TECHNOLOGY ACCEPTANCE MODEL FOR CUSTOMER SERVICE TECHNOLOGY OF RETAIL INDUSTRY IN THAILAND

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Thesis
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TECHNOLOGY ACCEPTANCE MODEL FOR CUSTOMER SERVICE TECHNOLOGY OF RETAIL INDUSTRY IN THAILAND

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ABSTRACT

Customer service technology may represent a source of competitive advantage for businesses in general and for retailers in particular. However, there is debate in the literature over the usefulness of investing in customer service technology. This paper aims at analyzing the acceptance retailers' perception on the use of customer service technology by the Technology Acceptance Model (TAM) to propose a theoretical model to explain retailers' intention to use customer service technology.

Questionnaires mailed to gather data from the retailers in Thailand Through mail survey. Base on data collected from 371 retailers participated in this research. This study used one-way analysis of variance (ANOVA). Confirmatory factor analysis and structure path analysis using LISREL were performed to analyze the data collect used to test hypotheses.

The results show indicated that the model of customer service technology was accepted with a reasonable good of fit. The important findings include the following items. first, TAM proves to be valid model explain the retailers' acceptance of the customer service technology. Meanwhile, perceive ease of system use more impact than perceive usefulness on retailers' acceptance. Perceive usefulness is positively influenced by such factors as organizational traits, individual traits, information quality, and task performed. As well as, Perceive ease of system use is positively influenced by such factors as organizational traits, individual traits, information quality, system/service quality, and task performed. The core TAM are absolutely positive. The results support the need to restrict the investment in customer service technology to what is strictly necessary and increase performance for the retail industry in Thailand.

KEY WORDS: CUSTOMER SERVICE TECHNOLOGY / RETAILER / TECHNOLOGY ACCEPTANCE MODEL (TAM)

115 pages

การศึกษาการยอมรับการใช้เทคโนโลยีในการบริการลูกค้าโดย TAM ของอุตสาหกรรมค้าปลีกในประเทศไทย
TECHNOLOGY ACCEPTANCE MODEL FOR CUSTOMER SERVICE TECHNOLOGY OF RETAIL INDUSTRY IN THAILAND

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บทคัดย่อ

เทคโนโลยีการบริการลูกค้าอาจแสดงถึงแหล่งที่มาของการแข่งขันสำหรับธุรกิจทั่วไปและสำหรับร้านค้าปลีกโดยเฉพาะ แต่มีการอภิปรายในงานวิจัยที่ผ่านมาถึงประโยชน์ที่มากกว่าของการลงทุนของเทคโนโลยีการบริการลูกค้างานวิจัยนี้มีวัตถุประสงค์เพื่อวิเคราะห์การรับรู้ของร้านค้าปลีกในการยอมรับการใช้เทคโนโลยีการบริการลูกค้าโดยใช้ TAM เพื่อนำเสนอรูปแบบทางทฤษฎีที่จะอธิบายความตั้งใจของร้านค้าปลีกในการยอมรับการใช้เทคโนโลยีบริการลูกค้า

แบบสอบถามที่ใช้ในการรวบรวมข้อมูลจากร้านค้าปลีกในประเทศไทยด้วยการสำรวจการส่งไปรษณีย์ซึ่งรวบรวมจาก 371 ร้านค้าปลีกที่ใช้ในการวิจัยครั้งนี้ และการวิจัยนี้ใช้วิธีวิเคราะห์โดยใช้สถิติการวิเคราะห์ทางเดียวของความแปรปรวน (ANOVA) เพื่อทดสอบสมมติฐานและการวิเคราะห์ปัจจัยเชิงยืนยันและการวิเคราะห์ทางโครงสร้างโดยการใช้โปรแกรมลิสเรลในการวิเคราะห์ข้อมูลที่รวบรวมเพื่อใช้ทดสอบสมมติฐาน

ผลการวิเคราะห์พบว่ารูปแบบของเทคโนโลยีการบริการลูกค้าได้ผลการยอมรับด้วยเหตุผลที่ดีและผลการวิจัยนี้สามารถพิสูจน์ได้ถึงการยอมรับของธุรกิจค้าปลีกของเทคโนโลยีบริการลูกค้าที่แสดงให้เห็นถึงความสะดวกในการใช้ระบบมากกว่าเห็นประโยชน์ ซึ่งการยอมรับของธุรกิจค้าปลีกประโยชน์คืออิทธิพลจากปัจจัยด้านบวกเช่นลักษณะขององค์กร ลักษณะคุณภาพข้อมูล รวมทั้งเห็นความสะดวกในการใช้ระบบได้รับอิทธิพลจากปัจจัยบวกได้แก่ลักษณะขององค์กรแต่ละองค์กรและลักษณะคุณภาพข้อมูล ระบบคุณภาพและบริการ ซึ่งในส่วนของโมเดลหลักของ TAM ผลการสนับสนุนยืนยันโมเดลหลัก และถือเป็นการสนับสนุนการลงทุนในเทคโนโลยีการบริการลูกค้าว่าเป็นสิ่งที่จำเป็นอย่างยิ่งและสามารถเพิ่มประสิทธิภาพของอุตสาหกรรมค้าปลีกในประเทศไทย

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CHAPTER I
INTRODUCTION

1.1 Background and Problem Statement

Over the past decades, retailing in Thailand has developed from traditional stores into modern stores and chain stores as with other places in the world. Most of the major developments have taken place in Bangkok, the capital city. The rising incomes and changing lifestyles have stimulated the development and modernization of retailing in Thailand. The strong competition in Bangkok has also encouraged superstores to move to provincial areas where significant competition has yet to develop and where income levels are now beginning to justify the investments. The giant companies are able to satisfy their shareholders by achieving continued growth (Feeny, Vongpatanasin, & Soonsatham, 1996). Industry observers indicate that superstore business is expanding rapidly due to their variety of product and discount price. They make customers convenience with air-conditioned stores and they attract customers with modern store layout. As the number of superstores continues to grow, the number of family-run stores has fallen. In 2001, according to the Commerce Ministry, more than 900 local retail operators ceased operations because they were not able to compete with superstores.

According to results on a survey of Thailand’s retailer it is observed that the number of retailers in Thailand is more than 4,000 and can be divided into many main types as (i) Department Store: is a retail establishment which specializes in satisfying a wide range of the consumer's personal and residential durable goods product needs; and at the same time offering the consumer a choice multiple merchandise lines, at variable price points, in all product categories, (ii) Convenience Store: is therefore determined by all attributes of a retail centre that influence the spatial, temporal and effort costs of patronage, and (iii) Grocery store : is descended from trading posts, which sold not only food but clothing, household items, tools, furniture, and other miscellaneous merchandise. These trading posts evolved into

larger retail businesses known as general stores. These facilities generally dealt only in "dry" goods such as flour, dry beans, and canned foods, (iv) Discount store or Super center: sell products at prices lower than those asked by department stores and other traditional retail outlets. Most discount department stores offer a wide assortment of goods; others specialize in such merchandise as electronic equipment, or electrical appliances. Discount stores are not variety stores, (v) Supermarket : is a self-service store offering a wide variety of food and household merchandise, organized into departments. It is larger in size and has a wider selection than a traditional store. The supermarket typically comprises meat, fresh produce, dairy, and baked goods departments along with shelf space reserved for canned and packaged goods as well as for various nonfood items such as household cleaners, pharmacy products, and pet supplies. Figure 1.1 shows the comparison the remains of retailers in four categories. Moreover, early literature also defines five main types of retailing in Thailand.

