



SRIPATUM UNIVERSITY

RESEARCH REPORT

**THE ADOPTION OF MOBILE COMMERCE (M-COMMERCE) IN
SMALL AND MEDIUM BUSINESSES IN THAILAND**

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ABSTRACT

The purpose of this study was to identify the factors affecting the decision on the adoption of mobile commerce (m-commerce) by small and medium businesses in Bangkok, Thailand. A better understanding of the factors influencing m-commerce usage will enable SME businesses to invest and adopt m-commerce use for business functions. Additionally, this will work effectively if the lawmakers or government can be convinced that customers will benefit from the m-commerce. The logistic was applied in this study to determine a relationship among the dependent variable, m-commerce adoption and the ten independent variables of technology literacy, level of education, age, user resistant to technology, the availability of wireless and mobile technology, perceived relative advantage of the technology, perceived compatibility of the technology, perceived complexity of the technology, perceived trialability of the technology, and perceived observability of the technology. The findings revealed that perceived observability of the technology, trialability of the technology, perceived compatibility of the technology, perceived complexity of the technology, and user resistance to the technology significantly affected the decision on the adoption of m-commerce.

Keywords : Mobile Commerce, Diffusion of Technology, Technology Adoption, Small and Medium Businesses, SMEs

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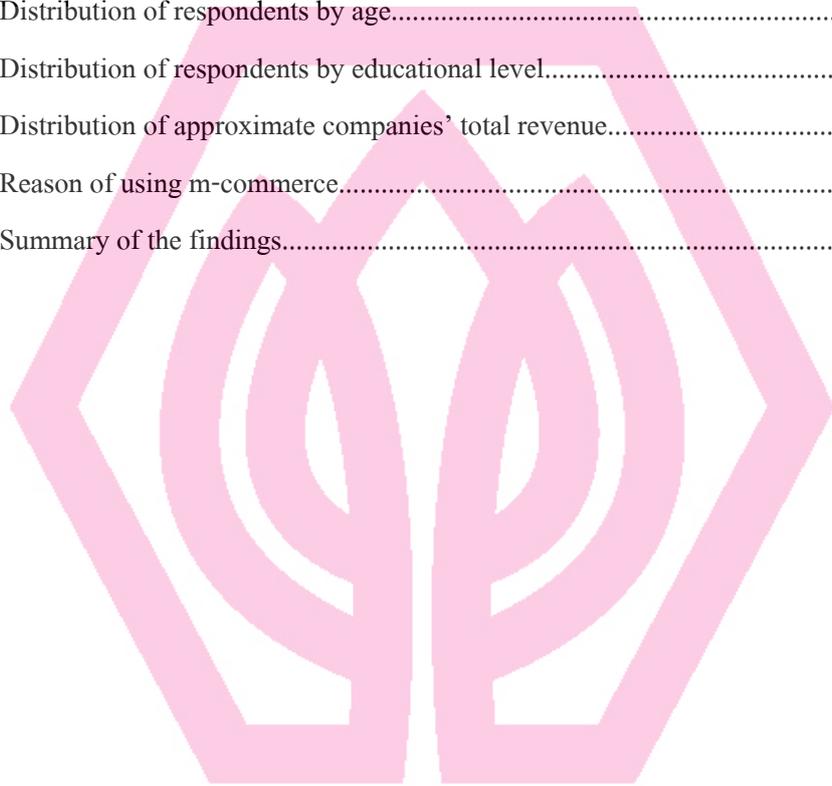
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Chapter 1

Introduction

In a new global and knowledge economy, there is a high competition among the organizations to attract customers. In the 21st century, the world of business is smaller than ever before. In such a competitive environment, businesses must constantly explore new technologies, innovations, and services in order to respond to evolving markets, technology and economic conditions. The growth of the technology, especially the Internet, has created a new interest in the information technology development and business strategy.

Technology is one of the important factors that provide the potential to change the way of doing business. It is also a key to the growth and success of all businesses of all sizes. In addition, technology is an important element for success in the global economy due to the increasing ability of business to process transaction information, transmit more quality information to management, and maintain more efficient inventories (Keen, 1991). Furthermore, the availability of many information and rapid technology advancement increases customer's expectations at the faster rate; therefore, in order to satisfy the customer needs and expectations, businesses should be responsive in shorter time.

In this chapter, background of the problem and statement of the problem are discussed in the first section. Then, purposes of the proposed study and research questions are presented. Finally, research hypotheses, significance of the study, definition of terms, and limitations of the study are discussed.

Background for This Research and Statement of the Problem

Since Thailand is one of the fast growing countries in Asia, the government has initiated and promoted a series of national plans and activities to support technology adoption in both public and private sectors. However, the rate of the technology adoption in the business sector is still slow (Chulikavit, 2003), although technology is used to facilitate business transactions especially by means of communication network.

Many firms that use technology are experiencing the most positive changes. For example, it allows firms in developing countries to internationalize their products and services more actively and effectively than ever by using the Internet. Thong and Yap (1995) find out that technology helps small businesses develop their markets, increase sales turnover, increase profitability and achieve competitive advantages. Furthermore, DeLone (1981) reports that technology helps small businesses improve productivity and performance within the organization, improve management perception of business environments, and promote stronger and better customer relationships. Moreover, Simon (1996) agrees that technology is the most important factor behind the successful small and medium businesses (SMEs) competitive advantages regarding reduced information overload.

Some researchers have different opinions on the benefits of technology. Barney (1996) finds that heavy investment in advanced technology does not always lead organizations to a positive return on investment. Generally, to invest in technology is to reduce production cost; however, the massive investment in technological hardware is not followed by a significant reduction in costs unless the organization invests in related technology, such as technological software to improve business functions. Further, considering privacy issues, there is an increasing numbers of computer hackers that can attack servers and steal sensitive information from seller databases if they are not secure (Rose, Khoo, & Straub, 1999; McClure & Scambray, 1999). Moreover, many believe that there is a better chance than ever of stealing data or hacking into a company network, stealing valuable and sensitive company information (Worthen, 2007; Munro, 2008; Zalud, 2008).

Since many researches in technology adoption shows that technology is one of the most important factors behind successful businesses, small and medium businesses, as important members of the economic, have adopted technology to increase business performance. Lately, the Internet and electronic commerce (e-commerce) have been adopted and used in order to improve communication and relationship with customers and suppliers. For example, businesses can improve their supply chain systems through automatic and faster transaction times. It is predicted that the Internet would generate the worldwide revenue as high as 6.9 trillion dollar in 2004, and the number of Internet users would grow as high as 765 million users in 2005, but the number of Internet users

currently is over 1400 million users (CommerceNet, 2003 and Internetworldstat, 2009). In Thailand, the country currently has the number of Internet users around 16 million users soared up from 15.39 million in 2006 (Nectec, 2008).

With the technology, m-commerce, emerging companies ask themselves the same question that was asked at the onset of e-commerce. Why should we invest in the technology? New technology such as m-commerce takes companies beyond the benefits of the Internet. M-commerce is rapidly becoming involved in daily operations, particularly in large corporations that invest heavily in new innovations. The device is improved to provide a faster speed in communication quickly anytime and anywhere through a wireless, Internet-enabled device, and without the use of a computer.

The handheld market has been on a rapid growth path since the mid-1990s. In addition, the potential for commercial use in the U.S. appears to be increasing; approximately 70% of all handhelds are purchased by consumers and 30% by enterprises (Portal, 2003). In Japan, the value of mobile phone-based commerce raised 23% in 2007 to 1,146.4 billion yen, and it is likely to rapidly and continually expand its trend (Jiji Press English News Service, 2008). In Thailand, where mobile technology is very fast growing, almost 80% of its population owns a mobile telephone (Niramansakun, 2007). Additionally, Research and Market (2008) forecasts that the number of total subscribers in Thailand will rise from 62.6 million in 2008 to 71.0 million in 2010 while the wireless penetration level will reach 90.2% in 2010.

Everyone must clearly understand the importance of implementation of technology. However, the initiation, adoption, and implementation of technology are not adequate to achieve the potential of technology investment. Thai business people must see the technology as providing with a strategic competitive advantage in the business arena. According to Rubino (2001), more than 80% of the information technology managers believed that the handheld device with Internet access was highly important for the business. As a global economy, those who embraced mobile technologies were a step ahead of their competitors and made a profitable and informative trip (Business Object, 2002).

Basically, the adoption of technology by SMEs is generally slower than larger organization because SMEs tend to have simple organizational structure and lack financial resources

(Chau, 1994; Glynn & Koenig, 1995; Montazemi, 1988). Therefore, it may imply that cost of investing may be one of the major barriers inhibiting SMEs from adopting new technology.

However, unlike other technologies that require a large technology investment, the handheld technology has plenty of models to choose from at prices to suit any budget, allowing the business to remain competitive in their industries without requiring them to invest a huge budget on IT. Additionally, the m-commerce is considered new technology to the Thai people. Therefore, they may believe that the new technology would not provide many benefits to enhance their businesses. As a result, they might not adopt the new technology into their businesses in some reasons. Hence, this paper is an early attempt aims to provide empirical data on factors that affect the decision of the adoption of m-commerce by small and medium businesses in Thailand.

Objectives

The main problem of this study is to identify the factors that affect the adoption decision for adoption of m-commerce by small and medium businesses in Thailand. Therefore, the objectives of the research are:

1. To explore the extent of usage of the m-commerce in small and medium businesses in Thailand.
2. To identify the factors affecting the m-commerce adoption in small and medium businesses in Thailand: (a) technology literacy of managers, (b) level of education of managers, (c) age of managers, (d) user resistance to technology by managers, and (e) the availability of wireless and mobile technology infrastructure.
3. To identify the attributes of innovations that affects the m-commerce in small and medium businesses in Thailand: (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (f) observability.
4. To recommend the policy from the known factors that would be beneficial for government or trade associations such as the Federation of Thai Industries to promote a policy concerning the use of m-commerce regarding infrastructure, tax promotion, and price.

Research Questions

The previous researches and studies, and the review of literature on the diffusion of technology theory, and attribution of innovation theory were explored and developed emphasizing on three main research questions as the followings:

1. What is the most important business application of the m-commerce in each type of small and medium businesses in Thailand?
2. To identify the factors regarding demographics that affect the adoption of the m-commerce in small and medium businesses in Thailand, the questions are broken down to the following:
 - a) Whether the level of technology literacy of the adopters influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - b) Whether the education level of the adopters influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - c) Whether the age of the adopters influence the adoption of the m-commerce in small and medium businesses in Thailand?
 - d) Whether the user resistance to technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
3. To identify the attributes of the m-commerce affecting the adoption of the m-commerce in small and medium businesses in Thailand, the study is divided into the following questions:
 - a) Whether the relative advantage of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - b) Whether the compatibility of the technology with the company's current system influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - c) Whether the complexity of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - d) Whether the trialability of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?

e) Whether the observability of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?

4. Whether the availability of wireless and mobile technology infrastructure influences the adoption of the m-commerce in small and medium businesses in Thailand?

Hypotheses

The research focuses on identifying factors affecting the adoption of the m-commerce in small and medium businesses by people who are likely to make the adoption decision, “decision maker”; therefore, the study examines both adopters and non-adopters by exploring the following hypotheses:

Hypothesis 1: There is a positive relationship between the decision maker’s technology literacy and that person’s adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 2: There is a positive relationship between the decision maker’s educational level and that person’s adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 3: There is an inverse relationship between the decision maker’s age and that person’s adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 4: There is an inverse relationship between the decision maker’s resistance to technology usage and the adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 5: The availability of wireless and mobile technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 6: The perceived relative advantage of the technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 7: The compatibility of the technology with the current technology system is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 8: The complexity of the technology is negatively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 9: The trialability of the technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 10: The observability of the technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Scope of Research

Small-and medium-sized enterprises exert a strong influence on the economy of all countries, particularly in today's fast-changing and increasingly competitive global market (Aharoni, 1994; Drilhon & Estime, 1993). A small business in Thailand, according to the Bureau of Industrial Promotion Policy and Planning, is defined as any business that has fixed assets of less than 20 million Baht or any company with fewer than 50 employees, while a medium business size is a business with fixed assets of between 20 and 100 million Bath or any company with employees between 50 and 200 (ThaiSME, 1998). However, the small and medium business is divided into three main categories: manufacturing; wholesale and retail, and service (The Office of Small and Medium Enterprises Promotion [TOSMEP], 2000).

Typically, most SMEs have similar characteristics. SMEs have simple organizational structures and highly centralized structures (Lees & Lees, 1987). Although they are limited by constraints on financial resources, human resources and management perspectives (Gable, 1991; Lees & Lees, 1987; Montazemi, 1988), SMEs exert a strong influence on the economy of all countries, particularly in the fast-changing and increasingly competitive global market (Aharoni, 1994; Drilhon & Estime, 1993). These businesses have been a major engine of economic growth and technological progress (Mulhern, 1995; Thornburg, 1993). In the United States, SMEs hold 99.7% of all employees and provide 47% of total sales (Small Business Note, 2003). In Australia, SMEs constitute over 97% of all private sector businesses, providing employment for 49% of the private sector workforce (Gadenne, Kennedy & McKeiver, 2009). Looking at the industrial structure of Thailand by size, SMEs cover approximately 80% of the total industrial establishments. Additionally, SMEs contribute their share in output and value added in Thailand's industrial sector (Huang, 2003). Back to July 1997, during the economic crisis in Asia, Thai small and medium businesses were able to continually make a profit and tended to gain larger profits of 10 to 30% (ThaiSME, 1998). Consequently,

Thailand's intensive government support toward SMEs through a clear policy on helping Thai SMEs by establishing the Bureau of Industrial Promotion Policy and Planning to promote rapid growth during Thailand's economic transaction (ThaiSME, 1998). Additionally, the Thai government plays a significant part in enabling small businesses to expand their resources by means of tax reduction and special loans and enforcing transfers of new technology projects by the Ministry of Information and Communication Technology (ICT). The setting for this examination is the small and medium businesses in Thailand. What makes SMEs an ideal place to study the diffusion of the m-commerce is that the SME business sector exerts a strong influence on the economy (Aharoni, 1994; Drilhon & Estime, 1993; ThaiSME, 1998). Small and medium businesses must change over time and be flexible in order to respond to evolving markets, technology and economic conditions.

The explosive growth of penetration and usage of mobile devices, including mobile phone, smart phone, personal digital assistants (PDAs), ultra mobile personal computer (UMPC), and other handheld devices, is regarded as a driving force for m-commerce, which is the next wave of electronic commerce (e-commerce). People may think that e-commerce is the evolution of the way to do business, and the e-commerce has moved beyond first-to-market players and real-time information. However, mobility technology is a practical extension of the digitalized commerce on how people work and what they will be required to do business today.

M-commerce generally refers to the use of mobile devices such as smart phones, which is a regular mobile phone integrated with business organizer functions, and personal digital assistants (PDA) phone, which is a PDA integrated phone functions, to conduct electronic business transactions and allow the mobile worker to work on the road and stay connected with business to collect and evaluate data in order to make better decisions more quickly.

In an early stage, the PDA was used to replace a paper organizer purposes such as addresses, phonebooks, memos, and appointments. Later on, the device has been used in many business functions allowing businesses to work more efficiently and improving the ways of communicating. The technology enables users to work anywhere by sending and receiving email, accessing the Internet, staying connected and managing office works.

Network operators are interested in the trend towards converging technology since they have seen a huge opportunity about mobile services. M-commerce is expected to experience a substantial growth regarding rapid adoption of mobile device and its advantages such as working wirelessly, and anytime-anywhere connectivity. Convergence of telecommunications and information technologies has revolutionized the way that peoples use these technologies (Haque, 2004). The technology has been increasingly delivered through broadband mobile medium known as 2.5G (second and a half generation of mobile technology), which is an evolution from 2G to 3G technology because the technology offers faster and wider range of more advanced services while achieving greater network capacity including wide-area of both wireless voice and data at the same time (Ahonen, Kasper and Melkko, 2004). The third generation (3G) of mobile is the evolution of existing mobile networks, and it is expected that in the near future m-commerce arena is having potential growth opportunities in the market which will affect the way of doing business (Wallage, 2008).

