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

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ชื่อโครงการ (ภาษาไทย) ความต้องการเชื่อมต่อและใช้อินเทอร์เน็ตของธุรกิจวิสาหกิจขนาดกลางและขนาดย่อมในประเทศไทย

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บทคัดย่อ

งานวิจัยฉบับนี้มีวัตถุประสงค์เพื่อวิเคราะห์อุปสงค์ของความต้องการเชื่อมต่อและเข้าใช้อินเทอร์เน็ตของธุรกิจวิสาหกิจขนาดกลางและขนาดย่อมในประเทศไทย กลุ่มตัวอย่างที่ใช้ในงานวิจัยฉบับนี้คือธุรกิจวิสาหกิจขนาดกลางและขนาดย่อมในประเทศไทยจากการสำรวจของสำนักงานสถิติแห่งชาติในปี พ.ศ. 2556 โดยอาศัยแบบจำลองทางเศรษฐมิติในการวิเคราะห์หาความสัมพันธ์ระหว่างการใช้คอมพิวเตอร์ในสถานประกอบการ กลุ่มอุตสาหกรรม ขนาดของสถานประกอบการ รูปแบบการจัดตั้งตามกฎหมายและการร่วมลงทุนหรือถือหุ้นจากต่างประเทศ ผลการศึกษาพบว่า ปัจจัยดังกล่าวข้างต้นมีความสัมพันธ์ต่ออุปสงค์ของความต้องการเชื่อมต่ออินเทอร์เน็ต หากพิจารณาการเข้าใช้เข้าใช้อินเทอร์เน็ตภายใต้เงื่อนไขที่ว่าผู้ประกอบการธุรกิจวิสาหกิจขนาดกลางและขนาดย่อมจะต้องมีการเชื่อมต่ออินเทอร์เน็ต ผลการศึกษาพบว่าปัจจัยต่างๆมีผลต่อลักษณะการใช้ดังต่อไปนี้ รับส่งจดหมายอิเล็กทรอนิกส์ ค้นหาข้อมูลเกี่ยวกับสินค้าและบริการ ค้นหาข้อมูลจากหน่วยงานภาครัฐ ติดต่อกับหน่วยงานภาครัฐ ซื้อขายสินค้าและบริการ ที่แตกต่างกันไป ดังนั้น ภาครัฐและผู้กำหนดนโยบายควรสนับสนุนให้มีการใช้บริการอินเทอร์เน็ตผ่านการสนับสนุนการลงทุนโครงสร้างพื้นที่จำเป็นและการอุดหนุนต่างๆที่จะส่งผลให้ผู้ประกอบการสามารถเข้าถึงและใช้บริการอินเทอร์เน็ตได้เพิ่มมากขึ้น ทั้งนี้เทคโนโลยีไร้สายอาจเป็นเทคโนโลยีทางเลือกสำหรับผู้ประกอบการขนาดเล็กหรือมีลักษณะการประกอบการในรูปแบบส่วนบุคคล ห้างหุ้นส่วนสามัญที่ไม่เป็นนิติบุคคล นอกจากนี้การจัดการอบรมให้ความรู้ทางด้านเทคโนโลยีและการใช้อินเทอร์เน็ตสำหรับผู้ประกอบการยังเป็นสิ่งจำเป็นอีกด้วย

คำสำคัญ (Keywords): การเข้าถึงอินเทอร์เน็ต การใช้อินเทอร์เน็ต ธุรกิจวิสาหกิจขนาดกลางและขนาดย่อม

Abstract

The aim of this paper is to analyse the demand for Internet access and use of small and medium enterprises (SMEs) in Thailand. Data obtained from a national survey in 2012 by the National Statistical Office (NSO) of Thailand. The bivariate probit model has been employed to examine empirically whether availability of computer, business sector, size of SMEs, form of organization and foreign shareholding have a systematic link to Internet access in the first stage, and then, specific usage, provided access exists, is estimated. Results of this study show that the variables, together with their potential impact, are as follows: availability of computer, business sector, size of SMEs, form of organization and foreign shareholding. The impact of these factors varies from service to service (i.e. E-mail, searching, getting information from government agency, interacting with government agency and purchase/sale goods and service). The implications for policy makers and government are to encourage Internet service for SMEs through the infrastructure development and subsidization. This could stimulate the growth of Internet access and use. Wireless technologies could be another alternative to solve the lack of fixed infrastructure and provide an opportunity for the SMEs access to the Internet service, in particular for SMEs that owned by individual proprietor. Moreover, the training program is necessary to increase Internet usage among SMEs.

Keywords: Internet access, Use of Internet, SMEs

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Any mistakes in this study are my sole responsibility.

Chalita Srinuan

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Chapter 1

Introduction

1.1 Background

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. The definition and concept of SMEs vary from country to country (Soontornthada and Sevilla, 2000). In general, however, SMEs are made up of enterprises which employ fewer than 250 persons and which have a specific amount of an annual turnover or fixed asset. In Thailand, SME was promoted after the calamitous financial crash of 1997. Later in 2002, Department of Industrial Promotion (DIP), Ministry of Industry's (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). Moreover, the category of SMEs is made up of enterprise which employ fewer than 200 employee and which have amount of fixed asset not exceeding 50 Million Thai Baht (or not exceeding 2 Million USD).

According to a report of DIP, there were 2.9 SMEs in 2012 or 99.6 percent of total enterprises. The employment rate is 77.8 percent of total employment and SMEs also created economic value added through the gross domestic product (GDP) about 37.1 percent of total economic value added (DIP, 2012). These statistics obviously showed that SME are a major source of entrepreneurial skills, innovation and employment. 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. Only some part of the SME sector is 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, 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 2016. Under the AEC blueprint[1], the AEC aims to set the following key characteristics: (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 affect the SMEs unavoidably. 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. 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, market, human resource development and skills, finance as well as technology. The launch of AEC will expand the market and increase the competition among the producer through the free flow of good and service, investment and capital and free flow of skilled labor. Hence, SMEs need to aware of this issue and prepare themselves.

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. In the globalization era, Information and communication technology (ICT) 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

[1]Retrieved from http://www.asean.org/archive/5187-10.pdf (27 July 2013)

systems and audio-visual systems in modern information technology. 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.

1.2 Objective of the study and research question

This research is conducted with the following main research question in mind:

RQ:

'What are the determinants of demand for Internet access and use of SMEs?'

The purposes motivating the main research question are

1.2.1 To analyze the determinant factors of demand for Internet access of SMEs.

1.2.2 To analyze the factor influencing on Internet usage of SMEs.

1.3 Scope and limitation of the study

This research focuses on the determinant factor of the demand for Internet access and use by SMEs in Thailand. SMEs are defined as small and medium enterprises. In this research, the size of SMEs are categorized into three groups as following; (1) a microenterprise (MIE) which employs less than 10 full-time equivalent employees, (2) a small enterprise (SE) is a firm which 15-50 workers and (3) a medium enterprise (ME) which ranges from 50-200 workers. The type of Internet connection is also focused and divided into three types are fixed Internet, leased line and mobile Internet. Data is collected by the NSO during 2012. Sample covered six economic activity groups which are business trade and services, manufacturing, construction, land transport and storage, hospital and Information and communication.

1.4 Structure of the study

This research consists of five chapters. An introduction gives an overview of the topic and state of problem. The rest of the research is structured as follows. Chapter 2 presents relevant theories and literature review. This is followed by research method in Chapter 3. Finding is then discussed in Chapter 4 and conclusion and future research are provided is Chapter 5.

1.5 Notes on terminology

Table 1 Notes on terminology

Terms	Definitions
SMEs	Small and medium enterprises (including microenterprise) which have number employers less than 200 employers
Fixed Internet	Internet subscriptions with fixed (wired) Internet access, which includes dial-up and total fixed (wired) broadband subscriptions (ITU, 2010)
Leased line	Internet connection via leased line subscriptions. A leased line connects two locations for private voice and/or data telecommunication service. Not a dedicated cable, a leased line is a reserved circuit between two points. Leased lines can span short or long distances. They maintain a single open circuit at all times, as opposed to traditional telephone services that reuse the same lines for many different conversations through a process called "switching." Leased lines most commonly are rented by businesses to connect branch offices, because these lines guarantee bandwidth for network traffic. (ITU, 2010)
Mobile Internet	Internet subscription through a mobile device
Internet access	The availability of Internet access choice categorized by technologies
Internet Usage	Use of service regardless of location and SME characteristics. Usage is conditional on access

Chapter 2

Literature review

2.1 Internet access and use in SME

A basic feature in modeling telecommunications demands is the distinction between access and usage. It is obvious that the usage of a given service by an individual is only possible if he/she has access to the service. *Usage is conditional on access*. At the same time an individual will choose to join a network only if he/she plans to make some use of it. *Access is conditional on use* (Perez Amaral and Cerno, 2005).

Internet is one of telecommunication service which has rapidly growth during last decade (ITU, 2011). This growth can be observed in the SMEs without exception. Levy et al. (2002) showed that SMEs adoption of ICT does develop- changes in ICT adoption are made as the strategies focus of the business changes. Growth requires improved systems. It is likely that the situation with Internet will be similar. Steady growth is not the path adopted, rather SME owners focus on the best potential of technology for their business. They are likely to make step change to support business strategy. Levy and Powell (2003) demonstrates the different adoption patterns as shown in Figure 1. These are based on the owner's recognition of the business value of the Internet and their approach to planning business growth. The 'not planned 'growth- dimension represents the lack of a coherent strategy for growth. Competitive pressure is usually determined by customer demands.

