ICT USAGE IN MALAYSIAN SMEs: ANALYSIS ON ICT ADOPTION AND PERCEIVED ATTRIBUTES

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DECLARATION

I declare that this thesis entitle "ICT Usage in Malaysian SMEs: Analysis on ICT Adoption and Perceived Attributes" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.

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ABSTRACT

The main objective of this study is to identify the level of ICT adoption among micro, small and medium categories of Malaysian SMEs from services sector. The empirical study from this research determined the relationship between perceived attributes of innovation elements and level of ICT adoption furthermore the ICT usage. From the probability proportionate stratified random sampling, 390 SMEs from the micro, small and medium categories as the respondents participated in the survey questionnaires. The data collection was performed throughout Malaysia by email, telephone calls and exhibition. The results were analyzed by descriptive statistic, correlation, multiple regression and ANOVA analysis. This empirical study revealed that 75.1% SMEs in service sectors at Level 3 – Advanced Communication, followed by 12.3% at Level 4 – Advanced Information Technology, 6.4% at Level 2 – Basic Information Technology and 6.2% at Level 1 – Basic Communication. The profile of ICT usage measured by the list of core ICT indicators was developed from the primary data gathering. Previous research has indicated that the rate of adoption of ICT innovation specifically among SMEs in Malaysia was low although there are many initiatives have been implemented by the government but the outcomes have not been fully translated into results. This is important to improve the performances by adopting the ICT innovation as SMEs are key drivers and engine for the economic growth. More importantly, ICT are among the National Key Economic Areas (NKEAs) that need to be focus especially for the purpose of SMEs development. Perceived attributes of innovation are important elements that have been considered in this study since it contributed up to 87% to the rate of adoption and core ICT indicators as the guidance adhered to globally accepted standards. Thus, the information on the current status is important before further develop the action plan. This study provided the useful information as the guidance to policy maker by created the identification of level ICT adoption and relate with the profile of ICT usage based on the list of core ICT indicators as the standard measuring tools. The practical implications to policy maker as well as society are to suggest the ICT trialability package, human capital development programs to increase the ICT-skilled workforce and empowering bottom 40 percent micro SMEs through ICT utilization along the business value chain. Mainly, the findings supported government agenda towards developing the SMEs as stated in SME Masterplan (2012-2020), Third Industrial Master Plan (IMP3), Tenth Malaysia Plan (10MP) and contribute to the government aspirations to become high income and developed nation by 2020 as stated in New Economic Model (NEM).

ABSTRAK

Objektif utama kajian ini adalah untuk mengenalpasti tahap penggunaan teknologi maklumat dan komunikasi (ICT) bagi kategori mikro, kecil dan sederhana (PKS) dalam sektor perkhidmatan di Malaysia. Kajiselidik ini mendapatkan hubungkait antara elemen-elemen anggapan inovasi dan tahap penggunaan ICT seterusnya penggunaan ICT itu sendiri. Melalui kaedah pensampelan rawak berperingkat, 390 PKS dari kategori mikro, kecil dan sederhana sebagai responden memberi maklumbalas mengambil bahagian kepada kajiselidik yang dijalankan. Pengumpulan data dijalankan merangkumi seluruh Malaysia melalui mel elektronik, panggilan telefon dan pameran. Data yang dikumpulkan dianalisa melalui kaedah demografik, hubungkait Pearson, analisa regresi berganda dan ANOVA. Kajian ini mendedahkan 75.1% PKS dalam sektor perkhidmatan berada pada Tahap 3 – Komunikasi Termaju, diikuti 12.3% pada Tahap 4 – Teknologi Maklumat Termaju, 6.4% pada Tahap 2 – Teknologi Maklumat Asas dan 6.2% pada Tahap 1 – Komunikasi Asas. Profil penggunaan ICT telah diukur dengan senarai penanda teras ICT melalui pengumpulan data utama. Penyelidikan sebelum ini menunjukkan tahap penggunaan inovasi ICT terutamanya di kalangan PKS adalah rendah sungguhpun berbagai-bagai inisiatif telah dilaksanakan oleh kerajaan tetapi belum menampakkan hasilnya. Adalah mustahak untuk menambahbaik prestasi penggunaan ICT melalui inovasi ICT memandangkan PKS adalah enjin dan penggerak utama kepada pertumbuhan ekonomi. Lebih penting lagi, ICT adalah antara Bidang Ekonomi Utama Negara (NKEAs) yang perlu di beri tumpuan terutamanya kepada pembangunan PKS. Elemen dalam ciri-ciri anggapan terhadap inovasi digunapakai dalam kajian ini kerana ianya menyumbang sehingga 87% terhadap kadar penggunaan ICT dan penanda teras ICT sebagai panduan ke arah mematuhi tahap global. Oleh itu, maklumat status terkini adalah penting sebelum membangunkan sebarang pelan tindakan. Kajian ini menyediakan informasi berguna sebagai panduan kepada penggubal polisi dengan mewujudkan kenalpasti penggunaan tahap ICT dan mengaitkannya dengan profil penggunaan ICT yang berdasarkan senarai penanda teras ICT sebagai alat pengukuran yang seragam. Kesan praktikal kepada penggubal polisi dan juga masyarakat adalah dengan mencadangkan pakej percubaan ICT, program pembangunan modal insan untuk meningkatkan tenaga kerja mahir ICT dan memantapkan 40% yang terkebawah kategori mikro melalui penggunaan ICT merangkumi semua proses perniagaan. Secara umumnya, hasil kajian ini menyokong agenda kerajaan ke arah pembangunan PKS seperti yang termaktub dalam SME Masterplan (2011-2020) dan menyumbang kepada aspirasi kerajaan ke arah mencapai negara maju pada 2020 seperti yang dinyatakan dalam model ekonomi baru.