Currently, there are several types of m-commerce services that are emerging. Mobile entertainment has become the dominant service as consumers continue to purchase ringtones and games for their mobile devices. However, the technology is far beyond an individual entertainment use, it is used for business purposes. The technology has been used in various sectors from entertainment to banking and from tourism to auditing. For example, banks' and other financial institutions' customers are allowed to access account information, make transactions such as purchasing stocks, remitting money, via mobile phones and other mobile equipments. Additionally, stock market services offered via mobile devices allowing subscribers to react to market developments in a timely manner through wireless connectivity (Troutman and Timpson, 2008).

According to Radar (2002), 10% of workers in the United States use a mobile tool such as PDAs for business purposes. Many workers spend more than 20% of their time away from their desks (Hulak, 2002). The growth in the business sector increased in 2004, with a worldwide sales increase by 12% in the business segment (Arnfield, 2004). Many industries are realizing the value of using mobile technology and the advantages of incorporating the handheld computers into various business applications.

In the healthcare industry, the m-commerce has been adopted, having the potential to effectively minimize the time of processing data by retrieving patient information, medical information, treatment information, recording patient history, prescribing medication, and providing a link to the hospital's finance dept for billing and financial administration (Tschopp & Geissbuhler, 2001). Psychiatrists are using more smart phones and PDAs for their treatment purposes. Furthermore, using a wireless and voice response PDA, a doctor can record the patient's history, send instruction and medicine information of patients, send blood test's request to the lab, send prescription's request to the pharmacy, and send bills to patients and/or insurance companies—all in a simple click without transporting or human errors (Tschopp & Geissbuhler, 2001; Saywell, 2003).

Beside the healthcare industry, the government also adopts the mobility technology for the purpose of improving the communication and cooperation processes, allowing the agencies to stay connected, share information, and operate internal and administrative functions to retrieve information quickly, easily, securely, and remotely (Silverberg, 2000; Palmone 2003).

In the education sector as well, the technology in the school and university is not only used to improve education but also to train students to be accustomed to advanced technology. For example, students are required to use PDAs to access the syllabus or class assignments before classes begin. Students have to communicate with the teachers by beaming at a kiosk in the schools to get homework assignments (Dean, 2000). According to Saywell (2003), some medical schools also require their students to use PDAs to monitor patient care, retrieve patient records and access anatomical diagrams. Many scholars believe that the use of the handheld devices improved methods of learning because of the mobility capability. The mobile learning allows students to retrieve existing information and access information in school databases and access to the Internet anytime and anywhere (Freise, 2001).

For the use in business, the technology enables businesses to provide effective customer relationships, real-time data processing, and remote organization (Blankenship, 2002). For example, sales managers access their latest billing, project, resources management, and customer information on a mobile device integrated with wireless capability (BusinessObject, 2002). Another example is the response of a supply chain manager having an exception alert, which is a product

delayed to a facility. The company integrated with m-commerce technology will be able to track the transportation of the product and notify the appropriate people in the supply chain immediately so they can adjust production schedules (McCullagh, 2000). Some companies are accepting payment by short message (SMS) payment system (Kerwin, 2008). For example, with m-commerce, some companies have begun to use short messages (SMS) in promotional offerings to customers. Additionally, wireless Application Protocol (WAP) allows companies to make an online catalog for their products and services so that mobile users and customers can access to the Internet by delivering web information and catalog from their mobile devices.

To adopt m-commerce by businesses, costs and benefits must be considered in terms of potential returns. The technology offers benefits for a wide range of business processes. M-commerce overrides many of the functions of today's e-commerce because of its ability to allow access at any location for companies and consumers, giving them access to another channel for communication. At least, it can make communication within the firm faster and make the management of the firm's resources more mobility. In SMEs, there is likely insufficient sharing of business information between managers and employees in part because the personnel's daily routine tends to be extremely busy. Some SMEs have exploited IT effectively to improve internal communications, used to transfer of information through shared electronic files and networked computers increases the efficiency of business processes such as documentation, data gathering, and data processing. Additionally, the technology is used for external communications to respond to customers' requests or complaints (OECD, 2004). As an international company, technology basically has great potential for reducing transaction costs and increasing the speed and reliability of transactions also known as business value chain. It allows companies to interact in real-time between buyers and suppliers and build closer relationships among trading partners in the cost of manner (Moodley, 2002).

Such benefits can be greater for SMEs than for larger firms. Since SMEs has fewer employees who have to do more than one tasks at a time. M-commerce enables SMEs workers to remain working and contacting local and regional market while they have to go work outside the office.

However, in order for any of the benefit to take place, managers and owners of SMEs must see m-commerce as giving them a strategic competitive advantage in the business. Firms must see that their relationships with customers, suppliers, employees, partners, as well as competition can have an effect on their bottom line in terms of m-commerce. Therefore, m-commerce as a new technology in this decade, and most researchers has not yet investigated of factors of the mobile technology. It is crucial for companies to fully understand the technology and must embrace the m-commerce and create a connected workplace in order to have continuously improved productivity, reduced costs, enhanced customer satisfaction and increased managerial performance since electronic business is considered as a mean in accomplishing these goals.

Operational Definition

Adopters (decision maker): This study defines adopters as business founders, top managers, leaders or anyone who have a right to make a decision to adopt m-commerce using in their businesses.

M-commerce: m-commerce stands for mobile commerce. This study defines m-commerce as the connectivity to access to the Internet via a mobile device, a cell phone, a PDA, a PDA phone, a smart phone, an ultra mobile personal computer (UMPC), a ultra laptop and a netbook.

Small and Medium business: Any business that has the fixed asset of less than 100 million Baht and numbers of employees with fewer than 200 employees.

Limitations of the Study

This research study focuses only on small and medium businesses, generalized to specific sampling in the areas of Bangkok. Furthermore, the results may not be generalized to larger businesses. Furthermore, the sampling technique used in this study is the convenience sampling instead of random sampling; hence, there is no guarantee that the behaviors of these people represent the behavior of the population. Therefore, the bias of participants in the study may be presented since some participants who are already involved or have technology literacy may have a positive attitude toward the technology adoption, and more likely to respond to the questionnaires. On the other hands, participants who have a bias against the technology might not pay close attention to each question of the questionnaire that may affect the validity and reliability of the study.

Lastly, the researcher will visit the samples' workplaces as one of the data gathering method to collect the data; hence, the participants may either choose to decline participation in the study or respond without proper attention to each question because of time constraint.

Benefit of Research

This study attempts to develop a research stream that investigates the relationships that surround the decision to adopt m-commerce. A better understanding of the factors influencing the m-commerce usage will enable small and medium businesses to invest and adopt the use of technology for business functions. Ultimately, the findings can be used for government or trade associations as a guideline to promote a policy on supporting and helping Thai small and medium businesses for using the technology.

Chapter 2

Literature Review

Theoretical Framework

The purpose of this research study is to identify the factors affecting the decision of the adoption of m-commerce by small and medium businesses in Bangkok, Thailand. To develop a solid theoretical research framework, this chapter presents the related literature as follows; first, the diffusion of innovation theoretical framework (Rogers, 1995); second, technology acceptance model known as TAM (Davis, 1989). Third, this chapter investigates factors affecting the innovation adoption in terms of organizational characteristics and information technology adoption in commerce, perceptions of technology (Morris & Venkatesh, 2000; Palvia & Palvia, 1999; Thong & Yap, 1995). Ultimately, the theoretical framework under the related technology and infrastructure are examined as factors that affect the adoption describing the relationship between the m-commerce and its related technology (Barczak, Bello, & Wallace, 1993; Surry & Gustafson, 1994).

Related Literature

Diffusion of Technology

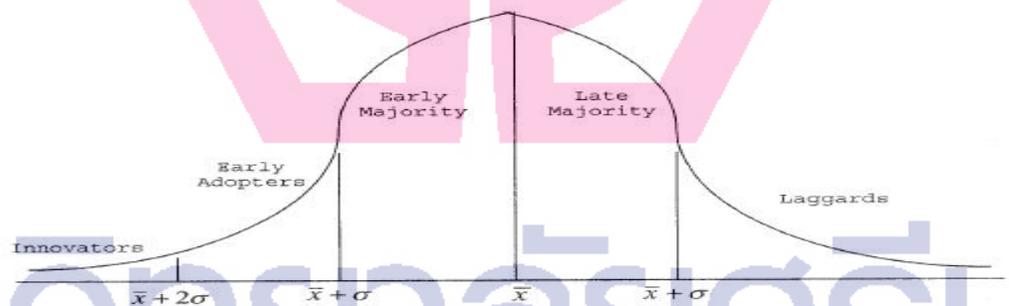
Rogers (1976) defines diffusion of technology as “the process by which an innovation is communicated through certain channels over time among the members of a social system.” The theory is used to comprehend people’s adopting behavior relating to innovations. The theory plays an important role to increase understanding of innovativeness and innovative decision-making in the adoption context, and how potential adopters perceive the innovation. An adopter forms an attitude toward the innovation, leading to a decision to accept or reject the innovation.

Many studies explore and identify factors that contributed to the diffusion of innovation affecting the use of technology in businesses (Kwon & Zmud, 1987; Rogers, 1995). Most researches in technology adoption use the diffusion of innovation theory because the theory explained how and why innovations are adopted at different rates within different organizations. According to

Rogers (1995), the diffusion of innovations basically contains with four main elements of diffusion, including innovation, channels of communication, time and the social system.

1. Innovation is an idea, practice, or object that perceived as new by an individual or other unit of adoption.
2. Channel of communication is a message received from one individual to another.
3. Time is an acceptance rate of innovation in a system.
4. Social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. (p. 11)

According to Rogers (1995), the adopting behavior could be divided into five categories: (a) innovators are very eager to try new ideas and ready to take risk by adopting new innovations; (b) early adopters are potential adopters seeking information before using a new idea; (c) early majority is people who adopt new ideas before the average people; (d) late majority is people who adopt new ideas after the average people; and (e) laggards are people who are resistant to innovations. The adopter categories can be illustrated as an S-Shaped curve shown in Figure 1.



Source: Roger, E. M., Diffusion of Innovations, The Free Press, 1995

Figure 1. S-Shaped curve.

Source: Roger, E. M., Diffusion of Innovations, The Free Press, 1995

Rogers reveals different the attributes of innovation that are associated with adoption of new innovations that the rate of adoption depends on “the relative speed with which an innovation is adopted by members of a social system” (Rogers, 1995: 206). The diffusion of innovation theory is used to understand people’s adopting behavior relating to innovations by emphasizing on the five

attributes that affect the innovation adoption decision: relative advantage, compatibility, complexity, trialability, and observability.

Rogers (1995) defined relative advantage as “the degree to which an innovation is perceived as better than its precursor”, compatibility is defined as “the degree to which an innovation is perceived as consistent with the existing values, needs, and past experiences of the potential adopters”, complexity is defined as “the degree to which an innovation is perceived as difficult to understand and use”, trialability is defined as “the degree to which an innovation may be experimented with on a limited basis”, observability is defined as “the degree to which the results of an innovation are visible to others” (Rogers, 1995: 243). Therefore, the five attributes are used to explain the degree that innovations are perceived by adopters.

Surry and Gustafson (1994) also claim that related technological innovations are significant predictors of the adoption of technology. According to Barczak, Bello, and Wallace (1993), the related technological innovations affect the adopters’ perceptive attributes influencing the level of adoption of technology. Compatibility of the related technologies with the existing technology is highly correlated with the adoption rate. Therefore, compatibility and complexity of related technologies are factors used to predict the correlation of the technology adoption rate.

Technology Acceptance Model (TAM)

There are many technology acceptance models are used to identify factors influencing the innovation adoption such as theory of reasoned action and theory of planned behavior. Fishbein’s and Ajzen’s (1975) introduce theory of reasoned action (TRA), it is a widely validated intention model for predicting and explaining behavior and extended by including another construct called perceived behavioral control, in his theory of planned behavior (TPB). Later, the theories are many used and proven successful in predicting and explaining behavior across business areas (Agrarwal and Prasad, 1997; Moore and Benbasat; 1996; Tayloy and Todd; 1995).

Recently, there have been a number of studies that provided theoretical frameworks for research in the acceptance of innovation. Another foundation of the model development relating to technology acceptance is introduced by Davis (1989) known as the Technology Acceptance Model (TAM). The theory has widely applied and examined the determinants of computer usage behavior.

Davis (1989) finds that intention to use a word processing system can precisely predict later use of the system. Meanwhile, perceived ease of use shows a significant effect on intention to use while attitude partially mediated the effects of beliefs on intention. Moreover, many studies test and successfully apply TAM to predict technology usage specific to Web site (Lin & Lu, 2000), spreadsheets (Mathieson, 1991), electronic mail (Straub, 1995), and database management systems (Szajana, 1994). The model is used to predict and explain human behavior, the structural linkages within a sequence of beliefs, attitudes, intentions, and behaviors.

The strength of TAM is focused on several areas: specific focus on information systems usage, theoretical foundation on social psychology, and the reliability of its constructs (Mathieson, 1991). Furthermore, the importance of TAM research focuses on the fact that its findings are validated by significant information systems research and considered well suited for modeling technology usage acceptance.

Based on the theory, there are two important points of departure explained and predicted user acceptance of technology, including the beliefs in ease of use (EOU) and perceived usefulness (PU) (Davis, 1989). Ease of use is a degree to which the user expects a technology to be free of physical and mental effort (Davis, 1989). Perceived usefulness is a degree to which an individual believes that a particular system will increase the individual user's job performance (Fishbein and Ajzen, 1975). The importance of EOU and PU as major determinants of innovation usage has been theoretically supported and empirically validated by many studies. Taylor and Todd (1995) study the effect of computer usage in a computer resource center. They adapt EOU and PU as fundamental element of perception to study 430 experienced and 356 inexperienced business school students focusing on computer usage and they find that perceived usefulness had a significantly greater correlation with usage behavior than does ease of use.

However, Mathieson, Peacock and Chin (2001) argue that TAM is limited in its explanation in some situations. In a manner similar to an impulse purchase in marketing, TAM cannot explain the user's decision to use technology for no apparent reason or rationale. Moreover, the model does not explain the variance associated with several situations, such as lack of time, resources and expertise, which would preclude the use of technology, as well as, TAM does not consider the

influence of social pressure (Mathieson et al., 2001). However, the overall is supportive evidence found for determinants of technology acceptance.

Characteristics of SME Business Founders as the Adopters on Innovation Adoption

Many researchers have investigated characteristics of firm and adopter whether they have any relationship and involvement in technology usage. DeLone (1981) investigates characteristics of computer use by surveying Los Angeles manufacturing firms, and find out that firms of different size experienced vary according to firm size. However, Raymond (1985) argues that firm size does not seem to have an effect on technology success, but tends to affect on characteristics of adopter. According to Spence (1994), to adopt or use new innovation depends upon the characteristics of the adopter. The characteristics of the innovation as perceived by the potential users have influenced the usage of new innovation. According to Palvia and Palvia (1999), business owner characteristics, including level of education, age and user resistance to technology had a significant influence on SMEs compared to larger businesses about technology investment. Adopters' characteristics in this study focus on characteristics of the manager of SME businesses since the manager of the business is most likely the one who makes decisions about technology adoption and implementation in the business.

Technology Literacy

As technology becomes more critical in businesses, the technology literacy skills of the business founders must evolve as well. Business founders in SME businesses, who usually conduct their businesses as chief executive officers (CEO) or top executives must understand the technology's impact that is necessary for the survival and success of the small and medium firms. Many of executives in SMEs grew up in a less technologically literate society and unfamiliar with operating a computer (Kotelniov, 2007). However, they need to learn to use a computer in order to do their jobs. This includes simple tasks such as communicating with workers through electronic mail messages, more complicated tasks, such as spread sheets for the corporate budget or analytical tasks—sensitivity analysis to determine which scenario may represent the most logical future conditions for the industry. Business founders need to be able to practice often using the computer to do relevant tasks; the founders will influence their workers' indispensable use in technology to

increase the productivity and performance. Additionally, the lack of technology literacy is one of the main reasons why owners or SME business founders are not adopting and implementing technology (Kotelniov, 2007).