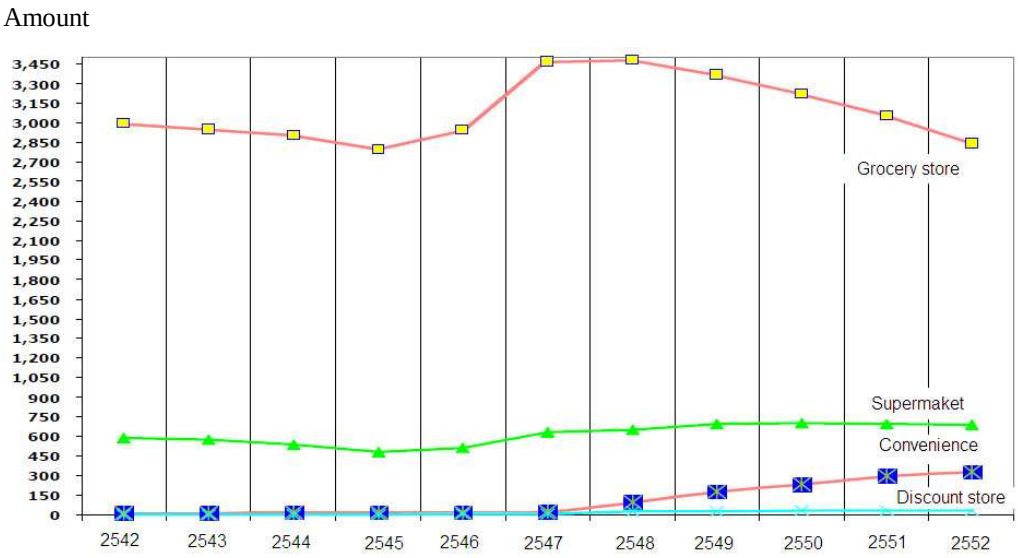


Figure 1.1 Comparison the remains of retailers in Thailand. (Thailand National Statistical Office, 2009)

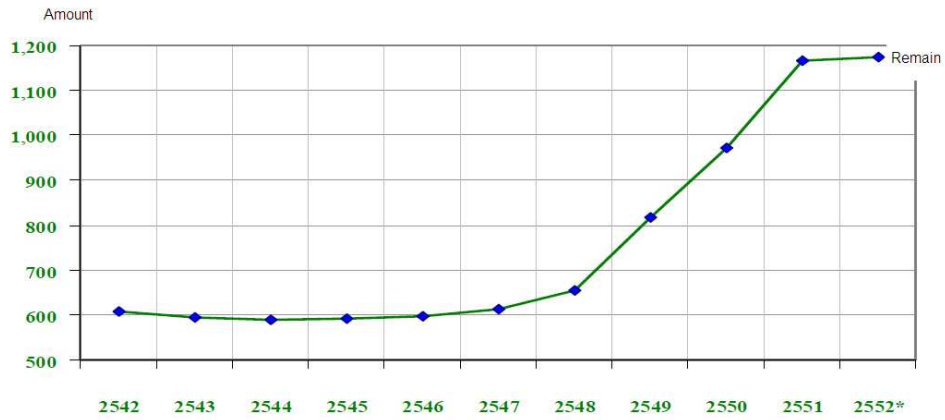


Figure 1.2 The amount of the department store in Thailand (Thailand National Statistical Office, 2009)

The growing use of information and communication technology (ICT) in services has revolutionized the interactions between service providers and customers, and increased the standardization of many services. This development makes the old adage of services being characterized by frequent customer–employee interaction, high service variability and high costs of serving customers less true today than 10–20 years ago (Lovelock and Gummesson, 2004). Service providers introduce customer service technology to increase productivity and efficiency (Walker et al., 2002; Zeithaml and Gilly, 1987), and to offer customers access to services via new and convenient channels (Meuteret al., 2003), thereby better meeting customer demand and increasing satisfaction (Bitner et al., 2002). Some customer service technology, such as credit/debit card payment, bar codes, RFID scanning purchases in retail, are indeed popular among consumers.

Currently, Customer service is a key factor towards generating loyal retail customers, and ultimately, successful retail businesses (Parasuraman et al., 1988). Organizations must cope with an increasingly changing environment. Such a change derives essentially from the evolution and changes in customers' needs, technological advances to satisfy those needs and the evolution in business management (Porter, 1997). A study of successful retailers reveals that the business ability to build and defend a competitive position in the market depends to a great extent on the capacity to invest and use information (Weber and Kantamneni, 2002). In this regard,

(Buxmann and Gebauer, 1999) consider information technology to be a key factor for the organization's success. The advances in customer service technology such as customer relationship management (CRM), self-service technology, credit/debit card payment, retailer card payment, radio frequency (RFID), and offer new possibilities for the management of retailing companies. The need to investigate these possibilities in the field of logistics from a marketing channel approach has been raised by several researchers. In particular, (Dresner and Xu, 1995), (Luque, 1995), (Denis and Czellar, 1997), (Van der Veeken and Rutten, 1998) and (Mentzer and Williams, 2001) have highlighted the need to research different aspects of the logistics function such as quick response, physical delivery and information system management.

The technology Acceptance Model (TAM) is among the most influential and discussed theories in explaining and predicting in individual's acceptance of information technology. Several past studies have examined the relationship of perceive ease of use (PEOU), perceived usefulness (PU), attitude toward using the system, behavioral intention to use, and the actual use of technology (Lee et al, 1999) summarized the information system examined by TAM in 101 articles published by leading IS journals and conference from 1986-2003 into four different classes: communication system (20%), general purpose system (28%), office system (27%), and specialized business. We apply TAM to the retail system can lead to a better understanding acceptance of customer service technology

From the above, shows that customer service technology has the important role to increase efficiency in retailing. However, Thailand is no study or research which related to the customer service technology acceptance in retailing in Thailand. The purpose of this survey is to understand the customer service technology acceptance in retail, the current status of the customer service technology in retailing in Thailand. The result of this research will be useful for improving retail services in Thai retail sector.

1.2 Objective of the Research

The research aims at enriching the knowledge and understands of factors affecting adoption of customer service technology of retailing in Thailand. Specifically the main objectives of this study are:

1. To survey the current status of customer service technology of retailing in Thailand.

2. To examine retailers' acceptance of the customer service technology with the technology acceptance model.

3. To survey an appropriate development direction for improving customer service technology of retailing in Thailand.

1.3 Scope of the Research

The scope of this study includes:

1. The research will study on customer service technology of retailing in Thailand. To study the main of retails which can be divided into 5 groups as follows:

- Department Store
- Convenience Store
- Discount Store
- Supermarket
- Grocery Store

To study the main of customer service technology – were studied in this paper can be divided into 9 types as follow:

- Bar codes/scanner
- Self-service technologies
- CRM (Customer Relationship Management)
- Credit/debit card payment
- Retailer card payment
- Smart card
- Invoicing software
- Internet security software
- RFID

2. The research develops and tests a theoretical extension of the Technology Acceptance Model (TAM) (Davis, 1989) in customer service technology of retailing in Thailand.

3. Example Group:

- Respondent of retailers in Thailand from sending 2,220 questionnaires which groups are department store, convenience store, discount store or super center, supermarket and grocery store.

- Example group were collected using multi-stage random sampling technique from a total population in 5 groups of retail.

