENTERPRIZES IN H MALAYSIA

Ali Juhary  
Dahalin Zulkhairi  
Mat Junoh Mohd-Zukime

## INTRODUCTION

A knowledge-based economy requires a workforce that has particular competencies. The workforce needs to have positive motivation and attitudes, be highly skilled and knowledgeable. These workforce qualities are required to achieve innovation, which when coupled with the entrepreneurial skills, enables businesses to grab the many opportunities that globalization and the proliferation of advanced technology now offer. To achieve a knowledge-based economy, greater emphasis is required to enhance the capacity of the industrial workforce through building academic credentials, technical requirements and the appropriate skill sets that can increase worker efficiency, positive work attitude and creativity. These 'knowledge workers' (K-workers) are *the* vital ingredient for a nation to transform itself into a knowledge-based economy.

The 'new economy' of the new millennium, is characterized the knowledge-based economy and the globalization of business era. This new economy has shown how the development of information and communication technology (ICT) is changing not only the way we do business, but also affects all walks of life. Through the development and up-take of diverse information technology (IT) such as, computers, mobile phones, e-mails, faxes, the Internet, web-site information and other electronic media, businesses have broader reach and are more competitive. Further, the globalization and liberalization of business now allow competitors to move relatively freely into any market. Ideally, when buyers and sellers have easy and free access to market information, market perfection is achievable through the availability of products, service quality, globally competitive prices, access to distribution channels and product promotion. In this 'borderless world', the free flow of goods and services not only takes place, but also human resource mobility occurs. Thus, in the context of the rapidly changing digital-age, the businesses that can effectively respond, adopt and adapt to the new corporate challenges of the global economic reality are able to build and sustain their performance. From a consumer perspective, internet shopping offers a fast and easy way to shop,

which in turn creates a valuable market opportunity for small-to-medium industries (SMIs) that are able to globally compete in response to rising demand. In the context of globalization, the application IT and ICT facilitates the e-commerce that enables industry to be competitive (Westhead, Wright & Ucbasaran, 2002).

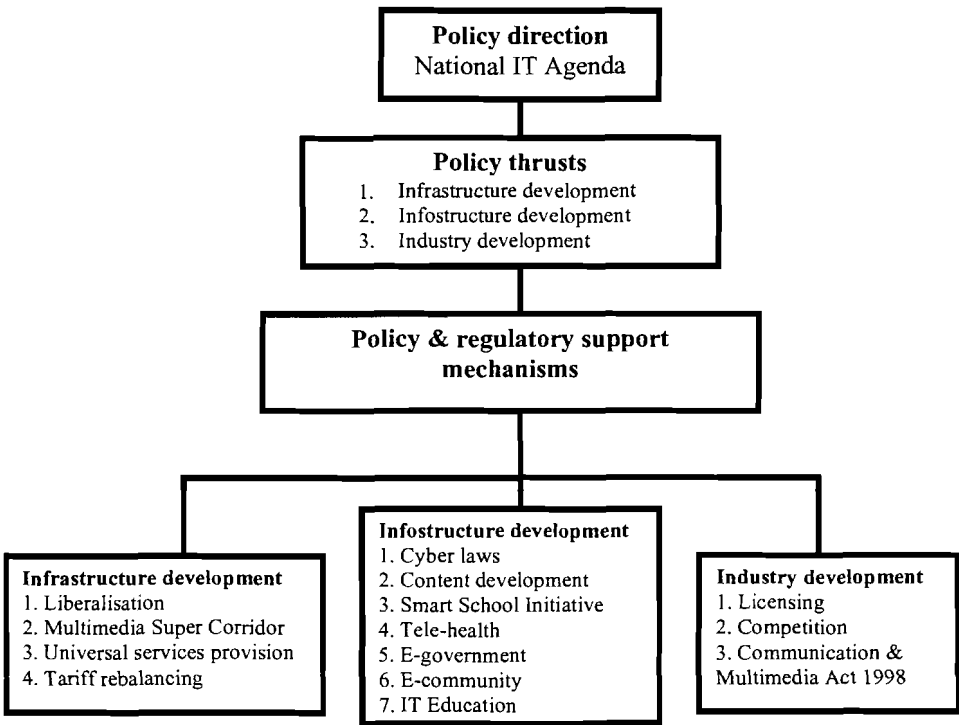
In the new millennium, Malaysia is fast becoming a knowledge economy. The industries, which encourage innovation, promote competitiveness, and create employment and wealth across the society, will further expedite this transition. Particular industries can also play an important role in leveraging the nation's economy by having a workforce that is highly skilled, knowledgeable and trainable in new technology. These firms will develop the capability to be more innovative and so give the economy greater flexibility, which further encourages the creation of new jobs. This strategic approach to business promotes healthy competition both within the domestic market, and internationally with success crucially dependent on workforce IT and ICT knowledge and performance.

This chapter discusses the role of policy development with regard to the up-take of IT and ICT in relationship to Malaysia's strategic approach to become a knowledge-based economy as outlined in Vision 2020. IT and ICT have a pivotal role to play in facilitating the processes of economic transformation in Malaysia. The chapter presents findings of research into IT and ICT capacity and performance in SMIs and small-to-medium enterprises (SMEs) in Malaysia. The research findings support an argument calling for greater recognition of the crucial human resource development role of IT and ICT in expediting the ongoing transformation of Malaysia's competitive knowledge-based economy.

## **ICT AND TECHNOLOGY POLICY IN MALAYSIA**

In 1989, the Steering Committee on National Information Technology Policy (DTMN) was established in Malaysia to coordinate the formulation of an ICT policy. However, it was not until the formation of the National Information Technology Council (NITC) in 1994 that a more serious effort towards a policy creation occurred. The NITC initiated the process to formulate a national IT plan and identify key programs to contribute to the transformation of Malaysian society into a knowledge-based society. The National IT Agenda (NITA), launched in December 1996 by the NITC, provides the foundation and framework for the utilization of ICT to transform Malaysia into a developed nation as conceived in Vision 2020. Chaired by the Prime Minister, the NITC comprises members from the public, private and community-interest sectors and functions as a think tank that advises the government on ICT strategy. MIMOS Berhad, the Secretariat to

the NITC, assists and supports the Council’s activities, which includes the development and realization of NITA. Figure 4.1 illustrates the National ICT Policy and Regulatory Framework.