Thong and Yap (1995) find that if the managers are unaware or do not understand the technologies available; they are unlikely to use them in their organizations. O'Brien and Wilde (1996) indicate that a change in a chief executive's attitude toward information technology can be achieved by the method of training adopted. O'Brien and Wilde (1996) also report that the end-user experience is a significant predictor of the use of technology. According to Kaminer (1997), the ability to learn new technology is also related to the innovation that it can be used as an indicator of an increased rate of adoption. Furthermore, those who adopted technology tend to have more prior knowledge of any other technology, a greater degree of innovativeness, and more interest in technology adoption (Nickell & Seado, 1986). Raymond (1985) agrees that managers with more computer knowledge tend to have a positive relationship to adoption of new technology.

Therefore, the technological literacy of business founders is important in the adoption and implementation decision. The technology literacy influences the business founders' decisions to use m-commerce in their businesses. Low levels of technology literacy made the technology incompatible, leading to a negative effect on the decision to adopt it in small and medium businesses. Furthermore, the lack of support from top management obstructs efforts to increase the level of technology literacy among employees of organizations.

Educational Level

Many researches draw the conclusion that there is a significant relationship between educational level of adopters and adoption of innovation. Rogers (1995), the early adopter tends to be more educated and more specialized in the area related to the innovation. In addition, Nickell and Seado (1986) agree that owners and managers with higher educational levels had more positive attitudes toward innovations. The educational level of adopters is found to be positive correlated with the adoption and usage of technology (Rai & Howard, 1990).

Moreover, training is a way to educate on technology literacy. Raymond (1985) finds that managers of SMEs who had higher levels of education and technology training have

stronger feelings of understanding of new technology usage, and tend to have more interest in innovation adoption. Nickell and Seado (1986) find that about 80% of the small business owners or managers who begin using technology in their daily life tend to adopt technology using in the organization, and the level of using technology is a significant relation with their education and training. The appropriate technology training courses taken by adopters promote the level of adoption of technology (Seyal et al., 2000). Furthermore, the proper training increases the attitude of the adopters to use the new technology. Raymond (1985) finds that technology training can increase the rate of technology adoption in SME businesses. Schleich, Corney, and Boe (1990) conclude that owners or managers who have computer training are a significant factor for using technology in the business. Additionally, the attitude toward technology adoption can be created by education and training (Seyal et al., 2000).

Age

Age is an important influence on technology adoption. According to Morris and Venkatesh (2000), age is a factor affecting the adoption of new technology. Compared to older generations, the younger generations are more strongly influenced by attitude toward the adoption of new technology. Daly and Kitchell (1995) support that the age of the SME business founders are negatively related to technology adoption.

Many researches find that age is accompanied by a decline in leaning ability (Morris & Venkatesh, 2000). Furthermore, memory capacity will decrease along with age (Floyd & Scogin, 1997). Elders appear to have problems with both accessing and retrieving information from memory (Arenberg & Robertson, 1977). As an age increase, the potential to adopt new technology seems to decline. In addition, elders are more likely to resist new technologies whereas younger tend to be more innovative and hold more positive attitudes toward innovation and change (Majchrzak & Cotton, 1998).

However, Morissette and Drolet (1998) argue that older workers are likely to use computers more often younger workers. Further, elder are less likely to adopt new technology in terms of financial consideration. Dickerson and Gentry (1983) find that innovations that require a large financial risk are more likely to be adopted by elders.

User Resistance to Technology

Resistance to change is one of the greatest threats for adoption of new technology. Unless business founders adopt and implement new technologies, they are apt to be an expensive failure. People always have negative feelings when dealing with change. User resistance to technology is the most critical factor that inhibits the adoption of technology in SME businesses (Cheney, 1983; Malone, 1985). According to Dewan, Lorenzi, and Zheng (2004), user resistance is a factor that prevents the technology adoption. The comment “I see. I don’t use computers” (LaPlante, 1994: 10) conclude the attitude of many business owners in retail industry to the technology.

Moreover, user resistance affects the timing of adoption of new technology (Ram & Sheth, 1989). Resistance to new innovation usually occurs from the lack of understanding and confidence in the new technology. Nickell and Seado (1986) find that SME business owners or managers will open to new innovations and to adopt new technology using in the organization if they already use technology in their daily life. According to Raymond (1985), the initiation, adoption, and implementation of technology are correlated with adopters’ perception. SME business owners and managers feel that the time required for technology changing and training is complicated. The business owners are dissatisfied with the time required for changing and training of new technology. Additionally, the business owners believe that the complicated nature of technology creates user stress. Once dissatisfied with the time requires and the complicated of technology occurs, the business owners or managers are less likely to adopt the technology and the owners prefer to commit to an old way of doing business, and create a high degree of change in their routine (Ray, Harris, & Dye, 1994).

The Availability of Wireless and Mobile Technology Infrastructure

Adoption and usage of m-commerce services have been highly variable between countries. Mobile technology has been rapidly adopted in Thailand since the prices fall and new marketing techniques. Most Thai end-users are price-conscious, while high-end mobile phone subscribers usually consider quality, technology, service, design, and price respectively (Sriswasdi, 2004). However, the adoption of m-commerce does not necessary to follow and base on any single universal format (Dholakia, Lehrer, and Kshetri, 2004). Additionally, differences in adoption and

usage between countries may be attributable to differences in the mobile telecommunications infrastructure.

Due to the Thai government policy, a clear policy supports and helps Thai SMEs, especially to promote the use of information technology that they believe is the actual key to rebuild Thai economy and increase business value with long-term sustainability (Koanatakool, 1999). In 2000, the Thai government developed the IT-2000 national plan which was the first national policy on information technology. The plan is the basic foundations for the development and to promote full potential of information technology investment in business to gain a sustainable economy. Therefore, the Thai government responds by building an equitable national telecommunication infrastructure, educating the population in technology, and reengineering the public sector and enhancing government service National Information Technology Committee Secretariat [NITC] (2002). The Thailand's approach to the application of IT in social and economic development is continually laid out in the IT 2010 Policy Framework (NITC, 2003). The government attempts to reform the telecommunications in order to make them more relevant to modern technological and global business environments, improving high-speed communication network, to make information technology (IT) an integral tool in education and training at all levels because it is the key factor for utilizing the global knowledge for development.

However, although optimism and the policy towards IT support the adoption, the adoption rate especially the Internet is still slow. Some may argue that there is the drastic increase in the Internet usage; in fact a wide gap has developed between the population of Bangkok and other provinces. Over 40% of Thailand's Internet users are based in Bangkok indicating that people who are living in rural areas or upcountries have fewer opportunities to gain access to the Internet than the people who are living in Bangkok and the surrounding areas (AseanAffairs, 2008). This is because the network infrastructure in Thailand is developing slowly and still lags other Asian countries such as Taiwan and Indonesia (EIU, 2001). As well as, Thailand's national telecommunication, which is under National Telecommunications Commission, act is uncertainty. There is an argument about deploying either Wi-Max or 3G as a new broadband high speed internet access for the country. The new broadband was expected to license by the end of 2008, however, the Information and

Communications Technology (ICT) ministry says that the network operating license should be allocated to operators by mid-2009. Apart of the Internet, Thailand's National Statistical Office finds users of mobile phones as high as 28.29 million or 47% of the total population. The growing popularity of mobile phone usage rises because of more competitive price and more convenience the portable devices have to offer (AseanAffari, 2008).

Furthermore, wireless technology capability is found to be an important barrier associated with the m-commerce adoption. According to Portal (2003), the reason that enterprise market for the m-commerce has been slowly moving is because of poor wireless infrastructure. There are three main mobile telephone technologies today discussed in this study which are basically the mobile equivalent to the m-commerce.

Firstly, many companies have wireless local area networks (WLANs) also known as Wi-Fi used to connect mobile customers and employees on the premises within their offices. In addition, there are increasing numbers of Hot Spot which is wireless high speed broadband network used Wi-Fi technology to coverage in most of business district areas. Secondly, General Packet Radio Service (GPRS) and Enhanced Data rates for Global Evolution (EDGE) are the newer connectivity allowing mobile users to pick up e-mail, synchronize calendars, and access databases instantly over the Internet through handheld mobile devices. The technology is designed to work with most wireless networks and the current mobile communication platforms. Further, it has gained broad acceptance because of its leverage of the existing Internet technology and ease of deployment; additionally, it is compatible with the majority of handsets currently on the market. However, it tends to be little slow comparing to Wi-Fi because it is not originally designed for broadband communication. Therefore, the technology is lack of high-speed connection, and the reliability of the services largely depends on the location of the user (Garfinkel, 2002). Lastly, many have been expecting and waiting for 3G and Wi-Max network coming. The widespread availability of the related technology can handle both voice and non-voice as digital data and that those are connected to digital communications infrastructure means, providing high speed of data transmission. However, during the period of the research in Thailand 3G enters in the markets within limited and only tests in some geographic

service areas. Hence, the wireless technology capability is expected to be one of the major factors affecting the adoption.

Summary

The diffusion and acceptance of new technologies have not always been smooth sailing. M-commerce is a very exciting prospect. Many studies have reported that technology can improve productivity, reduce cost, provide customer satisfaction, and increase business performances. M-commerce can help organizations gain competitive advantage in many ways, such as providing better customer relationships, reducing time and cost of routine tasks and accessing, and retrieving information at anytime. In addition, the technology can enhance the operation of business' functions such as productions, customer's service, quality control, marketing, and information systems that can contribute directly to the organization's profitability. M commerce is also important for helping organizations cope with several competitive challenges they face today and in the next decade. These challenges include global challenge, the quality challenge, the social challenge, and the high-performance work system challenge.

The literature review focuses on the diffusion of technology that first introduced by Rogers (1976). The theory is a foundation for explaining innovative adoption and behavior on the part of technology users which it considers to five factors; relative advantage of the technology, compatibility of the technology, complexity of the technology, trialability of the technology, and observability of the technology. Another framework discussed in the literature is technology acceptance model known as TAM (Davis, 1989). The model, which is quite similar to Rogers' model, uses to understand and predict behavior and behavioral intentions. The approach proposes that two particular belief, perceived usefulness (PU) and perceived ease of use (EOU) influencing an individual's attitude toward a technology that possibly influences this individual's intention and behavior to use the technology. Additionally, this chapter presents other factors may relate the adoption of technology, including technology literacy, level of education, age, user resistance to technology, and the availability of related technology.

Chapter 3

Research Methodology

This chapter discusses the methodology used to examine the factors affecting the adoption of m-commerce by small and medium businesses in Thailand. The purpose of this chapter is to describe the details of the research methodology, including research questions, research design, hypotheses, population, sampling, instrumentation, and data collection techniques, validity and reliability and questionnaire.

Research Questions

This study attempts to identify the factors that affect the decision to adopt of m-commerce by small and medium businesses in Thailand. The literatures are reviewed to aid in the development of the research questions. This study emphasizes four main research questions.

1. What is the most important business application of the m-commerce in each type of small and medium business in Thailand?
2. To identify the factors regarding demographics that affect the adoption of the m-commerce in small and medium businesses in Thailand, the questions are broken down to the following:
 - a) Whether the level of technology literacy of the adopters influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - b) Whether the education level of the adopters influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - c) Whether the age of the adopters influence the adoption of the m-commerce in small and medium businesses in Thailand?
 - d) Whether the user resistance to technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
3. To identify the attributes of the m-commerce affecting the adoption of the m-commerce in small and medium businesses in Thailand, the study is divided into the following questions:

- a) Whether the relative advantage of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - b) Whether the compatibility of the technology with the company's current system influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - c) Whether the complexity of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - d) Whether the trialability of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - e) Whether the observability of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
4. Whether the availability of wireless and mobile technology infrastructure influences the adoption of the m-commerce in small and medium businesses in Thailand?

Type of Research

The research design is drawn from quantitative research methodology. This quantitative research is used to identify the factors affecting the adoption of m-commerce by small and medium businesses in Thailand.

Furthermore, in order to answer the research questions and research hypotheses, the survey approach is used to gather the data in this study. This design is appropriate because it allows the researcher to gather the data from a large sample size in a cost-effective manner (Chatterjee & Machler, 1997; Gall et al., 1995). Furthermore, survey research allows researchers to compare and measure across factors if they have collinearity among variables (Blankenship, Breen, & Dutka, 1998).

Dependent Variable

In this study, the objective is to identify factors affecting the adoption of m-commerce. Thus, m-commerce adoption is operationalized as the dependent variable.

Independent Variables

The independent variables for this study are the factors that influence the adoption of m-commerce by small and medium businesses in Thailand. The independent variables are:

1. Technology literacy of user
2. Level of education of user
3. Age of user
4. User resistance to technology
5. The availability of wireless and mobile technology infrastructure
6. Perceived relative advantage of the technology
7. Perceived compatibility of the technology
8. Perceived complexity of the technology
9. Perceived trialability of the technology
10. Perceived observability of the technology

Research Hypotheses

The research focuses on the computer knowledge of the participants, characteristics of the participants, related technology and technology infrastructure. Thus, the study examines both adopters and non-adopters by exploring the following hypotheses:

Hypothesis 1: There is a positive relationship between the decision maker's technology literacy and that person's adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 2: There is a positive relationship between the decision maker's educational level and that person's adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 3: There is an inverse relationship between the decision maker's age and that person's adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 4: There is an inverse relationship between the decision maker's resistance to technology usage and the adoption of the m-commerce for small and medium businesses in Thailand.

Hypothesis 5: The availability of wireless and mobile technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 6: The relative advantage of the technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 7: The compatibility of the technology with the current technology system is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 8: The complexity of the technology is negatively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 9: The trialability of the technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Hypothesis 10: The observability of the technology is positively related to the adoption of the m-commerce in small and medium businesses in Thailand.

Pilot Testing

A pilot study is used to establish the reliability and validity of the study. A pilot testing is used to measure the quality of the study (Isaac & Michael, 1995). The pilot testing is the method used in this study to validate and measure the reliability of the questionnaire (Anderson & Gerbing, 1991). The approach is taken by experts in the area of the research in order to validate the reliability and validity of the research. Pilot participants from SME businesses in management level review the survey instrument to maximize the construct validity, face validity and content validity. Along with the responses from the respondents, the feedback is used as a guideline to improve the questionnaire.

Additionally, the English version of the questionnaire needs to be translated into the Thai language. The pilot testing is done on both the English and Thai versions of the questionnaire. The translation is conducted by a qualified lecturer of the faculty of liberal arts. The review in the area of the research is to validate the reliability and validity of the research. The feedback is used to correct any misinterpretation.

Selection of Subjects

Every researcher intends to conduct researches that cover the whole population in order to provide the accurate results; however, for reasons of size, time, cost, or accessibility, the researcher cannot conduct research in its entirety. Hence, this research study is conducted based on a sample representative of the target population.

Population and Sampling

In this study, the target population of this study is the small and medium businesses located in Bangkok, Thailand. The total sample for this study consists of 200 sample small and medium businesses. The sampling technique used in this study is the convenient sampling. The participants in this study are voluntary and anonymous. The survey is expected to be responded by top management level because they are most likely to be the one who makes the final decisions about technology adoption and implementation in business.

Instrumentation

A survey approach is one of the most frequently used of all research designs (Brase & Brase, 1995; Gall et al., 1995; Trochim, 2001) because a survey provides a basis for generalization of the results to the whole population (Bouchard, 1993). Survey also allows researchers to collect of large amounts of data from different groups of people and in a relatively short period of time (Babbie, 1990; Wimmer & Dominick, 1994). Since survey is a flexible tool, survey research easily explore of a wide range of topics requiring different types of data, including demographic, attitudinal, behavioral, and so forth (Downing & Jeffrey, 1996). Furthermore, survey research allows researchers to compare, and measure across factors (Blankenship et al., 1998). Therefore, a survey as a data collection instrument is used to gather the data in this study because the intent is to sample for 200 participants who work in small and medium businesses in Bangkok, Thailand in a cost-effective manner. Furthermore, survey research allows researchers to compare, and measure across factors (Blankenship et al., 1998).