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LIST OF ABBREVIATIONS

10MP	-	10th Master Plan
ANOVA	-	Analysis of Variance
CDMA	-	Code Division Multiple Access
CRM	-	Customer Relationship Management
DOI	-	Diffusion of Innovation
DOSM	-	Department of Statistics Malaysia
DSL	-	Digital Subscriber Line
E&E	-	Electrical and Electronics
ERP	-	Enterprise Resources Planning
F&B	-	Food and Beverage
GDP	-	Gross Domestic Product
GPRS	-	Global Positioning Remote Satellite
GST	-	Goods and Services Tax
HSDPA	-	High-Speed Downlink Pocket Access
HSUPA	-	High-Speed Uplink Pocket Access
ICT	-	Information Communication and Technology
IMP3	-	Integrated Malaysia Plan 3
IP	-	Intellectual Property
ISDN	-	Integrated Services Digital Network
ITU	-	International Telecommunication Union
KMO	-	Kaiser-Meyer-Olkin

LAN	-	Local Area Network
MNC	-	Multi National Company
MRS	-	Manufacturing Related Services
NEM	-	New Economic Model
NKEAs	-	National Key Economic Areas
NSDC	-	National SME Development Council
PC	-	Personal Computer
PDAs	-	Personal Digital Assistants
R&D	-	Research and Development
RPM	-	Rapid Prototyping and Manufacturing
SCM	-	Supply Chain Management
SMECorp	-	SME Corporation
SMEs	-	Small and Medium Enterprises
SPSS 19.0	-	Statistical Package for Social Sciences 19.0
SRI	-	Strategic Reform Initiatives
TAM	-	Technology Acceptance Model
TPB	-	Theory of Planned Behavior
TV	-	Television
UMTS	-	Universal Mobile Telecommunications System
VIF	-	Variance Inflation Frequency
VOIP	-	Voice over Internet Protocol
W-CDMA	-	Wideband-Code Division Multiple Access
WP KL	-	Wilayah Persekutuan Kuala Lumpur
WWW	-	World Wide Web

CHAPTER 1

INTRODUCTION

1.1 Purpose of Study

The main objective of this study is to identify the level of ICT adoption among micro, small and medium categories of Malaysian SMEs from services sector. The empirical study from this research determined the relationship between perceived attributes of innovation elements and level of ICT adoption furthermore the ICT usage. The contribution from this study is to provide useful information and support the government agenda in development of the SMEs as stated in the SME MasterPlan (2012-2020), Tenth Malaysia Plan (10MP), Third Industrial Master Plan (IMP3) and to become high income nation as described in New Economic Model (NEM) by increasing the productivity through creativity in managing the technology innovation.