Business value of Internet		Not planned	Planned
	High	*Business Opportunity* Some perceives benefits Owners has knowledge of IT Some competitive pressure	*Business Network* High perceived benefits Good knowledge of IT opportunity High competitive pressure
	Low	No perceived benefit Little or no knowledge of IT Value to the business No competitive pressure *Brochureware*	Some perceived benefit Owner has knowledge of IT No competitive pressure *Business Support*

Figure 1 Segmented Internet adoption patterns in SMEs (Levy and Powell, 2003)

Hallberg (2000) noted that the SME sector has an important role to play in economic development, poverty reduction and employment creation in developing economies. The SME sector is the sector in which most of the world poor people are working (Stern, 2002). The sector largely exceeds the average economic growth of national economies in many countries and contributes significantly to employment creation. Accordingly, government policies are geared toward supporting SME sector growth through a variety of programs that range from in tax incentive to technical assistance, from regulatory provision to policy interventions, training and other types of business development services (O'Shea & Stevens, 1998).

2.2 Overview of Internet access and use by SME in Thailand

According to the ITU statistics (2011), the growth of Internet user in Thailand is still not high enough compared with other countries in Southeast Asia, with Thailand ranked fifth. Brunei Darussalam (79.78%) was ranked first, followed by Singapore (77.23%), Malaysia (57.61%), Vietnam (27.25%) and Thailand (25.80%). Even in the ICT network readiness index 2009-2010, Thailand is in the third place after Singapore and Malaysia (Dutta & Mia, 2011).

Survey of the National Statistical Office (NSO) of Thailand in 2011 (NSO, 2011) presented that about 16.6 percent of establishments which is SME mostly and were majority engaged in business trade and service activity (74.5%). Among the established entrepreneurs, only 16.6 percent accessed to Internet. The major reason was getting information of gods or services (80.4%) and followed by sending or receiving e-mail (77.6%) and purchasing/ selling goods and services or trading (27.6%), respectively. Most of Internet access was connected to xDSL (56.6%) and use internet in their routine work at least once a week.

Considering Table 2, it clearly showed that the use of ICT by SME between 2010-2011 were not much difference in term of computer used, Internet used, website used, purchases via Internet and sale via Internet.

Table 2 Comparison the percentage of ICT Usage in SME between 2010-2011 by number of workers

Proportion of ICT usage	At least 1-15 workers		Greater than 15 workers	
	2010	2011	2010	2011
Using computer	23.5	23.5	82.2	83.5
Using Internet	16.5	16.6	73.9	70.5
Using Website	6.1	6.1	38.7	39.9
Purchasing via Internet	2.3	2.2	11.3	11.9
Sale via Internet	1.6	1.4	9.9	10.9

Source: NSO, 2011

2.3 Literature survey

There are number of 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 a,b; Koellinger 2006; Stroekn, 2001; Morikawa, 2004) Government around the world recognize the importance of adoption of ICT by SMEs and they have created special groups to study various aspects of ICT adoption in SMEs. It

has been reported that SMEs have been slow in adopting ICT for various reasons (Ashrafi and Murtaza, 2008). The drivers and barriers for adoption in SME can be explained as following

2.3.1 Driver for Internet adoption in SMEs

Mehrtens et al. (2001) suggested that three drivers of SMEs' decision to invest in e-business consist of perceived benefits, organization readiness and external pressures. There are three aspects to perceived benefit. First, efficiency benefits arise from improved communication using E-mail (Poon, 2000). In common with most large businesses, SMEs have embraced e-mail (Poon and Swatman, 1999), with 90% of SMEs using it regularly after its introduction (Chapman et al, 2000). Second, effectiveness benefits obtain from the ability to gather research and competitor information. Third, the Internet presents a modern image and improves SME promotion. Identifying new business opportunities is also a perceived benefit (Chapman et al, 2000).

Organization readiness for Internet adoption is personifies in the SME owner. SMEs do not see Internet adoption 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 have adequate information system to access the Internet. However, the time spent on Internet adoption and development may interfere with the core business activity (Poon and Swatman, 1999).

Most SMEs do not view the Internet as key to their business strategy. Strategy is rarely raised as an enabler or as an inhibitor in the literature. 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, Cragg and Mills, 2006) and the Netherland (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 primary from customers, though suppliers and employees exert influence. This might led us to question whether there might be sectoral differences in adoption given varying external conditions that impact different industries. Sillence (1998) noted that a lack of customer is an inhibitor, particularly 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 decision to invest in internal networks or e-business system (Keindll, 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 to adoption the Internet.

Overall, perceived benefit is the main driver for Internet adoption 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 suppliers to developing a website to sell products and services. Organizational readiness for Internet adoption is also important issue.

2.3.2 Barrier for Internet adoption in SMEs

Ashrafi and Murtaza (2006) indicated that large organizations have enough resource to adopt ICT while on the other hand SMEs have limited financial and human resources to adopt ICT. Lack of ICT skills and knowledge in SMEs as 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 industry of sector are contributory factors to the adoption and exploitation of ICTs by SMEs relating to adoption of ICT. In developing country, Kapurubandara et al. (2006) have categorized internal and external barriers that impede adoption of ICT by SMEs in a developing country. The internal barriers include owner manager characteristics, firm characteristics, cost and return on investment, and external barriers include: Infrastructure, social, cultural, political legal and regulatory.

Antlova (2009) emphasized that the major barrier of ICT adoption for SMEs can be divided into four barriers which are (1) technological barrier (problem of security, insufficient infrastructure), (2) Organizational barrier (management style, shortage of

financial sources), (3) Barriers arising from surrounding environment (insufficient knowledge of the market), (4) Individual barriers (Insufficient knowledge, personal relations in organization).

Technological barriers is a barrier to utilization of new information and communication technologies is, apart from insufficient infrastructure in the organization, the fear regarding the security of internal data. This fear is sometimes a 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. The employees working on this task often lack sufficient knowledge and experience and are also unable to document their solution, which can bring some problems in the future. Another barrier may be caused by fear from financial demand but this can be resolved by purchase of application information services using an external supplier.

A supported empirical study is by Tan et al. (2009), they investigate the innovative characteristics, benefits, and barriers influencing internet-based information and communications technology (ICT) adoption among the small and medium enterprises (SMEs). A questionnaire-based survey was used to collected data from 406 managers or owners of SMEs in the Southern region of Malaysia. The results suggested that internet-based ICT adoption provides a low cost yet effective communication tool for customers. However, security continues to be a major barrier. Finding on cost as a barrier is mixed. The inferential statistics reveal that relative advantage, compatibility, complexity, observability, and security are significant factors influencing internet-based ICT adoption.

Organization barrier is one of the significant barriers to ICT acceptance in SMEs is resistance to organizational changes, especially in connection with older managers or owners. Another barrier may be a missing long-term corporate strategy often omitted due to shortage of long-term orders and stable customers. Companies frequently have to respond quickly to individual demands of random customers and do not consider any long-term corporate strategy. That is why planning in such organizations is focused on "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.

A barrier preventing wider acceptance of ICT in SMES is furthermore influenced by an inability to apply ICT in relations with customers and suppliers. The fact that SMEs do not influence their business-specific surrounding environment, but that they are influenced by it and particularly by their customers is an important issue. Similarly, Beckinsale, Levy and Powell (2006) noted that the role of government policies and strategies is important. But government policies and strategies have little influence on Internet adoption. Further, 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 cheap solutions using their own resources, relatives or friends. Based on such solutions different problems connected with a lack of experience and specific knowledge arise. These solutions do not bring expected benefits. 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 connected with short-term planning of the organizations. ICT consequently cannot contribute to increased competitiveness and 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 with SMEs' owner–managers and employees from Spain, Portugal, Poland and the USA to investigate and compare the use of information and communication technology (ICT) solutions by SMEs and digital divide phenomena which exist between SMEs and large corporations. He found that 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, so long will the scale of the digital divide in Europe continue to grow.

2.4 Framework of the study

The literature suggested that SMEs decisions to adopt the Internet depend on internal and external factors. This study employed some of these factors in order to analyze the demand of Internet access and use of Thai SMEs. The internal factors include firm characteristics, firm size, business sector and external barriers include availability of computer and infrastructure.

As mentioned Perez Amaral and Cerno (2005), a basic feature in modeling telecommunications demands is the distinction between access and usage. It is obvious that the usage of a given service by an individual is only possible if he/she has access to the service. *Usage is conditional on access*. At the same time an individual will choose to join a network only if he/she plans to make some use of it. *Access is conditional on use*. A demand for Internet can be shown as Figure 2.

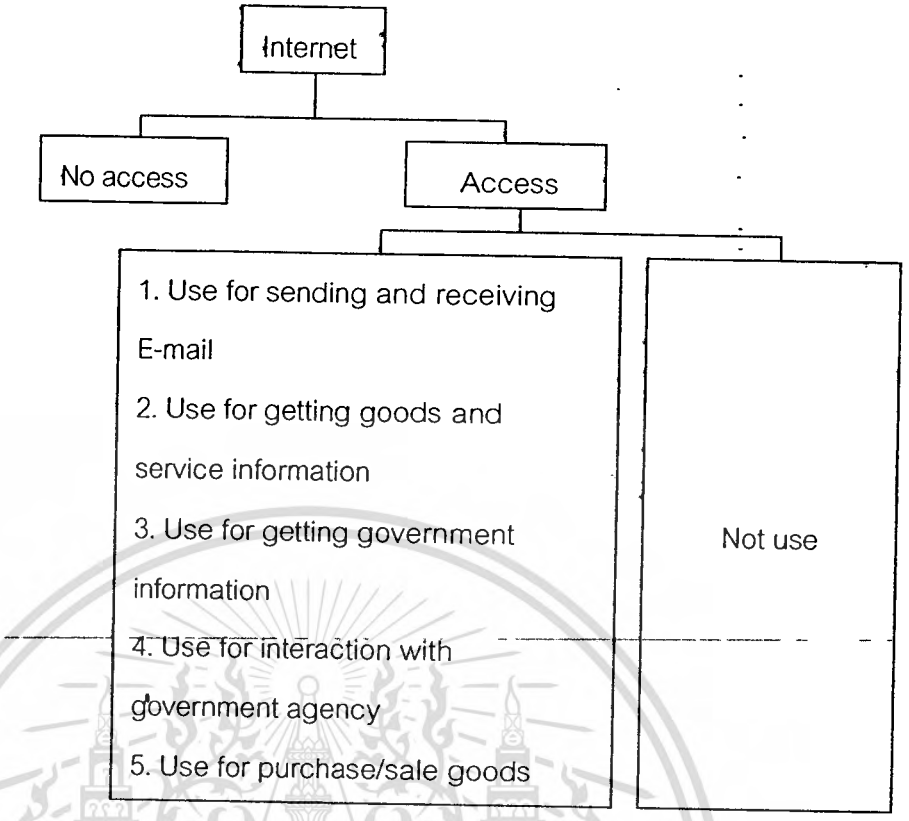

Figure 2 Framework of study

In other words, the demand for Internet connection occurs if there is a previous choice to access from work. Starting from there this study determines a demand for Internet as can be also described as the following attributes:

Access to Internet = f {firm characteristics, firm size, business sector, availability of computer and infrastructure)

Use of Internet = f {firm characteristics, business sector, availability of computer and infrastructure I Access}

The further explanation about the framework will be provided on Chapter 3 Data and Method

Chapter 3

Data and Method

3.1 Data

Quantitative research in the form of organization surveys was done by the NSO, Thailand, in 2012. The survey was conducted as a nationwide face-to-face interview-based survey. SME owners or managers were asked to supply information on their organization use of ICT, in particular Internet. These data were collected across each region of Thailand: North, Northeast, South, Central and Bangkok and Metropolitan Region.

Sample was selected by Stratified Systematic Sampling which region was stratum and SMEs organization was sample. This study had 6 stratums and organizations were divided into 38 sub-stratums according to International Standards Industrial Classification of All Economic Activities: ISIC Rev. 3.0). Moreover each of them was divided the size of organization by number of employees as Table 3. However, this study focused on SMEs, then organization which has employees more than 200 would not considered in this case.

Table 3 Size of organization by number of employees

Size of organization	1	2	3	4	5	6	7
Employees	1-9	10-15	16-25	25-30	31-50	51-200	>201

Source: NSO, 2012

The whole organizations across Thailand are 2,154,149 organizations. Sampling method was select 35,021 organizations as Shown in Table 4. Questionnaires were distributed and obtained 34,965. This study discarded organization which gave incomplete answers, large organization and has no Internet access. The final sample for further analysis is 18,755 SMEs.

Table 4 Sampling method

Region	Total	Size of organization						
		1	2	3	4	5	6	7
Bangkok	8,518	1,803	1,387	1,226	685	1,048	1,135	1,234
Bangkok Metro	7,063	1,501	1,152	882	463	804	952	1,309
central	6,214	1,503	923	748	313	629	873	1,225
North	4,533	1,489	879	673	290	461	471	270
North-East	4,548	1,453	847	657	309	478	516	288
South	4,145	1,427	776	553	228	407	448	306
Whole Kingdom	35,021	9,176	5,964	4,739	2,288	3,827	4,395	4,632

Source: NSO, 2012

The questionnaire was constructed and tested by the NSO. There are nine sections, 38 questions in overall questionnaire. This study focused on 9 questions from three sections (organization back ground, use of computer and use of Internet).

Considering usage specifically, the respondents were asked about 6 services that they have been used. These services consist of E-mail, searching for good or service information, getting information from government agency, interacting with government agency, purchase/sale goods or service and delivering goods or services in the digitize format. The first five services are only included in this study since the respondents use them most, while respondent has been used only 1.13 percent. Among these five services, the E-mail application is most popular with SMEs and is about 30.89% and followed by use of search (29.80%), interacting with government agency (15.98%), getting information from government agency (12.21%) and purchase/sale goods or service and delivering goods or service (7.89%) respectively as shown in Table 5.

Table 5 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 Internet connection at work ; = 0 if the respondent does not use Internet service j via 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 and service sector; = 0 otherwise	0.3815	0.4858
MANU	= 1 if the respondent in manufacturing sector; = 0 otherwise	0.4757	0.4994
CONS	= 1 if the respondent in 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 in private hospitals sector; = 0 otherwise	0.0082	0.0904
INFO	= 1 if the respondent in Information and communication sector; = 0 otherwise	0.0422	0.2010
SIZE	Size of organization by number of employees	87.5613	291.3031
IND	=1 if the respondent owned or works in individual proprietor; = 0 otherwise	0.2696	0.4438

Variable	Description	Mean	SD
PART	=1 if the respondent owned or works in juristic partnership; = 0 otherwise	0.0663	0.2488
LIMITED	=1 if the respondent owned or works in company limited, Public company limited; = 0 otherwise	0.2803	0.4492
STATE	=1 if the respondent owned or works in government, state-enterprise; = 0 otherwise	0.0043	0.0654
COOP	=1 if the respondent owned or works in cooperatives; = 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 government agency; = 0 otherwise	0.1221	0.3274
INTERACT	=1 if the purpose of using Internet at work is interacting with government organization; = 0 otherwise	0.1598	0.3664
BUYSALE	=1 if the purpose of using Internet at work is purchase/sale goods and services;= 0 otherwise	0.0789	0.2695

3.2 Method

This study followed the method which employed in Srinuan and Bohlin (2013). They 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 our approach is that Internet access or

connection is a prerequisite for Internet use which is similar to findings in previous studies (Cerno & Pérez Amaral, 2006; Goldfarb & Prince, 2008; Orviska & Hudson, 2009).

Since the data for this study are taken from a sample of the whole population, if we restrict our analysis only to those with Internet access, sample selection bias will be introduced. To avoid this, two-stage estimation is adopted (Heckman, 1979). The Heckman's procedure is employed first to analyse access to broadband and then specific Internet usage is analysed provided organization Internet access exists. Hence, the probability of organization having access to Internet is determined by an unobserved latent variable,

$$Y_i^* = X_i'\beta + u_i \quad (1)$$

for organization $i, i = 1, \ldots, N$. Only Y_i is observed, which equals to 1 if $Y_i^* > 0$, implying that organization i chooses to connect Internet via Internet at work; $Y_i^* \leq 0$, if that organization i has no Internet connection at work. X_i is a vector of technology attributes and organization characteristics variables and u_i is the error term. Assuming that u_i is normally distributes, the data are described by the following probit model:

$$Prob\,(Y_i = 1) = \emptyset(X_i'\beta) \quad (2)$$

Within this framework, there are several factors which influence the decision of organization to have Internet connection at work. The factors examined include both technology attributes and organization characteristics factors, for example: availability of computer, size of organization, Form of legal organization, 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 agency and purchase/sale 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 our 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. Hence, the probability of an individual i using the Internet for service j is

$$Y_{ij}^{*} = Z_i'\beta + \varepsilon_i \qquad (4)$$

Where Z_i is a vector of technology attributes and individual socio-economic variables which now excludes size of organization. ε_i is the error term. The random errors u_i and ε_i are assumed to follow a bivariate standard normal distribution with correlation $\rho_{u,\varepsilon}$. The bivariate probit model is appropriate when $\rho_{u,\varepsilon} \neq 0$. Note that using the bivariate probit model often represents two interrelated decisions by some actor. The explanatory variables which are used in this study can be shown in Table 6.

Table 6 Summary data on Internet access and use by characteristics of SMEs.

characteristics of SMEs	Percentage of					
	Internet access	E-mail (EMAIL)	Search (SEARCH)	Getting information from government agency (GOVIN)	Interacting with government agency (INTERACT)	Purchase/ Sale goods or services (BUYSALE)
Computer avialability	99.70	99.82	99.78	99.80	99.86	99.85
Size						
Micro enterprise	20.67	18.14	19.66	15.08	11.08	14.69
Small enterprise	45.55	45.61	44.99	41.59	38.28	42.87
Medium enterprise	18.74	19.85	19.15	21.73	24.31	21.65
Business sector						
Trade	40.07	39.00	38.87	35.54	36.1	42.87
Manufacturing	43.37	44.8	45.13	46.44	46.45	42.98
Construction	5.90	5.81	5.77	7.05	6.77	4.68
Land transport	3.64	3.70	3.49	3.35	3.16	2.68
Private hospital	1.21	1.32	1.20	2.04	2.51	1.27
Information	5.81	5.38	5.54	5.59	5.01	5.51
Form						
Individual	15.48	12.63	14.83	10.42	7.12	9.76
Partnership	13.10	12.74	12.38	12.39	11.20	13.13
Limited/Public Company Limited	69.39	72.75	70.94	74.40	79.81	75.30
State	0.78	0.77	0.62	1.34	1.05	0.36
Cooperative	0.28	0.22	0.27	0.38	0.26	0.22
Foreign investment	12.18	13.28	12.67	16.33	18.13	18.32
Full sample	52.87	30.89	29.80	15.98	12.21	7.89

Chapter 4

Results and Discussion

This study aims to investigate the determinants of demand for Internet access and use of SMEs in Thailand. The estimated results using bivariate probit model are shown in Table 7. The findings can be divided that into two parts which are (1) analyze the determinant factors of demand for Internet access of SMEs and (2) analyze the factor influencing on Internet usage of SMEs.