**Figure 4.1: Overview of National ICT Policy and Regulatory Framework in Malaysia**

The NITA vision incorporates a three-part national economy transformation strategy: firstly, to utilize ICT to transform Malaysian society into an information society, then evolve to a knowledge society and, finally, to become a values-based knowledge society. Through the theme ‘Turning ripples into tidal waves’, the NITA focuses on the capacity development of people, infostructure and applications to create value, and provide equity and access to all Malaysians, and so qualitatively transform the society into a values-based knowledge society by the year 2020.

The NITA adopted an integrated policy direction in 1997. The integrative policy objective of the NITA is to shape a Malaysian civil society that uses information,

and applies knowledgeable and appropriate value systems. Hence, the NITA policy focuses on three elements: the development of human, information infrastructure, and applications. The NITA structure takes into account intellectual applications, such as Master of Science and IT degree programs, as well as dialogue and feedback mechanisms that involve national leaders, Government agencies and the private sector. However, the NITA is concerned with to develop and promote the macro policy level of IT strategy and guidelines for the implementation processes.

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Less progressively, at the operational level, the procedures and guidelines established in the eighties are still applicable. For the government sector, a 'Computerization Guideline Manual' for public sector management has been in use and coordinated by the Malaysian Administration Modernization and Management Planning Unit (MAMPU) since its introduction in 1988. The manual covers the procurement procedures, IT standards, IT services, security and issues to use in the implementation of IT plans in government agencies. This guideline supports the Science and Technology Policy, which includes computerization as one of its key strategies. The National Policy for Library and Information Services is an additional strategy that relates to information management implementation. Another related policy relevant to the IT implementation guideline is the National Telecommunications Policy (NTP).

The metaphorical thematic 'ripples' are focused government strategic initiatives designed to create the necessary environment and empower the people to mobilize a tidal wave of changes required to achieve the integrated NITA vision. The multimedia super corridor (MSC) concept, the earliest strategic initiative of the NITC, is a key ripple initiative. Acknowledging the need to involve all Malaysians in the NITA process, another major ripple initiated by the NITC is the Demonstrator Application Grant Scheme (DAGS), which encourages Malaysians to participate in and utilize the opportunities made available by ICT. MIMOS Berhad, operates as the government Secretariat that manages and administers the DAGS. As an added aspect of the NITA realization, the NITC has formulated the NITC Strategic Agenda - a strategy for Malaysia's migration to the E-world of the new millennium. The strategy involves an orderly transformation from the current governance structure to a participatory approach that involves active tripartite partnership between the public, private and community-interest sectors. The Strategic Agenda highlights the need to address five areas critical to our migration to the E-world, namely E-community, E-public services, E-learning, E-economy and E-sovereignty.

The NITC promotes the notion that knowledge and information will be the most valuable assets in the new millennium economy. For Malaysia to be competitive, Malaysians must embrace the knowledge-based economy (K-economy) and create

world-class Malaysian enterprises that can compete globally through an edge in price, quality, delivery and costs. Sustaining this high level of business and service performance is fundamental to success. The NITA holds the key to empowering the nation and enabling the emergence of the new breed of entrepreneurs. Hence, the NITA is the foundation for Malaysia's success in the information age and beyond.

## **IT AND ICT IN SMALL AND MEDIUM MALAYSIAN ENTERPRISES**

The SMEs play an important role in providing linkages to export-oriented industries in the Malaysian economy. In terms of value-added and labor absorption in economic growth, particularly in the manufacturing sector, the SMEs are expected to contribute significantly as *the* driver of growth in the economy. Estimates indicate that there are 11292 SMEs, 88% are small enterprises and 12% are medium enterprises. The prediction is that the SMEs numbers will rise to 20,000 and so dominate the manufacturing sector in Malaysia. The increase in new small business entrants and workforce participation support this predicted trend. The launching of Ninth Malaysia Plan (9MP) for the following five years (2006 to 2010) aims to encourage the development and the adoption of ICT and technology in the small-scale industry (SMIs) sector. The various government strategies and guideline actions pertaining to the intense usage of ICT and technology guide the SMI sector technopreneurs.

In Malaysia, there is a distinction between SMEs and SMIs. The SMEs refer to those involved in non-manufacturing activities and are usually business traders of finished good and services. Their business activities include wholesale, distribution, retailing, contractors, and food processing, farming, financing and mining. In addition, there are 'informal' traders/ micro-business/ street traders that participate in the economy. Those businesses involved in the manufacturing/production/processing/engineering sectors are referred to as SMIs. In Malaysia, the SMIs are classified according to the following criteria, namely, numbers of workers, sale volume, net asset, capital and local equity as shown in Table 4.1 (MITI ,1992).

Reports on the current <sup>8</sup> IT and ICT development scenario for SMIs in Malaysia have not been encouraging. SMIs in Malaysia continue to operate in the traditional way with most organized on a family-based structure (Hodge, 2001), and use traditional and obsolete technology to produce cheap and low quality products with limited market penetration. The problems faced by SMIs can be linked to a lack of the following factors:

- able personnel to negotiate funding (Chee, 1979).
- expertise in technology use and management (Raymond, 1990; Anderson, 1987).
- skilled workers (Mohd Asri & Mohd Isa, 2000).

In addition, low levels of the following factors:

- IT skills and knowledge (Hussein & Zulkhairi, 2004).
- poor user attitude towards technology (Lees & Lees, 1987).

In the contemporary K-economy oriented era, organizations that compete globally are heavily dependent on the sustaining competitive advantage through their development and enhancement of the latest technology and ICT capabilities. This reality indicates that significant change in both attitudes towards IT and ICTs and skill development is required if the Malaysian SME and SMI enterprises are to make a positive contribution to the K-economy goals at the core of the national Vision 2020 strategy.

