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Demand for internet access and use of Small and Medium Enterprises (SMEs) in Thailand

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Demand for Internet Access and Use of Small and Medium Enterprises (SMEs) in Thailand

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Abstract

The aim of this paper is to analyse the demand and use of Internet access by small and medium enterprises (SMEs) in Thailand. Given the huge importance of SMEs to a national economy such as Thailand, this paper dives into the data to understand the magnitude of the issue. Official 2010 Thai government statistics state there are 2.82 million SMEs with unregistered SMEs triple this size. This compares to a population figure of 66.79 million and an Internet user community of 36 million users. This study therefore set out to empirically examine by use of a bivariate probit model whether the variables of computer availability, business sector, SME size, organizational form or foreign shareholding has a systematic link to Internet access. After this, once Internet use was determined, to analyse and estimate specific usage. The impact of these factors varies from service to service (i.e. e-mail, searching, retrieving and interacting with governmental agencies or purchasing goods and services online). Implications suggest that SME Internet connectivity and subsidy should be considered by key policy makers while developing and implementing more robust infrastructure and better support which could stimulate the growth of Internet access and use. Along with fixed/land line technologies, wireless broadband technologies such as 3G/4G could be another alternative to solve the lack of fixed infrastructure and provide an opportunity for SME Internet services. This must also be combined with better education and support for the entrepreneurial SME owner/manager.

Keywords: Internet access / Internet use / SMEs / Thailand

1. Introduction

Small and Medium Enterprises (SMEs) are a fundamental part of the economic fabric in developing countries, and they play a crucial role in furthering growth, innovation and prosperity (Harvie, 2007), and this is no less the case for Thailand. The definition and concept of SMEs vary from country to country. Various Thai agencies apply different definitions, including the size of net fixed assets, number of staff, annual sales, registered capital and economic activity (whether agricultural and farming or not). To simply the definition of an SME however, this study refers to the study of Meephokhee and Ruengsrichaiya (2005). SME is defined as enterprises with fewer than 200 persons. After that, research discovered that assets provide the second criteria, with widely varying amounts according to the sector of the economy.

In Thailand, SMEs were more heavily promoted after the calamitous financial crash of 1997 and later in 2002, the Department of Industrial Promotion (DIP), which is a department of Thailand's Ministry of Industry (MoI), defined three different categories of SMEs which are: (1) Production Sector SMEs (includes agricultural processing, manufacturing, and mining); (2) Service Sector SMEs and; (3) Trading Sector SMEs (includes wholesale and retail). Furthermore, each category for an SME is made up of enterprises which employ fewer than 200 employees and have fixed assets not exceeding 50 Million Thai Baht (or not exceeding approximately 1.5 Million USD).

The Bangkok area contains the highest density of SMEs in Thailand, accounting for around 30 percent of total SMEs on average during the period 1994 to 2009. Bangkok is also recognized as the major economic center of the nation (OSMEP, 2001- 2009).

Small and medium enterprises are the beating heart of Thai business, making up 99.7% of companies operating in the country (TIR, 2010) with 2.82 million SMEs registered with the Ministry of Commerce. When considering unregistered businesses, Thailand's actual number of such companies is believed to be triple that. SMEs create jobs for more than 8.9 million people in Thailand, or 76% of the national workforce. They contribute about 37.8% of the GDP or 3.4 trillion baht. Such businesses also generate about 1.7 trillion baht in exports annually according to OSMEP (TIR, 2010). With Thailand's goal of economic development and the spread of prosperity within the region, there must be a strategy focused on developing countries to generate economic growth.

SMEs are a major source of entrepreneurial skills, innovation and employment (European Commission, 2005). As such, SME development emerges as a key instrument in poverty reduction efforts. Globalization and trade liberalization have ushered in new opportunities, as well as challenges for SMEs (OECD, 2004). Only some parts of the SME sector are able to identify and exploit these opportunities and deal with the challenges.

The majority of SMEs in developing and transition countries, however, has been less able or unable to exploit the benefits of globalization and, to add to the situation, are frequently under pressure on the local or domestic markets from cheaper imports and foreign competition. Moreover, they frequently have difficulties in obtaining capital or credit, contributing to production and distribution efficiency. These restrictions may also reduce their performance.

SMEs in Thailand are in the transition stage for the upcoming ASEAN Economic Community (AEC) in 2015. In the 2012 'Thailand Competitiveness Report', under the category 'Key Development Directions for the Future', developing the creative economy by promoting creative geographical pockets and knowledge-based infrastructure, and upgrading skills of SMEs to increase value of their products and services was highlighted as a key component (TCR, 2012). Under the AEC blueprint (ASEAN, 2008), the AEC has stated its goals to be: (a) a single market and production base, (b) a highly competitive economic region, (c) a region of equitable economic development, and (d) a region fully integrated into the global economy. Activities under this blueprint will unavoidably affect SMEs.

There are a number of programs which provided by the government and policy makers to support and increase the competitiveness of Thai SMEs such as providing financing various schemes and advisory through SME Bank and providing Infrastructure and business service. Access and integration of SMEs into local, national, regional and global markets require substantial investments in sustainable physical infrastructure development and business service delivery to SMEs in all areas, including those that are rural and/or remote. Meephokhee and Ruengsrichaiya (2005) noted that information technology (IT) is a prerequisite for SMEs. SMEs could employ IT in both the production process (design and production) and the management process (marketing and administration). However, IT use by SMEs in Thailand is still very low according to the statistics of National Statistical Office (NSO) in 2011. Hence, this study attempts to describe the present situation of ICT use by SMEs in Thailand by focusing in Internet service. The determining factors for demand of Internet access and use by SMEs will be investigated and discussed. The results could be used as guidance in policy and plan formation, as well as promoting the use of Internet by SMEs effectively.

This paper is divided into seven major sections consisting of the introduction, followed by a Section 2 provides an overview of SMEs and Internet usage in Thailand. Section 3 focuses on the prior studies. Section 4 describes the data and method. An analysis of findings are presented in Section 5 and discussed in Section 6 respectively. The conclusion and policy implication are concluded in Section 7.

2. A snapshot of SMEs' history and Internet usage in Thailand

2.1 Thailand's SME history: Supported policy

In 1964, the Council of Ministers approved a financing strategy to promote and develop small industries, as proposed by the National Economic and Social Development Board (NESDB). A loan processing office for small industries was established under the Department of Industrial Promotion, under the Ministry of Industry's supervision to provide financial support to small manufacturing businesses. That office later became the Small Industry Finance Office (SIFO). However, the SIFO's operations and growth were hampered by limited funds, which were dependent on state budget allocations, and cumbersome and inflexible government procedures and regulations (SME Guidebook, 2013).