4. This research uses SPSS for window version 17.0 for analyzing the data.

1.4 Research Model

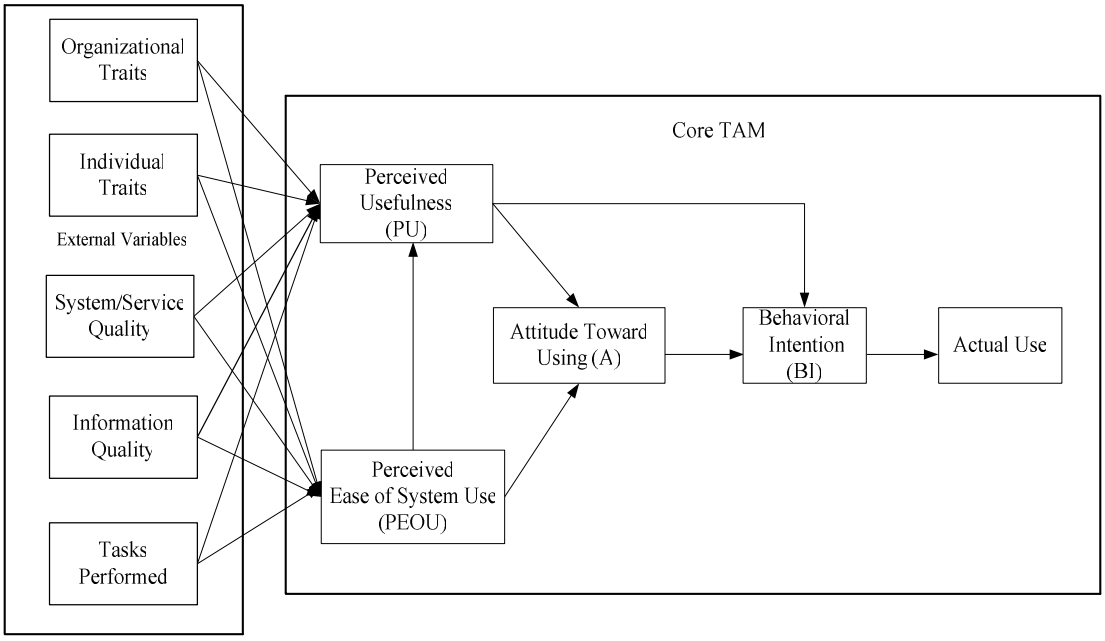


Figure 1.3 Adaptation from Technology Acceptance Model (TAM) (Davis, 1989)

1.5 Expected Results

The expected outcome of this study includes:

1. The current status and acceptance of the customer service technology in Thai retail sector.

2. Main factors that affected with the acceptance of customer service technology in retail.

3. Business developing problem of customer service technology in retail.

4. Suggest direction in customer service technology in the retail sector.

CHAPTER II
LITERATURE REVIEW

This chapter describe about the characteristics of Thai retailing, the customer service technology, the Technology Acceptance Model (TAM), and related research.

2.1 Retailing in Thailand

There is no intention of providing a full review of literature on Thai retailing, but rather an overview of developments that have led to calls for regulation. Retailing saw very few changes in Thailand through the 1980s and early 1990s (Feeneyet al., 1996) provide a useful history; while Shannon and Mandhachitara (2005) provide information on more recent developments. With the exception of two standalone local supermarket chains, supermarkets were found within Japanese or Thai department stores, such as Sogo, Daimaru, Central and Robinsons. Daimaru had been an extremely successful department store and supermarket, opening in Thailand in 1964, until they decided to move from the city centre to a new suburban location (Seri Centre) in 1994, which finally led to their demise in 1998. French retailer Printemps opened in the same location and also failed. These failures are can be partially explained by the opening of Seacon Square, the fifth largest mall in the world at that time, which opened literally next door to the Seri Centre in 1994. Sogo also eventually closed their doors, after languishing for many years in the city centre. Today, Isetan is the only Japanese department store still operating in Bangkok, which also has a small supermarket. Prior to the recession in 1997, the Alien Business Law had restricted ownership of companies, such that Thai shareholdings must account for at least 51%. This law was adjusted after the recession, and a wave of increased foreign investment ensued. The Foreign Business Act has been in place since 2000, which allows leeway based on total capital invested. The government has recently stated that the ratio of foreign ownership will need to be adjusted back down to the

maximum of 49%. Delhaize abandoned the market and sold the majority of their stores to Tops in 2004, which rapidly expanded after being bought back by Central that same year. Deloitte Research's Thailand Investment Review (2006) ranked Thailand third (out of nine) for the fifth consecutive year in terms of being a key Asian retail market, behind China and Taiwan, with a market value of US$21.6 billion. While the modernization of retailing brings about efficiency gains, there is the danger of crossing a tipping point, whereby the largest players dominate the market (Fels, 2009). This makes for a difficult situation, as the government encourages foreign investment, yet finds itself facing demands for regulation due to perceptions of over expansion. Bureaucrats forced into a regulatory position may find themselves ill-equipped, lacking experience and often moving slowly, which further allows expansion (Reardon, 2006). Expansion has not been as rapid or straightforward, however, for all the foreign firms, as might have been expected in this situation. Is it possible that aspects of Thai culture may challenge them? Thailand is a highly collectivist culture, emphasizing relationships (Hofstede, 1980) that will likely be missing in modern trade formats. Thais also place high importance on aspects of face and status (Schutte and Ciarlante, 1998; (Wong and Ahuvia, 1998) which may limit interest in private label brands (DeMooij and Hofstede, 2002). Retailers trying to offer time saving benefits, following the Western idiom 'time is money', may find a lackluster response. The research question, then, is how retailers, who are aiming for growth, are dealing with the twin demands of regulation and consumer behaviors potentially shaped by culture. What follows is a presentation of the development of major retail firms and an exploratory discussion of the themes which emerge.

The concept of retailing draws strength from the French word *retaille*, which means' a piece cut off'. The range of activities carried out by a modern retailer encompasses sourcing a wide range of products at huge volumes, and through intelligent use of systems and processes, getting them across to customers at attractive prices. Thailand has been one of the fastest-growing retail markets in the world over the past decade. This growth has mainly come from foreign investment, and has therefore been more revolutionary than evolutionary. Consider Tesco's expansion from 12 hypermarkets in 1997 to 75 by November, 2008. Including Tesco Express and other formats, Tesco Lotus in Thailand had a total of 476 outlets as of November,

2008, with sales in 2007 reported by the Stock Exchange of Thailand to be just over THB108 bn. 7-Eleven was the nearest competitor in terms of revenue, with THB77.3 billion in 2007 and a total of 4,766 convenience stores as of November 2008. Thailand's population of roughly 65 million, coupled with stable growth and lax regulation seems to make for a popular playing field. Private label brands have seen explosive (35 percent) growth, although this is considered more a function of expansion by retailers, rather than actual consumer demand. For a review of retail growth in Thailand, as well as regulatory issues, see Shannon's (2009) overview from 1997 to 2007. Such rapid expansion by the modern trade, predictably, has adversely affected many traditional trade retailers. The economy was considered to have the fastest growth rate in the world from the period of 1986–1997, and remains one of the fastest growing markets for food retailing in Asia. It has thus been an obvious destination for international retailers seeking global growth. However, the expansion of these firms has not been straightforward. Jusco was the first to launch a superstore format, in 1985, followed by Makro's big box cash and carry format in 1989 (partnered with CP). Lotus, by the CP Group, opened their first hypermarket in 1994, and later partnered with Tesco in 1998. Other investments into hypermarkets included Carrefour in 1996, Auchan in 1997, and Casino joining Big C in 1999. Casino ended up taking over Auchan's stores after their lack of success in the first two years. Royal A hold (Tops) entered in 1995 but sold out to its local partner in 2004. Delhaize (Food lion) entered in 1997 to compete with the three existing local supermarkets (Villa, Food land and Home Fresh Mart) but quit the country in 2004 (Shannon, 2008).

Division of business industry	Number	%
Total	241,941	100.0
Sale, maintenance and repair of motor vehicles and motorcycles, retail sale of automotive fuel	17,794	7.4
Wholesale trade and commission trade, except of motor vehicles and motorcycles	21,012	8.7
Retail trade, (except of motor vehicles and motorcycles), repair of personal and household goods	99,636	41.2
Hotels and restaurants	35,719	14.8
Real estate activities	22,086	9.1
Renting of machinery and equipment without operator and of personal and household goods	2,142	0.9
Computer and related activities	1,544	0.6
Research and development	32	-
Other business activities	10,103	4.2
Recreational, cultural and sporting activities	4,909	2.0
Other service activities	26,964	11.1

Note : - nil of zero negligible amount.

Figure 2.1 Number and percentage of business establishments by division of business industry (The National Statistical Office, 2008)

This figure shows that there were in total 241,941 establishments in Bangkok. Most of them (about 41.2 percent) were engaged in retail trade, (except of motor vehicles and motorcycles), repair of personal and household goods. Followed by, those engaged in hotels and restaurants and other service activities of about 14.8 and 11.1 percent respectively.