**Table 4.1: Classification of SMEs in Malaysia**

Criteria	Small scale industry	Medium scale industry
Employees	below 49	50-199
Sales	RM 3 million and below	RM 3 to 10 million
Net Asset	RM 1 million and below	RM 1 to 10 million
Capital	RM 0.5 million and below Above 70%	RM 0.5 million to 2.5 million Above 70%

The various business problems faced by SMEs include small market share, a lack of capital fund, proper accounting systems, low and outdated technology and the limited availability of skilled and competent workers. Although there are various SME assistance programs offered by government agencies and large corporations, these problems remain unsolved. Overall, the K-economy era places its human resource focus on the capacity development of individuals and organizations through the adoption of the latest ICT and the production technology. Ideally, the government's ICT and technology policy aims to ensure these production firms do become more efficient and productive.

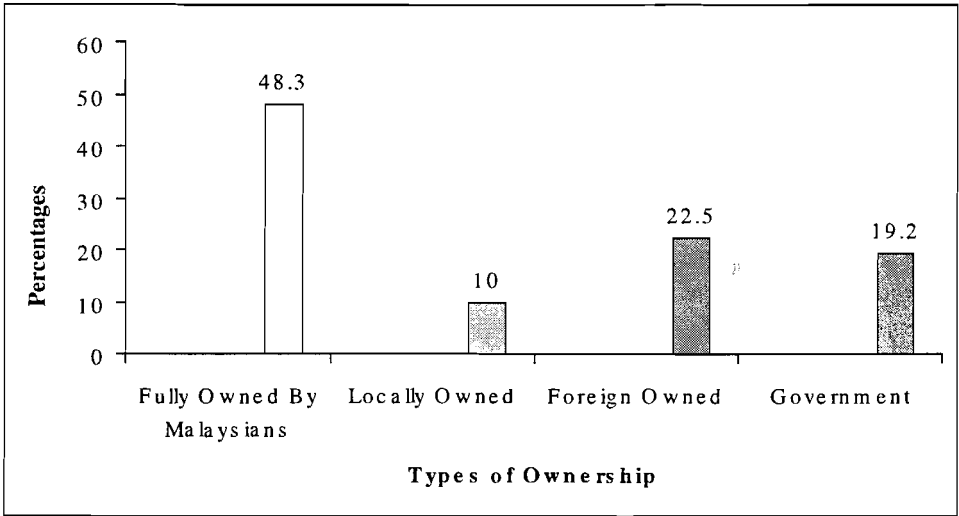
## ICT and TECHNOLOGY Adoption

In developed nations, an increasing number of industries are adopting IT in their particular strategic effort to build competitive advantage and maintain their position in the marketplace. Lees and Lees (1987) found that the reasons firms adopt IT are to improve operational procedures, produce information at a lower cost, make available new management tools for decision-making, and to facilitate billing and invoicing, business growth, inventory control, and to be innovative. The benefits derived include better record keeping, timely, accurate, and expanded information, improved customer service, increased productivity, and enhanced management control and decision-making. Thus, the many benefits encourage an increasing number of firms in the industrial sector to adopt IT. A United Kingdom study found that even small industrial firms with less than 100 employees adopt IT using at least one personal computer to support their business (Dahalin & Golder, 1998).

In Malaysia, studies have also shown that the industrial sector, which constitutes more than 90% of SMIs and SMEs (Beckett, 1997), in general, has workplace end-users with low-level computer literacy and elementary-level formal education. In addition, these industries also lacked qualified IT personnel, had no specific policy and planning on IT adoption, a lack of formal IS methodology, with limited end-user participation and minimal technology diffusion throughout the firm (Montazemi, 1987). An ICT adoption study applied in 100 firms (Juhary, Zulkhairi & Mohd-Zukime, 2006) assessed the level of IT adoption of the Malaysian industry in terms of their end-users, IT personnel, education and training, and the types of technology and IT products used. The survey also examined the number of Multimedia Super Corridor (MSC) firms, with 11 firms identified to attain the MSC high status of a Cyberjaya city location.

The following section discusses the major findings of this research. The sample included a majority (58.3%) of Malaysian and locally owned companies. Foreign owned companies accounted for 22.5% of the sample, with the remaining 19.2% from the government sector. A noteworthy discussion presented later in this chapter compares the human resource development for both technology and ICT usage between these three major sectors. Figure 4.2 shows the ownership type and distribution of companies in the investigative sample.

Table 4.2 shows the distribution of the companies in the sample by category, i.e., small, medium and large. The table indicates that small companies in the survey with employee size of less than 50 account for 38.3% of the sample. Medium sized companies with 50 to 199 employees make up 24.2% of the sample. Large



**Figure 4.2: Ownership of Companies**

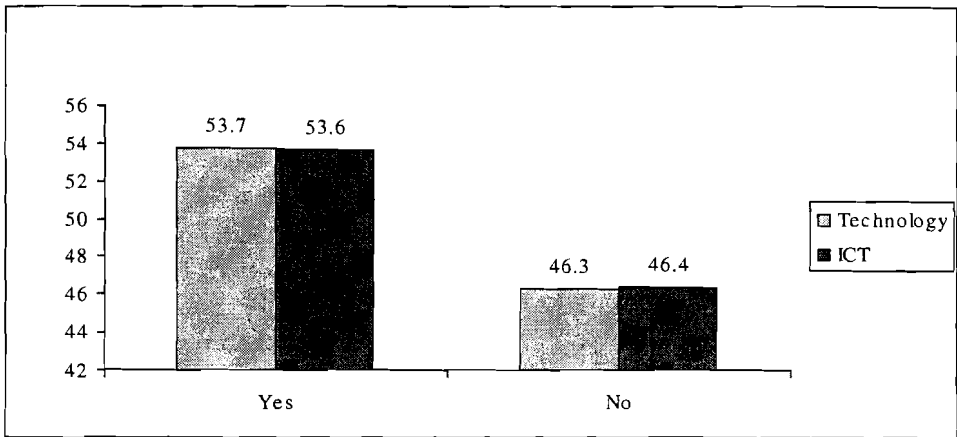
**Table 4.2: Category of Company by Size of Employee**