In 1991, the government promulgated the Small Industry Finance Corporation Act and the SIFO became the Small Industry Finance Corporation (SIFC) with registered capital of 300 million baht. Its status as a juristic person allowed the SIFC to raise capital domestically and internationally. In 2000, the government initiated policies using the SIFC as the primary mechanism to assist small and medium enterprises, key drivers of the Thai economy. The

Ministry of Finance recapitalized the SIFC, increasing its equity to THB 2.5 billion. On December 20, 2002, the Small and Medium Enterprise Development Bank of Thailand Act was enacted, re-establishing the SIFC as the Small and Medium Enterprise Development Bank of Thailand (SME Bank). The bank's mandate was "to conduct business with the aim of developing, promoting and assisting small and medium enterprises to start-up, expand, or improve their businesses by providing loans, guarantees, venture capital, counseling, and other necessary services as prescribed by the Act". In Fiscal Year 2009, the department passed a THB 2.5 billion baht capital increase that saw the bank's share capital increase to THB 1.6 billion (SME Guidebook, 2013).

The other state-owned specialized SME financial institution is the Thai Credit Guarantee Corporation (TCG) under the supervision of the Ministry of Finance (MoF). It was established on December 30, 1991 under the Small Industry Credit Guarantee Corporation Act B.E. 2534 (1991) to take over all the business and operations of the Small Industry Credit Guarantee Fund. It officially commenced operations on February 21, 1992. At present, TCG's total registered capital is THB 6,839,946,700 (TCG, 2013).

The mission statement for TCG states that it is to provide support to SMEs through guarantee services for those that have potential but lack collateral security in order to enable them to acquire loans from financial institutions and, at the same time, enhance the financial institutions' confidence in credit expansion which will benefit overall economic development. TCG's operations not only help boost the capabilities of SMEs in business and investment expansion but also encourage the emergence of new entrants, contributing to the country's economic development. With the above nature of business, and as a non-profit organization, TCG is committed to operating for the benefit of the country. Its credit guarantee service will be a key driver in the strengthening of SMEs and the healthy social and economic growth of the country (TCG, 2013).

In May 2014 in an effort to relieve the economic difficulties brought on by political unrest, Thailand's SME Bank created a fund totaling 8 billion baht in liquidity, enabling each qualifying entrepreneur to seek a loan up to a limit of 40 million baht, guaranteed by the TCG. The Small and Medium Enterprise Development Bank of Thailand (SME Bank) and representatives from 23 agencies under the Ministry of Industrial Organization signed an agreement to cooperatively support SME entrepreneurs in accordance with the Ministry of Industry's policy. The SME Bank and the Thai Credit Guarantee Corporation (TCG) launched the special measure to grant loans to the SME entrepreneurs in electronics and power, vehicles, garments and the plastics field who are affected by economic conditions and political demonstrations. The Ministry of Industry's agreement is an agreement between the agencies, to help SME entrepreneurs to enhance their potential in production and to survive the economic recession (NNB, 2014).

Even with an extensive history of SME development within Thailand, current situation under the AEC blueprint will unavoidably affect SMEs. Specifically, the ASEAN Policy Blueprint for SME Development (APBSD) 2004-2014 outlines the framework for SME development in the ASEAN region. It comprises strategic work programs, policy measures and indicative outputs (APBSD, 2004). The strategic plan aims to accelerate the pace of SME development and enhance the competitiveness and dynamism of ASEAN SMEs by facilitating their access to information, technology, market, finance and human resource development and skills. The launch of the AEC will expand the market and increase the competition amongst producers through the free flow of goods and services, investment,

capital and free flow of skilled labor. Hence, SMEs need to be aware of this issue and prepare themselves.

To help with this process, a key document was issued in 2013 titled 'SEM Guidebook Towards the AEC 2015' by the ASEAN Secretariat. It stated that small and medium enterprises (SMEs) in ASEAN will benefit from the bloc's economic integration framework which provides for simplified customs procedures, a self-certification system and harmonization of product standards which will help make doing business across the regional bloc easier and reduce the cost of doing business, and ultimately enhance their competitiveness, resilience and presence in the global value supply chains by 2015 and beyond.

The guidebook revealed that one of the measures is the ASEAN Customs Transit System (ACTS). This is an automated system established by member states' customs departments and agencies to monitor the movement of goods in transit as they move through ASEAN countries to their final destination (SEM Guidebook, 2013). This of course is Internet based and a critical component of SME's participation in this 600 million consumer trade block. ACTS will promote simplification, security and savings while boosting the bottom-line of regional businesses, leading to greater economic competitiveness.

The SME Guidebook also noted that faster customs clearance of goods will lead to significant savings in logistical time and cost for companies and "SMEs will benefit through the establishment of a more stable and secure supply chain, reduced costs through shorter and more reliable journey times, while still providing a secure environment which protects the interests and revenue of exporters and member states" (SME Guidebook, 2013), with better connectivity of goods making it easier and much less riskier for companies, and specifically SMEs, to branch out into new markets across the region and sustain their, and the member states', economic development."

Also, under the ASEAN Self-Certification Scheme, the primary responsibility of origin certification is carried out by companies, including SMEs, participating in regional trade. Certified exporters are allowed to declare that their products have satisfied the ASEAN origin criteria by presenting a commercial invoice. If the invoice is not available, any other commercial document such as billing statements, delivery order, or packing list would suffice. "SMEs commonly do not necessarily have the advantages of multinational companies with existing regional networks or familiarity with the administrative certification procedures of other member states" (SME Guidebook, 2013).

The importance for national SMEs within the AEC is no less important with a recent Indonesian report stating that SME's account for 57 percent of the Indonesian gross domestic product (GDP), with MSMEs forming the backbone of the Indonesian economy. During the 2008 crisis, MSMEs were the driving force behind the country's recovery and absorbed more than 97 percent of the Indonesian workforce. But what is also interesting to note is the statement that, "It is vital for the Indonesian government to anticipate the negative impacts of the AEC on the country's MSMEs" (Jakarta Post, 2014).

As can be seen from the above research, there are a number of programs which are provided by the Thai government and AEC policy makers to support and increase the competitiveness of Thai and AEC SMEs. These include such things as providing financing schemes and advice through SME Bank and TCG. Access and integration of SMEs into local, national, regional and global markets require substantial investments in sustainable physical

infrastructure development and business service delivery to SMEs in all areas, including those that are in rural and/or remote areas.

2.2 Internet usage in Thailand

Meephokhee and Ruengsrichaiya (2005) noted that information technology (IT) is a prerequisite for SMEs. SMEs could employ IT in both the production process (design and production) and the management process (marketing and administration). However, IT use by SMEs in Thailand is still comparatively low according to the statistics of the National Statistical Office (NSO) in 2011 which is reflected by Fig.1.