2.2 The Technology Acceptance Model (TAM)

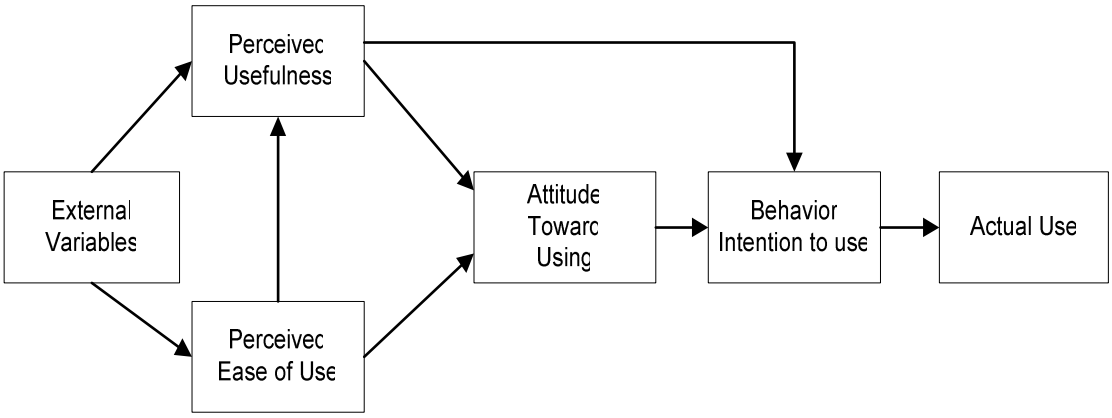


Figure 2.2 Technology Acceptance Model (TAM) (Davis, 1989)

The Technology Acceptance Model (TAM) (first introduced by Davis, 1989; Davis et al., 1989), is a causal model that proposes user acceptance and usage of a technology is determined by two key attitudinal components (beliefs): perceived usefulness (PU) and perceived ease of use (PEOU). PU is the extent to which a person believes that using a particular technology will enhance their job performance. This instrumentality component is the most critical belief underlying the adoption and use of new technology (Davis, 1989; Davis et al., 1989; Taylor and Todd, 1995). PEOU is the extent to which a person believes that using a new technology will be free from effort (Davis, 1989). That is, it is a perception of the ease or difficulty of learning and using a particular technology (Ajzen, 1991). Both PU and PEOU are distinct psychological constructs that exert direct effects on technology acceptance and usage behaviors, with PU having the greater effect. However, PEOU can operate via PU; that is a perception of ease of adoption and use can effectively make a technology more

useful (Davis et al., 1989). Nevertheless the direct influence of PEOU on adoption and usage behavior is believed to be more important than its indirect effect (Davis et al., 1989; Szajna, 1996). The TAM has been used to explain both short-term (acceptance and adoption) behaviors and long-term (usage) behaviors (Venkatesh and Morris, 2000; Morrisand Venkatesh, 2000). The TAM has predominantly been used to explain Information Technology (IT) acceptance and usage, where its validity is well established (Al-Gahtani and King, 1999; Davis, 1989). It has, however, been applied in some other areas, such as the use of adaptive technology by people with disability (Goette, 1995). The primary aim of the present study was to determine whether the TAM model could provide an adequate explanation of adoption and use of customer technologies. Specifically that PU and PEOU operate as semi-independent decision making processes in the adoption and use of a range of customer farming technologies, with PU making the greater contribution. An additional aim was to determine the extent to which economic factors influence Thailand retailer decision making, technology adoption and use. The TAM model was tested with five different retailing in Thailand to provide a representative view of retailer behavior and to determine.

2.3 Customer Service Technology

Customer service technology is integral to business. The challenge occurs when companies want to deliver cost-effective customer service while still providing quality service to the customer. Technology can help close the gap between budget restraints and customer expectations. There are several technologies organizations can use to deliver cost-effective, high-quality customer service technology.

Information Technology (IT) has made life easier for customers and businesses alike. Activities and processes that may have taken days to complete now only take minutes. This time is now reallocated to more valuable activities that can benefit the business and the customer. Through IT advances, businesses can serve the customer more effectively and efficiently and the customer receives better customer service.

IT has helped the business deliver faster service to the customer. For example, customers often interact through IVRs (interactive voice response). The IVR system allows the customer to speak her request and the system's "behind-the-scenes"

intelligence directs the customer to the proper department. Customers can also place an order outside of normal operating hours with an IVR system. Through the advances made using the Internet, customers can place an order online at their convenience. This allows the customer to interact with the company on their terms and does not place restrictions on the customer.

IT has made it easier to maintain customer records. When the customer requests address changes, that information is retained in the computer systems and can be accessed by anyone in the company. If an employee in the sales department needs the information, it can be readily accessed although it may have been updated by a person in the customer service department.

IT has aided companies in offering better products and services to the customers. Businesses can analyze customer complaint trends. By using the information in the computer systems, the business can understand where it is not meeting the customers' expectations. When the reasons for the complaints are minimized, customers have a better impression of the company. In turn, the customers purchase more products and are open to products the company may up sell to the customer.

Do not allow IT to substitute for providing excellent customer service. The customers still expect to be treated properly and respectfully. Also, always allow customers the option of speaking with a representative. Customers become frustrated when the company is so automated that the person cannot reach a representative.

2.4 Radio Frequency Identification (RFID)

Radio frequency identification (RFID) technology is assumed to be a key technology for the retail sector and logistic operations, as well as for customer orientation (Greipl, 2005). RFID can be classified under automatic identification technologies. These technologies automatically assign an identity to objects they spot (Glover and Bhatt, 2006). In the case of RFID, this is achieved by a contact less data transmission via a radio signal. An RFID system consists always of two components: a transponder and a scanner (Finkenzeller, 2002). The transponder serves as the actual data-processing medium. In the customer goods industry, RFID transponders are usually integrated into extraordinarily thin so-called smart labels, which are placed on

pallets, cardboard boxes, or individual products. The tags transfer the information via wireless communication to a bar code scanner without any intervisibility or physical contact. The corporation, with cooperation from industrial partners, began testing the introduction of RFID in its outlets in 2003. A special store that had been designed to test other novel technologies was used. One example is the so-called personal shopping assistant (PSA), a small mobile computer that is attached to a shopping trolley. The PSA allows customers to obtain a shopping list from his PDA by revealing his identity with his customer card while in close proximity to the PSA. The PSA has further optional features, e.g., it signals price offers or indicates the location of products on demand to speed up the shopping process. Similar benefits can be derived by companies from RFID technology. For example, payment and stock keeping could be facilitated if a whole store were to be equipped with RFID.

Companies see a high potential for RFID technology and assume that it will soon replace the optical bar code scanning technologies (Schoblick, 2005). In this paper we concentrate on those areas of RFID application that are useful for electronic retailers. Cause we focus on retailers' acceptance.