Category	No. of employees	Frequency	Per cent
Small	49 and below	46	38.3
Medium	50 to 199	29	24.2
Large	200 and above	45	37.5
	<b>Total</b>	<b>120</b>	<b>100%</b>

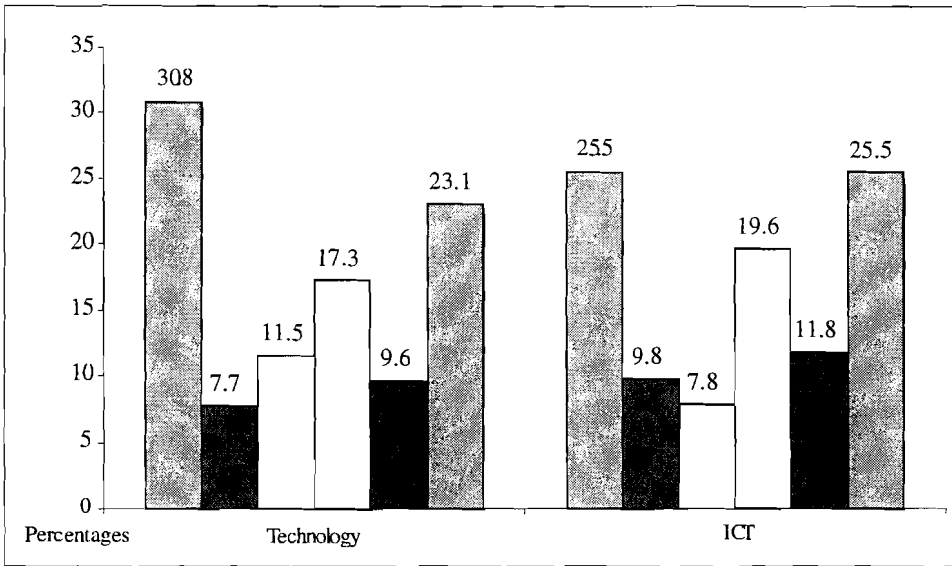
companies of 200 and above employees constitute the remaining sample amounting to 37.5%. The majority of the sample respondents (62.5%) are the SMEs.

As Figure 4.3 shows, more than half of the sample indicated having skilled workers in both technology and ICT with both categories have about the same proportion. Though this figure may look encouraging, quite a significant proportion (46%) of the firms indicated they did not have adequate skilled workers in both technology and ICT. Considering the majority of the sample firms came from the industrial areas, this finding is quite disturbing as a significant number of these industry-based firms still have difficulty filling positions that require skills and expertise. Scrutiny of the distribution of skilled workers reveals that for the technology





**Figure 4.3: Availability of Skilled Workers in Technology and ICT Adoption**

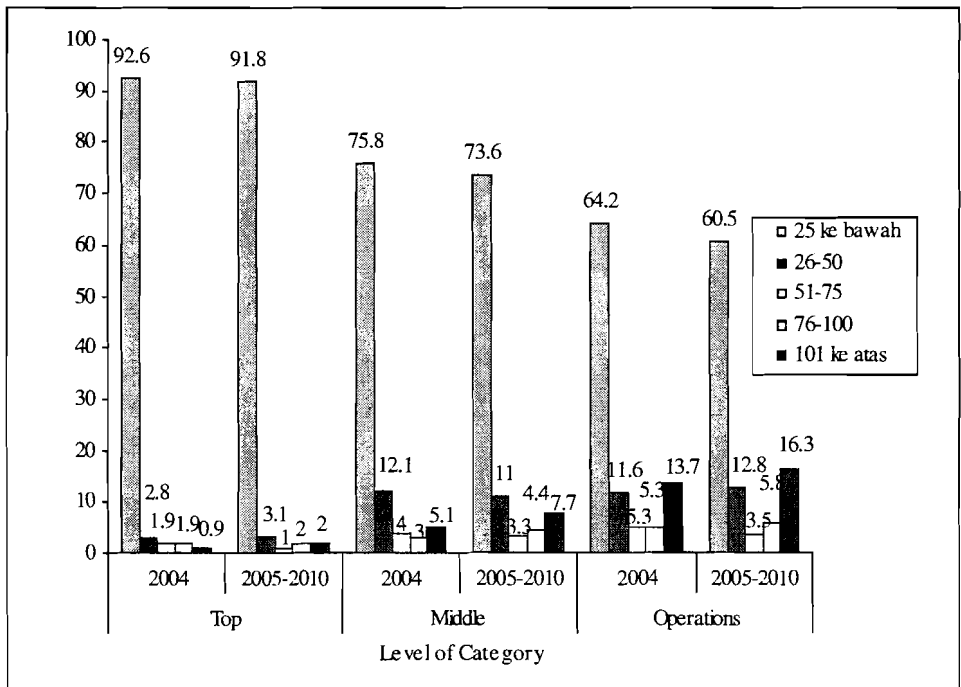


**Figure 4.4: Levels of Skilled Workers in Sample Technology and ICT Industries**

industry just above 30% have ten or less skilled workers. 23% of the sample firms indicated having more than 50 skilled workers, and about 45% have skilled workers in the range ten to 50. For the ICT category, 25.5% have less than ten skilled IT workers, and the same proportion indicated having more than 50 skilled workers.

The remaining half of the sample firms in ICT category have between ten to 50 skilled workers. Figure 4.4 illustrates the distribution of the technology and ICT samples according to the range of skilled workers available. There is considerable variance is demonstrated.