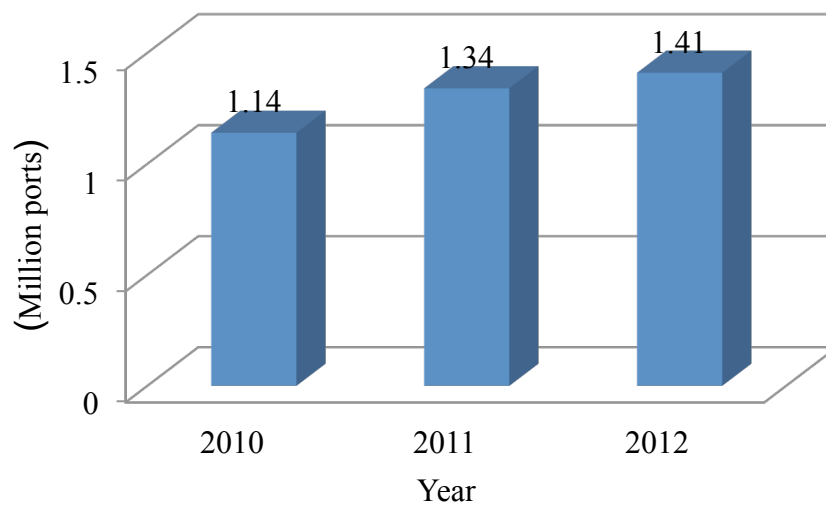


Fig. 1 Thailand TOT Broadband Internet (TOT Annual Report, 2012)

In Fig. 1 broadband Internet growth (landline) has occurred within Thailand but in recent years, at a relatively slow pace compared to other communications mediums such as mobile 3G/4G and smartphones. In Fig. 2 it can also be seen the relatively slow growth of leased lines, usually installed by larger enterprises, schools and government agencies.

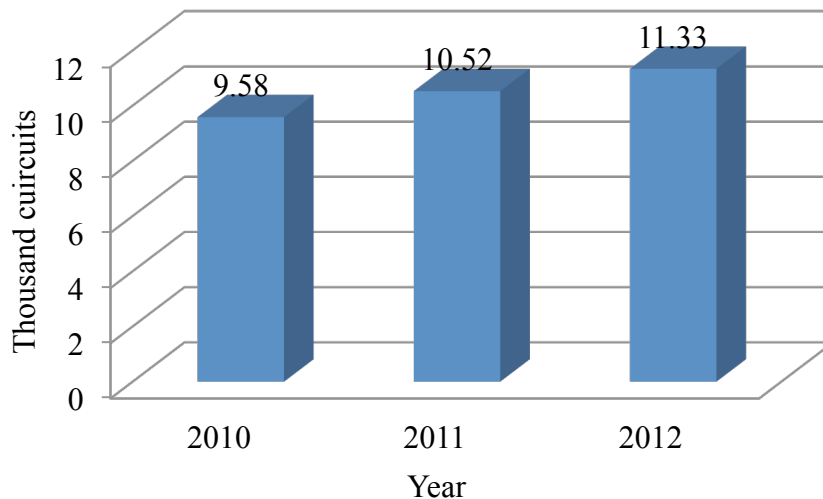


Fig. 2 Thailand TOT Leasedline (TOT Annual Report, 2012)

Although reports and statistics vary widely depending on the definition of ‘Internet’ and how it is accessed, one report stated Thailand had 23.86 million Internet users as of the middle of 2013 with a penetration of 35.8% (TrueHits, July 2013). Internet Broadband was stated to represent 4.72 million users with a penetration of 23.63% per household (NBTC, Sep. 2013). (In 2012, the World Bank stated that Thailand’s population was 66.79 million people)

In another report (Table 1.), 2011 saw a 71% use of the Internet by consumers, compared to 24% for corporations, both large and small, as well as only a 5% use by government. This data seems to mirror the results of this study as well.

What however is interesting is to see the importance of the scale of E-Commerce to Thailand’s economy and to SMEs in particular who have the vision to grasp the moment. According to the Association of Thai ICT Industry (ATCI) in their 2013 Quarter 4 report, the e-Commerce market in Thailand was estimated at 340,903 million baht in 2011[NSO] with the e-commerce market in Thailand expected to reach almost Bt15 billion in 2013 [Paypal]. Additionally, the e-commerce usage in Thailand in 2011-2012 was estimated to be at 67% with m-commerce at 37% with Thailand being one of the top growing countries in Asia [MasterCard] with 51% of Thai people purchasing goods via smartphones [OurMobilePlanet] (ATCI, 2014).

Table1. Thailand Internet Use 2011

Service	Value of using service: Million Baht (%)			
	Total	Corporate	Government	Household
Internet	36,096 (100%)	8,519 (23.6%)	1,877 (5.2%)	25,700 (71.2%)

Source: NSTDA 2012

Given the above statistics, one must ask the question, “How are the e-commerce customers placing their orders?” The answer shows that the magnitude of mobile Internet

smartphone penetration into the Thai economy, with the mobile majors, AIS, DTAC and True representing 18.6 million mobile Internet users out of a stated total of 36.4 million Internet users (ASPI, 2014). With nearly half of the Thai population connecting to the Internet either by landline or wireless, one can quickly grasp the importance of SME's understanding, implementing and using the Internet as a communications medium to do business, whether for tourism, clothing, transportation, etc. With AEC integration in 2015 with its 600 million consumers, the numbers become crucial to Thai SME growth.

In 2014, according to Thailand's Ministry of Information and Communication Technology (ICT), the ICT has been in the process of installing a total of 105,000 Wi-Fi hotspots around the country in order to provide free internet usage for the country. The ministry has been given a budget of 950 million baht for the project, by the National Broadcasting and Telecommunication Commission (NBTC) with 77 Wi-Fi projects underway (one for each province). The project is anticipated to take 3 years to complete with every hotspot being able to offer a 4-5 megabit/second download speed (NNT, 2014).

Beyond just the physical medium of land lines and 3G/4G towers and phones, content development has been a driving force for Internet use in Thailand, with field software service and digital content both now regarded as new branches for both the business sector and domestic consumption. Information Technology (IT) marketing now consists of 3 components including the computer hardware market, data communication equipment market and software service. It was also found that these technology markets in 2011 had an overall value of 155.549 billion baht and grew in 2012 by 18.7% reaching a value of 182.327 billion baht. In 2011, research showed that the computer hardware market share in the technology market had a 61% hold followed by communications and software/software services with 19.9% and 19.1 %, respectively (NECTEC, 2012).

Computer hardware has a very high market share with much higher values due to smaller growth and share of competing technologies such as data communications transmission systems, wired (wireline/landline) and delivery systems and wireless. Much of this growth is within the SME sector as any visit to large IT malls around Thailand will show.