Development of the Questionnaire

The questionnaire is designed to gather the information involving the identified factors that influence the adoption of m-commerce by small and medium businesses in Thailand. The

questionnaire questions are adapted from previously validated instruments of similar field of study. Content validity or expert validity is used to measure the content of the questionnaire samples whether or not an appropriate professional consensus exists.

Therefore, the questionnaire is reviewed by experts in the area. Further, the previous research and recommendations and comments from research committees and faculty of business administration members from Sripatum University as academic professionals are incorporated as modifications to the survey instrument to establish the content validity of the research.

The questionnaire for this study includes a five point Likert scale, multiple choice items, and rank-order assessment. Items on the survey are scored on a five-point Likert scale. The scale ranges from one through five, with a response of one meaning strongly disagree, two meaning disagree, three meaning uncertain, four meaning agree, and five meaning strongly agree.

The questionnaire has four parts with a total of 37 items. Part A in the questionnaire uses multiple-response items, involving the information about the participants' business background, business industry, and numbers of employees, approximate company's revenue. This section of the survey is used to provide the demographics of the types of organizations and their numbers of employees, but it is also used to indicate the validity of the respondents to insure that they are in the SME industry according to the definition used in this study.

Part B in the questionnaire uses multiple-response items. This part of the questionnaire is designed to investigate the general background of the participants, including age, level of education, and the m-commerce usage.

Part C in the questionnaire is designed for the m-commerce users only. The items in this part included rank-order items, and the Likert-type items. This part is designed to examine the most important business application of m-commerce usage in SMEs in Thailand. In section one of Part C, the respondents are asked to rank the business applications of m-commerce used, with one being most important and seven being least important application.

Part D in the questionnaire is a five point Likert scale, representing a range from strongly disagree to strongly agree, and from never to always. This part is designed to investigate the factors associated with the adoption of m-commerce by SMEs in Thailand, including technology

literacy, user resistance to technology, and availability of wireless and mobile technology, perceived relative advantage, perceived compatibility, perceived complexity, perceived trialability, and perceived observability.

Coding Procedure

Items on the survey are scored on a five-point Likert scale. The scale ranges from one through five, with a response of one indicating “strongly disagree / never”, two means “disagree / seldom”, three means “uncertainty / sometimes”, four means “agree / often”, and five means “strongly agree / always”. Furthermore, each Likert-scale response is assigned a numerical value (e.g., strongly disagree = one, strongly agree = five).

For each multiple choice question, the items are coded as a numerical value. For example, Part A, question one reads “What is your age?” Eighteen – 23 is coded as one, 24 – 32 is coded as two, 33 – 40 is coded as three, 41 – 50 is coded as four, 51 – 60 is coded as five, and > 61 is coded as six. Furthermore, the level of education also is also a multiple choice question, and it is coded as the following: high school is coded as one; college diploma is coded as two; bachelor’s degree is coded as three; and master’s degree or higher is coded as four. Additionally, question three, Part A reads do you use m-commerce in your work? This question is used as a dichotomous question, and it is coded zero = no, and one = yes.

For rank-order assessment, Part C, section one, each item is coded as follow: one = most important, two = second important, and so forth. Further, for any missing data, the missing responses are disregarded.

Procedures and Data Collection

Once the English version of the questionnaire is created and sent to a lecturer in the Faculty of Liberal Arts for review, the English version of the questionnaire needs to be translated into the Thai language. The pilot testing is also done on the Thai version of the questionnaire. The test is taken by participants from SME businesses in management level. The research is reviewed involved in the area of the research in order to validate the reliability and validity of the research. Additionally, the feedback from the respondents is used to correct any misinterpretation.

The data is collected in two ways: personal contact and self-administered survey. First, the questionnaires with the cover letter, which explained the purposes of the study and requested for cooperation, are provided to the top management level of small and medium businesses by the researcher visiting the samples' workplaces because of time and cost limitations. By visiting the prospective participants in their offices, the researcher expects to obtain a high return rate of responses.

Secondly, a completely self-administered survey is taken. The survey is done at business seminars attended by SME business persons. These seminars are regularly scheduled by the Office of Small and Medium Enterprises Promotion of Thailand.

Validity and Reliability

The measuring instruments used must be valid and reliable. Thus, the validated instruments are guided from reviewing prior studies, and theoretical frameworks. Some of the variables are adapted from previously used scales. Furthermore, the questionnaire questions are adapted from previously validated instruments of similar field of study.

In terms of content validity or expert validity, the previous research and recommendations from faculty members as academic professionals are incorporated as modifications to the survey instrument to establish the validity of the research. The questionnaire is tested by experts in the area of the research in order to validate the reliability and validity of the research. The experts review the survey instrument to maximize the construct validity, face validity, and content validity. Along with the responses from the respondents, the feedback is used as a way to improve the questionnaire.

To establish the reliability of standardized tests, Cronbach's alpha coefficient is used to analyze all the scores on individual items. All variables of this study are tested by computing the Cronbach's alpha coefficient. According to Bickman and Rog (1998), a highly reliable test will have an alpha coefficient of 0.70 or more on a scale of zero to one where a high alpha coefficient indicates high reliability.

Data Processing and Analysis

The primary purpose of this study is to identify the factors that influence the adoption of m-commerce. Consequently, the dependent variable is m-commerce adoption.

The independent variables for this study are the factors that may influence the adoption of m-commerce by small and medium businesses in Thailand. The independent variables are:

1. Technology literacy of adopters (part D, questions one – six)
2. Level of education of adopters (part B, question two)
3. Age of adopters (part B, question one)
4. Adopter resistance to technology (part D, question seven – nine)
5. The availability of wireless and mobile technology (part D, questions twenty five – twenty eight)
6. Perceived relative advantage of the technology (part D, questions ten – twelfth)
7. Perceived compatibility of the technology (part D, questions thirteen – fifteen)
8. Perceived complexity of the technology (part D, questions sixteen – eighteen)
9. Perceived trialability of the technology (part D, questions nineteen – twenty one)
10. Perceived observability of the technology (part D, questions twenty two – twenty four)

After the end of the data-gathering process, the Statistical Program for the Social Sciences (SPSS) program is used to analyze the survey responses. Logistic regression is used to test the research hypotheses one through ten in this study. The analysis involves the predictive nature of the independent variables. The primary reason that logistic regression is the appropriate model to use is that the dependent variable of this study, which is the m-commerce adoption, is dichotomous (Grimm & Yarnold, 2000). In this research, only two outcome variables existed: m-commerce adoption and m-commerce non-adoption. Furthermore, logistic regression is an appropriate model because the independent variables can be nominal, ordinal, ratio, or interval (Tabachnick & Fidell, 1996).

In this study, technology literacy, level of education, age, adopter resistance to technology, social pressure, and the availability of wireless, mobile technology, perceived relative

advantage of the technology, perceived compatibility of the technology, perceived complexity of the technology, perceived trialability of the technology, and perceived observability of the technology are operationalized as independent variable in the logistic regression. Therefore, the logistic regression model is applied in this study to determine if a relationship between the independent variables and the dependent variable existed.

Summary of Research Methodology

This chapter discusses the research questions, research design, instruments, subjects, data collection procedures, and data processing used in this study. The research questions examine the current status of m-commerce usage in small and medium businesses in Thailand, and the important factors influencing the adoption of m-commerce usage in small and medium businesses. The target population focused on top management level of small and medium businesses in Bangkok, Thailand. The sample of this study consisted of 200 small and medium businesses are convenient sampling. To collect the data, two methods are used: (a) personal contact, and (b) self-administered survey. The statistical method used for research hypotheses testing is logistic regression.

Chapter 4

Results

The purpose of this research study is to identify the factors which affect the decision to adopt m-commerce by small and medium businesses in Bangkok, Thailand. Specifically, the following four main research questions are advanced: First, what is the m-commerce usage in SMEs Thailand? Second, what are the important factors affecting the adoption of m-commerce in SME business in Thailand? Third, what are the attributes of the m-commerce affecting the adoption of the m-commerce in SMEs in Thailand? Fourth, does the availability of wireless and mobile technology infrastructure influence the adoption of the m-commerce in SMEs in Thailand?

This chapter presents the results of the study as well as a discussion of the data analysis and evaluation of the results. This chapter is divided into three sections including the descriptive statistics, the correlation and reliability analysis, and the research findings and tests of hypotheses. In order to enhance the value of the findings, an explanation of the sample characteristics and the descriptive statistics are also provided in section one. Section two presents the correlation and reliability analysis of the instrument. Lastly, section three presents research findings as they relate to each research question and its sub-questions.

Sample Characteristics and Descriptive Statistics

The purpose of descriptive statistics is to provide a structured depiction of the characteristics of a data set. The target population of this study is SME businesses in Thailand. Questionnaires are distributed to owners and managers of small and medium businesses by the researcher visiting the samples' workplaces. In addition, the survey is done at business seminars which are the new entrepreneurs creation network 1st, the new entrepreneurs creation network 2nd, die hard SMEs, K SME Care, how to choose franchise, running business with e-commerce 2.0, and sale management for SMEs. These seminars are held during March to May and attended by SME business men and women.

A total of 166 usable questionnaires are obtained. Demographic questions are included as part of the survey. Respondents are asked their types of business, number of employees, approximate revenue, age, and highest level of education. In addition, they are asked to identify if they used m-commerce in their work, including the frequency and length of time of usage.

Figure 2 shows the distribution of usable responses by age; 7.8% report their age to be between 18 and 23; 22.3% report their age to be between 24 and 32; 28.3% report their age to be between 33 and 40; 25.9% report their age to be between 41 and 50; 15.1% report their age to be between 51 and 60, and 0.6% reports his/her age to be over 61.

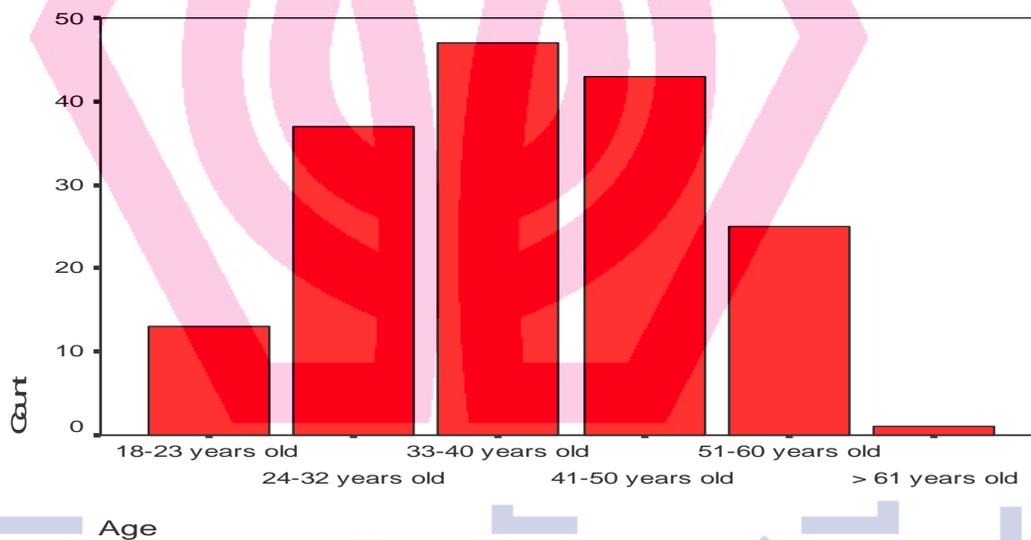


Figure 2. Distribution of respondents by age.

In terms of respondent's level of education, 13.9% report high school as their highest level of education. 15.7% report college/diploma as their highest level of education, 51.2% indicate they have a bachelor's degree and 19.3% indicate they have master's degrees or higher degrees. The distribution of respondents by educational level appears below in Figure 3.

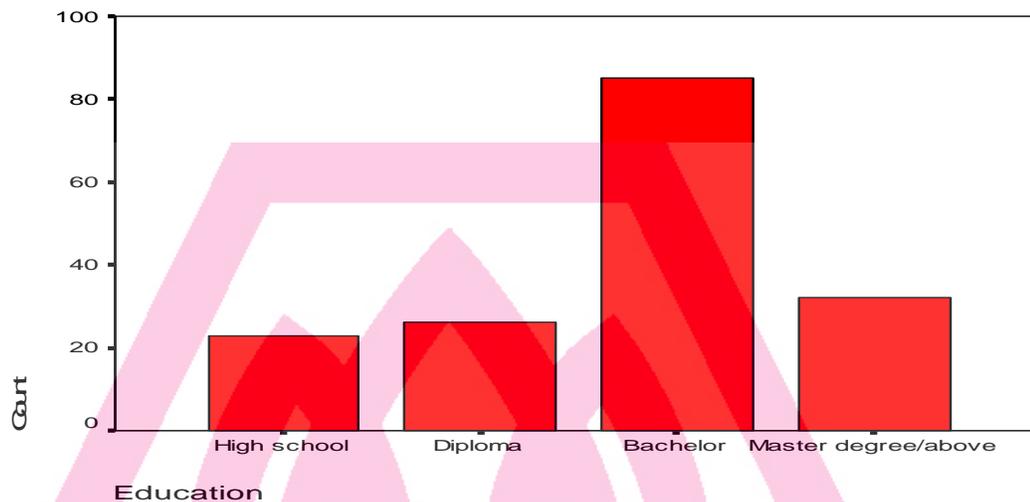


Figure 3. Distribution of respondents by educational level.

The diversity of the 166 SME businesses is indicated in Table 1 showing a distribution in nine different categories regarding types of business. 19.9% of the businesses sampled are in manufacturing, 20.5% of the businesses sampled are in wholesale, 27.1% of the businesses sampled are in retail, 5.4% of the businesses sampled are in agriculture, 9.6% of the businesses sampled are in food and restaurant, 3% of the businesses sampled are in financial, 4.2% of the businesses sampled are in tourism, 7.2% of the businesses sampled are in construction, and 3% of the businesses sampled are in transportation.

Table 1 *Breakdown of Sample by Business Classification*

Business Type	Frequency	Percentage
Retailer	45	27.1
Wholesaler	34	20.5
Manufacturer	33	19.9
Food and restaurant	16	9.6
Construction	12	7.2
Agriculture	9	5.4
Tourism	7	4.2
Financial	5	3.0
Transportation	5	3.0
Total	166	100.0

The breakdown of the sampled SME businesses by the number of employees is shown in Table 2. This section is not only used to provide the demographics of the numbers of employees, but it is also used to indicate the validity of the respondents to insure that they are in SME business industry according to the definition of small and medium business used in this study. 54.8% report their employees to be between 1 and 15, 20.5% report their employees to be between 16 and 25, 15.1% report their employees to be between 26 and 50, 3.6% report their employees to be between 51 and 100, and 6% report their employees are over 100 staffs.

Table 2 *Breakdown of Sample by Number of Employees*

Number of staff	Frequency	Percentage
1 – 15	91	54.8
16 – 25	34	20.5
26 – 50	25	15.1
51 – 100	6	3.6
Over 100	10	6.0
Total	143	100.0

Figure 4 shows the breakdown of the sampled SME businesses by the approximate companies' total revenue. 36.7% report their total revenue are less than 1 million: 38.6% report their total revenue to be between 1 and 10 million: 10.8% report their total revenue to be between 10.01 and 20 million: 7.8% report their total revenue to be between 20.01 and 30 million: 1.8% report their total revenue to be between 30.01 and 40 million, and 4.2% reports their total revenue are over 40 million.