Figure 4.5 shows the distribution of management workforce according to the different management levels. The study examined the current workforce based on 2004 figures and the anticipated demand for each management level in the five years from 2005 to 2010. The results of the study show that the majority of the companies have 25 or fewer employees in all the management level categories, ranging from 64.2% at the operations level, to 75.8% at the middle-level management, and to 92.6% at the top-level management. As the figures indicate, this trend appears to be consistent even for the next five years, though there is a slight decrease in the demand for management workforce across all three management levels. However, the decrease is only slight particularly at the top-level management. This decrease may suggest that the firms believe that there will not be any increase in the demand for workforce in the next five years in



**Figure 4.5: Distribution of Workforce by Management Category**

Note: 'ke bawah' = below; 'ke atas' = above.

companies with 25 or less employees across all management levels. However, as depicted in Figure 4.5, for the larger companies, the trend appears to be the opposite, with an increase in management workforce demand for the next five years across all three management levels, and with the operations level showing the highest increase. This trend may indicate that larger firms are expected to have more job openings for all management categories particularly at the operations level in the technology and ICT industry in Malaysia within the next five years.

The workforce trend in the technology industry shows an equally distributed proportion of workforces across all three categories of skilled workers, semi-skilled workers and unskilled workers for companies with 25 or less employees. However, the biggest decrease is in the semi-skilled worker category with a decrease by almost 7%. For unskilled workers, as Figure 4.6 shows, there is the least fall in demand with only 2% decrease, while the larger firms tend to have increased demand for skilled workers. This result may suggest that while smaller companies will tend to have less demand for technology workforce in the future, alternatively, larger companies will tend to have more demand for technology workforce within the next five years. This is particularly true in the semi-skilled category where the demand appears to be the greatest.

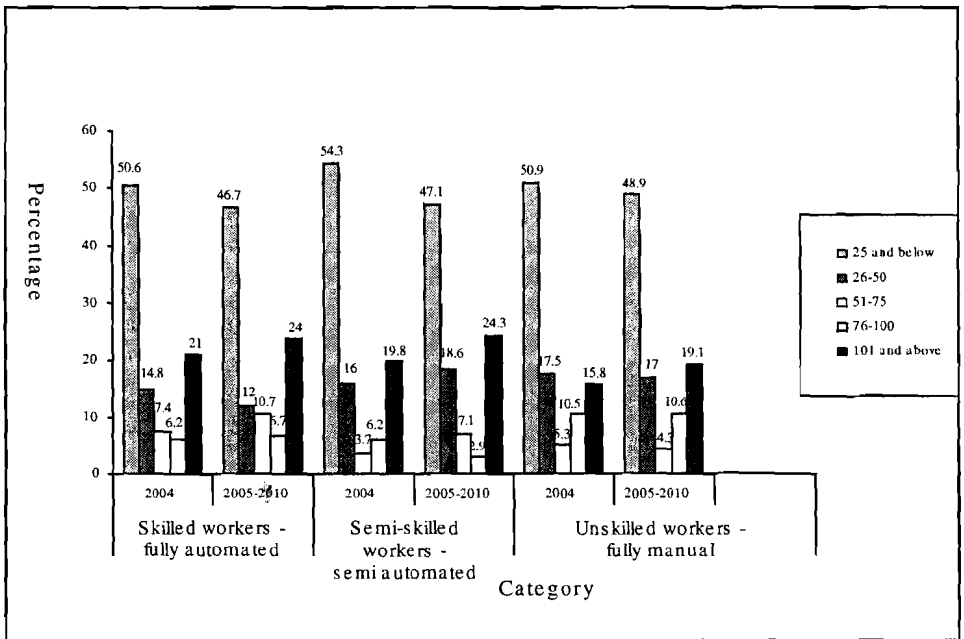


Figure 4.6: Distribution of Workforce by Technology

Figures 4.7a and 4.7b following show the distribution of workforce and future workforce demand in the ICT industry. This future demand may indicate the current demand for ICT workforce is in the ICT support category, followed by the database administrator, systems analyst or application developer category and desktop publishing. The demand for hardware or computer engineering category is comparatively lower at 79.1% of the 25 and below employee sample. However, in the next five years, the predicted demand for computer engineers will increase by 2%, as suggested by the trend in Figure 4.7a. This increase is also evident for desktop publishing specialists. As illustrated in Figure 4.7b, demand for these specialists is predicted to rise even more in the next five years at 3%. In contrast, computer support specialists, systems analysts, and database administrators are expected to see a fall for the next five years with between three to 4% decrease in demand.

There is a significant demand for non-ICT workers who do use a computer in their daily operations. This result shows that almost 60% of the sample employs non-ICT staff as knowledge workers, which indicates significant transformation to a knowledge society. Furthermore, in the next five years the number of non-ICT workers is expected to drop by 7% for smaller firms. Closer examination of the