Another research survey of technology households in 2011 surveyed a total population of approximately 62.4 million users. Of this survey population, 19.9 million (32%) used computers and 14.8 million or 23.7% used the Internet. In towns and cities, computer users were 9.5 million (44.3%) and Internet users 7.7 million (36%).

However, outside the towns and cities in rural Thailand, there were 10.5 million computer users or 25.5% and 7.1 million Internet users making up 17.2%. Compared to the previous year 2010, the percentage of both Internet and computer users had increased in all groups (NSO, 2011, page 19).

From the survey mentioned above, it can be extrapolated that as the technology markets continue to grow steadily, IT SMEs need to be highly competitive in order to wrest an advantage and seize market share. Information technology executives also need to seek new strategies in order to attract consumers.

In the globalization era, information and communication technology (ICT) is used as an extended synonym for IT but is usually a more general term that stresses the role of unified communications and the integration of telecommunications (telephone lines and

wireless), intelligent building management systems and audio-visual systems in modern information technology (Agbetuyi et al., 2012). Hence, there is a gap for empirical study to provide insight situation of ICT used by SMEs in Thailand by focusing on Internet service. The results could benefit for both policy maker and SMEs.

3. Prior Studies

There are numerous studies that discuss adoption of Internet and e-business in SMEs in developed countries (i.e. Lucchetti and Sterlacchini, 2004; Love et al., 2004; Schubert and Leimstoll, 2006 and 2007; Koellinger 2006; Stroeken, 2001; Morikawa, 2004). Governments around the world recognize the importance of adopting ICT by SMEs and they have created special groups to study various aspects of ICT adoption by SMEs. However it has been reported that SMEs have been slow in adopting ICT for various reasons (Ashrafi and Murtaza, 2008). The drivers and barriers for ICT adoption by SMEs can partially be explained by the following;

3.1 SME Motivational Reasons for Internet Adoption

There are three drivers of SMEs' decisions to invest in e- business which consists of 1) perceived benefits, 2) organization readiness and 3) external pressures (Mehrtens et al. 2006). They are presented as follows:

First, there are three aspects to perceived benefits which include efficiency arising from improved communications by the use of e-mail (Poon, 2000). As is common with most large businesses, SMEs have embraced e-mail (Poon and Swatman, 1999b), with 90% of SMEs using it regularly after its introduction (Chapman et al, 2000). Second, it is the effectiveness obtained from the ability to gather research and competitor information. Third, the Internet presents a modern image and improves SME promotion helping to identify new business opportunities, which is also a perceived benefit (Chapman et al, 2000).

Organization readiness for Internet implementation and use is often identified with the culture of the founder and owner of the business. Often times, SME managers and owners do not view Internet use as an IT issue, but as a business one. SMEs that are attracted to Internet commerce tend to be more entrepreneurial, risk takers, innovative and invariably, creative (Poon and Swatman, 1999). A second organizational readiness factor is the requirement of SMEs to purchase hardware, software and security systems with appropriate Internet bandwidth connections able to handle the size of modern information content such as digital images and video. To address the critical issue of security, Thailand's TOT recently launched "Panda Cloud Service" for providing Internet security to safeguard against threats such as viruses, worms, trojans, spyware, adware, root kits, and phishing (TOT, 2012).

However, problems can occur when the time spent on Internet adoption and use detracts from the main focus of the business activity (Poon and Swatman, 1999). But this is just not an Internet problem, as it has become today a social problem with the ever increasing use of smartphones and social media in the workplace such as Line and Instagram (IG) in Thailand and Asia. The owner is critical in determining Internet development (Levy and Powell, 2002). However, strategic commitment has been shown to be critical in some countries such as Singapore (Kowtha and Choon, 2001), New Zealand (Mehrtens et al., 2006) and the Netherlands (Sadowski, Mittland and Dongen, 2002). Indeed, Internet adoption is faster when SMEs recognize a business need (Kendall et al. 2001).

The final factor, external pressure, is primarily from customers, though suppliers and employees exert influence. This might lead us to question whether there might be sectorial differences in adoption given varying external conditions that impact different industries (Beckinsale et al., 2006). Sillence et al. (1998) noted that a lack of customer is an inhibitor, particularly with e-mail. However, few SMEs integrate their website with their back office system. While many see value in e-mail there is scant evidence of a decision to invest in internal networks or e-business systems (Keindl, 2000). An evidence from the study by Beckinsale, Levy and Powell (2006) confirmed that customer-led—driven by customer requirements is the key driver to determine the strategy of SMEs in their adoption of the Internet.

Overall, perceived benefit is the main driver for Internet adoption along with some evidence of external pressure, particularly for those SMEs with close relationships with their customers. Internet use among SMEs may take many forms, from simply using the web to purchase goods to developing a website to sell products and services (e-commerce/e-portals). Organizational readiness for Internet adoption is also an important issue.

3.2 Barriers for Internet Adoption by SMEs

Ashrafi and Murtaza (2008) indicated that large organizations have enough resources to adopt ICT while on the other hand SMEs have limited financial and human resources in adopting ICT. Lack of ICT skills and knowledge in SMEs are one of the major challenges faced by all European countries (Duan et al., 2002). Shiels et al. (2003) found that characteristics of the firm and sector of the industry are contributing factors to the adoption and exploitation of ICTs by SMEs relating to adoption of ICT. Kapurubandara et al. (2006) categorized internal and external barriers that impede ICT adoption by SMEs in a developing country. The internal barriers include owner manager characteristics, firm characteristics, cost and return on investment (ROI). External barriers include infrastructure, social, cultural, political, legal and regulatory.

Antlova (2009) cited barriers to the acceptance of information and communication technologies, which included:

1. Technological barriers (problems of security, insufficient infrastructure).
2. Organizational barriers (management style, shortage of financial sources).
3. Barriers arising from the surrounding environment (insufficient knowledge of the market).
4. Individual barriers (Insufficient knowledge, personal relations in organization).

Technological barriers are the barriers to utilization of new information and communication technologies which is apart from insufficient infrastructure in the organization, thus the fear regarding the security of internal data (IGI, 2010). This fear is sometimes the reason for non-purchase of ICT from a well-established provider. Some organizations consequently try to design such applications internally although this solution is not always successful with IT staff ill-prepared or lacking sufficient knowledge or expertise as well as being unable to document their solution. This can contribute to even larger problems in the future but often times these challenges are outsourced to another entity which hopefully has the expertise and ability to offload these issues to. Thus we see cloud products and services from vendors like Thailand TOT's Panda Cloud Service, Salesforce, Oracle, Microsoft and Google (CRN, 2013).