1.2 The Problem and its Background

1.2.1 The Problem

Over the years, there had been a growing concern of ICT development among SMEs with regards to the slow adoption of ICT. Tan (2006) found that ICT in Malaysia is facing big challenges because of the slow adoption of technology by SMEs. SME owners in Malaysia possess below-average ICT skills and seldom use the ICT such internet at their workplace while they also find IT adoption are difficult and thus SME owners in Malaysia are in the late majority in the adopter category (Hashim, 2007). The

Report of 2012 SMEs Survey by The Associated Chinese Chambers of Commerce & Industry of Malaysia (ACCCIM), in regard to the use of e-commerce, Malaysian SMEs are still bond of using the conventional method of doing business. The finding showed 48 percent not using e-commerce, 24 percent in planning and only 28 percent used e-commerce. Only 20 percent of SMEs used IT extensively in daily operations (SME Masterplan 2012-2020).

Recognizing the important role of ICT to SMEs in the economy, the government is committed to support and nurture the development of SMEs to ensure their sustainability and competitiveness. There have the needs to identify the current status level of ICT adoption and usage as the useful information and guidance to related bodies for developing further programs. The National SME Development Council (NSDC) established in 2004 underlines the government commitment and initiatives in development of SMEs in Malaysia in a comprehensive and coordinated ways. NSDC has introduced various initiatives through the SME Development Framework which coordinates the policies and programs across more than 15 ministries and 60 agencies. The major programs in SME Masterplan (2012 – 2020) included the research to study the effectiveness of SMEs' performance, technology awareness and advisory services, developing SME business portal and to create the ICT adoption culture among SMEs. Third Industrial Master Plan (IMP3) 2006-2020 promoting the greater utilization of ICT and other technologies along the value chain of the business process. Government emphasized the courses in management, finance, marketing and ICT for SMEs in 10th Malaysia Plan (10MP). In New Economic Model (NEM), two key issues have become relevant to SME development; firstly, create a number of strong homegrown companies that can compete in the international market to become regional and global champions. Secondly, to focus on the bottom 40 percent of the income group that earn RM1,500 and below, which mainly

comprises self-employed micro enterprises to upgrade their activities and to elevate their income levels.

1.2.2 The Importance of the Problem

Among the government policies regarding the SME development as stated in SME Masterplan (2012 – 2020) included the research to study the effectiveness of SMEs' performance. Although in the Asia-Pacific Development Information Program have reported several reasons contributed to the slow ICT adoption among SMEs in Asia-Pacific countries, it is important to identify these causes at several point of different time, since the user's perception and intention can change over time due to several factors (Selamat et al., 2011). SMEs play an important role and become a catalyst of economic growth in Malaysia with contribution of 99 percent of total business establishments in Malaysia, but there has been very little research done on ICT in SME (Selamat et al., 2011). In addition, this research concluded that it is critical to have more empirical evidence of the factors affecting adoption of ICT to help managers, regulatory bodies and ICT providers further access the benefits of its continuous and potential development.

1.2.3 The Problems in More Detail

SMEs in most developing countries like Malaysia still have been slow to adopt it although most SMEs in Malaysia realize that ICT is critical to the productivity and performance of their companies (Lim, 2006). Findings from Tan and Eze (2008) indicated that SMEs are likely to adopt ICT in future, government initiatives through Ninth Malaysia Plan (2006-2010) seems to be not very successful because the internet-based ICT adoption is still low. Tan and Eze (2008) also revealed that email usage and information seeking by

internet become two most important factors on ICT while business transaction through like e-commerce and e-business was still not popular among SMEs in Malaysia.

1.2.4 The Solution to the Problem

To achieve this end, this research conducted the empirical study on the level of ICT adoption related with perceived attributes of innovation for micro, small and medium categories. Also included the ICT usage using core ICT indicators adhered to globally accepted standards. As identified by Rogers (1995) in his seminal work "Diffusion of Innovations", five attributes of innovations that best determined their rate of adoption are relative advantage, compatibility, complexity, trialability, and observability affecting the rate of adoption of the technology by contributed the variance up to 87 percent. The core list of ICT indicators was the outcome of an intensive consultation process by the Partnership on Measuring ICT for Development, which involved NSOs worldwide. The indicators are based on internationally agreed standard.

1.3 The Conceptual Framework

1.3.1 This Research Position

In the light of the theories cited in the review of related literature and studies, especially the insights from Kotelnikov (2007), Alam and Ahsan (2007), Selamat et al. (2011), Tan and Eze (2008), Rogers (1995) and Core Indicators on use of ICT by businesses by Partnership on Measuring ICT for Development Core ICT Indicators (2010), this study aimed to develop the empirical study on the level of ICT adoption related with the perceived attributes of innovation. Further, to determine the ICT usage using core ICT indicators adhered to globally accepted standards for micro, small and medium categories.