4.1 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 application. The estimated first stage equations for each independent variable are almost identical both in terms of estimated coefficients and statistically significant levels (See more detail of estimated results in Appendix A). Internet access will increase significantly with the availability of computer at organization, SME in information and communication sector, size of organization, limited company/public limited company and if SME has a foreign shareholder. Specifically, the results suggested that there is a high probability of access to Internet at work for SMEs if the SME has more available computer at work. Size of organization also revealed that the larger size of SME organization is more likely to access to Internet. Considerably, SMEs in each business sector has access to Internet at different level. The results presented that SMEs in information and communications sector has high possibility to access to Internet as compared to other business sector. Furthermore, the form of SME has significantly effect on Internet access. SMEs which form their organization in the form of individual proprietor and cooperatives have less probability to access to Internet. At the same time, the SMEs which form their organization in the form of company limited and public company limited tends to access more to the Internet. Interestingly, SMEs which has foreign shareholder is more likely to access to Internet. The higher percentage of foreign investment or share will affect the probability of Internet access.

Table 7 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***	3.1991***	3.2674***	2.5143***	2.2812***	2.3415***
	(0.0724)	(0.0808)	(0.0861)	(0.1090)	(0.1428)	(0.1967)
TRADE	-0.7256***	-0.2513***	-0.2890***	-0.2334***	-0.1499***	0.1969
	(0.0957)	(0.0624)	(0.060)	(0.0537)	(0.0567)	(0.0598)
MANU	-0.6828***	-0.1437**	-0.1096*	-0.0954*	-0.0939*	-0.2031***
	(0.0957)	(0.0631)	(0.0607)	(0.0538)	(0.0567)	(0.0600)
CONS	-0.4213***	-0.1117	-0.1391*	0.1461**	0.1068	-0.2875***
	(0.1152)	(0.0808)	(0.0773)	(0.0690)	(0.0720)	(0.0795)
TRANS	-0.8367***	-0.3245***	(-0.3746)***	-0.2692***	-0.2953***	-0.4235***
	(0.1194)	(0.0884)	(0.0841)	(0.0779)	(0.0821)	(0.0909)
HOS	-0.5276***	0.2556*	-0.1446	0.6544***	0.8586***	-0.1098
	(0.1822)	(0.1520)	(0.1262)	(0.1177)	(0.1177)	(0.1258)
SIZE	0.0009***					
	(0.0001)					
IND	-0.2090*	-0.2593**	-0.0991	-0.3669***	-0.0287	-0.5193***
	(0.1085)	(0.1071)	(0.1086)	(0.1092)	(0.1389)	(0 .1234)
PART	0.2606**	0.2535**	0.1095	-0.0228	0.4484***	-0.0927
	(0.1116)	(0.1088)	(0.1102)	(0.1099)	(0.1384)	(0. 1231)
LIMITED	0.5204***	0.1088***	0.4141***	0.1398	0.7264***	-0.0618
	(0.1065)	(0.1051)	(0.1067)	(0.1064)	(0.1352)	(0.1191)
STATE	0.3750*	0.5496***	-0.0112	0.8300***	0.9608	-0.5853***
	(0.2019)	(0.1865)	(0.1717)	(0.1750)	(0.1890)	(0.2175)
COOP	-0.6949	-0.6319***	-0.6053***	-0.0511	0.2153	-0.4070
	(0.2049)	(0.2049)	(0.2049)	(0.2064)	(0.2458)	(0.2577)
FOREIGN	0.4420***	0.4966***	0.2488***	0.4362***	0.4443***	0.4000***
	(0.0619)	(0.0508)	(0.4270)	(0.0356)	(0.0355)	(0.0371)

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)
CONSTANT	-1.9579***	-2.610***	-2.6610***	-2.7034	-3.3030	-2.9399
	(0.1488)	(0.1357)	(0.1380)	(0.1465)	(0.1969)	(0.2189)
ρ		1	0.9940	0.9642	0.9605	0.9994
		(7.25e-09)	(0.0072)	(.0260)	(0.0740)	(0.1253)
x^2		4474.13***	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 Information and communication sector is reference group. In form of legal organization, the 'others form' is reference group. 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.

4.2 Determinant factors of demand for Internet usage of SMEs

Next, using Internet is examined in the second stage. The results vary with the purpose of usage. For example, the probability of using any application is more likely to increase if number of computer is available at organization. Usage is significantly greater for foreign shareholding organization in every application. Considering by business sector, the finding showed that SMEs in business trade and service sector use every application but use less than SMEs in information and communication sector. Though the use of Internet for purchasing and selling goods or services is positive or higher but it is not statistically significant. SMEs in manufacturing and land transport and storage sector use every application less than SMEs in information and communication sector in particular for purchasing and selling goods or services. For SMEs in construction sector, they use search and purchasing and selling goods or services less than SMEs in information and communication sector. However, they use Internet for getting information from government

organization higher than SMEs in information and communication sector. Importantly, SMEs in private hospital sector tends to use more Internet for E-mail, getting information from government organization and interacting with government agency e.g. downloading and submitting tax application and requesting online forms.

Considering other variables, the results reported that the SME organizations which formed in individual proprietor are less likely to use the E-mail, getting information from government organization and purchasing and selling goods or services than other forms. Similarly, the cooperative is less likely to use Internet for E-mail and searching information about goods and services. On the contrary, if SME is formed in juristic partnership or company limited or public company limited. There is high probability for SME to use internet for E-mail, searching information about goods and services, getting information from government organization and interacting with government agency. While the SMEs in form of government agency or state owned enterprise are more likely to use E-mail, searching information about goods and services but they are less likely to use Internet for purchasing and selling goods or services.

4.3 Discussion

The results of this study are in line with previous literature in several aspects. As Arendt (2008) and Tan et al. (2009) mentioned, the insufficient infrastructure is the important barrier. The finding indicated that number of computer availability will encourage SMEs to more access and use Internet. However, the number of computer and network is also related to the size of SMEs. It may imply that medium enterprise will have more advantage in term of Internet access than the micro or small enterprise since the infrastructure of these two enterprises still lag behind. The major reason is the limited financial and human resource to adopt ICT (Ashrafi and Murtaza, 2006). This also confirmed the results which showed that limited company, public limited company or a foreign shareholding company has high probability of access to Internet. Owners or structure of these organizations have enough resource to adopt ICT. They can get access to external funding easier than other form if they aim to invest in ICT infrastructure.

SMEs in Information and communication sector are more familiar with the Internet since they access and use more as compared to others. This result confirmed the study of Antlova (2009). The SMEs in Information and communication sector have knowledge and skill regarding the information technologies. They normally have their owned IT division, though some of them may rely on the external consultants.

Regarding to the form of organization and Internet access, the results showed that the SMEs in form of individual proprietor and cooperative are less likely access and use Internet. This may due to organization barrier. Resistance to adopt Internet of the manager or owner is one possible reason. Another possible reason is missing long-term corporate strategy often omitted due to shortage of long-term orders and stable customers (Antlova, 2009). They make their decisions on the basis of current needs and the current situation. Consequently manage process becomes an obstacle for SMEs to adopt Internet.

Policy maker and government have been promoted the use of ICT by organization effectively. In term of Internet access, the finding revealed the small enterprise, cooperative, SMEs in land transport, trade business and service, manufacturing, private hospital and construction sector has disadvantage of Internet access. This confirmed that government policies and strategies have little influence on Internet adoption of Thai SMEs which similar to the finding of Beckinsale, Levy and Powell (2006).

In comparison with Mehrten et al. (2001) and Levy and Powell (2006), this study revealed that most of SME owners or managers use Internet for sending or receiving E-mail and searching information of goods and services with the different degrees. SMEs in land transport, trade business and service, manufacturing use every application including getting and interacting information from government and purchase/sale goods or service. On the contrary, SMEs in construction sector use search, getting and private hospital, while SMEs in private hospital sector use E-mail, getting and interacting information from government.

These results confirmed that SME owners in first three sectors viewed Internet as a key strategy to improve SME efficiency. Thai SMEs have not embraced E-mail, search and getting interacting information from government, with majority of SMEs in this study using it regularly. The decision of SMEs to adopt Internet may due to efficiency benefits in term of communication improving, ability to gather customer and competitor information and improving SME image promotion (Chapman et al, 2000).

Chapter 5

Conclusion

The section below presents the finding conclusion and discussed the extent to which the knowledge gained from the work conducted in the study achieves this purpose. This section is divided into three sub-sections which are conclusion, implications and future research at the end.

5.1 Conclusion

In the globalization era, Information and communication technology (ICT) 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 attempts 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 survey data in 2012 from the NSO and econometric model in this study.

The study revealed that Internet access will increase significantly with the availability of computer at organization, SME in information and communication sector, size of organization, limited company/public limited company and if SME has a foreign shareholder. The form of SME has also significantly effect on Internet access. SMEs which form their organization in the form of individual proprietor and cooperatives have less probability to access to Internet. On the contrary, the SMEs which form their organization in the form of company limited and public company limited tends to access more to the Internet. Furthermore, the percentage of foreign investment or share will affect the probability of Internet access.

Considering Internet usage, results vary with the purpose of usage. For example, the probability of using any application is more likely to increase if number of computer is available at organization. Usage is significantly greater for foreign shareholding

organization in every application. Considering by business sector, the finding showed that SMEs in business trade and service sector use every application but use less than SMEs in information and communication sector. E-mail and searching of good or service information and getting information from government become important application that SMEs use regularly. Moreover, SMEs have embraced to use Internet for purchasing and selling goods or services in particular in trade business and private hospital. In addition, SMEs which owned by individual proprietor and cooperative are less likely to use the E-mail, getting information from government organization and purchasing and selling goods or services than other forms.

5.2 Implications

The results could be used as guidance in policy and plan formation, as well as promoting the use of ICT by SMEs effectively. According to the findings, the role of policy maker and government are needed to facilitate the Internet access. The first priority should be the development of Internet infrastructure including subsidization for the first installation of ICT by SMEs, in particular the micro and small enterprise. Price of Internet service after installation is also important but this factor is not investigated in this study. However, policy maker could encourage the service provider to invest more in infrastructure or allow more competition in providing Internet service for SMEs. This will result in an increase in choice for the consumer and drive down the price of the service.