An AEC member nation empirical study about Malaysia's SMEs and ICT adoption by Khong Sin Tan et al. (2009), found results that suggested that internet-based ICT adoption provides a low cost yet effective communication tool for customers with security however still being a major barrier. This questionnaire-based survey used data collected from 406 managers or owners of SMEs in southern Malaysia. Finding on cost as a barrier is mixed. The inferential statistics revealed that relative advantage, compatibility, complexity, observability, and security are significant factors influencing internet-based ICT adoption. According to "The Edge", which conducted a Malaysian 2013 SME ICT usage survey, SMEs accounted for up to 99.2% of the total business establishments and contribute up to 32% of Malaysia's GDP while employing 56% of total workforce but yet 70% of the estimated 1 million SMEs do have a website (Wong, 2013).

In Thailand, under the category of 'Person using ICT in business', a report issued by the National Statistical Office (NSO, 2010) stated that establishments (SMEs) with 1-15 persons have the lowest proportion of ICT use, while large establishments with 200 persons or more use ICT at the highest proportion (Table 2).

Table 2. Number of employees using computer, internet in establishments/SMEs- 2009

Economic Activity	Number of establishment using computer	Employees using computer		Number of establishment using Internet	Employees using Internet	
		Number	Average per establishment		Number	Average per establishment
Total	507,477	2,664,335	(5.25)	339,452	1,421,779	(4.19)
Business Trade and services	417,350	1,740,720	(4.17)	276,192	910,059	(3.30)
Manufacturing	63,311	632,220	(9.99)	41,952	321,542	(7.66)
Construction	11,178	51,649	(4.62)	9,047	36,614	(4.05)
Other land transport and activities of travel agencies	14,419	67,918	(4.71)	11,082	45,863	(4.14)
Hospital	1,234	171,827	(139.24)	1,179	107,701	(91.35)

Source: ICT Business Survey, National Statistical office. (See Anex3)

The organization's barrier is one of the most significant barriers to ICT acceptance in SMEs with resistance to organizational change primarily coming from older managers or owners. Another barrier may be a missing long-term corporate strategy often omitted due to shortage of long-term orders and/or stable customers with companies frequently having to respond quickly to individual demands of random customers, therefore not considering any long-term corporate strategy. That is why planning in such organizations is focused "solely on survival" and on short-term activities. The managers or owners of SMEs make their decisions on the basis of current needs and the current situation. Consequently, management processes are very sensitive to market behavior, changing external conditions and market trends (IGI, 2010).

An additional barrier preventing wider acceptance of ICT in SMEs is furthermore influenced by an inability to apply ICT with customer and supplier relations. SMEs do not influence their business-specific surrounding environment, but they are influenced by it and particularly by their customers, which is an important issue (IGI, 2010). Similarly, Beckinsale

et al. (2006) noted that the role of government policies and strategies is important but government policies and strategies have little influence on Internet adoption. Furthermore, competitor pressure has little influence while customer pressure is central.

One of the main barriers preventing acceptance of ICT, especially by small organizations is knowledge and skills regarding information technologies. Small companies do not have ICT departments (except for organizations with higher number of employees in the analyzed sample) and rely on either external consultants or friends. A role of such a consultant is not always fully understood which leads to a number of mutual misunderstandings during specification, purchase and implementation of ICT applications.

This problem is connected to a missing information strategy and as previously mentioned, an insufficient knowledge of ICT on the part of the owner or manager of the organization. According to this research where the analyzed sample were often employing less experienced students, owners typically searched for simple and cheaper solutions using their own resources, relatives or friends which has the potential to cause even greater problems due to lack of experience and specific knowledge. It is often only a “quick fix” and unfortunately a short-term solution of a given issue forgetting about further possibilities of the utilization of ICT. This is often associated and connected with the short-term planning of an organization’s ICT operations, not strategies. This consequently does not contribute to increased competitiveness and thus becomes only a tool for cost reductions and minimization of the administrative burden.

In order to remove this barrier, universities may contribute high-quality knowledge to managers and owners of SMEs by providing education and training in the area of management and ICT. Another option would be utilization of specific ICT knowledge and skills in a co-operation with other organizations or business networks.

Similarly, Arendt (2008) interviewed SME owner-managers and employees from Spain, Portugal, Poland and the USA. The study investigated and compared the use of information and communication technology (ICT) solutions by SMEs and digital divide phenomena which existed between SMEs and large corporations. It was found that the main barrier to better utilization of ICT and e-Business, and thus the main reason why SMEs face a digital divide, is not so much the lack of access to information technology (“material access” barrier) as the lack of proper knowledge, education and skilled owner-managers and employees within the enterprise (“skills access” barrier). As long as European SMEs do not realize this fact, the greater the digital divide in Europe will become.

4. Data and Method

Quantitative research in the form of organization surveys was done by Thailand’s National Statistical Office in 2011 with the final report issued in 2012 (NSO, 2012).

The survey was conducted as a nationwide face-to-face interview-based survey. In Thailand, often times the word ‘establishment’ is the translated word instead of SME, but they are the same. In the 2011 survey (Fig. 3), owners or managers were asked to supply information about their organization’s use of ICT, in particular, the Internet. These data were collected across each region of Thailand’s north, northeast, south, central and Bangkok’s metropolitan region.

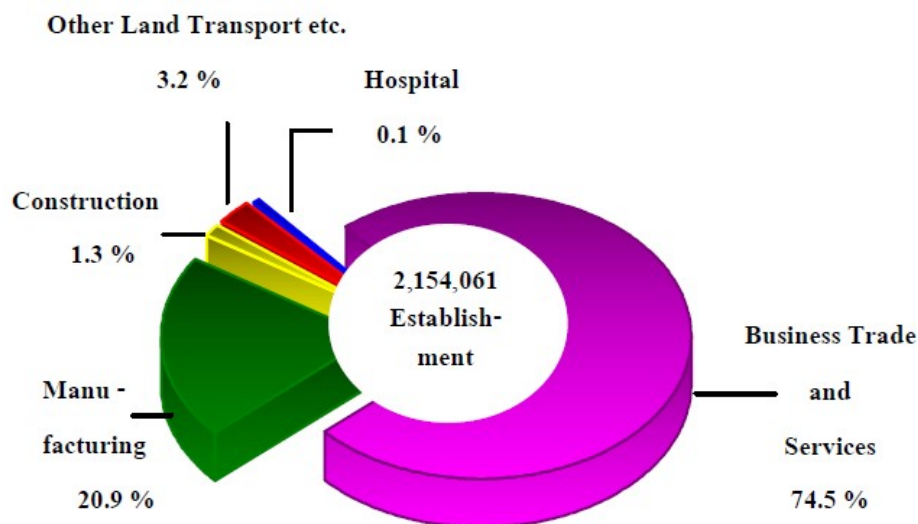


Fig. 3 Percentage of Establishments/SMEs in 2011 by Economic Activity (NSO, 2012)

This survey adopted a multi-stage stratified systematic sampling design. The design sampling unit used is the establishment/SME by region according to *Standard Industrial Classification of All Economic Activities (ISIC Rev. 3.0)*. The definition of an SME for this research was an organization equal to or fewer than 200 employees. Research data was drawn from a total of 2,154,149 organizations across Thailand (Fig. 3) with the sampling method selecting 35,021 organizations. Questionnaires were distributed, of which 34,965 were obtained. This study discarded organizations which gave incomplete answers to the survey, were larger than 200 employees or had no Internet access. The final sample for further analysis was 18,755 SMEs.