1.3.2 The Previous Studies

Study from Kotelnikov (2007) formed the base for Gradual Progression of ICT Adoption in SMEs. The model indicated the sequential process of ICT adoption among SMEs. The adoption of ICT started from Basic communication (fixed line, mobile phone, fax) to Basic Information Technology (PC with basic software and hardware) follow with Advanced Communication (connected to internet) and Advanced Information Technology (PC with advanced software). Alam and Ahsan (2007) in their "ICT Adoption in Malaysian SMEs from Services Sectors: Preliminary Findings", there are five variables used to measure level of ICT adoption. These are included develop formal ICT training plan, develop business web site, e-mail usage for business purposes, e-business practices and internet transactions. Selamat et al. (2011) "ICT Adoption in Malaysian SMEs" referred to the usage of ICT such as computer hardware, software and network to connect to the internet. Tan and Eze (2008) suggested for future research to investigate types of ICT applications Malaysian SMEs adopt. The Partnership on Measuring ICT for Development is an international, multi-stakeholder initiative to improve the availability and quality of ICT data and indicators particularly in developing countries. The list, which is revised regularly, was identified to help guide countries in measuring the information society. On March 2007, the UN Statistical Commission endorsed the core list of indicators on ICT, which was developed by the Partnership on Measuring ICT for Development. The indicators are based on internationally agreed standards. Rogers (1995) stated that there are five stages in adoption process which included knowledge, persuasion, decision, implementation and confirmation. The perceived attributes of innovation which consists of five elements namely relative advantage, compatibility, complexity, trialability and observability have an influenced individual decision whether to adopt or reject. Rogers

suggested that up to 87 percent of the variance in rate of adoption is contributed by these five attributes.

1.3.3 The New Studies

To accomplish the research objectives, the output would be the level of ICT adoption related with perceived attributes of innovation and the ICT usage based on 12 elements of core ICT indicators. For assessing level of ICT adoption in this research, the gradual processes in the model by Kotelnikov (2007) was named and identified as Level 1 for Basic Communication, Level 2 for Basic Information Technology, Level 3 for Advanced Communication and Level 4 for Advanced Information Technology. The ICT usage was measured standardized based on the 12 elements core ICT indicators for the micro, small and medium categories of SMEs. The perceived attributes of innovation elements were the factors that contributed to the level of ICT adoption. It is important to assess at several different times to identify the changes in perception of the SMEs. This study extended to fill the gaps in the several related previous research and model as shown in Table 1.1.

Table 1.1 : Proposed Improvements on Previous Related Studies

Gaps existed in related previous research/model on adoption and usage of ICT applications	Suggested improvements to the previous study
2. Alam and Ahsan (2007) measured the level of ICT adoption in terms of ICT training plan, develop business web site, e-mail usage, e-business practice and internet transactions for Melaka and Johor. The findings are not divided into categories of SMEs. 2. Tan and Eze (2008) in their suggestions of future research to investigate types of	i) Measurement level of ICT adoption for micro, small and medium categories of Malaysian SMEs from services sector. ii) More specific ICT usage measurement on 12 elements core ICT indicators for business adhered to global standard as suggested by ITU.

ICT applications adopted by SMEs. 3. Selamat et al. (2011) referred ICT adoption to the usage of ICT such as computer hardware, software and network to connect to the internet whereby this is a broad measurement and absence of the specific ICT applications.	

1.4 Research Questions

The research questions developed based on the research objectives. This research answered the level of ICT adoption and the relationship perceived attributes of innovation elements and the impact to the ICT usage. The research questions are as follows:

1. What is the level of ICT adoption in Malaysian SMEs from service sectors?
2. What is the relationship between perceived attributes of innovation elements and level of ICT adoption in Malaysian SMEs from service sectors?
3. What is the relationship between level of ICT adoption and ICT usage in Malaysian SMEs from service sectors?

1.5 Research Objectives

As the research purposes are to study the level of ICT adoption and ICT usage, it is divided into several research objectives. The development programs for the SMEs have many strategies to be implemented and it is important to identify the present situation. This study take into account the perceived attributes of innovation elements and the core ICT indicators because the experimental results showed the relationship and impact with each other. For that, the objectives of this research are as follows:

1. To assess the level of ICT adoption in Malaysian SMEs from service sectors.