2.5 The Credit Cards

A card indicating that the holder has been granted a line of credit. It enables the holder to make purchases and/or withdraw cash up to a prearranged ceiling; the credit granted can be settled in full by the end of a specified period or can be settled in part, with the balance taken as extended credit. Interest is charged on the amount of any extended credit and the holder is sometimes charged an annual fee (Bank of Thailand, 2008). The credit cards are highly complex financial instruments. Their usage reflects a large number of different characteristics and motivations (transactions, debt, customer benefits etc.), involve a large number of prices (interest rates, teaser rates, grace periods, penalty fees, annual fees etc.) and quantity constraints (credit limits, minimum payments). These characteristics and their associated services are supplied by a large variety of different card providers (banks, non-banks etc.). Furthermore, because credit card markets involve decisions by customers (rather than corporations or markets) issues of customer behavior and customer rationality play a far more significant role in this market relative to other

financial markets. In the last 15 years or so Credit cards have essentially become a "test case" for examining how far standard finance theory (risk and return, competitive markets etc.) can be extended in an environment where some of the usual characteristics of financial markets (e.g. competitive buyers and sellers of assets) are not present. (Research Department of Bangkok Bank, 2009)

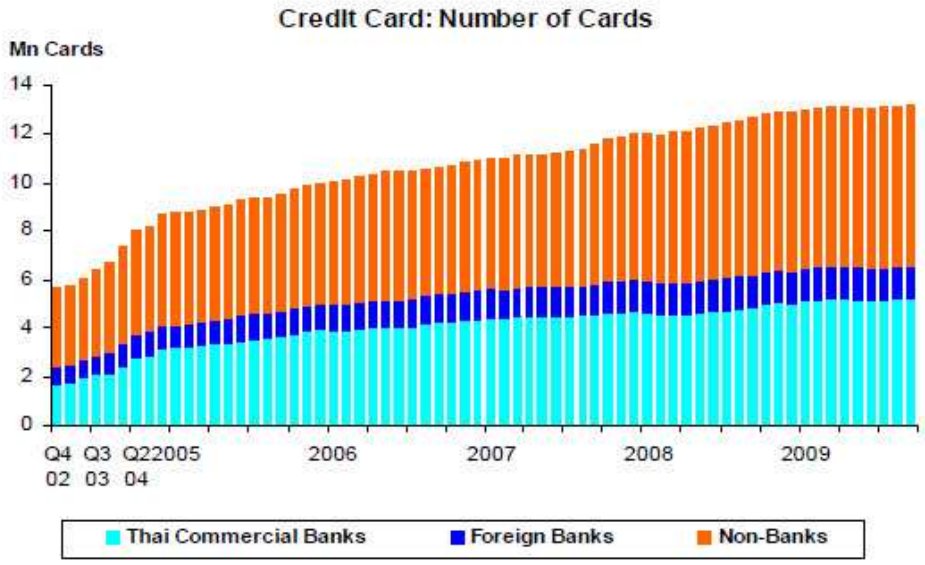


Figure 2.3 The growth number of credit card (Research Department of Bangkok Bank, 2009)

2.6 The Debit Card

Debit Card enabling the holder to have his purchases directly charged to funds on his account at a deposit-taking institution. (Bank of Thailand, 2008) The debit card is a plastic payment card which, when used in a merchant outlet that accepts such cards, immediately debits the account of the card holder held by the financial institution that issues the card to its customers, and also immediately credits the account of the merchant at whose outlet the debit card has been used. The debit card transactions that take place at the merchant outlet are acquired by usually one, but sometimes more than one, financial institution, hereafter called the 'acquirer'. The acquirer reimburses the merchant for the value of the goods and services purchased with the debit card, minus a negotiated fee, called the merchant service charge (MSC), which in the UK is a fixed fee per transaction. When the debit card payment product

was introduced into the UK in 1987, an attempt was made by the financial institutions who issued these cards (the issuers) to charge an ad valorem (percentage) fee to the merchants who were willing to accept debit cards, on the grounds that these transactions were similar to credit card transactions, where an ad valorem charge already existed. Retailers in the UK who have the majority of merchant outlets fiercely resisted this attempt to introduce ad valorem fees on debit card transactions, as they argued that the debit card product was intended as a replacement for the paper cheque, a payment option on which they were already charged a negotiable fixed fee for paying such items into their bank or building society. The retailers eventually won the argument, a story chronicled by Worthington (1988) and the debit card transaction currently carries a fixed fee, calculated in pence per transaction, as proposed to an ad valorem fee, calculated as a percentage of the value of the transaction. It should be added that payment of the merchant service charge on debit card transactions is not always retailer to acquirer. In Australia, for example, the large retailers have such a strong power position in the payments systems supply chain that they have negotiated a situation where the acquirer pays the retailer a fee for every transaction that they acquire from that retailer. It describes this situation and the reasons for it. Debit cards were first issued in the UK in 1987 and since then there has been an extremely rapid growth in both the number of cards issued and in the volume and value of transactions carried out with debit cards. There are now over 27 million debit cards on issue in the UK. These are issued by UK banks and building societies under two different acceptance marques, Switch and Visa Delta. Unlike credit cards where an issuer can have 'duality' and issue both MasterCard and Visa credit cards, each debit card issuer is committed to one of the two debit card acceptance marques, because the debit card is directly attached to the customer's current or savings account, held with the issuing financial institution. The value and volume of transactions carried out on debit cards in the UK has also grown rapidly over the past five years. The average value of a transaction carried out with a debit card is around £28. The outlook for the debit card as a plastic payment card in the UK is very promising. More financial institutions are issuing debit cards (e.g. building societies), more merchants are accepting the debit card as a payment mechanism, both large (e.g. Marks and Spencer) and small (e.g. independent retailers, taxi drivers).

2.7 Smart Card

Smart cards are perhaps some of the most widely used, but underestimated electronic devices in use today. In many cases these devices are in the front-line, defending citizens and systems alike against attacks on information security. Because they have tended to be small and often concealed, smart cards have carried on their important work, largely unnoticed, but this is changing. High profile use of smart cards for IDs (UK Home Office Identity and Passport Service, 2007), passports , credit cards and e-tickets means that the smart card is now a regular topic for the popular press. Furthermore some recent and startling advances in technology and associated standards means that the influence and use of new generation smart cards could have a dramatically expanded role in some industries. With all this activity and positive momentum, one would expect that the term smart card has a clear definition and the physical devices would be easy to identify.

Part of the problem stems from the use of “smart”. If a system is much more convenient because a particular card is being used then that is a pretty smart thing to do, even if by technical standards the card is quite stupid. The next problem comes from “card” which to most people would imply say a credit card sized piece of plastic, whereas various sizes are possible and indeed the innards of the device could be embedded in something completely different like a passport or phone. The candidates that could be described as smart cards are therefore numerous and so the definition will be refined a little to weed out some of the least relevant.

A smart card;

- can participate in an automated electronic transaction
- is used primarily to add security and
- is not easily forged or copied. can store data securely
- can host/run a range of security algorithms and functions.

This definition will now be applied to a few well known card types to see if they are truly “smart”.

Magnetic stripe cards are widely used in a range of applications. They are characterized by being low cost and relatively easy to read/write. An example is shown in Figure 2.4 for many years this type of card was been used for credit and debit card financial applications, although in Europe it is being phased out by EMV

cards described. The cards are still widely used throughput the world and indeed for a diverse range of applications including entitlement cards, tickets and access control systems.

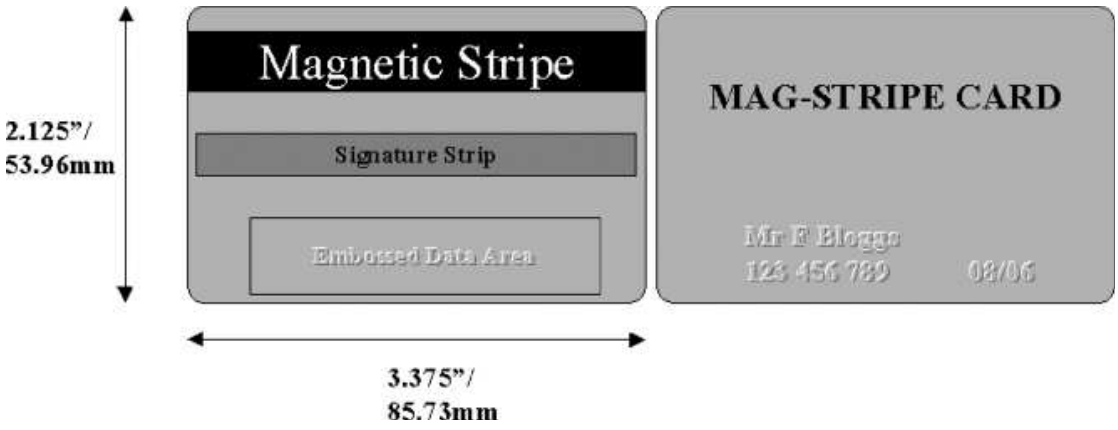


Figure 2.4 Typical Magnetic Stripe Card

In terms of our smart card definitions, the magnetic stripe card can be regarded as follows;