The questionnaire was constructed and tested by the NSO which included nine sections of 38 questions. This study focused on 9 questions from three sections (organization's background, computer and Internet use).

Considering usage specifically, the respondents were asked about 6 services that they have been using. These services consisted of e-mail, Internet searching for information about goods or services, accessing data from government agencies, communications with government agencies, purchasing or selling goods or services via the Internet and delivering goods or services in a digitized format.

The first five services are only included in this study since the respondents used them the most while the last data set was cutoff since it only had a 1.13% of use (digitized format). Among the top five services, e-mail applications were the most frequently used service with SMEs representing 30.89%. This was followed by Internet search with 29.80% and interacting with government agencies at 15.98%. Obtaining governmental information represented the next level with 12.21%, while the purchase/sale of goods or services or delivering goods or service was 7.89%, as shown in Table 3.

Table 3 Description of variables

Variable	Description	Mean	SD
Dummy for type of Internet access (dependent variable for first stage)	= 1 if the respondent has Internet connection at work; = 0 if the respondent has no Internet connection at work		
Dummy for type of Internet use (dependent variable for second stage)	= 1 if the respondent uses Internet service j via an Internet connection at work ; = 0 if the respondent does not use Internet service j via an Internet connection at work		
COMP	= 1 if the respondent has computers at work; = 0 otherwise	0.5945	0.4910
TRADE	= 1 if the respondent is in business, trade or the service sector; = 0 otherwise	0.3815	0.4858
MANU	= 1 if the respondent is in the manufacturing sector; = 0 otherwise	0.4757	0.4994
CONS	= 1 if the respondent is in the construction sector; = 0 otherwise	0.0555	0.2289
TRANS	= 1 if the respondent in land transport and storage sector; = 0 otherwise	0.0370	0.1886
HOS	= 1 if the respondent works in the private hospital sector; = 0 otherwise	0.0082	0.0904
INFO	= 1 if the respondent is in the information and communication (ICT) sector; = 0 otherwise	0.0422	0.2010
SIZE	Size of organization by number of employees	87.5613	291.3031
IND	= 1 if the respondent owns or works as an individual proprietor; = 0 otherwise	0.2696	0.4438
PART	= 1 if the respondent owns or works in a legal partnership; = 0 otherwise	0.0663	0.2488
LIMITED	= 1 if the respondent owns or works in a limited liability company or public company limited; = 0 otherwise	0.2803	0.4492
STATE	= 1 if the respondent owns or works in a government or state-enterprise; = 0 otherwise	0.0043	0.0654
COOP	= 1 if the respondent owns or works in a cooperative; = 0 otherwise	0.0035	0.0594
FOREIGN	= 1 if the respondent frequently uses video steaming via broadband at home; = 0 otherwise	0.0738	0.2615
E-MAIL	= 1 if the purpose of using Internet at work is e-mail; = 0 otherwise	0.3089	0.4621
SEARCH	= 1 if the purpose of using Internet at work is getting information about goods or services; = 0 otherwise	0.2980	0.4574
GOVIN	= 1 if the purpose of using Internet at work is getting information from a government agency; = 0 otherwise	0.1221	0.3274
INTERACT	= 1 if the purpose of using Internet at work is interacting with government organizations; = 0 otherwise	0.1598	0.3664
BUYSALE	= 1 if the purpose of using Internet at work is purchase/sale of goods and services; = 0 otherwise	0.0789	0.2695

- Internet Access
1. Use for sending and receiving e-mail
 2. Use for getting goods and service information
 3. Use for getting government information
 4. Use for interaction with government agency
 5. Use for purchase/sale goods

No use

4.2 Methodology

This study followed the same methodology which was employed by Srinuan and Bohlin (2013) in which it was noted that a standard, neo-classical utility maximisation framework is adopted in the economic analysis of Internet access, whereby the demand for access is determined by the size of consumer surplus associated with Internet usage and the cost of access. Regarding the demand for Internet usage, it requires a clear-cut distinction between access and usage. For example, there must be access to the network before it can be used (Rappoport et al. 2002). The major premise of this study's approach is that Internet access or connection is a prerequisite for Internet use. This is consistent with findings from previous studies (Pérez Amaral & Cerno, 2005; Goldfarb & Prince, 2008; Orviska & Hudson, 2009).

Since the data for this study was taken from a sample of the whole population and if we restrict the analysis only to those with Internet access, sample selection bias will be introduced. To avoid this, two-stage estimation is adopted (Heckman, 1979) using Heckman's procedure which is employed first to analyse access to broadband and then specific Internet usage by analysing the provided organizational Internet access information shown in Figure 7.

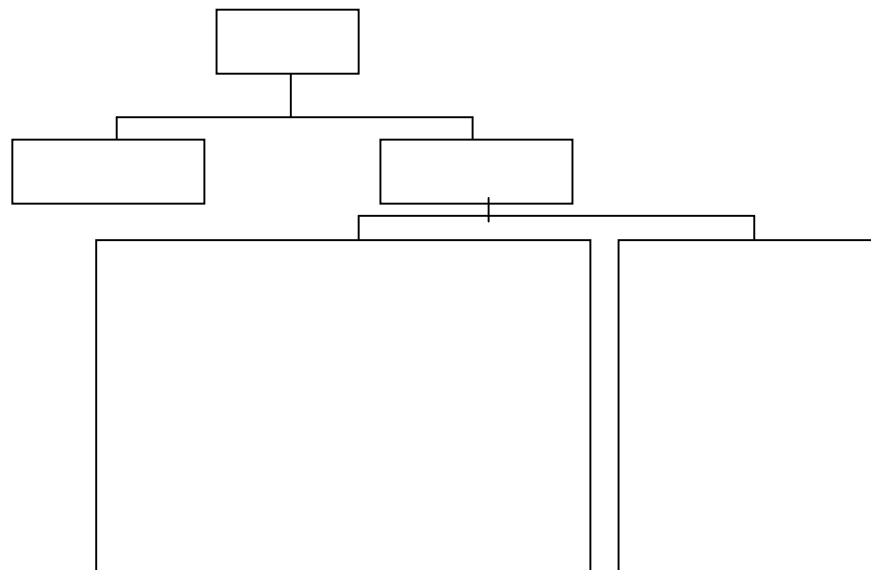


Fig 4 Framework of study

Within this framework, there are several factors which influence the decision of an organization to have a work location Internet connection. The factors examined included both technology attributes and organizational characteristics. Examples of these factors include computer availability, organizational size, organizational legal form, foreign investment and business sector. The second stage of the estimate deals with the probability of an organization which has Internet access using the Internet for purposes such as e-mail, getting information, interacting with government agencies and purchasing or selling goods or services.