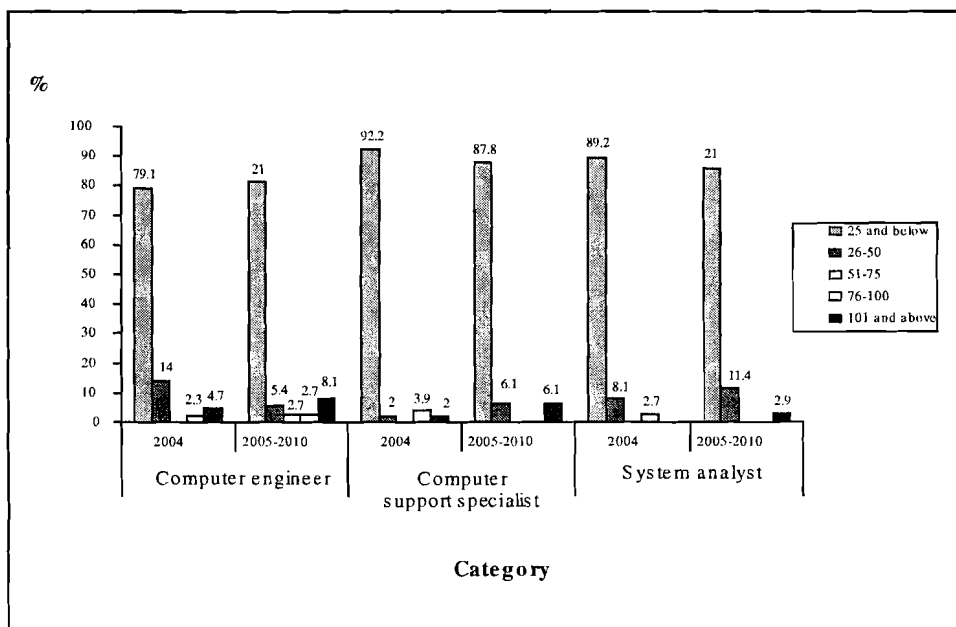
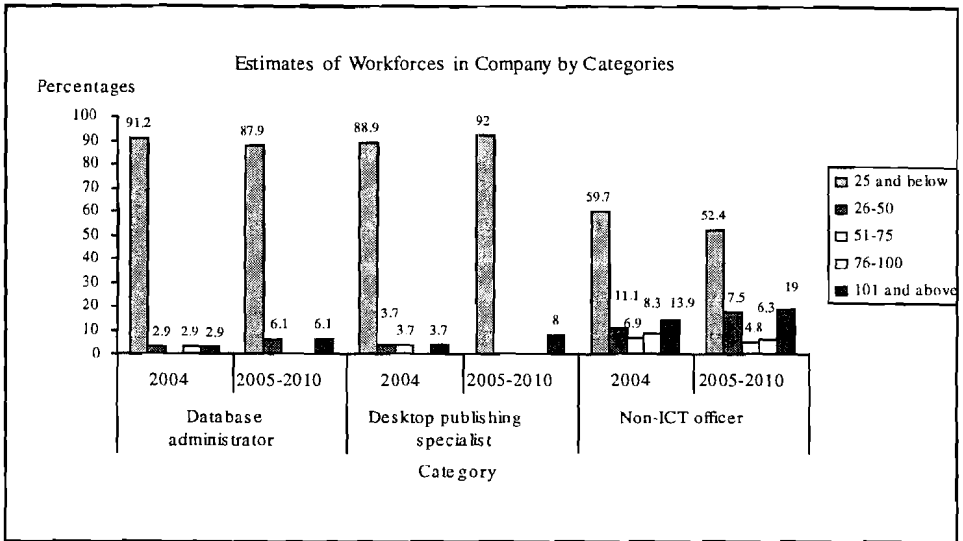


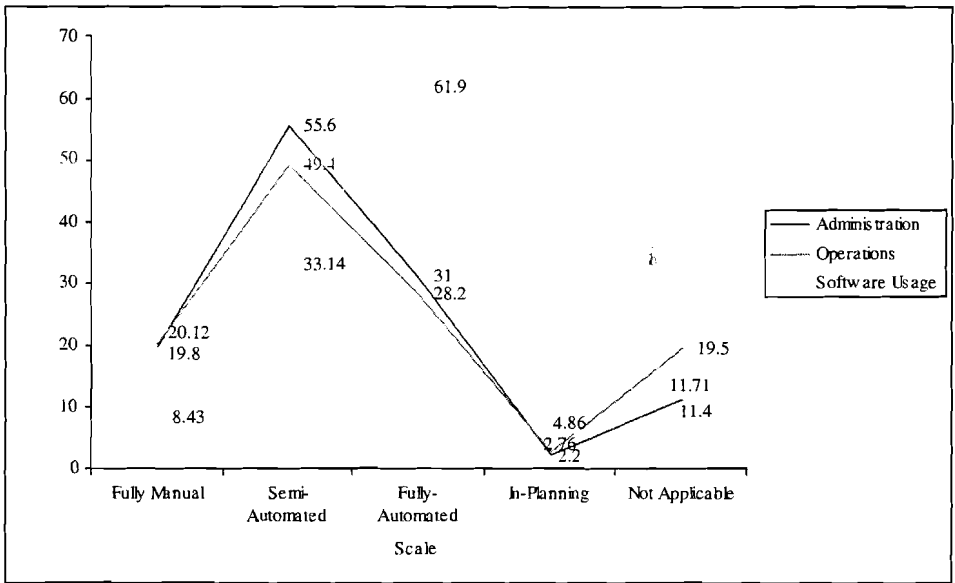
Figure 4.7a: Distribution of ICT Workforce



**Figure 4.7b: Distribution of ICT Workforce**

study findings shows an upward trend in the demand for non-ICT workers in the larger-sized companies. This finding suggests that larger firms will require more non-ICT workers in the future and the demand for K-workers will increase more for larger companies than for small companies.

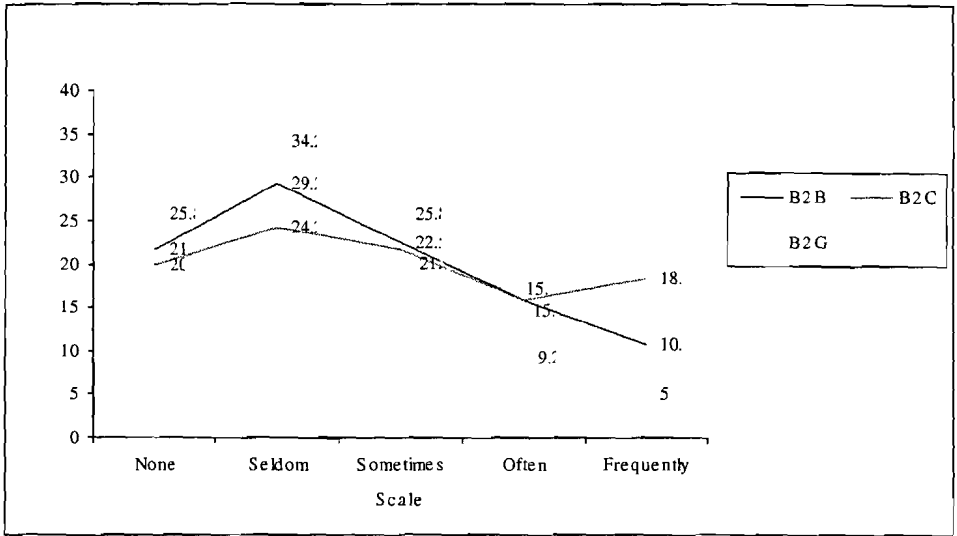
Figure 4.8 compares the level of ICT adoption in the administration, operation, and software usage. With the exception of software usage, the level of ICT adoption appears to be higher in the administration in comparison to operations usage. In administration, an average of 55.6 applications is used as semi-automated and only 31 applications are fully automated. In operations, an average of 49.4 applications is used as semi-automated and only 28.2 applications are fully automated. The results indicate semi-automated applications are dominant in both administration and operations functions. It is noteworthy that there is still manual usage of traditional word processing (i.e., usage of a typewriter), manual spreadsheet, project planning, and human resource planning. However, on average only 8.43 applications are manual. Understandably, software usage in fully automated applications is the highest with an average of 61.9%. The respondent sample also indicated that a number of applications are in planning through software usage top the list at 4.86 applications. The results also show more operations applications are in the pipeline in comparison to applications that support the administration function.