- It is clearly involved in electronic transactions and
- in many cases it is meant to be provide some security element, unfortunately it is very poor when tested against the third definition, i.e. it can be copied or forged. Considering Fig. 2.4 in closer detail, we have a piece of plastic which is used as a carrier for a stripe of magnetic tape. The plastic card may also carry some text or images designed more for human interpretation and checking rather than the electronic transaction that is of primary interest. Invisible to the human eye is the information stored within the magnetic stripe. The stripe is not dissimilar to that used in a cassette recorder i.e. a strong magnetic field controls the alignment of magnetic dipoles into various orientations along the length of the tape. The alignment is preserved even when the polarizing field is removed and so information is stored by the dipoles. The alignment can be simply tested and the information recovered by a tape reader head. Because the tape and the equipment used is relatively crude, the information storage capacity is quite limited. To maximize this in a practical manner multiple tracks are stored along the stripe - again similar to an audiotape-recorder. On

each track one can store a few bits of identity related information and the method of storage is known as format The important thing to say about magnetic stripe cards is that they are not smartcards because they fail the third smart card definition and quite disastrously too. It is therefore quite astonishing to see how long they have survived in financial applications. The root of the problem is quite easy to find. The magnetic stripe is not much more than a piece of audio tape and so it can be easily read and indeed rewritten with relatively simple equipment. This means that it is quite trivial to forge/clone magnetic stripe cards. A lot of effort has gone into making the plastic carrier harder to duplicate (although with limited success), but there is not much that can be done about the magnetic stripe used in the automated transactions. Two types of magnetic stripe fraud have become legendary;

- Skimming - Here the information from a valid card's magnetic stripe is copied to another card for use in fraudulent automated transactions.
- Counterfeiting - here the plastic carrier/card is very carefully copied, but the magnetic stripe may be blank or invalid

How a skimmed card may be exploited is fairly obvious, but counterfeiting deserves a few word of explanation. Although there are various countermeasures on cards to discourage counterfeiting, such as special graphics, embossed printing and holograms, they really just represent more inconvenience and time for an attacker, rather than serious obstacles. The counterfeit is to fool a human operator rather than an automated process, so how can this be useful when most physical transactions tend to be automated? The reason is that it is a very common occurrence for the magnetic stripe on a valid card to be unreadable due to wear and tear. This has lead to an acceptance for the manual fall-back mechanism. For example, a man goes into a petrol station to buy fuel. The assistant swipes the card once, twice, rubs the stripe on his sleeve and tries once more but in vain. He then simply reads the numbers printed on the card plastic and types them into the point of sale terminal to complete the transaction. For internet purchases it is even easier as there is no attempt at an automated process and the attacker only needs to have read the required information from the source card, rather than create the counterfeit. Because of the prevalence of skimming and counterfeiting, magnetic stripe card scan no longer be recommended to safeguard significant financial transactions. Far better is the electronic chip based

solution standardized by EMV and described in detail within chapter 5. The EMV solution is now the standard in some countries such as the United Kingdom where it has drastically reduced fraud for card-holder present transactions (e.g. physical transactions in a store). However EMV has not yet delivered similar safeguards for the increasing volume of internet transactions which are now the most worrying form of fraud and hence the industry focus for countermeasure development. There can be a future for magnetic stripe cards where the solutions are very cost sensitive and the cards are not protecting anything of significant value, for example a loyalty card or a library access card etc. The lack of reliability of the stripe is perhaps not a problem when the cards are only required to have a limited lifetime and usage. For all other applications the trend is towards the use of electronic chips embedded within the card, in order to improve, functionality, reliability and security.

Smart Card Characteristics

So far a fairly glowing report has been given of smart cards; however like any device they have both strengths and weaknesses. In order to exploit it smart cards appropriately it is just as important to appreciate the weaknesses as well as the strengths. Table 2.1 presents this is a summary form.

Features	**Limitations**
CPU (>32bit)	**Helpless Alone**
RAM (>8kb)	-No internal power supply
ROM(>200kb)	-Externally restrictions on power consumption
EEROM(>64kb)	-No user interface
Crypto-processor option	-No clock
Very Small	**Limited (by PC comparison)**
Low power	-Memory
Low cost	-CPU speeds
Secure	**Issued device**
Standardised	-Legacy cards may be inflexible
Operating Systems	-New cards require deployment
Development Tools	
Multiple Suppliers	
Consistent & Controllable	

Table 2.1 Presents a smart card characteristics summary form

Bearing in mind that the smart chip might only be 9mm2 then the processor and memory capabilities are surprisingly good, however compared to a PC processor the card is rather feeble and would not be a good choice for handling large amounts of data or time critical processing. However cards with co-processors are no slouches when it comes to specialized cryptographic processing. The main positive features include the tamper-resistant security, the precise standardization and the resulting consistency and control. An obvious weakness includes the fact that the card is helpless on its own and thus is always reliant on other system elements. For example, a conventional smart card has no internal power-source, no direct user-interface and not even a clock. From a system management perspective another significant feature is the ability to personalize the smart card to a particular customer or account. Smart cards tend to be issued in very large numbers and so one of the ever present problems is dealing with legacy devices. A great new service that only works on newly issued cards may take years to reach a large proportion of the customer base. Legacy problems can be minimized by forward looking design and lifecycle management systems, however legacy problems are often “designed-in” to satisfy short term cost savings.

One of the features that could be described as an advantage or limitation, depending on your viewpoint is the Issuer control of the smart card platform. Used in-practice. Issuers would likely argue that Issuer control is a positive thing as it ensures tight control of the card contents and behaviors and thereby maintains security, however there is a risk that frustrated application developers will implement on alternative and more open devices, in order to give customers the services that they desire.

2.8 Customer Relationship Management (CRM)

Customer relationship management (CRM) is a combination of people, processes and technology that seeks to understand a company’s customers. It is an integrated approach to managing relationships by focusing on customer retention and relationship development. CRM has evolved from advances in information technology and organizational changes in customer-centric processes. Companies that successfully implement CRM will reap the rewards in customer loyalty and long run

profitability. However, successful implementation is elusive to many companies, mostly because they do not understand that CRM requires company-wide, cross-functional, customer-focused business process re-engineering. Although a large portion of CRM is technology, viewing CRM as a technology-only solution is likely to fail. Managing a successful CRM implementation requires an integrated and balanced approach to technology, process, and people. IT vendors focused on the technologies such as computer telephony integration (CTI), data warehousing, application software, and system integration, etc., which are used to implement the CRM concept. The managerial value of CRM is in customer loyalty and relationship building, although it has foundations in technological dimensions. Therefore, CRM is defined as customer relationship building program based on IT. Such program may be directed at loyalty building, but other uses are also in evidence. Conceptually, CRM is supposed to enhance value to customers through raising satisfaction levels on transactions. If customers appreciate the value provided by a CRM program, they are expected to continuously enhance the relationship with the firm involved through loyalty to the products/brands, purchasing more, advocating the firm to others, etc. Such a customer, who has repetitive or loyal behaviors, brings about additional financial value to the firms. Although the implementation of CRM involves large investments in IT and management, it is expected to yield a profitable outcome, as a result. Therefore, a sequential effect of CRM should be expected from customer satisfaction to financial benefit for the firm. However, most research on CRM has tended to test partial causalities, for example, impact of CRM on customer satisfaction or customer retention on financial performance, other than the direct effect of CRM on financial performance, even though the sequential effect of CRM is recognized. Customers lost their uniqueness, as they became an “account number” and shopkeepers lost track of their customers’ individual needs as the market became full of product and service options. Many companies today are racing to re-establish their connections to new as well as existing customers to boost long-term customer loyalty.