In order to estimate the model, it is necessary that some variables be included in the first stage of the analysis which is excluded from the second model. In the analysis, size of organization fulfils this condition due to the correlation of this variable with the Internet

usage not being significant and also the heterogeneity problem. Note that using the bivariate probit model often represents two interrelated decisions by some actor.

5. Results

5.1 Determinant Factors of Demand for Internet Access of SMEs

The first stage results relate to Internet access and are in the first column for e-mail applications as shown in Table 4. The estimated first stage equations for each independent variable are almost identical both in terms of estimated coefficients and statistically significant levels. Internet access will increase significantly with the availability of computers in an organization, whether the SME is involved in the information and communication sector, the size of the organization, whether it is a limited company/public limited company or if the SME has a foreign shareholder.

Specifically, the results suggested that there is a high probability of an SME's Internet access at work if the SME has made computers available in the organization to the staff. Organizational size also revealed that the larger the number of employees, the more probable that an SME will use the Internet.

Results of the research also suggested that Internet access by an SME takes place at a different level depending on the business sector the SME is involved in with SMEs involved in the information and communications sector having the highest possibility of access to the Internet compared to other surveyed business sectors. Furthermore, the legal form of an SME has a significant effect on Internet access with individual proprietors and cooperatives having the greatest probability of no Internet access. At the same time, SMEs which are operating as a limited company or public company limited tended to have a higher potential for Internet access. Interestingly, SMEs which have foreign shareholders are more likely to have access to the Internet with a greater percentage of foreign investment or shareholders affecting the probability of Internet access.

Table 4 Estimated results of Internet access and use by SMEs

Variable	First stage: Access	Second stage: Usage				
		E-mail (EMAIL)	Search (SEARCH)	Getting information from government agency(GOVIN)	Interacting with government agency (INTERACT)	Purchase/ Sale goods or services (BUYSALE)
COMP	3.4892*** (0.0724)	3.1991*** (0.0808)	3.2674*** (0.0861)	2.5143*** (0.1090)	2.2812*** (0.1428)	2.3415*** (0.1967)
TRADE	-0.7256*** (0.0957)	0.2513*** (0.0624)	-0.2890*** (0.060)	-0.2334*** (0.0537)	-0.1499*** (0.0567)	0.1969 (0.0598)
MANU	-0.6828*** (0.0957)	-0.1437** (0.0631)	-0.1096* (0.0607)	-0.0954* (0.0538)	-0.0939* (0.0567)	-0.2031*** (0.0600)
CONS	-0.4213*** (0.1152)	-0.1117 (0.0808)	-0.1391* (0.0773)	0.1461** (0.0690)	0.1068 (0.0720)	-0.2875*** (0.0795)
TRANS	-0.8367*** (0.1194)	0.3245*** (0.0884)	0.3746*** (0.0841)	-0.2692*** (0.0779)	-0.2953*** (0.0821)	-0.4235*** (0.0909)
HOS	-0.5276*** (0.1822)	0.2556* (0.1520)	-0.1446 (0.1262)	0.6544*** (0.1177)	0.8586*** (0.1177)	-0.1098 (0.1258)

Variable	First stage: Access	Second stage: Usage				
		E-mail (EMAIL)	Search (SEARCH)	Getting information from government agency(GOVIN)	Interacting with government agency (INTERACT)	Purchase/ Sale goods or services (BUYSALE)
SIZE	0.0009*** (0.0001)					
IND	-0.2090* (0.1085)	-0.2593** (0.1071)	-0.0991 (0.1086)	-0.3669*** (0.1092)	-0.0287 (0.1389)	-0.5193*** (0.1234)
PART	0.2606** (0.1116)	0.2535** (0.1088)	0.1095 (0.1102)	-0.0228 (0.1099)	0.4484*** (0.1384)	-0.0927 (0.1231)
LIMITED	0.5204*** (0.1065)	0.1088*** (0.1051)	0.4141*** (0.1067)	0.1398 (0.1064)	0.7264*** (0.1352)	-0.0618 (0.1191)
STATE	0.3750* (0.2019)	0.5496*** (0.1865)	-0.0112 (0.1717)	0.8300*** (0.1750)	0.9608 (0.1890)	-0.5853*** (0.2175)
COOP	-0.6949 (0.2049)	0.6319*** (0.2049)	-0.6053*** (0.2049)	-0.0511 (0.2064)	0.2153 (0.2458)	-0.4070 (0.2577)
FOREIGN	0.4420*** (0.0619)	0.4966*** (0.0508)	0.2488*** (0.4270)	0.4362*** (0.0356)	0.4443*** (0.0355)	0.4000*** (0.0371)
CONSTANT	-1.9579*** (0.1488)	-2.610*** (0.1357)	-2.6610*** (0.1380)	-2.7034 (0.1465)	-3.3030 (0.1969)	-2.9399 (0.2189)
ρ		1 (7.25e-09) 4474.13**	0.9940 (0.0072)	0.9642 (0.0260)	0.9605 (0.0740)	0.9994 (0.1253)
χ^2		*	4163.06***	1347.6***	820.643***	562.071*
Observations	18755	18755	18755	18755	18755	18755

Note. The first column relates to the first stage of the application of Heckman's sample selection model. The business sector is divided into 6 groups and the information and communication sector is used as a reference group. In forms of legal organizations, the 'others form' is a reference group as well. The remaining columns relate to the second stage of estimation. The numbers in parenthesis represent the standard deviation. *, ** and *** indicates the significance at the 10, 5 and 1% levels, respectively. The statistic is the likelihood ratio test of independency of the whole equation.

5.2 Determinant Factors of Demand for Internet Usage of SMEs

The second stage examined Internet use with the results varying according to the purpose of usage. For example, the probability of using any application is more likely to increase as the number of computers becomes more available to the organization. Usage is significantly greater for foreign shareholding organizations in every application as shown in Table 4.

Considered by business sector, the findings showed that SMEs in the business trade and service sector use every application but use these less than SMEs in the information and communication sector with the use of Internet for purchasing and selling goods or services being somewhat positive or higher but not statistically significant.

SMEs in the manufacturing and land transportation and storage sector use every application less than SMEs in the information and communication sector. In particular, this group uses the Internet less frequently for the purchasing and selling of goods or services compared to ICT enterprises.