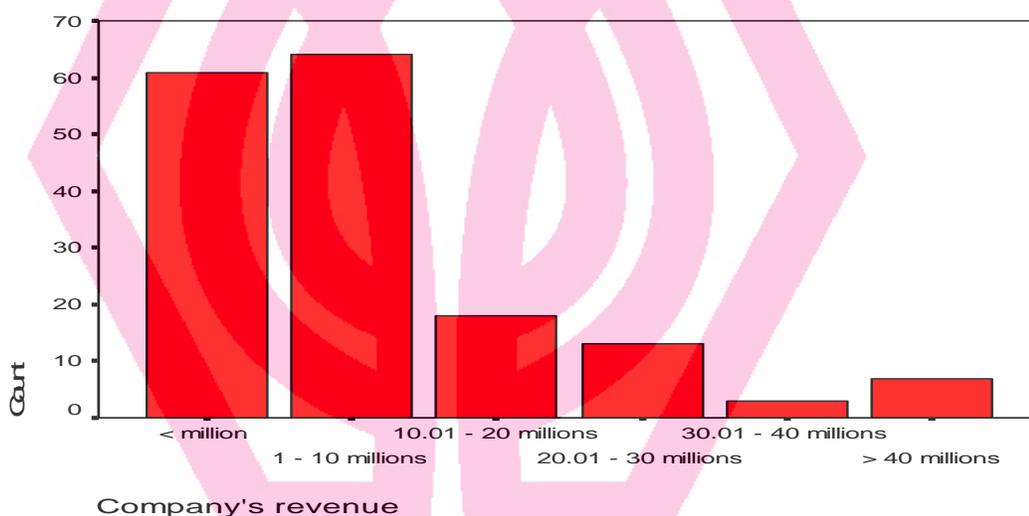


Figure 4. Distribution of approximate companies' total revenue.

Table 3 presents the adoption rate of m-commerce used in business. Of the 166 of responses, 62% adopt m-commerce and use in their works, while 38% are non-m-commerce adopters.

Table 3 Frequency Distribution of Respondents by M-Commerce Usage

M-Commerce Usage	Frequency	Percentage
Yes	103	62.0
No	63	38.0
Total	166	100.0

Table 4 presents the frequency of m-commerce in their work. 1.9% report their m-commerce usage to be less than once a week; 6.8% report their m-commerce usage to be a few times per week; 25.2% report their m-commerce usage to be many times per week; 31.1% report their m-commerce usage to be once a day, and 35% report their m-commerce usage to be over 5 times per day.

Table 4 *Frequency of M-Commerce in Their Work*

M-Commerce Usage	Frequency	Percentage
Less than once a week	2	1.9
A few times per week	7	6.8
Many times per week	26	25.2
Once a day	32	31.1
More than 5 times per day	36	35.0
Total	103	100.0

Table 5 presents how long the users have been using m-commerce in their work. 1.2% report that they have been using m-commerce for one to three months; 12.6% report that they have been using m-commerce for three to six months; 33% report that they have been using m-commerce for six months to one year; 32% report that they have been using m-commerce for one to two years, and 20.4% report that they have been using m-commerce over 2 years.

Table 5 *Length of m-commerce usage*

Length	Frequency	Percentage
1 – 3 months	2	1.9
3 – 6 months	13	12.6
6 – 12 months	34	33.0
12 – 24 months	33	32.0
Over 24 months	21	20.4
Total	103	100.0

Figure 5 shows the breakdown of the reason of using m-commerce in their work. Most of m-commerce users, 40.8% report their reason of using m-commerce to be their companies' support on hardware and device, 33% report their reason of using m-commerce to be their companies' support on the cost of connection service, and 16.3% report their reason of using m-commerce to be their companies policy.

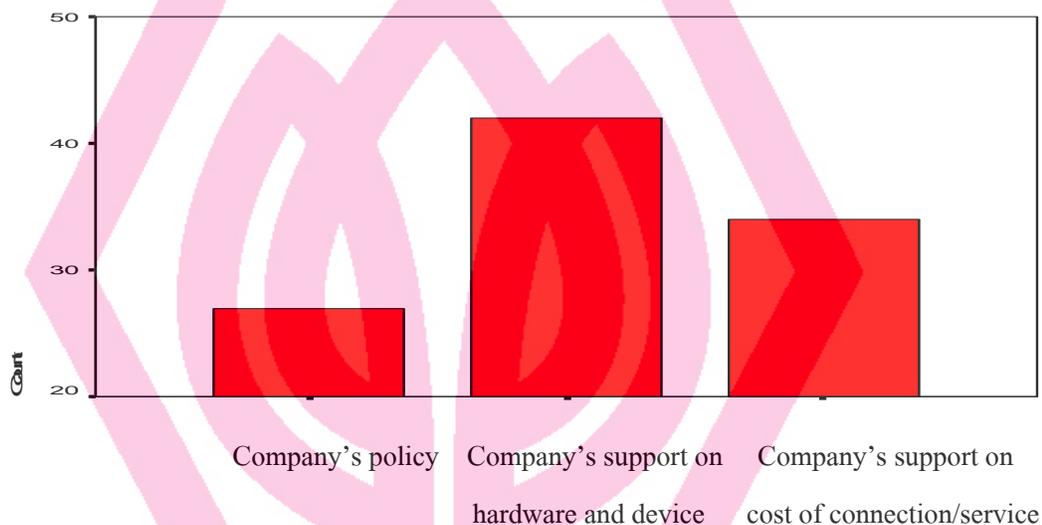


Figure 5. Reason of using m-commerce.

Reliability

The reliability of the research variables is assessed by running the Cronbach's alpha coefficients. The standardized Cronbach's alpha coefficients for the research variables were 0.7276. According to Bickman and Rog (1998), a highly reliable test should have an alpha coefficient of 0.70 or more on a scale of zero to one where a high coefficient indicates high reliability. However, Nunnally (1967) argues that reliabilities of 0.50 to 0.60 would suffice in early stages of research. Thus, a Cronbach alpha of 0.7276 is acceptable as a reliable measure.

Research Findings and Tests of Hypotheses

Research Question One

What is the most important business application of the m-commerce in each type of small and medium business in Thailand? The first research question is asked in order to provide information on the current status of the m-commerce application used in SME businesses. In addition, the researcher seeks to identify most important business applications of m-commerce used in Thai SME businesses by different types of SME business.

The data in Table 6 reveals the overall of the most important business applications of m-commerce used in Thai SME businesses. Generally, customer service application is the most important application used in Thai small businesses. Information management and communication are the second and third most important applications.

Table 6 *Ranking of Most Frequently Used M-Commerce Applications*

Applications	Mean	Standard deviation	Ranking
Customer service	2.9320	1.64055	1
Information management	3.7476	1.87197	2
Communication	3.7573	2.05544	3
Financial	3.7767	1.97003	4
Business transaction	3.9709	1.99242	5
Supply chain	4.6214	1.98581	6
Advertising	5.2524	1.49979	7

Research Question Two, Three, and Four

What are the important factors affecting the adoption of m-commerce by SME businesses in Thailand? In this study, technology literacy, level of education, age, user resistance to technology, perceived relative advantage of the technology, perceived compatibility of the

technology, perceived complexity of the technology, perceived trialability of the technology, perceived observability of the technology, and the availability of wireless and mobile technology infrastructure are operationalized as independent variables, while the dependent variable is m-commerce adoption. For this question, a logistic regression is used to analyze if a relationship exist between the independent variables and the dependent variable.

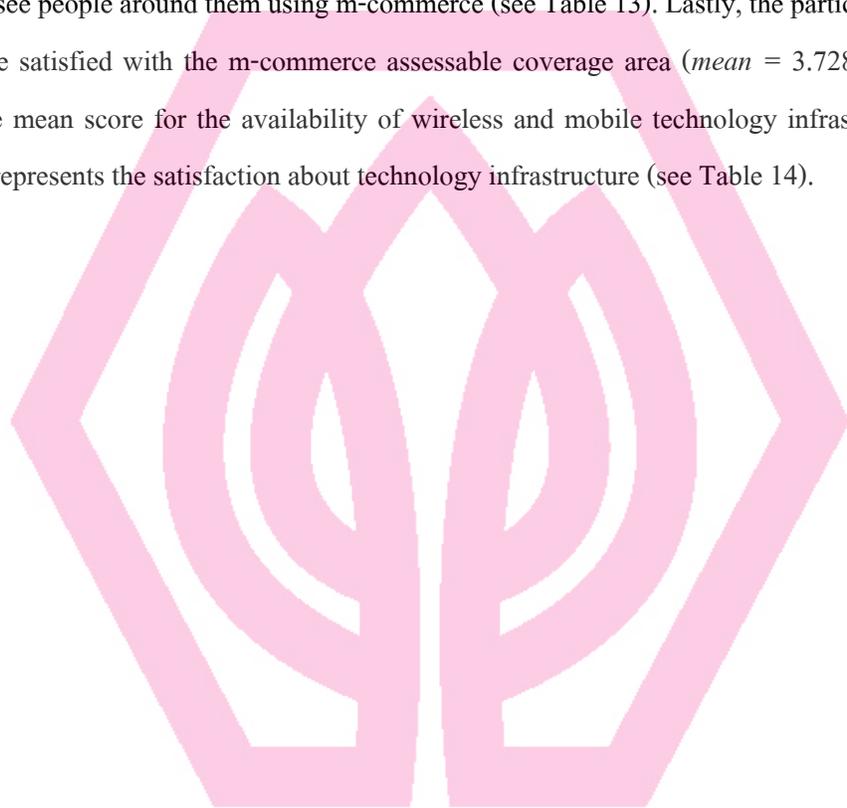
Descriptive Statistics

Respondents are asked to rate their perceptions on the five-point Likert scale. The possible responses are 5 for strongly agree, 4 for agree, 3 for uncertainty, 2 for disagree, and 1 for strongly disagree.

Tables 7 to 14 display the descriptive statistics for technology literacy, user resistance to technology, the availability of wireless and mobile technology infrastructure, perceived relative advantage of the technology, perceived compatibility of the technology, perceived complexity of the technology, perceived trialability of the technology, and perceived observability of the technology. Mean is used to describe the range of variation.

When asked multiple-response questions concerning the ways the participants express their technology literacy, using the mean ratings, the most frequency endorsed responses is to take computer classes at schools or university ($mean = 3.3554$). However, overall of the average mean score for technology literacy is 3.0231, which represents neutral (see Table 7). The mean score for user resistance to technology shows that the participants feel entertained to use new technology ($mean = 3.50$), the average mean score for user resistance to technology is 3.4980, which represents the user resistant is at lower level (see Table 8). Most participant believe that using m-commerce will enable to do their jobs more quickly ($mean = 3.7410$). The average mean score for perceived relative advantage of the technology is 3.5442, which represents agreement (see Table 9). The average mean of perceived compatibility of the technology is 3.0703, which has only a neutral influence on the individual's perception in accepting m-commerce (see Table 10). Most participants do not believe that using m-commerce is difficult, they disagree that m-commerce is complicated to use (see Table 11). The average mean of perceived complexity is 2.8494. The average mean of perceived trialability of the technology is 3.3012, which represents a neutral, or the participant is uncertainty if they would

use m-commerce once they have a chance to try (see Table 12). The average mean of perceived observability of the technology is 3.0663, which represent a neutral, or the participant is uncentianty if they see people around them using m-commerce (see Table 13). Lastly, the participants express that they are satisfied with the m-commerce assessable coverage area ($mean = 3.7289$). The overall of average mean score for the availability of wireless and mobile technology infrastructure is 3.5467, which represents the satisfaction about technology infrastructure (see Table 14).



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Table 7 Descriptive Statistics for Technology Literacy Questions (N = 166)

Technology literacy	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
Taking computer classes at schools/university	10.2%	18.1%	28.9%	23.5%	25.3%	3.3554
Taking outside technology training courses	18.7%	20.5%	23.5%	30.1%	7.2%	2.8675
Participating in in-house technology training	25.9%	13.9%	28.9%	18.1%	13.3%	2.7892
Using an online social network	24.1%	23.5%	16.9%	18.7%	16.9%	2.8072
Able to build a website by applications	15.7%	19.3%	28.9%	22.3%	13.9%	2.9940
Level of understanding of computer skill	7.2%	14.5%	32.5%	30.1%	15.7%	3.3253
Average						3.0231

Table 8 *Descriptive Statistics for User Resistance to Technology Questions (N = 166)*

User resistance to technology	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
Using new technology is entertaining	6.0%	15.1%	22.3%	30.1%	26.5%	3.5602
Using new technology is exciting	10.2%	7.8%	27.1%	31.3%	23.5%	3.50
Learning to use the technology is easy	13.3%	7.8%	27.1%	25.9%	25.9%	3.4337
Average						3.4980

Table 9 Descriptive Statistics Perceived Relative Advantage of the Technology Questions (N = 166)

Perceived relative advantage of the technology	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
Using m-commerce will enable to do jobs more quickly	3.6%	13.3%	18.7%	34.3%	30.1%	3.7410
Using m-commerce will improve performance of work	9.6%	13.9%	18.7%	34.9%	22.9%	3.4759
Using m-commerce will make it easier to do work	17.5%	6.0%	19.3%	31.9%	25.3%	3.4157
Average						3.5442

Table 10 *Descriptive Statistics Perceived Compatibility of the Technology Questions (N = 166)*

Perceived compatibility of the technology	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
M-commerce is compatible with company's network system	16.3%	10.8%	28.9%	30.7%	13.3%	3.1386
M-commerce fits well with my work	18.7%	9.0%	29.5%	28.9%	13.9%	3.1024
M-commerce is under company's policy	18.7%	17.5%	25.9%	24.1%	13.9%	2.9699
Average						3.0703

Table 11 *Descriptive Statistics Perceived Complexity of the Technology Questions (N = 166)*

Perceived complexity of the technology	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
M-commerce is complicated	10.2%	10.2%	42.2%	18.1%	19.3%	3.2590
Taking too long to learn how to use m-commerce	26.5%	13.3%	30.7%	18.7%	10.8%	2.7410
Only a few expert understand how to use m-commerce	30.1%	15.7%	28.9%	19.9%	5.4%	2.5482
Average						2.8494

Table 12 *Descriptive Statistics Perceived Trialability of the Technology Questions (N = 166)*

Perceived trialability of the technology	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
Before deciding whether to use m-commerce, I have to be able to properly try it out	13.3%	9.0%	32.5%	28.3%	16.9%	3.2651
Trying a new technology the first time, I like it	14.5%	9.0%	33.7%	24.1%	18.7%	3.2349
I am confident of using m-commerce, if I have a chance to try	9.6%	9.6%	31.9%	28.3%	20.5%	3.4036
Average						3.3012

Table 13 *Descriptive Statistics Perceived Observability of the Technology Questions (N = 166)*

Perceived observability of the technology	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
I can observe m-commerce in use at office	9.6%	18.1%	24.1%	24.1%	24.1%	3.3494
I can observe m-commerce in use in public	18.7%	20.5%	23.5%	30.1%	7.2%	2.8675
Many of my co-workers use m-commerce at work	22.3%	11.4%	29.5%	19.3%	17.5%	2.9819
Average						3.0663

Table 14 *Descriptive Statistics the Availability of Wireless and Mobile Technology Infrastructure Questions (N = 166)*

	Frequency					Mean
	Never/ Strongly disagree	Seldom/ Disagree	Sometime/ Neutral	Often/ Agree	Always/ Strongly agree	
The availability of wireless and mobile technology infrastructure						
M-commerce is accessible in any area you need	-	16.9%	21.7%	33.1%	28.3%	3.7289
M-commerce provides reliable connection	1.2%	18.7%	27.1%	34.9%	18.1%	3.5000
M-commerce provides the high speed connectivity	0.6%	14.5%	27.1%	30.7%	27.1%	3.6928
Cost of using m-commerce is reasonable	3.0%	13.9%	46.4%	27.1%	9.6%	3.2651
Average						3.5467

Multicollinearity

Before applying logistic regression, it is necessary to check for collinearity because logistic regression is subject to the effect of multicollinearity. Therefore, there are three ways used to check for collinearity in this study: tolerance, variance inflation factors (VIF), and coefficient correlation matrix.