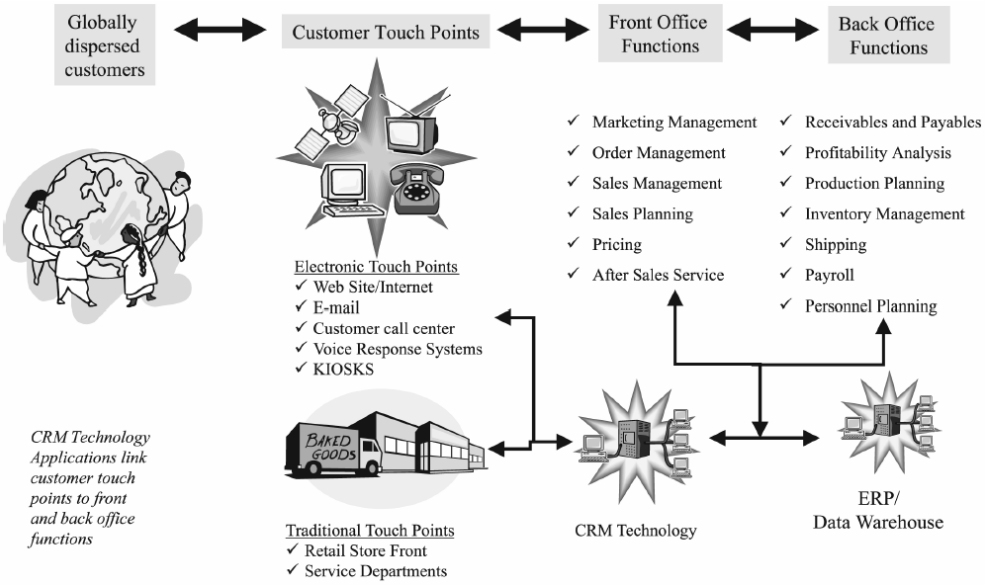


Figure 2.5 CRM applications, supported by ERP/data warehouse, link front and back office functions

Some companies are competing effectively and winning this race through the implementation of relationship marketing principles using strategic and technology-based customer relationship management (CRM) applications. CRM technology applications link front office (e.g. sales, marketing and customer service) and back office (e.g. financial, operations, logistics and human resources) functions with the company's customer "touch points" (Fickel, 1999). A company's touch points can include the Internet, e-mail, sales, direct mail, telemarketing operations, call centers, advertising, fax, pagers, stores, and kiosks. Often, these touch points are controlled by separate information systems. CRM integrates touch points around a common view of the customer (Eckerson and Watson, 2000). Figure 2.5 demonstrates the relationship between customer touch points with front and back office operations. In some organizations, CRM is simply a technology solution that extends separate databases and sales force automation tools to bridge sales and marketing functions in order to improve targeting efforts. Other organizations consider CRM as a tool specifically designed for one-to-one (Peppers and Rogers, 1999) customer communications, a sole responsibility of sales/service, call centers, or marketing departments. We believe that CRM is not merely technology applications for

marketing, sales and service, but rather, when fully and successfully implemented, a cross-functional, customer-driven, technology-integrated business process management strategy that maximizes relationships and encompasses the entire organization (Goldenberg, 2000). A CRM business strategy leverages marketing, operations, sales, customer service, human resources, R&D and finance, as well as information technology and the Internet to maximize profitability of customer interactions. For customers, CRM offers customization, simplicity, and convenience for completing transactions, regardless of the channel used for interaction (Gulati and Garino, 2000). CRM initiatives have resulted in increased competitiveness for many companies as witnessed by higher revenues and lower operational costs. Managing customer relationships effectively and efficiently boosts customer satisfaction and retention rates (Reichheld, 1996a, b; Jackson, 1994; Levine, 1993). CRM applications help organizations assess customer loyalty and profitability on measures such as repeat purchases, dollars spent, and longevity. CRM applications help answer questions such as “What products or services are important to our customers? How should we communicate with our customers? What are my customer’s favorite colors or what is my customer’s size?” In particular, customers benefit from the belief that they are saving time and money as well as receiving better information and special treatment (Kassanoff, 2000). Furthermore, regardless of the channel or method used to contact the company, whether it is the Internet, call centers, sales representatives, or resellers, customers receive the same consistent and efficient service (Creighton, 2000). Figure 2.5 provides a brief overview of some of the benefits that CRM offers by sharing customer data throughout the organization and implementing innovative technology. With much success, software vendors such as Oracle, SAP, PeopleSoft, Clarify, SAS, and Siebel are racing to bring off-the-shelf CRM applications to organizations. Many of these are the vendors responsible for developing enterprise resource planning (ERP) systems.

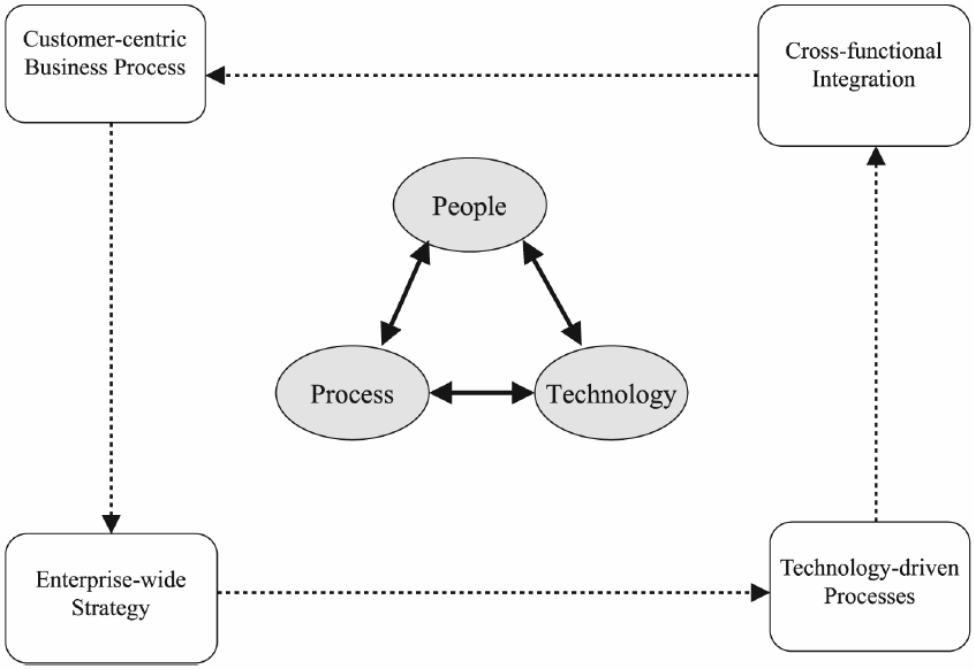


Figure 2.6 A brief overview of some of the benefits that CRM

The technology factor with CRM

Information technology (IT) has long been recognized as an enabler to radically redesign business processes in order to achieve dramatic improvements in organizational performance (Davenport and Short, 1990; Porter, 1987). IT assists with the re-design of a business process by facilitating changes to work practices and establishing innovative methods to link a company with customers, suppliers and internal stakeholders (Hammer and Champy, 1993). CRM applications take full advantage of technology innovations with their ability to collect and analyze data on customer patterns, interpret customer behavior, develop predictive models, respond with timely and effective customized communications, and deliver product and service value to individual customers. Using technology to “optimize interactions” with customers, companies can create a 360 degree view of customers to learn from past interactions to optimize future ones (Eckerson and Watson, 2000). Innovations in network infrastructure, client/server computing, and business intelligence applications are leading factors in CRM development. CRM solutions deliver repositories of customer data at a fraction of the cost of older network technologies. CRM systems accumulate, store, maintain, and distribute customer knowledge throughout the

organization. The effective management of information has a crucial role to play in CRM. Information is critical for product tailoring, service innovation, consolidated views of customers, and calculating customer lifetime value (Peppard, 2000). Among others, data warehouses, enterprise resource planning (ERP) systems, and the Internet are central infrastructures to CRM applications.