Policy maker and government may need also to consider whether wireless technologies, e.g., mobile broadband and hotspots could be another alternative to solve the lack of fixed infrastructure. There was apparently a leap-frogging of mobile over fixed both in terms of infrastructure and user on the Thai market together with the growth of mobile application. This could provide an opportunity for the SMEs access to the Internet service, in particular for SMEs that owned by individual proprietor.

In addition, policy maker and government need to consider kinds of policies which can attract potential Internet users for example develop and support applications in the Thai language, provide user-friendly applications for small enterprise which has low ICT skills and knowledge. Another issue is security system. Majority of SMEs has feared about security system of internal data after using Internet. Therefore, supporting or providing a a security system from government need to be done.

In term of theoretical contribution, this research provides a theoretical contribution by identifying and determining detailed factors such as supply side, SMEs characteristics, content and applications. These finding extend the current body of knowledge within the area of consumer adoption of broadband since these factors have previously rarely been examined in the literature to explain the Internet adoption in SMEs, within the context of developing countries such as Thailand. Furthermore, this study shows that the focus of research in this area is now transferring from the supply side to the development of the content and applications that will entice users to utilizing Internet.

5.3 Future research

This study has investigated the determinant of demand for Internet access and use of SMEs and discussed the policy implications. Future research is needed, however. The Internet service in Thailand is in the emerging stage in particular for SMEs. Future research could investigate further by including other related factors: for example, location of SMEs, financial saving (cost and revenue) after using Internet, problem or security experiences, knowledge of user and trust and attitude. Moreover, the issue of non-Internet users is also interesting to investigate. A lack of acceptance of Internet amongst those not connected is probably the most significant problem facing policy makers. This will fill the gaps in this study.

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Appendices

Appendix A

Estimated Resuls

. biprobit (access = trade manu cons trans hos size individual partner limited state coop foreign comp)

> (email = trade manu cons trans hos individual partner limited state coop foreign comp)

Fitting comparison equation 1:

Iteration 0: log likelihood = -12448.681

Iteration 1: log likelihood = -4446.9541

Iteration 2: log likelihood = -4140.3378

Iteration 3: log likelihood = -4101.7971

Iteration 4: log likelihood = -4101.1326

Iteration 5: log likelihood = -4101.1325

Fitting comparison equation 2:

Iteration 0: log likelihood = -12907.094

Iteration 1: log likelihood = -6514.555

Iteration 2: log likelihood = -6238.7656

Iteration 3: log likelihood = -6211.1044

Iteration 4: log likelihood = -6210.0234

Iteration 5: log likelihood = -6210.0217

Iteration 6: log likelihood = -6210.0217

Comparison: log likelihood = -10311.154

Fitting full model:

Iteration 0: log likelihood = -10311.154

Iteration 1: log likelihood = -8352.5216

Iteration 2: log likelihood = -8101.743

Iteration 3: log likelihood = -8077.0298

Iteration 4: log likelihood = -8075.1461

Iteration 5: log likelihood = -8074.5345

Iteration 6: log likelihood = -8074.2138

Iteration 7: log likelihood = -8074.1139

Iteration 8: log likelihood = -8074.0985

Iteration 9: log likelihood = -8074.0913

Iteration 10: log likelihood = -8074.0901

Iteration 11: log likelihood = -8074.0897

Iteration 12: log likelihood = -8074.0894

Iteration 13: log likelihood = -8074.0894

Iteration 14: log likelihood = -8074.0894

Iteration 15: log likelihood = -8074.0894

Seemingly unrelated bivariate probit Number of obs = 18755

Wald chi2(25) = 4686.74

Log likelihood = -8074.0894 Prob > chi2 = 0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
access						
trade	-.7256305	.09486	-7.65	0.000	-.9115528	-.5397083
manu	-.6828503	.0957696	-7.13	0.000	-.8705552	-.4951454
cons	-.4213568	.1152424	-3.66	0.000	-.6472278	-.1954857
trans	-.8367877	.1194974	-7.00	0.000	-1.070998	-.6025772
hos	-.5276348	.1822122	-2.90	0.004	-.8847641	-.1705055
size	.0009982	.0001897	5.26	0.000	.0006265	.00137
individual	-.2090735	.1085953	-1.93	0.054	-.4219164	.0037694
partner	.2606264	.1116057	2.34	0.020	.0418833	.4793695
limited	.5204219	.1065333	4.89	0.000	.3116205	.7292234
state	.3750812	.2019827	1.86	0.063	-.0207975	.77096
coop	-.6949867	.2049652	-3.39	0.001	-1.096711	-.2932622
foreign	.4420514	.0619994	7.13	0.000	.3205347	.563568
comp	3.489247	.0724854	48.14	0.000	3.347178	3.631316
_cons	-1.957969	.1488431	-13.15	0.000	-2.249696	-1.666242
email						
trade	-.251365	.06246	-4.02	0.000	-.3737843	-.1289456
manu	-.1437948	.0631566	-2.28	0.023	-.2675795	-.0200102

cons	-.1117537	.0808306	-1.38	0.167	-.2701788	.0466714
trans	-.3245967	.0884529	-3.67	0.000	-.4979612	-.1512322
hos	.2556716	.1520927	1.68	0.093	-.0424247	.5537679
individual	-.2593139	.1071409	-2.42	0.016	-.4693062	-.0493217
partner	.2535137	.108821	2.33	0.020	.0402284	.466799
limited	.6028085	.1051093	5.74	0.000	.396798	.8088189
state	.5496531	.1865405	2.95	0.003	.1840404	.9152657
coop	-.6319435	.204951	-3.08	0.002	-1.03364	-.2302469
foreign	.4966425	.050847	9.77	0.000	.3969843	.5963007
comp	3.199117	.0808604	39.56	0.000	3.040633	3.3576
_cons	-2.610042	.135758	-19.23	0.000	-2.876123	-2.343962
/athrho	13.30156	648.5781	0.02	0.984	-1257.888	1284.491
rho	1	7.25e-09			-1	1

Likelihood-ratio test of rho=0: chi2(1) = 4474.13 Prob > chi2 = 0.0000

. biprobit (access = trade manu cons trans hos.size individual partner limited state coop foreign comp)

> (goods_search = trade manu cons trans hos individual partner limited state coop foreign comp)

Fitting comparison equation 1:

Iteration 0: log likelihood = -12448.681

Iteration 1: log likelihood = -4446.9541

Iteration 2: log likelihood = -4140.3378

Iteration 3: log likelihood = -4101.7971

Iteration 4: log likelihood = -4101.1326

Iteration 5: log likelihood = -4101.1325

Fitting comparison equation 2:

Iteration 0: log likelihood = -12973.357

Iteration 1: log likelihood = -7321.3669

Iteration 2: log likelihood = -7052.2111

Iteration 3: log likelihood = -7023.7584

Iteration 4: log likelihood = -7023.0024

Iteration 5: log likelihood = -7022.9991

Iteration 6: log likelihood = -7022.9991

Comparison: log likelihood = -11124.132

Fitting full model:

```
Iteration 0:  log likelihood = -11124.132
Iteration 1:  log likelihood = -9281.0913
Iteration 2:  log likelihood = -9065.2982
Iteration 3:  log likelihood = -9044.2293
Iteration 4:  log likelihood = -9042.7134
Iteration 5:  log likelihood = -9042.6057
Iteration 6:  log likelihood = -9042.5997
Iteration 7:  log likelihood = -9042.5997

Seemingly unrelated bivariate probit              Number of obs   =     18755
                                                  Wald chi2(25)   =   3575.84
Log likelihood = -9042.5997                       Prob > chi2     =    0.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
access       |
       trade |  -.7497449   .0942507    -7.95   0.000    -.9344729   -.5650169
        manu |  -.6871921   .0950164    -7.23   0.000    -.8734208   -.5009634
        cons |  -.4658386   .1145407    -4.07   0.000    -.6903342    -.241343
       trans |  -.8539807   .1188473    -7.19   0.000    -1.086917   -.6210443
         hos |  -.6179326   .1826217    -3.38   0.001    -.9758645   -.2600006
        size |   .0014476   .0002114     6.85   0.000     .0010333    .0018619
  individual |   -.162347   .1116402    -1.45   0.146    -.3811578    .0564639
     partner |   .2871863   .1149806     2.50   0.013     .0618286    .5125441
     limited |   .5463906   .1105908     4.94   0.000     .3296367    .7631445
       state |   .2208361   .2057905     1.07   0.283    -.1825058     .624178
```

coop	-.6646008	.2065325	-3.22	0.001	-1.069397	-.2598046
foreign	.4314969	.0668377	6.46	0.000	.3004975	.5624963
comp	3.475275	.0726152	47.86	0.000	3.332951	3.617598
_cons	-1.97748	.1502805	-13.16	0.000	-2.272024	-1.682936
goods_search						
trade	-.2890965	.0602065	-4.80	0.000	-.4070991	-.171094
manu	-.1096714	.0607968	-1.80	0.071	-.2288309	.0094881
cons	-.1391754	.0773289	-1.80	0.072	-.2907372	.0123864
trans	-.3746884	.0841764	-4.45	0.000	-.539671	-.2097058
hos	-.1446689	.1262606	-1.15	0.252	-.3921351	.1027972
individual	-.0991268	.1086037	-0.91	0.361	-.3119862	.1137326
partner	.1095551	.1102511	0.99	0.320	-.1065332	.3256433
limited	.4141071	.1067428	3.88	0.000	.2048951	.6233192
state	-.0112627	.1717632	-0.07	0.948	-.3479123	.3253869
coop	-.6053658	.2049611	-2.95	0.003	-1.007082	-.2036494
foreign	.2488062	.042799	5.81	0.000	.1649216	.3326908
comp	3.267407	.0861297	37.94	0.000	3.098596	3.436218
_cons	-2.661079	.1380111	-19.28	0.000	-2.931575	-2.390582
/athrho	2.909384	.6147342	4.73	0.000	1.704528	4.114241
rho	.9940751	.0072629			.9359727	.9994663