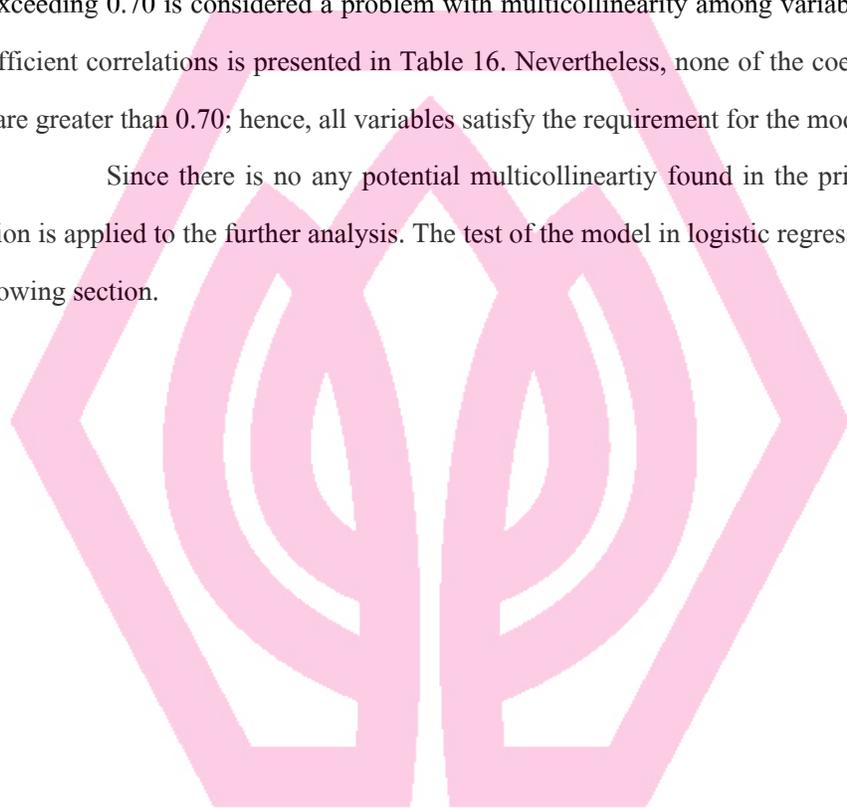
Correlation analysis is the first stage to measure if a problem with multicollinearity among the research variables existed. First, tolerance value is used to test the multicollinearity. The tolerance values less than 0.10 among the independent variables are deemed to suggest a problem with collinearity among the research variables. Additionally, VIF values greater than 10 are also a concern for multicollinearity (Johnson, 1998). Table 15 shows the results of tolerance values and VIF values computed in the regression model describing measures of multicollinearity. However, none of the tolerance values are less than 0.10 and none of VIF values are greater than 10; therefore, there is no effect of multicollinearity found in the model.

Table 15 *Tolerance for Interpreting Measures of Multicollinearity*

Variables	Tolerance Values	Variance Inflation Factors (VIF)
Age	.844	1.185
Education	.792	1.263
Technology Literacy	.176	5.686
User Resistance to Technology	.343	2.918
Perceived Relative Advantage to Technology	.113	8.821
Perceived Compatibility to Technology	.212	4.706
Perceived Complexity to Technology	.775	1.290
Perceived Trialability to Technology	.263	3.808
Perceived Observability to Technology	.205	4.877
The Availability of Wireless and Mobile Technology Infrastructure	.166	6.041

Furthermore, coefficient correlation matrix is used for interpretation of correlation as a method to measure of multicollinearity. According to Johnson (1998), a coefficient correlation value exceeding 0.70 is considered a problem with multicollinearity among variables. A summary of the coefficient correlations is presented in Table 16. Nevertheless, none of the coefficient correlation values are greater than 0.70; hence, all variables satisfy the requirement for the model.

Since there is no any potential multicollinearity found in the prior section, logistic regression is applied to the further analysis. The test of the model in logistic regression is presented in the following section.



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Table 16 *Coefficient Correlation Matrix*

	Constant	Age	Education	Technology Literacy	User Resistance	Relative Advantage	Compatibility	Complexity	Trialability	Observability	Infrastructure
Constant	1.00										
Age	-.552	1.00									
Education	-.188	.122	1.00								
Technology Literacy	-.056	.081	-.202	1.00							
User Resistance	.140	.034	.030	-.220	1.00						
Relative Advantage	.307	.019	.133	.004	-.225	1.00					
Compatibility	.195	-.090	.016	-.159	-.277	.097	1.00				
Complexity	-.182	.003	.048	-.096	.014	-.205	-.360	1.00			
Trialability	-.328	.168	-.055	.102	-.218	-.268	-.007	-.360	1.00		
Observability	-.122	.052	-.172	-.645	-.123	-.071	.138	-.062	.112	1.00	
Infrastructure	-.456	-.131	-.119	-.005	-.010	-.682	-.317	.231	-.017	-.020	1.00

Logistic Regression

Logistic regression is used to test the research hypotheses in this study. The model is applied in this study to determine the relationships among the dependent variable, m-commerce adoption and the ten independent variables of technology literacy, level of education, age, adopter resistant to technology, perceived relative advantage of the technology, perceived compatibility of the technology, perceived complexity of the technology, perceived trialability of the technology, perceived observability of the technology, and the availability of wireless and mobile technology infrastructure.

Table 17 shows the results of how effective the model of logistic regression predicts a relationship between dependent variable and independent variables. According to the Omnibus tests of model coefficients, it shows the chi-square statistics and the significance level. In this study, the statistics for the Step, Model and Block are the same since stepwise logistic regression or blocking is not used. After comparing the p-value, which is compared to a critical value (0.05), the overall model is statistically significant (Chi square = 133.461, df = 10, p = 0.000). The significance level for chi-square indicates that when testing the null hypothesis of the model that there is no significant difference from m-commerce adoption and the ten independent variables in the model; therefore, the null hypothesis can be rejected.

Table 17 *Omnibus Tests of Model Coefficients*

		Chi-square	Df	Sig.
Step 1	Step	133.461	10	.000
	Block	133.461	10	.000
	Model	133.461	10	.000

Hosmer and Lemshow test shown in Table 18 used to measure the overall goodness-of-fit whether the model's estimates fit the data at an acceptable level. Table 18 reveals that the goodness-of-fit is significant since the p-value (0.433) computed from the Chi-square with 8 degrees of freedom is greater than the Hosmer and Lemshow statistic of 0.05. This can be concluded that the logistic regression model for this study is a good fit. Therefore, the requirements for using the Hosmer and Lemshow test are satisfied in this research.

Table 18 *Hosmer and Lemeshow Test*

Step	Chi-square	df	Sig.
1	8.002	8	.433

A model summary shown in Table 19 is represented of Cox-Snell R^2 and Nagelkerke R^2 known as Pseudo R^2 . Pseudo R^2 is used to provide the proportion of the variance in the dependent variable explained by the independent variables in the logistic regression model. Table 20 reveals that 0.552 and 0.752 or 55.2% and 75.2% of the variance are Cox and Snell R^2 , and Nagelkerke R^2 respectively. Nagelkerke R^2 can be a maximum of one but the Nagelkerke R^2 in this study is 0.752, which indicates the independent variables can explain the dependent variable and reflect a high relationship between m-commerce adoption and the independent variables.

Table 19 Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	86.930	.552	.752

Furthermore, in Table 20 the predicted values of the dependent variable based on the full logistic regression model shows that 84.1% is correctly predicted to be non-m-commerce use and 92.2% is correctly predicted to be m-commerce users. Additionally, the overall percent of cases that are correctly predicted by the model is 89.2% of the 166 cases in the sample.

Table 20 *Classification Table*

		<u>Observed</u>	<u>Predicted</u>		Percentage Correct
			M-commerce in current using		
			No	Yes	
Step 1	m-commerce	No	53	10	84.1
	in current using	Yes	8	95	92.2
Overall Percentage					89.2

The Wald Statistic is used to indicate the significance of each coefficient for each independent variable. The Wald Statistic in Table 21 reveals that the predictor variables of user resistance to the technology (Wald's Chi-square = 8.904, $df = 1$, $p = 0.003$), perceived compatibility of the technology (Wald's Chi-square = 6.687, $df = 1$, $p = 0.010$), perceived complexity of the technology (Wald's Chi-square = 9.255, $df = 1$, $p = 0.002$), perceived trialability of the technology (Wald's Chi-square = 12.201, $df = 1$, $p = 0.000$), and perceived obserability of the technology (Wald's Chi-square = 8.848, $df = 1$, $p = 0.003$) achieved significance at the 0.05 level, while the predictor variables include technology literacy (Wald's Chi-square = 0.757, $df = 1$, $p = 0.384$), age (Wald's Chi-square = .299, $df = 1$, $p = 0.585$), level of education (Wald's Chi-square = 1.200, $df = 1$, $p = 0.273$), perceived relative advantage of the technology (Wald's Chi-square = 1.658, $df = 1$, $p = 0.198$), and the availability of the wireless and mobile technology infrastructure (Wald's Chi-square = 0.734, $df = 1$, $p = 0.392$) do not reach the 0.05 significant level.

Table 21 *Variables in the Equation*

	B	S.E.	Wald	df	p-value	Exp(B)
Age	-.136	.248	.299	1	.585	.873
Educational Level	-.388	.354	1.200	1	.273	.679
Technology Literacy	-.582	.670	.757	1	.384	.559
User Resistance	-1.495	.501	8.904	1	.003**	.224
Relative Advantage	.961	.747	1.658	1	.198	2.615
Compatibility	1.337	.517	6.687	1	.010*	3.807
Complexity	-1.517	.499	9.255	1	.002**	.219
Trialability	2.059	.589	12.201	1	.000**	7.836
Observability	1.769	.595	8.848	1	.003**	5.863
Avialable of Wireless and Mobile Technology Infrastructure	-.765	.892	.734	1	.392	.466

* Significant at 10%

** Significant at 5%

Hence, the logistic regression equation for predicting the dependent variable from the independent variables is

$$\text{M-Commerce Adoption} = -2.809 + (-1.495) \text{ User resistance to the technology} + 1.337 \text{ Compatibility of the technology} + (-1.517) \text{ Complexity of the technology} + 2.059 \text{ Trialability of the technology} + 1.769 \text{ Observability of the technology}$$

The equation shows the negative relationship between the independent variable, which are user resistance to the technology and perceived complexity of the technology, and the dependent variable, which is m-commerce adoption. According to the data, the potential to adopt m-commerce seems to be related with adopters' resistance to technology. As the potential adopters have more resistance to the technology, the potential to adopt and use m-commerce seems to decline. As well as, the more complicated of the technology is, the potential to adopt the technology is decline.

On the other hand, there are positive relationships between the independent variables, which are compatibility of the technology, trialability of the technology and observability of the technology, and the dependent variable, which is m-commerce adoption. Furthermore, the Wald Statistic reveals the strength of the relationship between each independent variable and the dependent variable. First, trialability of the technology (Wald's Chi-square = 12.201) of adopter is found to have the strongest relationship with the m-commerce adoption. Complexity of the technology (Wald's Chi-square = 9.255), user resistance to the technology (Wald's Chi-square = 8.904), observability (Wald's Chi-square = 8.848), and compatibility of the technology (Wald's Chi-square = 6.687) are second, third, fourth, and fifth in strength relationship, respectively (see Table 21).

According to the values of the exp (B) in Table 21, it shows the change in odds ratios resulting from a unit change in the predictors. General speaking, odds ratios more than 1 correspond to increases in odds of the event. Odds ratios less than 1 correspond to decreases in odds of the event. Additionally, odds ratios equal or close to 1 indicate that unit changes in that independent variable do not correspond with dependent variable (Johnson, 1998). However, the odds

ratio can be interpreted for the variables that are statistically significant only. Therefore, the odds ratio, the 95% confidence interval and p-value show that adoption is a significant predictor of three independent variables; user resistance to the technology, compatibility of the technology, complexity of the technology, trialability of the technology, and observability of the technology. User resistance to the technology as a predictor variable has an odds ratio value of 0.224 that is less than 1, implying that one unit increase in user resistance to the technology resulted in the odds ratio value or m-commerce adoption rate being decreased by 0.224. For compatibility of the technology, it has an odds ratio value of 3.807, which is greater than 1, implying that a one unit increase in compatibility of the technology resulted in the odds ratio or m-commerce adoption rate being increase by 3.807. For complexity of the technology, it has an odds ratio value of 0.219, which is less than 1, implying that a one unit increase in complexity of the technology resulted in the odds ratio value or m-commerce adoption rate being decrease by 0.219. For the trialability, it has an odds ratio value of 7.836, which is greater than 1, implying that a one unit increase in trialbility resulted in the odds ratio value or m-commerce adoption rate being increased by 7.836. Lastly, for the observability of the technology, it has an odds ratio value of 5.863, which is greater than 1, implying that a one unit increase observability of the technology resulted in the odds ratio value or m-commerce adoption rate being increased by 5.863 (see Table 21).

Hypotheses Recap

This section provided a recap of the ten hypotheses of this research and the results of study made to reject or not reject of the hypotheses.

Hypothesis 1: There is no statistically significant relationship between a decision makers' technology literacy and that person's adoption of the m-commerce for small and medium businesses in Thailand

The null hypothesis one cannot be rejected since the variable of technology literacy (Wald's Chi-square = 0.757, df = 1, p = 0.384) does not achieve the 0.05 significant level.

Hypothesis 2: There is no statistically significant relationship between a decision maker's educational level and that person's adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis two is not rejected. According to alpha of 0.05, the p-value is 0.273, which is greater than 0.05.

Hypothesis 3: There is no statistically significant relationship between a decision maker's age and that person's adoption of the m-commerce for small and medium

The null hypothesis three is not rejected. According to alpha of 0.05, the p-value is 0.585, which is greater than 0.05.

Hypothesis 4: There is no statistically significant relationship between a decision maker's resistance to technology usage and the adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis four is rejected since the variable of user resistance to technology (Wald's Chi-square = 8.904, df = 1, p = 0.003) achieve the 0.05 significant level.

Hypothesis 5: There is no statistically significant relationship between the wireless or mobile technology infrastructure and the adoption of m-commerce in small and medium businesses in Thailand.

The null hypothesis five cannot be rejected since the variable of the availability of the wireless and mobile technology infrastructure (Wald's Chi-square = 0.734, df = 1, p = 0.392) does not reach the 0.05 significance level.

Hypothesis 6: There is no statistically significant relationship between the perceived relative advantage of the technology and the adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis six cannot be rejected since the variable of perceived relative advantage of the technology (Wald's Chi-square = 1.658, df = 1, p = 0.198) does not achieve the 0.05 significant level.

Hypothesis 7: There is no statistically significant relationship the compatibility of the technology with the company's current technology system and the adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis seven is rejected since the variable of the compatibility of the technology with the company's current technology system (Wald's Chi-square = 6.687, $df = 1$, $p = 0.010$) achieve the 0.05 significant level.

Hypothesis 8: There is no statistically significant relationship the complexity of the technology and the adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis eight is rejected since the variable of the complexity of the technology (Wald's Chi-square = 9.255, $df = 1$, $p = 0.002$) achieve the 0.05 significant level.

Hypothesis 9: There is no statistically significant relationship the trialability of the technology and the adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis nine is rejected since the variable of the trialability of the technology (Wald's Chi-square = 12.201, $df = 1$, $p = 0.000$) achieve the 0.05 significant level.

Hypothesis 10: There is no statistically significant relationship the observability of the technology and the adoption of the m-commerce for small and medium businesses in Thailand.

The null hypothesis ten is rejected since the variable of the observability of the technology (Wald's Chi-square = 8.848, $df = 1$, $p = 0.003$) achieve the 0.05 significant level.

Chapter 5

Conclusion, Discussion and Recommendation

This chapter presented a brief summary of the study, including the research problems, literature review, research methodology, and research findings. Further, the end result is discussed as the recommendations for future research.

Summary of Research

The purpose and over all goal of this study is to identify the factors which affect the decision to adopt m-commerce by small and medium businesses in Thailand. A better understanding of the factors influencing the m-commerce usage will enable small and medium businesses to invest and adopt of the m-commerce use for business functions. Furthermore, the results of the study may be used to recommend the policy from the known factors that would be beneficial for government or trade associations such as the Federation of Thai Industries to promote a policy to the use of m-commerce regarding infrastructure, tax promotion, and price. For the commercial use, the results may be used by mobile corporations regarding marketing promotions and product campaigns.

The conceptual or theoretical frameworks of this research study are used to identify and describe the important factors associated with the technology adoption.