For SMEs in the construction sector, this group uses the Internet for getting information from government organizations more frequently than SMEs in information and communication but use search and purchasing and selling of goods or services less than SMEs in the information and communication sector. However, importantly, SMEs in the private hospital sector tend to use the Internet more than other sectors for e-mail, getting information from government organizations and interacting with government agencies (e.g. downloading and submitting tax forms and requesting online forms such as insurance).

Considering all the other variables, the results showed that an SME formed as an individual proprietorship is the least likely form of company to use e-mail, get information from government organizations or purchase or sell goods or service via the Internet. Similarly, a cooperative is less likely to use the Internet for e-mail and searching information about goods and services.

On the contrary, if a SME is formed in a legal partnership, limited company or public company limited, there is high probability that these SMEs will use the internet for e-mail, searching for information about goods and services, getting information from government organizations and interacting with government agencies. SMEs on the other hand which function as a government agency or state owned enterprise are more likely to use e-mail, use search technologies for information about goods and services but they are less likely to use the Internet for purchasing and the selling of goods or services.

6. Discussion

The results of this study are in line with previous literature in several aspects. As Arendt (2008) and Khong Sin Tan et al. (2009) mentioned, insufficient infrastructure is the important barrier. The findings also indicated that number of computers available within an SME will encourage SMEs access and use the Internet more. However, the number of computers and networks is also related to the size of SMEs. It may imply that medium enterprise will have more advantage in terms of Internet access than the micro or small enterprise since the infrastructure of these two enterprises still lag behind with the major reasons being the limited financial and human resources to adopt ICT (Ashrafi and Murtaza, 2006). This was also confirmed in the results which showed that limited companies, public limited companies or a foreign shareholding company has a higher probability of access to the Internet. Owners or structure of these organizations have enough resources to adopt ICT and they can get access to external funding easier than other organizational forms if they aim to invest in ICT infrastructure.

SMEs in the information and communication sector are more familiar with the Internet since they access and use the Internet more compared to other forms of SMEs, which was also confirmed in the study by Antlova (2009). The SMEs in Information and communication sector have knowledge and skills regarding information technologies, often times having their own IT divisions, though some of them may rely on external consultants.

With regards to organizational form affecting Internet access, the results showed that SMEs operating as individual proprietors and cooperatives are less likely to access and use the Internet. This may be due to an organizational barrier or the resistance to adopt Internet technology by the manager or owner being one possible reason. Another possible reason is a missing long-term corporate strategy which is often omitted due to the shortage of long-term orders and stable customers (Antlova, 2009) as these SMEs make their decisions based on current needs and the current situation. Consequently the managerial process becomes an obstacle for SMEs to adopt the Internet and its related technologies.

As has been stated in this study, policy makers and governmental agencies in Thailand have started to fund and implement a nationwide, broadband, free Wi-Fi network via access to hotspots (NNT, 2014). This is a start to promoting the importance and use of ICT by both individual entrepreneurs and those involved in larger SME commercial operations. As has been shown however, smaller enterprises, cooperatives, SMEs in land transport, business trade and service, manufacturing, private hospitals and the construction sector has a disadvantage when it comes to Internet access for a variety of reasons. This study once again confirmed that governmental policies and strategies have little influence on Internet adoption by Thai SMEs which is similar to the findings of Beckinsale, Levy and Powell (2006).

Both the research from Mehrten et al. (2001) and Levy and Powell (2003) showed that most SME owners or managers use the Internet for sending or receiving e-mail and searching for information or goods and services to varying degrees. SMEs in land transport, the business trade and service and manufacturing use every application including obtaining and interacting with information from government agencies as well as the purchase/sale of goods or services. On the contrary, SMEs in the construction sector use search, getting and private hospital, while private hospital SMEs use e-mail as well as retrieve information and interacting with governmental and private institutions.

The results from this study confirmed that SME owners in the first three sectors viewed the Internet as a key strategy to improve SME efficiency. Often times the decision of a SME to adopt Internet technology may be due to benefits from the efficiency in terms of improving communications and the ability to gather customer and competitor information while improving the SME image (Chapman et al, 2000).

7. Conclusion and Policy Implication

In a globalized era, information and communication technology (ICT) is used as an extended synonym for IT, but is usually a more general term that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), intelligent building management systems and audio-visual systems in modern information technology. Hence, this study attempted to describe the present situation of ICT use by SMEs in Thailand and analyze the determining factors for demand of Internet access and use by SMEs. The study employed the National Statistic Office survey data from 2011 and an econometric model.

The study revealed that Internet access will increase significantly with the availability of computers within an organization, if an SME is an information and communication company, if the organization is larger, whether it is a limited company/public company limited or if the SME has a foreign shareholder. The legal form of a SME also has a significant effect on

Internet access as well as whether a SME is an individual proprietorship or cooperative which will most likely contributes to their less use of the Internet.

Considering Internet usage, results vary with the purpose of usage. For example, the probability of using any application is more likely to increase if the number of computers is available at organization. Usage is significantly greater for foreign shareholding organizations in every application. When Internet use is considered by business sector, the findings show that SMEs in business trade and service sectors use every application but use them less than SMEs in information and communication. e-mail and searching for goods or services or information and obtaining information from government becomes an important application that SMEs use regularly. Moreover, many SMEs have embraced the Internet for purchasing and selling of goods or services in particular those SMEs involved in the business trade and private hospitals. In addition, SMEs which are owned by individual proprietors and cooperatives are less likely to use e-mail or obtain government information or purchase or sell goods or services via the Internet.

The results from this study could be a good basis to help with the guidance of policy and plan formation, as well as effectively promoting the use of ICT by SMEs. According to the findings, policy makers and government officials are needed to facilitate the process of Internet access. The first priority should be the development of Internet infrastructure including subsidies for the first installation of ICT by SMEs, in particular micro and small enterprises. Internet service price after installation is also important but this factor was not investigated in this study but in an effort to encourage service providers to invest more in infrastructure or allow more competition, policy makers could provide more Internet service for SMEs. This could result in an increase in choice for the consumer and drive down the price of the service.

Policy makers and government officials may also need to consider whether wireless technologies, e.g., mobile broadband and hotspots could be another alternative to solve the lack of fixed infrastructure. There has obviously been a dramatic, leap-frog jump of mobile technology once 3G was finally implemented in Thailand, with 4G technologies now being offered by some carriers. With wireless, came a less expensive, more flexible way to access the Internet compared to the older, fixed and costly form of infrastructure in the form of land/wire lines. This could provide an opportunity for SMEs to access Internet services, in especially smaller SMEs owned by individual proprietors and entrepreneurs. It could also benefit these same businesses in their ability to conduct e-commerce and propel Thailand ahead as it reaches an even more competitive environment in 2015 with the implementation of the AEC.

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