Likelihood-ratio test of rho=0: chi2(1) = 4163.06 Prob > chi2 = 0.0000

. biprobit (access = trade manu cons trans hos size individual partner limited state coop foreign comp)

> (info_search = trade manu cons trans hos individual partner limited state coop foreign comp)

Fitting comparison equation 1:

Iteration 0: log likelihood = -12448.681

Iteration 1: log likelihood = -4446.9541

Iteration 2: log likelihood = -4140.3378

Iteration 3: log likelihood = -4101.7971

Iteration 4: log likelihood = -4101.1326

Iteration 5: log likelihood = -4101.1325

Fitting comparison equation 2:

Iteration 0: log likelihood = -11240.121

Iteration 1: log likelihood = -8788.6313

Iteration 2: log likelihood = -8568.491

Iteration 3: log likelihood = -8543.2535

Iteration 4: log likelihood = -8542.5052

Iteration 5: log likelihood = -8542.5019

Iteration 6: log likelihood = -8542.5019

Comparison: log likelihood = -12643.634

Fitting full model:

Iteration 0: log likelihood = -12643.634

Iteration 1: log likelihood = -12024.498

Iteration 2: log likelihood = -11979.095

Iteration 3: log likelihood = -11971.551

Iteration 4: log likelihood = -11969.986

Iteration 5: log likelihood = -11969.839

Iteration 6: log likelihood = -11969.837

Iteration 7: log likelihood = -11969.837

Seemingly unrelated bivariate probit Number of obs = 18755

Wald chi2(25) = 3830.86

Log likelihood = -11969.837 Prob > chi2 = 0.0000

Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
access					
trade	-.7220658	.0952894	-7.58	0.000	-.9088296	-.5353019
manu	-.6958805	.0963163	-7.22	0.000	-.8846569	-.507104
cons	-.4663819	.1150014	-4.06	0.000	-.6917806	-.2409833
trans	-.8182559	.1199635	-6.82	0.000	-1.05338	-.5831318
hos	-.5655616	.181901	-3.11	0.002	-.922081	-.2090422
size	.0017096	.0002221	7.70	0.000	.0012744	.0021448
individual	-.1419466	.1118248	-1.27	0.204	-.3611192	.077226
partner	.3021674	.1148789	2.63	0.009	.0770089	.5273259

limited	.5462723	.1105746	4.94	0.000	.3295501	.7629945
state	.3986762	.2173926	1.83	0.067	-.0274054	.8247579
coop	-.6458233	.2072136	-3.12	0.002	-1.051955	-.2396921
foreign	.4511654	.0670801	6.73	0.000	.3196909	.58264
comp	3.469776	.0727718	47.68	0.000	3.327146	3.612406
_cons	-2.010857	.1521487	-13.22	0.000	-2.309063	-1.712651
info_search						
trade	-.2334499	.0537713	-4.34	0.000	-.3388397	-.1280601
manu	-.0954402	.0538353	-1.77	0.076	-.2009554	.010075
cons	.1461691	.0690469	2.12	0.034	.0108397	.2814985
trans	-.2692761	.0779348	-3.46	0.001	-.4220255	-.1165268
hos	.6544921	.1177846	5.56	0.000	.4236386	.8853456
individual	-.366933	.1092384	-3.36	0.001	-.5810364	-.1528296
partner	-.0228533	.1099366	-0.21	0.835	-.238325	.1926184
limited	.1398228	.1064371	1.31	0.189	-.0687902	.3484357
state	.8300877	.1750107	4.74	0.000	.4870731	1.173102
coop	-.0511268	.2064633	-0.25	0.804	-.4557876	.3535339
foreign	.4362523	.0356002	12.25	0.000	.3664773	.5060273
comp	2.51438	.1090238	23.06	0.000	2.300697	2.728063
_cons	-2.703408	.1465587	-18.45	0.000	-2.990658	-2.416158
/athrho	2.003686	.3711282	5.40	0.000	1.276289	2.731084
rho	.9642871	.0260348			.8554929	.9915472

Likelihood-ratio test of rho=0: chi2(1) = 1347.6 Prob > chi2 = 0.0000

. biprobit (access = trade manu cons trans hos size individual partner limited state coop foreign comp)

> (gov_contact = trade manu cons trans hos individual partner limited state coop foreign comp)

Fitting comparison equation 1:

Iteration 0: log likelihood = -12448.681

Iteration 1: log likelihood = -4446.9541

Iteration 2: log likelihood = -4140.3378

Iteration 3: log likelihood = -4101.7971

Iteration 4: log likelihood = -4101.1326

Iteration 5: log likelihood = -4101.1325

Fitting comparison equation 2:

Iteration 0: log likelihood = -9903.5042

Iteration 1: log likelihood = -7971.7187

Iteration 2: log likelihood = -7755.8293

Iteration 3: log likelihood = -7727.4043

Iteration 4: log likelihood = -7726.1803

Iteration 5: log likelihood = -7726.1801

Comparison: log likelihood = -11827.313

Fitting full model:

Iteration 0: log likelihood = -11827.313

Iteration 1: log likelihood = -11448.824

Iteration 2: log likelihood = -11421.841

Iteration 3: log likelihood = -11418.008

Iteration 4: log likelihood = -11417.191

Iteration 5: log likelihood = -11417

Iteration 6: log likelihood = -11416.991

Iteration 7: log likelihood = -11416.991

Seemingly unrelated bivariate probit Number of obs = 18755

Wald chi2(25) = 4013.59

Log likelihood = -11416.991 Prob > chi2 = 0.0000

Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
access					
trade	-.7445858	.0954642	-7.80	0.000	-.9316922	-.5574794
manu	-.7274002	.0965543	-7.53	0.000	-.9166432	-.5381572
cons	-.4668434	.1156598	-4.04	0.000	-.6935325	-.2401544
trans	-.8679146	.1201853	-7.22	0.000	-1.103473	-.6323558
hos	-.551668	.1827181	-3.02	0.003	-.9097888	-.1935471
size	.0016065	.0002212	7.26	0.000	.001173	.00204
individual	-.147	.1133533	-1.30	0.195	-.3691684	.0751685
partner	.3139486	.1162793	2.70	0.007	.0860454	.5418518
limited	.5619513	.1120275	5.02	0.000	.3423814	.7815212
state	.5009773	.2116575	2.37	0.018	.0861361	.9158184
coop	-.6395664	.2084094	-3.07	0.002	-1.048041	-.2310916
foreign	.4449988	.0680296	6.54	0.000	.3116633	.5783343
comp	3.464802	.0725786	47.74	0.000	3.322551	3.607054

_cons	-1.984197	.1523463	-13.02	0.000	-2.28279	-1.685604
gov_contact						
trade	-.1499185	.0567818	-2.64	0.008	-.2612087	-.0386283
manu	-.0939091	.056744	-1.65	0.098	-.2051253	.0173071
cons	.1068356	.0720767	1.48	0.138	-.0344322	.2481034
trans	-.2953491	.0821223	-3.60	0.000	-.4563059	-.1343923
hos	.8586847	.1177602	7.29	0.000	.627879	1.08949
individual	-.0287901	.1389546	-0.21	0.836	-.3011361	.2435558
partner	.448435	.1384452	3.24	0.001	.1770874	.7197826
limited	.72643	.1352141	5.37	0.000	.4614153	.9914447
state	.9608179	.1890684	5.08	0.000	.5902506	1.331385
coop	.2153258	.245814	0.88	0.381	-.2664608	.6971125
foreign	.4443481	.0355852	12.49	0.000	.3746024	.5140939
comp	2.281241	.1428227	15.97	0.000	2.001314	2.561169
_cons	-3.303081	.196981	-16.77	0.000	-3.689157	-2.917006
/athrho	1.952924	.9577808	2.04	0.041	.0757084	3.83014
rho	.9605462	.0740853			.075564	.9990581

Likelihood-ratio test of rho=0: chi2(1) = 820.643 Prob > chi2 = 0.0000

. biprobit (access = trade manu cons trans hos size individual partner limited state coop foreign comp)

> (buy_sale = trade manu cons trans hos individual partner limited state coop foreign comp)

Fitting comparison equation 1:

Iteration 0: log likelihood = -12448.681

Iteration 1: log likelihood = -4446.9541

Iteration 2: log likelihood = -4140.3378

Iteration 3: log likelihood = -4101.7971

Iteration 4: log likelihood = -4101.1326

Iteration 5: log likelihood = -4101.1325

Fitting comparison equation 2:

Iteration 0: log likelihood = -7653.4938

Iteration 1: log likelihood = -6608.3327

Iteration 2: log likelihood = -6457.4401

Iteration 3: log likelihood = -6437.917

Iteration 4: log likelihood = -6435.768

Iteration 5: log likelihood = -6435.7203

Iteration 6: log likelihood = -6435.7202

Comparison: log likelihood = -10536.853

Fitting full model:

Iteration 0: log likelihood = -10536.853

Iteration 1: log likelihood = -10271.208

```
Iteration 2:  log likelihood = -10256.951
Iteration 3:  log likelihood = -10256.167
Iteration 4:  log likelihood = -10255.878
Iteration 5:  log likelihood = -10255.824
Iteration 6:  log likelihood = -10255.818
Iteration 7:  log likelihood = -10255.817
Iteration 8:  log likelihood = -10255.817
Iteration 9:  log likelihood = -10255.817
Iteration 10: log likelihood = -10255.817

Seemingly unrelated bivariate probit          Number of obs   =     18755
                                              Wald chi2(25)   =   3594.67
Log likelihood = -10255.817                   Prob > chi2     =    0.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
access       |
       trade |  -.7565226   .0951216    -7.95   0.000    -.9429576   -.5700876
        manu |  -.7753392   .0963894    -8.04   0.000    -.9642588   -.5864195
        cons |  -.4908323   .1160684    -4.23   0.000    -.7183222   -.2633424
       trans |  -.8715373   .1202581    -7.25   0.000    -1.107239   -.6358357
         hos |  -.6510806   .1872596    -3.48   0.001    -1.018103   -.2840585
        size |   .0021617   .0002245     9.63   0.000     .0017216    .0026018
  individual |  -.1215202   .1128424    -1.08   0.282    -.3426872    .0996468
     partner |   .3343029   .1159614     2.88   0.004     .1070228     .561583
     limited |   .5552534   .1116383     4.97   0.000     .3364463    .7740606
```

state	.33492	.210826	1.59	0.112	-.0782915	.7481314
coop	-.6246257	.2092968	-2.98	0.003	-1.03484	-.2144115
foreign	.3946651	.0692566	5.70	0.000	.2589247	.5304055
comp	3.448966	.0727	47.44	0.000	3.306477	3.591456
_cons	-1.980252	.1519081	-13.04	0.000	-2.277986	-1.682517
buy_sale						
trade	-.0749237	.0598106	-1.25	0.210	-.1921504	.042303
manu	-.2031533	.0600352	-3.38	0.001	-.32082	-.0854865
cons	-.2875739	.0795177	-3.62	0.000	-.4434258	-.131722
trans	-.4235494	.0909534	-4.66	0.000	-.6018147	-.245284
hos	-.1098766	.1258959	-0.87	0.383	-.356628	.1368747
individual	-.5193712	.1234957	-4.21	0.000	-.7614183	-.2773242
partner	-.0927989	.1231531	-0.75	0.451	-.3341746	.1485767
limited	-.0618961	.1191863	-0.52	0.604	-.295497	.1717048
state	-.5853083	.2175787	-2.69	0.007	-1.011755	-.1588619
coop	-.4070571	.2577509	-1.58	0.114	-.9122397	.0981254
foreign	.400061	.0371639	10.76	0.000	.3272211	.4729009
comp	2.341503	.1967423	11.90	0.000	1.955895	2.727111
_cons	-2.939948	.2189684	-13.43	0.000	-3.369118	-2.510778
/athrho	4.069385	107.4142	0.04	0.970	-206.4586	214.5974
rho	.9994162	.1253849			-1	1

Likelihood-ratio test of rho=0: chi2(1) = 562.071 Prob > chi2 = 0.0000

Appendix B

Selected Questions from NSO Questionnaire

ลับ

การสำรวจการมีการใช้เทคโนโลยีสารสนเทศและการสื่อสาร
ในสถานประกอบการ พ.ศ. 2555

สำนักงานสถิติแห่งชาติ

ICT. 55

บันทึกข้อมูลการดำเนินกิจการในรอบปีที่แล้ว (ระหว่าง 1 มกราคม – 31 ธันวาคม 2554)

ID 1-15

ชื่อสถานประกอบการ..........

สถานที่ตั้ง

เลขที่........ ตรอก/ซอย........ ถนน........

ตำบล/แขวง........ อำเภอ/เขต........

จังหวัด........ รหัสไปรษณีย์........

โทรศัพท์........ โทรสาร........

E-mail........ Website........

Social Network (เช่น facebook, twitter เป็นต้น)........

เขตการปกครอง (ใส่ ✓ ใน ☐ เพียงช่องเดียว)

☐ 1 ในเขตเทศบาล ☐ 2 นอกเขตเทศบาล ชื่อ อบต. ....

สถานประกอบการแห่งนี้ ประกอบกิจการทางเศรษฐกิจประเภทใด

(ใส่ ✓ ใน ☐ เพียงช่องเดียว [illegible])

☐ 1 [illegible] (45)

☐ 2 [illegible] (46)

☐ 3 [illegible] (47)

☐ 4 [illegible] (55 – 56)

☐ 5 [illegible] (58 – 63)

☐ 6 [illegible] (68)

☐ 7 [illegible] (69 – 75)

☐ 8 [illegible] (77 – 82)

☐ 9 [illegible] (90 – 93)

☐ 10 [illegible] (95 – 96)

☐ 11 [illegible] (10 – 33)

☐ 12 [illegible] (37 – 39)

☐ 13 [illegible] (41 – 43)

☐ 14 [illegible] (52)

☐ 15 [illegible] (56.10)

[illegible]

ใช้ในสำนักงาน	
REG 16	☐
CWT 17 - 18	☐☐
AMP 19 - 20	☐☐
TAM 21 - 22	☐☐
MUN 23	☐
TYPE 24 - 25	☐☐
CODE_R 26 - 30	☐☐☐☐☐
CODE_L 31 - 35	☐☐☐☐☐
SIZE_R 36	☐
SIZE_L 37	☐
NO 38 - 41	☐☐☐☐
YR 42 - 43	5 5
ENU 44	☐

ความร่วมมือของสถานประกอบการนี้ (สำหรับเจ้าหน้าที่)

1 ตอบครบถ้วน
2 [illegible]
3 [illegible]
4 [illegible]
5 [illegible]
6 [illegible]

2

ตอนที่ 1 ข้อมูลทั่วไปของสถานประกอบการ

Rec. 1 Col. 45 | 1

ข้อ 1 ระยะเวลาในการดำเนินกิจการมา [A01 46-48] ☐☐☐ ปี

ข้อ 2 รูปแบบการจัดตั้งตามกฎหมาย (กา ✓ ใน ☐ เพียงข้อเดียว) [A02 49] ☐

☐ 1 ส่วนบุคคล ห้างหุ้นส่วนสามัญที่ไม่เป็นนิติบุคคล

☐ 2 ห้างหุ้นส่วนสามัญนิติบุคคล ห้างหุ้นส่วนจำกัด

☐ 3 บริษัทจำกัด บริษัทจำกัด (มหาชน)

☐ 4 ส่วนราชการ รัฐวิสาหกิจ

☐ 5 สหกรณ์

☐ 6 การจัดตั้งในรูปแบบอื่นๆ (ระบุ ....)

ข้อ 3 รูปแบบการจัดตั้งทางเศรษฐกิจ (กา ✓ ใน ☐ เพียงข้อเดียว) [A03 50] ☐

☐ 1 สำนักงานแห่งเดียว

☐ 2 สำนักงานใหญ่

☐ 3 สำนักงานสาขา

ข้อ 4 สถานประกอบการแห่งนี้ มีต่างประเทศร่วมลงทุนหรือถือหุ้นหรือไม่ (กา ✓ ใน ☐ เพียงข้อเดียว) [A04 51] ☐

☐ 1 มี โดยสัดส่วนน้อยกว่า 10 %

☐ 2 มี โดยสัดส่วน 10 - 50 %

☐ 3 มี โดยสัดส่วนมากกว่า 50 %

☐ 4 ไม่มี

ข้อ 5 โปรดบันทึกจำนวนคนทำงานตามปกติของสถานประกอบการ (สำหรับลูกจ้างให้นับทั้งลูกจ้างประจำและลูกจ้างชั่วคราว)

	ชาย		หญิง	
1 คนทำงานโดยไม่ได้รับค่าจ้างหรือเงินเดือน	A05 52-55	☐☐☐☐	A08 64-67	☐☐☐☐
2 ลูกจ้าง	A06 56-59	☐☐☐☐	A09 68-71	☐☐☐☐
รวม (1 – 2)	A07 60-63	☐☐☐☐	A10 72-75	☐☐☐☐

■ คนทำงาน

หมายถึง ผู้ที่ทำงานในสถานประกอบการ ทั้งที่ได้รับเงินเดือนและไม่ได้รับเงินเดือน ที่สถานประกอบการมีอยู่ตามปกติ รวมทั้งผู้ที่ทำงานอยู่ในสถานประกอบการแห่งนี้ แต่ในวันสัมภาษณ์ไม่ได้มาทำงาน หรือ [illegible] โดยได้รับค่าจ้างหรือเงินเดือน คนทำงานประกอบด้วย

1. คนทำงานโดยไม่ได้รับค่าจ้างหรือเงินเดือน หมายถึง เจ้าของกิจการ หุ้นส่วน หรือสมาชิกในครอบครัวที่ทำงานให้กับสถานประกอบการ หรือผู้ปฏิบัติงานในสถานประกอบการซึ่งมีจำนวนชั่วโมงทำงานไม่ต่ำกว่าสัปดาห์ละ 20 ชั่วโมง โดยเจ้าของหรือผู้ประกอบการอาจให้เงิน อาหาร เครื่องนุ่งห่ม หรือ ช่วยเหลือเกื้อกูลอย่างอื่นๆ แต่ไม่ถือว่าเป็น [illegible]

2. ลูกจ้าง หมายถึง ผู้ที่ปฏิบัติงานให้กับสถานประกอบการ โดยได้รับเงินเดือนหรือค่าจ้างเป็นประจำ ตั้งแต่ระดับบริหาร นักวิชาการ เสมียน พนักงานต่างๆ เช่น ผู้จัดการ ผู้อำนวยการ ผู้ปฏิบัติงานในโรงงาน [illegible] พนักงานขาย และลูกจ้าง [illegible] ที่สถานประกอบการส่งไปประจำที่สถานประกอบการอื่น [illegible] เป็นต้น

ไม่รวม บุคคลต่อไปนี้ [illegible] ที่สถานประกอบการแห่งนี้ [illegible] ที่ไม่มีเงินเดือนประจำ