To develop a solid theoretical research framework, the related literatures are first, the diffusion of innovation theoretical framework (Rogers, 1995); second, technology acceptance model known as TAM (Davis, 1989). Third, this chapter investigates factors affecting the innovation adoption in term of organizational characteristics and information technology adoption in commerce, perceptions of technology (Morris & Venkatesh, 2000; Palvia & Palvia, 1999; Thong & Yap, 1995). Ultimately, the theoretical framework under the related technology and infrastructure are examined as factors that affect the adoption describing the relationship between the m-commerce and its related technology (Barczak, Bello, & Wallace, 1993; Surry & Gustafson, 1994).

Therefore, this study built upon the literature, carried out to aid in development of the research questions. In particular, the study is designed to answer the following questions:

1. What is the most important business application of the m-commerce in each type of small and medium business in Thailand?
2. To identify the factors regarding demographics that affect the adoption of the m-commerce in small and medium businesses in Thailand, the questions are broken down to:
 - a) Whether the level of technology literacy of the adopters influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - b) Whether the education level of the adopters influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - c) Whether the age of the adopters influence the adoption of the m-commerce in small and medium businesses in Thailand?
 - d) Whether the user resistance to technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
3. To identify the attributes of the m-commerce affecting the adoption of the m-commerce in small and medium businesses in Thailand, the study is divided into the following questions:
 - a) Whether the relative advantage of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - b) Whether the compatibility of the technology with the company's current system influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - c) Whether the complexity of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - d) Whether the trialability of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
 - e) Whether the observability of the technology influences the adoption of the m-commerce in small and medium businesses in Thailand?
4. Whether the availability of wireless and mobile technology infrastructure influences the adoption of the m-commerce in small and medium businesses in Thailand?

The methodology in this study is designed as quantitative research. A survey is used to collect the data from managers of Thai SME businesses, with a total of 166 usable questionnaires are obtained.

First, descriptive statistics is used to answer first research question. Second, logistic regression is used to answer second, third and fourth research question. The ten specific research hypotheses derived from research question two, three and four are formulated and tested by logistic regression. Logistic regression is used to examine if a relationship existed between the independent variables and the dependent variable. Technology literacy, level of education, age, adopter resistance to technology, relative advantage of the technology, compatibility of the technology, complexity of the technology, trialability of the technology, observability of the technology, and the availability of wireless and mobile technology infrastructure are operationalized as independent variables, while the dependent variable is m-commerce adoption.

Conclusions

The results of this study show that about 62% of the Thai SME businesses have adopted m-commerce. Although most of them have been using the m-commerce just over a year, they access the m-commerce more than five times a day, which is significantly high frequently usage. The first research question in this study addresses the issue of applications using the m-commerce. The experimental results present that the most important m-commerce application used in the Thai SME businesses are involved in customer service (*mean* = 2.9320), followed by information management (*mean* = 2.7476), communication (*mean* = 3.7573), financial (*mean* = 3.7767), business transaction (*mean* = 3.9709), supply chain (*mean* = 4.6214), and advertising (*mean* = 5.2524).

The second research question attempts to determine factors which are predictors of the m-commerce adoption by the Thai SME businesses. Logistic regression is used to examine a relationship among the dependent variable, m-commerce adoption, and the independent variables, including technology literacy, level of education, age, adopter resistance to technology, relative advantage of the technology, compatibility of the technology, complexity of the technology, trialability of the technology, observability of the technology, and the availability of wireless and mobile technology infrastructure

The results show that five null hypotheses out of ten hypotheses, which are user resistance to technology, compatibility of the technology, complexity of the technology, trialability of the technology, and observability of the technology, are rejected, as significant differences, while age, educational level, technology literacy, relative advantage, and available of wireless and mobile technology infrastructure are not found to be statistically significant. The model further reveals the strength of the relationship between each independent variable and the dependent variable. First, trialability of the technology is found to have the strongest relationship with the m-commerce adoption, followed by complexity of the technology, user resistance to technology, observability, and compatibility.

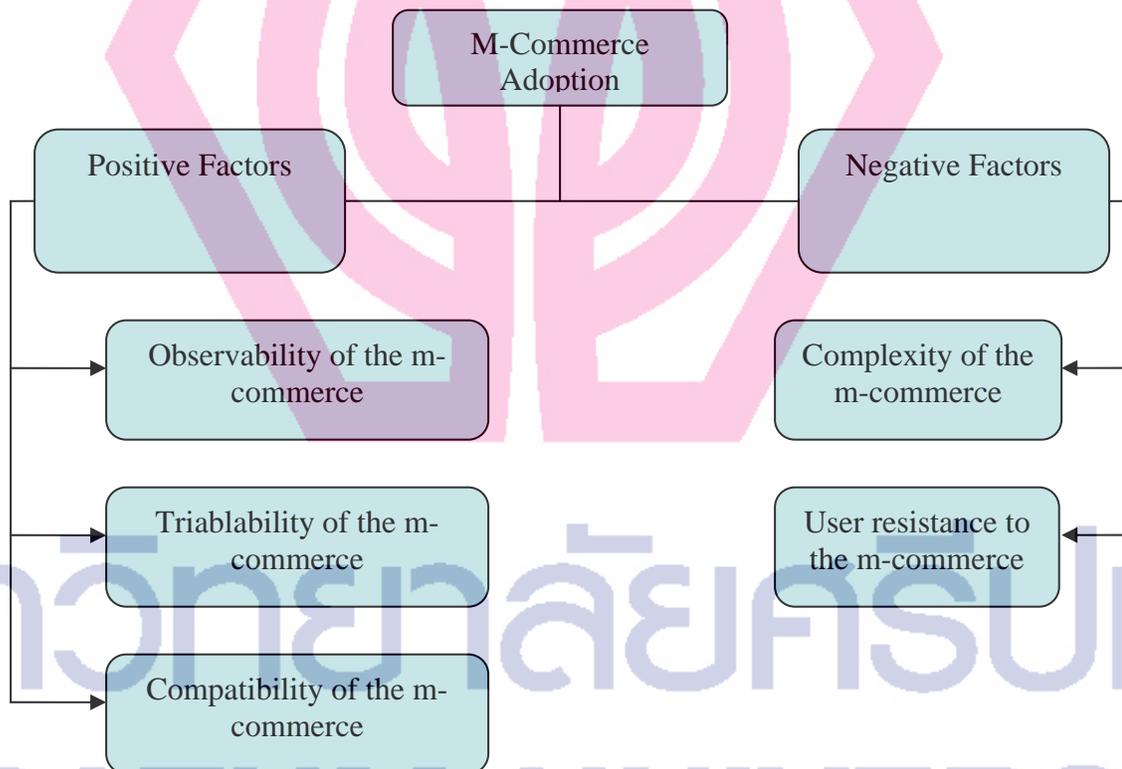


Figure 6. Summary of the findings.

Discussions

Derived from the findings (see figure 6), there are a positive significant association between trialability, observability and compatibility, and m-commerce adoption. On the other hand, there are negative significant association between user resistance to the technology and complexity of the technology, and m-commerce adoption. This finding is common for any innovation adoption. According to the result, the chance of the m-commerce adoption will increase if people have an opportunity to test or try a product before making a decision. Most participants view the m-commerce technology requires a trial period because they may be committed to an old way of doing business; therefore, the trialability may create a high degree of adoption. Trial product is not a new marketing tool. It has been used for a decade. For example, before a person buys a car, he/she usually goes for test-driving. Obviously, many other companies currently before launch a try before buy campaign. For example, it is found a lot on software application. Most software especially online software allows consumers download the application, install and use the software either for a limited time or a limited number of uses to test the performance of the application before purchasing the products. Hence, to increase the rate of using technology, the technology should be provided and reviewed by employees in order to receive feedbacks before investing the technology. Additionally, focusing on trial period, it is enhancing technological skills and avoiding the user resistance to the new technology that can provide the overall potential economic benefits of enhancing the human resources.

For the observability to the technology, the result finds that it has a positive relation with the m-commerce adoption. When an individual sees other people use a new technology, it will reflect the opinion of that person, especially within a group considered important by the individual impacting the adoption technology. As we can see in Thailand, the rapid penetration rate of mobile phone seemingly supports this issue. Mobile phone users have been twice or over as much as in the last five years. Sometimes observability is about social context, people may adopt a technology because they just see or observe another person's around them using it, and they would like to do something similar without considering pros and cons of the technology. What it needs here for improving the rate of the adoption is to overcome a poor image and become trend setter. It is needed to associate consciously the m-commerce with someone or something having a positive image. SME

businesses should make the m-commerce obvious to their offices. Visibility of the m-commerce can be obtained by disseminating the companies' workers through meetings and seminars, because it will emphasize and place on the role of image in the adoption process.

Typically, one of the greatest fears among the technology usage is the inability to use a new technology device. To the matter of fact, a new technology, it must be created from user's perspective, rather than from an engineer or a computer programmers' perspective if they intend to success in the market. According to the result, it may conclude that when a user's perception of the complexity of the m-commerce decreases and their sense of control improves, the possibility of the adoption of the m-commerce will increase. This implies that if SME business owners and managers do not feel comfortable with the technology, they will not use it. The most significant implication that can be addressed in improving the adoption rate by SME business in Thailand is efficacy which should be addressed by both the businesses and vendors.

In order to improve utilization, the prospect adopters need to become more comfortable with the technology by providing them in computer/technology trainings. The approach focuses on making the prospect adopters feel that m-commerce are a familiar and integral part of the work environment rather than just a necessary that must be delegated to other employees.

From a vendor perspective, too, since people are likely to adopt a new technology in this case is m-commerce easily if the technology is not complicated and easy to learn how to use, a new mobile device needs an intuitive user interface, giving users the ability to use most of the device's function without reference to a user manual. Vendors must make every effort to overcome any fear of technology or concerns about complexity that the prospect adopters may express.

In order to increase the adoption rate, a new technology must be also consider a compatible of the technology with the current system because it will require less period of time to learn how to use the technology and make it work functionally in their work. The incompatibly also leads to the resistance to adopt the technology. Perhaps the most common reasons for user resistance to technology are that it is not compatible with existing workflows, practices, or even habits, it is difficult to learn how to use the technology, it is unavailable for try out before making decision. Those are already discussed above. Therefore, strategies for breaking the barriers needed to proper

develop. When any new technology is introduced, innovation vendors need to focus on related products that technology vendors can estimate how its new offering will fit into the existing system. For example, when computers were first introduced and attempted to replace the typewriter, they met the primary with resistance from workers. When workers were working on paperwork by using a typewriter, the computer to take their place seemed unnecessary. Besides, the computer needed compatible printer and cable. The intended customers thus faced a significant usage barrier. The vendor should realize that the best approach to marketing the product is to integrate it with other technology that was considered essential and provided convenience.

Ultimately, it is possible to overcome usage barriers by making the innovation mandatory through government legislation. This will work effectively if the lawmakers or government can be convinced that customers will benefit from the m-commerce. For example, the government succeeded to convince people using lead-free gasoline replacing the polluting leaded gasoline. Currently, the government is attempting again to convince people using substitute fuel instead.

According to the above, it can be concluded that the adoption of the m-commerce by SME businesses in Thailand can be seen at three levels: government, organization – both SME and technology vendor, and individual. Government should provide liberal m-commerce policies and supports as enhance the m-commerce adoption. Moreover, SME businesses should provide adequate trainings in technology literacy to make them feel that m-commerce is a familiar and integral part of the work. Additionally, technology vendors must make every effort to overcome any fear of technology or concerns about complexity that the prospect adopters may express by providing needs an intuitive user interface and functions compatible with other devices. The vendors may give the opportunity to the SME businesses to try the technology awhile before purchasing. Lastly, the individual level, prospect adopters must overcome their self-barrier of the adoption, and accept the opportunity to try a new technology.

Recommendations

This study focuses on the predictors and determinants of discretionary m-commerce usage in SMEs, specifically targeting the owners and managers of the firms. It is supposed that increased m-commerce use by these firms will lead to improved productivity and a concomitant increase in personal effectiveness and organizational performance. Therefore the following recommendations are offered as a result of this study in order to increase the adoption rate of m-commerce use in SME businesses.

1. SMEs should set aside the budget for m-commerce adoption. The budget should be invested in the followings:
 - a. SMEs or its training department need to help the employees understand how m-commerce relates to their actual activities within the organization.
 - b. SMEs should invest on internal technology infrastructure such as wireless network communication system, security system, even technician support.
2. Vendors need to focus on making the prospect adopters feel that m-commerce are a familiar and integral part of the work environment rather than just a necessary.
3. Vendors may provide adequate trainings to overcome any fear of technology or concerns about complexity or incompatible that SMEs may express.
4. Vendors should design applications that benefit specific job function especially customer service support since the results show that most SMEs are view as customer service is the most important function of m-commerce.
5. Federal government and mobile service providers should finalize the conclusion on launching the 3G, improving high-speed communication network to play a larger role in m-commerce adoption.
6. Federal government, the Federation of Thai Industries, the Thai Chamber of Commerce and other associations should promote a policy to the use of m-commerce regarding infrastructure, tax promotion, and price that support as enhance the m-commerce adoption.

Limitations and Recommendations for Future Research

Since this research has some limitations, the researcher would like to make some recommendations for future study as the following:

1. Although the rate of responses is adequate in number, this data collection conducted from the participants who attended business seminars in Bangkok, although some of them may come from other provinces. Hence, the findings of study may mainly apply to the SME businesses in Bangkok. Therefore, further research should be expanded to other provinces to increase the consistency of the study.

2. As the current survey only studies and asks about the level of education of the participants, to increase the reliability of the study, the researcher would like to recommend finding out more if there is any relationship between the field of study and the m-commerce adoption.



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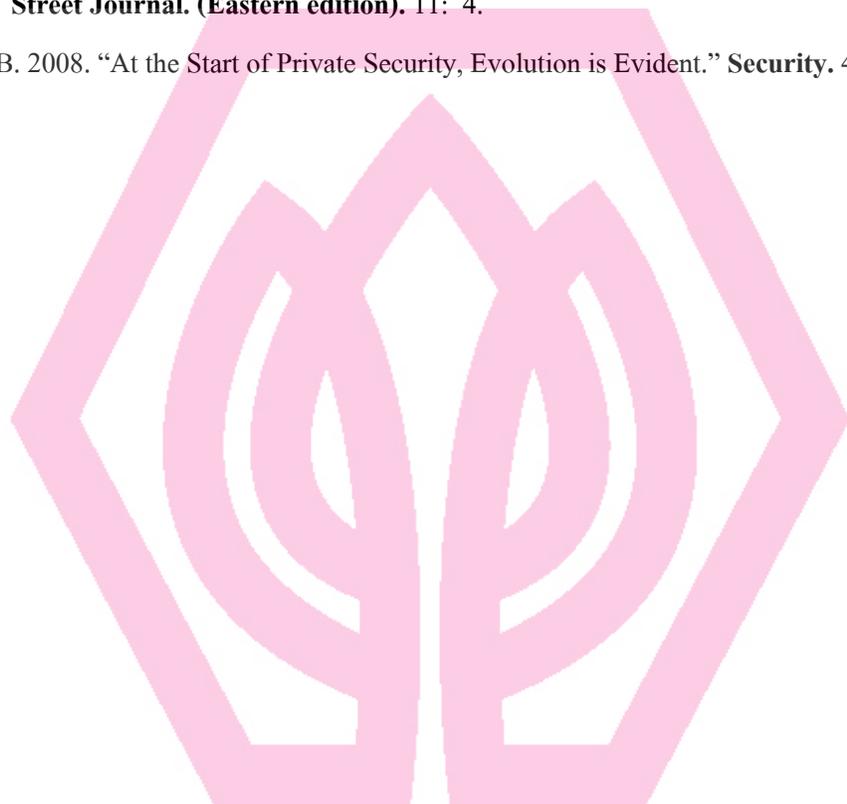
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Appendix

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Appendix A

Questionnaire in English

มหาวิทยาลัยศรีปทุม
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**The Adoption of Mobile Commerce (M-Commerce) in Small and Medium Businesses in
Thailand**

The purpose of the research is to identify factors affecting the decision of the adoption of mobile commerce (m-commerce) by small and medium businesses in Thailand. An effort will be made to better understanding of the factors influencing m-commerce usage, resulting in enable to adopt m-commerce used in business functions, and to recommend the policy from the known factors that would be beneficial for government or trade associations. By completing and turning in this survey you are giving your consent for the researcher to include your responses in his/her data analysis. Your participation in this research is strictly voluntary, and you may choose not to participate without fear of penalty or any negative consequences. Individual responses will be treated confidentially. No individually identifiable information will be disclosed or published, and all results will be presented as aggregate, summary data. Once the research is completed, you may request a copy of the results of this research by writing to the researcher at: Dr.Anupong Avirutha (Dr_anupong@yahoo.com)

Mobile commerce (m-commerce) = transaction for goods, services, and information via mobile devices.