**Figure 4.8: Comparison of Level of ICT Adoption**

Figure 4.9 shows the usage of E-business applications amongst the respondents. The study captured three categories of E-business. Business-to-business (B2B) is electronic transactions between companies, whereas business-to-customer (B2C) is the availability of electronic facilities provided by a company to its customers. Business-to-government (B2G) is part of the E-government initiative that provides online access for companies and individuals to access government services. The results show that only a small percentage of the sample has never experienced E-business, with a range from 20% for B2C, to 21.7% for B2B and 25.8% for B2G. In other words, the results indicate that up to 80% of the sample has had the experience of participating in E-business and the B2C category has the highest E-business participation followed closely by the B2B category.

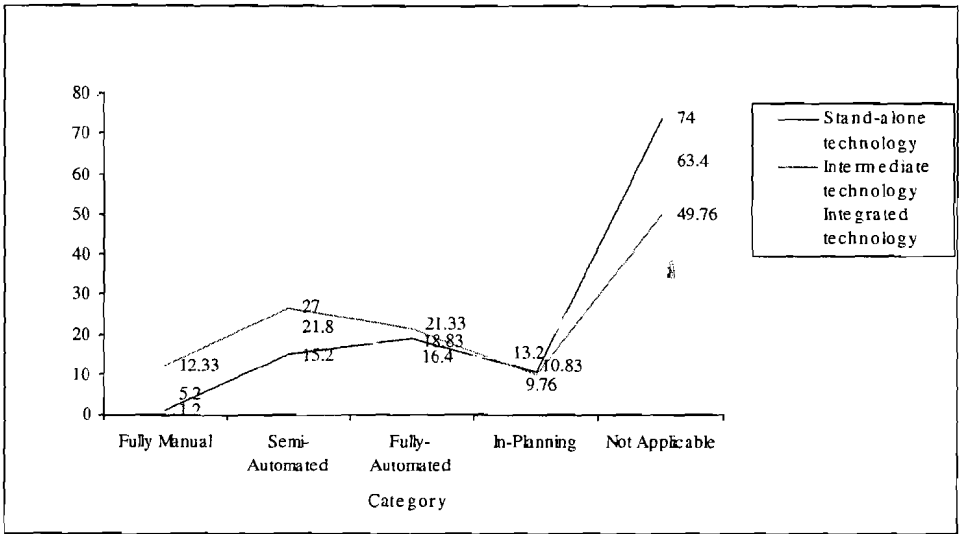
Among the most frequent E-business use is the B2C category, and the least used is the B2G category. Hence, there is still a significant opportunity to expand the E-government initiatives, particularly at the state and local government level, and further to the district and housing, or village level. Only through the implementation of these types of initiatives can Malaysia fully realize the potential to become a knowledge-base society and so achieve its knowledge-based economic development goals.



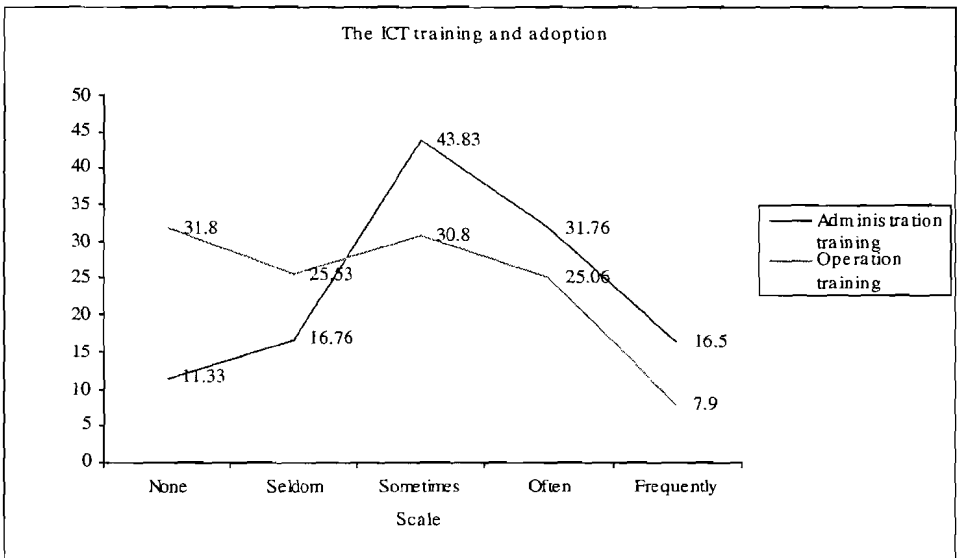
**Figure 4.9: Usage of E-business Applications**

On the issue of technology adoption, intermediate technology appears to be dominant in the fully and semi automated categories. This situation suggests that solutions for technology adoption are currently most popular in the intermediate technology, which could be more economical than integrated technology, but have power and capability beyond stand-alone technology. Figure 4.10 presents the trends in technology adoption from manual technology to fully automated technology. Intermediate technology is dominant in the manual category. For future planning, however, the trend indicates a shift to the integrated technology. This trend suggests the industry should move towards integrated technology, as integrated solutions are more feasible and economic as organizations engage with the more competitive market realities of the globalization.