ตอนที่ 2 การใช้เครื่องคอมพิวเตอร์ในการประกอบกิจการของสถานประกอบการ

Rec. 2 Col. 45	2
800 46	

ข้อ 6 สถานประกอบการแห่งนี้ มีการใช้เครื่องคอมพิวเตอร์ในการดำเนินกิจการหรือไม่

(กา ✓ ใน □ เลือกข้อเดียว)

□ 1 ใช้ (ในสถานประกอบการ) ให้บันทึกข้อ 1.1 - 1.2 ⇩

1.1 จำนวนเครื่องคอมพิวเตอร์

- คอมพิวเตอร์ส่วนบุคคล

  จำนวน [801 47-50] เครื่อง ⇨ • ใช้เชื่อมต่ออินเทอร์เน็ต [803 51-54] เครื่อง

- คอมพิวเตอร์เพื่อการบริการและประมวลผลแบบรวมศูนย์

  จำนวน [804 55-57] เครื่อง ⇨ • ใช้เชื่อมต่ออินเทอร์เน็ต [805 58-60] เครื่อง

1.2 จำนวนบุคลากรที่ใช้เครื่องคอมพิวเตอร์ในการปฏิบัติงานเป็นประจำ (เฉลี่ยอย่างน้อยสัปดาห์ละ 1 ครั้ง ถ้าไม่มีบุคลากรดังกล่าวให้บันทึก 0) จำนวน [806 61-64] คน

□ 2 ใช้ที่อื่น (ตอบได้มากกว่า 1 ข้อ)

• อินเทอร์เน็ตคาเฟ่	1	807 65
• ศูนย์บริการสารสนเทศเพื่อประชาชน (Telecenter) ศูนย์เรียนรู้ ICT ชุมชน	2	808 66
• บ้าน	3	809 67
• อื่นๆ (ระบุ...)	4	810 68

□ 3 ไม่ใช้ ให้บันทึกข้อ 3.1 และ 3.2 ⇩ แล้วข้ามไปตอนที่ 3

3.1 ข้อจำกัดที่ไม่ใช้เครื่องคอมพิวเตอร์ในการดำเนินกิจการ (ตอบได้มากกว่า 1 ข้อ)

• ค่าใช้จ่ายสูง	1	811 69
• ความไม่เชื่อมั่นในการรักษาความปลอดภัยของข้อมูลทางธุรกิจ	2	812 70
• บุคลากรไม่มีทักษะในการใช้งาน	3	813 71
• ไม่มีบุคลากรที่มีความรู้และทักษะในการใช้งาน	4	814 72
• เทคโนโลยีมีการเปลี่ยนแปลงเร็ว	5	815 73
• ไม่เห็นประโยชน์ที่จะใช้งาน	6	816 74
• มีความคิดจะใช้	7	817 75
• อื่นๆ (ระบุ)	8	818 76

3.2 สถานประกอบการแห่งนี้ มีแผนจะใช้เครื่องคอมพิวเตอร์ในการดำเนินกิจการในปี 2556 หรือไม่ (ตามกรอบ) แล้วข้ามไปข้อ 8

• มีแผน	1	819 77
งบประมาณที่คาดว่าจะใช้ในการลงทุน [820 78-85] บาท		
• ไม่มีแผน	2	

- ■ เครื่องคอมพิวเตอร์ หมายถึง เครื่องคอมพิวเตอร์ที่สถานประกอบการมีไว้ใช้ในการดำเนินธุรกิจ และสามารถใช้งานได้ จำแนกเป็น
  - *คอมพิวเตอร์ส่วนบุคคล* หมายถึง คอมพิวเตอร์ที่ออกแบบสำหรับใช้งานโดยผู้ใช้ครั้งละ 1 คน ประกอบด้วยจอแสดงผล ซีพียู แป้นพิมพ์ และอุปกรณ์ต่อพ่วงอื่นๆ ได้แก่ เครื่องคอมพิวเตอร์แบบตั้งโต๊ะ (พีซี) คอมพิวเตอร์แบบกระเป๋าหิ้ว (โน้ตบุ๊ก เน็ตบุ๊ก) และคอมพิวเตอร์แท็บเล็ต
  - *คอมพิวเตอร์เพื่อการบริการและประมวลผลแบบรวมศูนย์* หมายถึง คอมพิวเตอร์ที่ติดตั้งไว้ส่วนกลาง เพื่อควบคุมการทำงานและให้บริการคอมพิวเตอร์เครื่องอื่นๆ ได้แก่ เซิร์ฟเวอร์ (Server) เมนเฟรม (Mainframe) มินิคอมพิวเตอร์ (Minicomputer) ซูเปอร์คอมพิวเตอร์ (Supercomputer)
- ■ ศูนย์บริการสารสนเทศเพื่อประชาชน หรือ เทเลเซ็นเตอร์ (Telecenter) คือ สถานที่ให้บริการเทคโนโลยีสารสนเทศและการสื่อสารแก่ชุมชนหรือประชาชน โดยจะมีการคิดค่าบริการหรือไม่ก็ได้

ตอนที่ 3 การใช้อินเทอร์เน็ตในการประกอบกิจการของสถานประกอบการ

ข้อ 14 สถานประกอบการแห่งนี้ มีการใช้อินเทอร์เน็ตในการดำเนินกิจการหรือไม่ (กา ✓ ใน ☐ เพียงข้อเดียว) | Rec. 3 Col. 45 | 3 | C01 46

☐ 1 ใช้

- จำนวนบุคลากรที่ใช้อินเทอร์เน็ตในการปฏิบัติงานเป็นประจำ (เฉลี่ยอย่างน้อยสัปดาห์ละ 1 ครั้ง ถ้าใช้น้อยกว่าสัปดาห์ละ 1 ครั้ง ไม่นับรวม) จำนวน C02 47-50 คน

☐ 2 ไม่ใช้ ให้บันทึกข้อ 2.1 ⇩ แล้วข้ามไปถามตอนที่ 4

2.1 ข้อจำกัดของการไม่ใช้อินเทอร์เน็ตในสถานประกอบการ (ตอบตามลำดับความสำคัญได้ไม่เกิน 3 ข้อ)

- ค่าใช้จ่ายสูง.............................. 1 (C03 51-52)
- ความไม่จำเป็น ไม่เหมาะกับลักษณะของรูปแบบธุรกิจหรือสินค้า.............. 2 (C04 53-54)
- ลูกค้าไม่มีทักษะในการใช้งาน.............................. 3 (C05 55-56)
- มีปัญหาในการสรรหาบุคลากรที่มีทักษะในการใช้งาน.............. 4 (C06 57-58)
- เทคโนโลยีมีการเปลี่ยนแปลงเร็ว.............................. 5 (C07 59-60)
- ไม่เห็นประโยชน์ที่จะได้รับ.............................. 6 (C08 61-62)
- มีความยุ่งยากที่จะใช้.............................. 7 (C09 63-64)
- ระบบรักษาความปลอดภัย ต่อไวรัส หรือผู้บุกรุก (Hacker) 8 (C10 65-66)
- ไม่มีเครือข่ายอินเทอร์เน็ตให้บริการในบริเวณนี้.............. 9 (C11 67-68)
- อื่นๆ (ระบุ).............................. 10 (C12 69-70)

ข้อ 15 สถานประกอบการแห่งนี้ มีการใช้อินเทอร์เน็ตเพื่อวัตถุประสงค์ใด (กา ✓ ใน ☐ ได้มากกว่า 1 ข้อ)

☐ 1 รับส่ง e-mail (C13 71-72)

☐ 2 ค้นหาข้อมูลเกี่ยวกับสินค้าหรือบริการ (C14 73-74)

☐ 3 ค้นหาข้อมูลจากหน่วยงานรัฐ (C15 75-76)

☐ 4 ติดต่อกับหน่วยงานรัฐ เช่น ยื่นภาษี download แบบฟอร์มต่างๆ (C16 77-78)

☐ 5 ซื้อ ขายสินค้าและบริการ หรือดำเนินธุรกิจออนไลน์ (C17 79-80)

☐ 6 ส่งสินค้าหรือบริการออนไลน์ในรูปแบบ digital เช่น ซอฟต์แวร์ วีดีโอ เพลง ผ่านอินเทอร์เน็ต (C18 81-82)

☐ 7 ให้บริการหลังการขาย (C19 83-84)

☐ 8 ฝึกอบรม/เรียนรู้ผ่าน e-learning (C20 85-86)

☐ 9 โทรศัพท์ประชุมผ่านอินเทอร์เน็ต (VoIP, video conference) (C21 87-88)

☐ 10 อื่นๆ (ระบุ)...... (C22 89-90)

ข้อ 16 ระบบการติดต่อสื่อสารทางอินเทอร์เน็ต สถานประกอบการของท่านเชื่อมต่อวิธีการใดบ้าง (กา ✓ ใน ☐ ได้มากกว่า 1 ข้อ)

☐ 1 Analogue modem (dial-up via standard phone line) (C23 91-92)

☐ 2 ISDN (Integrated Services Digital Network) (C24 93-94)

☐ 3 xDSL (ADSL, SDSL, VDSL) (C25 95-96)

☐ 4 สายวงจรเช่า (Leased Line) (C26 97-98)

☐ 5 Cable modem (C27 99-100)

☐ 6 Frame Relay หรือ VPN (C28 101-102)

☐ 7 broadband การเชื่อมต่อแบบไร้สาย (Fixed Wireless, WLAN, WiMAX) (C29 103-104)

☐ 8 เทคโนโลยีโทรศัพท์มือถือ 2G, 2.5G (เช่น GSM, CDMA, GPRS) (C30 105-106)

☐ 9 เทคโนโลยีโทรศัพท์มือถือ 3G ขึ้นไป (เช่น WCDMA, EV-DO) (C31 107-108)

☐ 10 ไม่ทราบ (C32 109-110)

☐ 11 อื่นๆ (ระบุ)...... (C33 111-112)