Part A: Information about Your Business

Please check (X) in the appropriate space that are true about your business

1. Your business industry is

- | | |
|--|--|
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Financial |
| <input type="checkbox"/> Wholesale | <input type="checkbox"/> Tourism |
| <input type="checkbox"/> Retail | <input type="checkbox"/> Construction |
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation |
| <input type="checkbox"/> Food and restaurant | <input type="checkbox"/> Other, please specify _____ |

2. Numbers of your employees

- | | |
|----------------------------------|-----------------------------------|
| <input type="checkbox"/> 1 – 15 | <input type="checkbox"/> 51 – 100 |
| <input type="checkbox"/> 16 – 25 | <input type="checkbox"/> > 100 |
| <input type="checkbox"/> 26 – 50 | |

3. Approximate your company's total revenue

- | | |
|--|--|
| <input type="checkbox"/> < 1 million | <input type="checkbox"/> 20.01 – 30 millions |
| <input type="checkbox"/> 1 – 10 millions | <input type="checkbox"/> 30.01 – 40 millions |
| <input type="checkbox"/> 10.01 – 20 millions | <input type="checkbox"/> > 40 millions |

Part B: Information about You

Please checks (X) in the appropriate space that are true about yourself

1. What is your age?

- | | |
|----------------------------------|----------------------------------|
| <input type="checkbox"/> 18 – 23 | <input type="checkbox"/> 41 – 50 |
| <input type="checkbox"/> 24 – 32 | <input type="checkbox"/> 51 – 60 |
| <input type="checkbox"/> 33 – 40 | <input type="checkbox"/> > 61 |

2. What is your highest level of education?

- | | |
|--|--|
| <input type="checkbox"/> High school | <input type="checkbox"/> Bachelor's degree |
| <input type="checkbox"/> College diploma | <input type="checkbox"/> Master's degree or higher |

3. How often do you use an m-commerce (PDA, Smartphone, Netbook, and Laptop) as a connectivity to access to the Internet or network in your work?

- | | |
|--|--|
| <input type="checkbox"/> Less than once a week | <input type="checkbox"/> Once a day |
| <input type="checkbox"/> A few times per week | <input type="checkbox"/> More than 5 times per day |
| <input type="checkbox"/> Many times per week | <input type="checkbox"/> I don't use it (Skip to part D) |

4. How long have you been using m-commerce?

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> < 1 month | <input type="checkbox"/> 6 – 12 months |
| <input type="checkbox"/> 1 – 3 months | <input type="checkbox"/> 12 – 24 months |
| <input type="checkbox"/> 3 – 6 months | <input type="checkbox"/> > 24 months |

5. Please identify your reason(s) of using m-commerce

- Company's policy
- Company's support on hardware and device
- Company's support on the cost of connection service
- Other, please specify _____

Part C: Business Applications for M-Commerce

This Part (Part C) is for Adopter of M-Commerce ONLY; Otherwise Skip to Part D

Please rank the following business applications for m-commerce in terms of important to your business. Write number 1 next to the most important business application, number 2 next to the second most important, and so forth.

_____ Financial, Mobile payment, Banking service

_____ Business transaction

_____ Advertising

_____ Information management

_____ Customer service

_____ Mobile communication, SMS, MMS

_____ Supply chain

Part D: Usage Factors

Please read each of the statements below about your technology experience, and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means “Never” 2 means “Seldom”; 3 means “Sometimes”; 4 means “Often”; and 5 means “Always”.

	1	2	3	4	5
1. Taking computer classes at schools or universities					
2. Taking outside technology training courses					
3. Participating in in-house technology training					
4. Using an online social network (hi5, facebook, myspace)					

Please read each of the statements below about your technology experience, and place X in the suitable box that most accurately reflects your opinion of specific statement. 1 means “Strongly disagree”; 2 means “Disagree”; 3 means “Uncertainty”; 4 means “Agree”; and 5 means “Strongly agree”.

	1	2	3	4	5
1. Able to build a website by applications, i.e., dreamweaver, frontpage, and flash macromedia					
2. My level of understanding of overall computer skill					
3. Using new technology is Entertaining					
4. Using new technology is exciting					
5. Learning to use the new technology is easy					
6. I think using m-commerce will enable me to do my jobs more quickly					
7. I think using m-commerce will improve the performance of work					

8. I think using m-commerce will make it easier to do my work					
9. I think using m-commerce will be compatible with my company's network system					
10. I think that using m-commerce will fit well with my work					
11. Using m-commerce is under my company's policy					
12. Working with m-commerce is so complicated					
13. It takes too long to learn how to use m-commerce to make it worth the effort					
14. Only a few experts really understand how to use m-commerce					
15. Before deciding whether to use m-commerce, I have to be able to properly try it out					
16. Often, trying a new technology the first time, I like it					
17. I am confident of using m-commerce, if I have a chance to try it myself					
18. I can observe m-commerce in use at office					
19. I can observe m-commerce in use in public					
20. Many of my coworkers use m-commerce at work					
21. M-commerce is accessible in any area you need					
22. M-commerce provides reliable connection					
23. M-commerce provides the high speed connectivity					
24. The cost of using m-commerce is reasonable					



Appendix B

Questionnaire in Thai

มหาวิทยาลัยศรีปทุม
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ปัจจัยที่ส่งผลกระทบต่อการนำ M-commerce มาใช้ในธุรกิจขนาดกลางและขนาดย่อมในประเทศไทย

M-commerce (เทคโนโลยีเคลื่อนที่) หมายถึง การทำธุรกรรม (เช่น การไหลเพลง เสียงรอสาย การชำระเงิน การโอนเงิน) ผ่านทางโทรศัพท์มือถือ หรือ อุปกรณ์เคลื่อนที่อื่น ๆ

ตอนที่ 1: ขอเรียนถามเกี่ยวกับข้อมูลทั่วไปในธุรกิจ

กรุณาให้ข้อมูลเกี่ยวกับธุรกิจของท่าน โดยการทำเครื่องหมาย (X) หน้าข้อที่ท่านเห็นว่าสอดคล้องกับความเป็นจริงมากที่สุด

1. ธุรกิจของท่านอยู่ในอุตสาหกรรมใด

- | | |
|------------------------------------|--|
| <input type="checkbox"/> การผลิต | <input type="checkbox"/> การเงิน |
| <input type="checkbox"/> ค้าส่ง | <input type="checkbox"/> การท่องเที่ยว |
| <input type="checkbox"/> ค้าปลีก | <input type="checkbox"/> ก่อสร้าง ตกแต่งภายใน |
| <input type="checkbox"/> เกษตรกรรม | <input type="checkbox"/> การขนส่ง |
| <input type="checkbox"/> ร้านอาหาร | <input type="checkbox"/> อื่น ๆ โปรดระบุ _____ |

2. จำนวนพนักงานในธุรกิจ

- | | |
|-------------------------------------|---|
| <input type="checkbox"/> 1 – 15 คน | <input type="checkbox"/> 51 – 100 คน |
| <input type="checkbox"/> 16 – 25 คน | <input type="checkbox"/> มากกว่า 100 คน |
| <input type="checkbox"/> 26 – 50 คน | |

3. ธุรกิจท่านมีรายได้ต่อปีประมาณ

- | | |
|---|---|
| <input type="checkbox"/> น้อยกว่า 1 ล้านบาท | <input type="checkbox"/> 20.01 – 30 ล้านบาท |
| <input type="checkbox"/> 1 – 10 ล้านบาท | <input type="checkbox"/> 30.01 – 40 ล้านบาท |
| <input type="checkbox"/> 10.01 – 20 ล้านบาท | <input type="checkbox"/> มากกว่า 40 ล้านบาท |

ตอนที่ 2: ขอเรียนถามเกี่ยวกับตัวท่าน

1. อายุ

- () 18 – 23 () 41 – 50
 () 24 – 32 () 51 – 60
 () 33 – 40 () มากกว่า 61

2. ระดับการศึกษาสูงสุด

- () มัธยมปลาย () ปริญญาตรี
 () วิทยาลัย () ปริญญาโท หรือ สูงกว่า

3. ท่านได้มีการใช้อุปกรณ์ไร้สาย เช่น PDA โทรศัพท์มือถือ โน้ตบุ๊ก ในการเชื่อมต่ออินเทอร์เน็ต สำหรับการทำงานบ่อยเพียงใด

- () น้อยกว่าหนึ่งครั้งต่อสัปดาห์ () วันละครั้ง
 () สองถึงสามครั้งต่อสัปดาห์ () มากกว่าวันละครั้ง
 () มากกว่า 3 ครั้งต่อสัปดาห์
 () ไม่ได้ใช้เลย (โปรดระบุเหตุผล และ ข้ามไปตอน 4), _____

4. ท่านได้ใช้ M-commerce มานานเท่าใดแล้ว

- () น้อยกว่า 1 เดือน () 6 – 12 เดือน
 () 1 – 3 เดือน () 12 – 24 เดือน
 () 3 – 6 เดือน () มากกว่า 24 เดือน

5. โปรดระบุเหตุผลที่ท่านใช้ M-commerce (ตอบได้มากกว่า 1 ข้อ)

- () เป็นนโยบายของทางบริษัท
 () บริษัทให้อุปกรณ์สำหรับการเชื่อมต่ออินเทอร์เน็ตไร้สาย
 () บริษัทออกค่าใช้จ่ายสำหรับการเชื่อมต่ออินเทอร์เน็ตไร้สาย
 () อื่น ๆ โปรดระบุ _____

ตอนที่ 3: โปรแกรมเสริมที่ใช้งานใน m-commerce
ส่วนนี้ เฉพาะผู้ที่ใช่ m-commerce เท่านั้น
(สำหรับผู้ที่ไม่ได้ใช่ m-commerce ให้ข้ามไปตอนที่ 4)

โปรดเรียงลำดับความสำคัญของโปรแกรมเสริมที่มีต่อธุรกิจของท่าน โดยโปรแกรมเสริมที่มีความสำคัญที่สุดเป็นลำดับที่ 1 และโปรแกรมเสริมที่มีความสำคัญน้อยที่สุดเป็นลำดับที่ 7

- _____ การเงิน การธนาคาร
- _____ บัญชี
- _____ การโฆษณา
- _____ การจัดการด้านข้อมูล
- _____ การบริการลูกค้า
- _____ การติดต่อสื่อสาร SMS, MMS
- _____ การบริการขนส่ง

ตอนที่ 4: ปัจจัยที่ส่งผลในการใช้ m-commerce

ส่วนย่อย ที่ 1

กรุณาอ่านข้อความข้างล่างซึ่งเกี่ยวกับประสบการณ์ด้านเทคโนโลยีของท่าน และทำเครื่องหมาย (X) ในช่องที่กำหนด โดย 1 หมายถึง ไม่เคย, 2 หมายถึง น้อยครั้ง, 3 หมายถึง บางที, 4 หมายถึง บ่อยครั้ง, และ 5 หมายถึง เสมอ ๆ

1 2 3 4 5

1. ข้าพเจ้าได้เรียนวิชาคอมพิวเตอร์จากโรงเรียน หรือ มหาวิทยาลัย					
2. ข้าพเจ้าได้เข้าการอบรมด้านเทคโนโลยีจากโรงเรียนหรือสถาบันสอนคอมพิวเตอร์ต่าง ๆ					
3. ข้าพเจ้าได้รับการอบรมด้านเทคโนโลยีที่จัดขึ้นโดยบริษัทที่ข้าพเจ้าทำงานอยู่					
4. ข้าพเจ้าเล่น Hi5 หรือ Facebook หรือ MySpace					

ส่วนย่อย ที่ 2

กรุณาอ่านข้อความข้างล่างซึ่งเกี่ยวกับทัศนคติของท่าน และทำเครื่องหมาย (X) หมายเลขตามความมากน้อย ในช่องที่กำหนด โดย 1 หมายถึง ไม่เห็นด้วยอย่างยิ่ง, 2 หมายถึง ไม่เห็นด้วย, 3 หมายถึง เฉย ๆ, 4 หมายถึง เห็นด้วย, และ 5 หมายถึง เห็นด้วยอย่างยิ่ง

	1	2	3	4	5
1. ข้าพเจ้าสามารถสร้างเว็บไซต์โดยใช้โปรแกรม Dreamweaver, Frontpage, หรือ Flash ได้					
2. ระดับของความเข้าใจในเรื่องเทคโนโลยีของข้าพเจ้า					
3. การใช้เทคโนโลยีใหม่ ๆ เป็นเรื่องที่สนุก					
4. การใช้เทคโนโลยีใหม่ ๆ เป็นเรื่องที่น่าตื่นเต้น					
5. การศึกษาและเริ่มใช้เทคโนโลยีใหม่เป็นเรื่องที่ง่าย					
6. ข้าพเจ้าคิดว่าการใช้เทคโนโลยีเคลื่อนที่จะช่วยทำให้ทำงานได้เร็วขึ้น					
7. ข้าพเจ้าคิดว่าการใช้เทคโนโลยีเคลื่อนที่จะช่วยทำให้ผลการปฏิบัติงานเพิ่มขึ้น					
8. ข้าพเจ้าคิดว่าการใช้เทคโนโลยีเคลื่อนที่จะช่วยทำให้ทำงานได้สะดวกขึ้น					
9. ข้าพเจ้าคิดว่าเทคโนโลยีเคลื่อนที่สามารถทำงานร่วมกับระบบเน็ตเวิร์คของที่ทำงานข้าพเจ้า					
10. ข้าพเจ้าคิดว่าการใช้เทคโนโลยีเคลื่อนที่ที่ทำงานนั้นสามารถเข้ากับลักษณะการทำงานของข้าพเจ้า					
11. การใช้เทคโนโลยีเคลื่อนที่นั้นเป็นนโยบายของที่ทำงานข้าพเจ้า					
12. 1. การใช้เทคโนโลยีเคลื่อนที่นั้นมีความซับซ้อน					
13. การใช้เทคโนโลยีเคลื่อนที่นั้นต้องเสียเวลาในการเรียนรู้					
14. มีแค่ผู้เชี่ยวชาญเท่านั้นที่จะใช้เทคโนโลยีเคลื่อนที่ได้					
15. ก่อนที่จะตัดสินใจใช้เทคโนโลยีเคลื่อนที่ ข้าพเจ้าควรจะได้ทำการทดลองใช้ก่อน					
16. บ่อยครั้งที่ได้ลองเทคโนโลยีใหม่ ๆ ข้าพเจ้ารู้สึกชอบ					

17. ข้าพเจ้ามั่นใจว่าข้าพเจ้าจะใช้เทคโนโลยีเคลื่อนที่ ถ้าข้าพเจ้ามีโอกาสได้ลองใช้					
18. ข้าพเจ้าสังเกตเห็นคนใช้เทคโนโลยีเคลื่อนที่ในที่ทำงาน					
19. ข้าพเจ้าสังเกตเห็นคนใช้เทคโนโลยีเคลื่อนที่ในสาธารณะ					
20. เพื่อนข้าพเจ้าหลายคนใช้เทคโนโลยีเคลื่อนที่ในการทำงาน					
21. เทคโนโลยีเคลื่อนที่ในปัจจุบันครอบคลุมพื้นที่ที่ข้าพเจ้าต้องการ					
22. เทคโนโลยีเคลื่อนที่ในปัจจุบันมีความเสถียร ไม่หลุดบ่อย					
23. เทคโนโลยีเคลื่อนที่ในปัจจุบันมีความเร็วสูง					
24. ค่าใช้จ่ายในการใช้เทคโนโลยีเคลื่อนที่ในปัจจุบันสมเหตุสมผล					

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