As organizations embark on IT adoption, the requirements for ICT training become more important. The study shows that administrative staff undergo ICT training more frequently than their operations counterpart does. This result is somewhat surprising as operations personnel should be equipped with the necessary ICT skills and knowledge to become effective and efficient end-users responsible for the day-to-day operations of the business. Figure 4.11 shows the frequency of ICT training by the administrative and operations personnel.



**Figure 4.10: Technology Adoption**

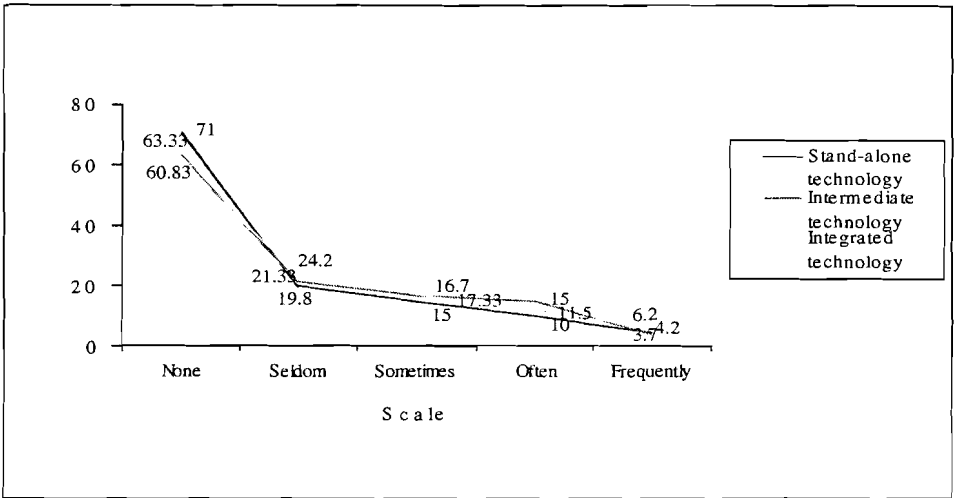


**Figure 4.11: ICT Training**

Figure 4.12 shows the frequency of technology training according to the three technology categories — stand-alone, intermediate and integrated technologies.



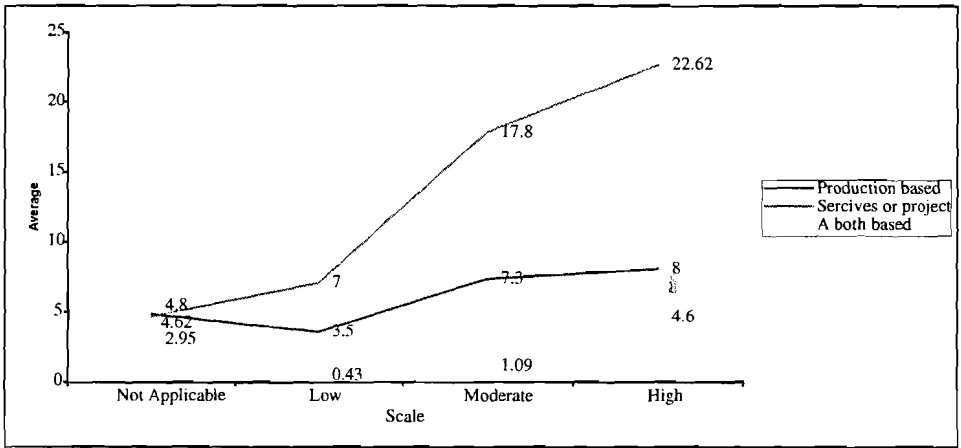
The study indicates a worrying trend in technology training. In all the three technology categories, a high proportion of the sample indicates having none, or very little, training in the technology they adopted. Further, the results show a decrease in the average technology training in all three categories as the frequency of training increases. These results emphasize that industry must acknowledge that the highly competent and skilled technology adopters come with adequate training and, thus, the firms must be prepared to allocate appropriate training budget.



**Figure 4.12: Technology Training**

Figure 4.13 shows the results of the productivity trends found in the firms. The results indicate that service-based companies have better productivity performance than production-based companies. The study indicates a near three-fold increase in productivity performance for service-based industry. This study indicates the imperative to give greater attention to the services industry to accelerate the performance of the Malaysian economy, particularly in national efforts to become a fully developed country by 2020.

The development of appropriate human resource capabilities is essential to ensure an ongoing contribution to sustainable productivity required for continued economic growth. In support of this reality, this study provides an informative assessment of the development of human resource capabilities based on the application of information technology in the context of Malaysia.



**Figure 4.13: Measurement of Productivity**

## CONCLUSION

The ICT policy and adoption study demonstrates that a large supply and capacity vacuum exists in Malaysia for the key requirements of well-educated skilled workforce in the areas of IT and other high technology in the SMEs' industrial sector. The findings indicate an unfavorable human resource performance reality when national policy acknowledges that there is a fundamental need to make progress in the area if high technology development in the K-economy era and IT is in high demand to engage competitively in the global market. In particular, the findings reveal low levels of human resource IT capacity and limited level of technology adoption amongst the smaller SMEs. Forecasts predict more complex job demands for all three managerial levels. Predictably, in a context of higher levels of economic growth, the competitive expansion of the business operations will trigger high staff turnover. Hence, in this context, there will inevitably be increasing demand for skilled, semi and unskilled workers who hold the appropriate ICT and technology capacity that training programs should currently be investing in and developing for the future of Malaysia to achieve the K-economy goals that are fundamental to Vision 2020.

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