Data warehouse technology

A data warehouse is an information technology management tool that gives business decision makers instant access to information by collecting "islands of customer data" throughout the organization by combining all database and operational systems such as human resources, sales and transaction processing systems, financials, inventory, purchasing, and marketing systems. Specifically, data warehouses extract, clean, transform, and manage large volumes of data from multiple, heterogeneous systems, creating a historical record of all customer interactions (Eckerson and Watson, 2000). The abilities to view and manipulate set data warehouses apart from other computer systems.

Constantly extracting knowledge about customers reduces the need for traditional marketing research tools such as customer surveys and focus groups. Thus, it is possible to identify and report by product or service, geographic region, distribution channel, customer group, and individual customer (Story, 1998). Information is then available to all customer contact points in the organization. Data warehousing technology makes CRM possible because it consolidates correlates and transforms customer data into customer intelligence that can used to form a better understanding of customer behavior. Customer data includes all sales, promotions, and customer service activities (Shepard et al., 1998). In addition to transaction details, many other types of data generated from internal operations can make significant contributions. Information related to billing and account status, customer service interactions, back orders, product shipment, product returns, claims history, and internal operating costs all can improve understanding of customers and their purchasing patterns. The ability of a data warehouse to store hundreds and thousands of gigabytes of data make drill-down analysis feasible as well as immediate. A corporate awareness survey conducted jointly by Cap Gemini and International Data

Corporation (1999) found that 70 percent of US firms and 64 percent of European firms plan on building a data warehouse to support their CRM projects. SAS Corporation, a significant player in the data warehouse industry, has recently teamed with Peppers and Rogers Group to provide "CRM Resource", a weekly guide on industry-focused CRM.

Brief outlines of organizational benefits with a data warehouse are:

- data quality and filtering to eliminate bad and duplicate data;
- extract, manipulate and drill-down data quickly for profitability analysis, customer profiling, and retention modeling;
- advanced data consolidation and data analysis tools for higher level summary as well as detailed reports;
- calculate total present value and estimate future value of each and every customer; and
- accurate and faster access to information to facilitate responses to customer questions.

Enterprise resource planning (ERP) systems

Enterprise resource planning (ERP), when successfully implemented, links all areas of a company including order management, manufacturing, human resources, financial systems and distribution with external suppliers and customers into a tightly integrated system with shared data and visibility (Chen, 2001). An overview of ERP systems is provided in Figure 2.5. Major enterprise systems vendors, who have been successful in the ERP market, are gearing up for the growing needs of CRM by aggressively forming alliances with, or taking over other software companies that have been operating in the CRM market. For example, J.D. Edwards entered into a deal with Seibel, a leading CRM company, in May 1999 and subsequently shut down its in-house sales force automation team. Peoplesoft acquired Vantive's CRM software in October 1999 to integrate with its own ERP systems. Through mySAP initiatives, users of SAP R/3 system can add Web-based CRM and SCM functions while leaving the core R/3 system intact (Xenakis, 2000). Oracle has taken the most drastic steps in forming a new bond between ERP and CRM. The new flagship ERP/CRM software package, called 11i, is heavily Internet oriented and allows users to seamlessly

implement modules of CRM with a smaller ERP suite (Sweat, 2000). Significant differences exist between ERP technology and CRM applications. ERP serves as a strong foundation with tightly integrated back office functions while CRM strives to link front and back office applications to maintain relationships and build customer loyalty. ERP systems promise to integrate all functional areas of the business with suppliers and customers. CRM promises to improve front office applications and customer touch points to optimize customer satisfaction and profitability. While ERP systems address fragmented information systems, CRM addresses fragmented customer data. CRM applications are Web-enabled and designed to extend the data mining capabilities of ERP throughout the supply chain to customers, distributors, and manufacturers (Scannell, 1999). Organizations can use CRM analytical capabilities to predict and answer key business questions on customer intelligence and share the results across channels.

Although ERP is not required for CRM, providing customers, suppliers, and employees with Web-based access to systems through CRM will only be beneficial if the underlying infrastructure, such as data warehouses and/or ERP, exists (Solomon, 2000). Companies with an ERP system, however, need to understand where they are in the implementation process, as well as assess where other technologies, such as data warehouses, fit in before plunging into CRM applications (Saunders, 1999).

2.9 Bar code

Bar codes have been widely employed in commodity circulation, logistics transportation, post, warehouse and library management, and other areas. To correctly and rapidly recognize the information from a bar code is an important task. At present, laser bar code readers are most commonly used in applications, because of their excellent performances over the light pen bar code readers and the CCD bar code readers. The advantages of a laser bar code reader are as follows. 1) It provides the non-contact scanning without damaging the bar code label. 2) It reads the bar codes of a large range of density. 3) It reads bar codes on non-regular surfaces and through glass or transparent plastic bags. 4) Its recognition rate is much higher than that of a light pen reader or a CCD reader. 5) It can read blurred bar codes or bar codes not well

printed. 6) The bit-error rate is very low, about one per three million. 7) Its performance of shake-proof and throw-proof is desirable. By those advantages, nowadays laser bar coder readers gain large applications in supermarkets. However, they are still not free from disadvantages. Their mobile parts are prone to get biased or damaged; this reduces the service lifetime and raises the service price. The current price of a laser bar code reader ranges from 1,800 to 3,000 RMB. This high price makes them to be owned only by big corporations. . Figure 2.6 shows two types of common laser bar code readers. Figure 2.6 (a) is the hand-held type and. Figure 2.6 (b) is the desk-top type. Besides, there are also products in our country, which are low in price but are inferior in performance.

(a)Hand-held type (b) Desk-top type

Figure 2.7 Two types of common laser bar-code readers

For those products, great improvement is needed in order to make them acceptable in practical applications. In 1998, the first image bar code reader appeared. Linear image readers have the advantages which the laser bar code readers have in all aspects except in the distant reading; however, more importantly, the prices of them are lower. People pay more and more attention on linear image readers because of their distinctive features as follows. 1) There are no mobile parts that are prone to get biased and damaged. This extends the service lifetime and reduces the service price. 2) The recognition rate is 5 times higher than that of a light pen reader or a CCD reader. 3) Image bar code readers are developed for reading two-dimensional bar codes, whereas the laser bar code ones cannot be improved to own this capability. This paper studies bar code localization and recognition based on the image processing method.

First, we capture the image containing a bar code by a digital camera, and then we improve the image quality by image processing technique to eliminate the bad effects on the image, such as non-uniform lighting, blurs, bar code inclination, noise, and so on. After that, we locate the bar code area correctively and rapidly, and then decode a part of the processed bar code to retrieve the information of the bar code.

Anil K. Jain (1993) localizes bar code using texture analysis and Gabor filter. Both supervised and unsupervised methods have been discussed. However, those methods are time consuming. Douglas Chai (2005) divides the image into 32-by-32 pixels small blocks, and then computes each block's angle. Blocks with the same angles are selected to form a bar code area for localization. The localization algorithm is straightforward in idea; it also determines the image angle while localizing the bar code. However, this method is good for one-dimensional bar code only; it is not effective for some other cases. Zhang Chunhui (2006) proposes a method for automatically localizing the bar code in complex scenes. First, the image is reduced in resolution, and then the region-based analysis is applied to localize the bar code. After that, the original image is used to focus and read the bar code. Ramtin Shams (2007) develops a method for reading bar codes from highly distorted images with low resolution, with blurs and noises, under no uniform lighting. It can be applied to a hand-held device, like a mobile phone. By making use of the special head data of a bar code, Feng Xiaojun (2005) localizes the bar code from JPEG2000 images. Because JPEG images are less complex in coding than JPEG2000 images, it is necessary to do Huffman decoding for a JPEG image before this method is applied to. Alexander Tropf (2006) proposes to localize bar codes in DCT (discrete cosine transform) domain; the precondition is that a bar code has to occupy at least 10 percent of the whole image. Because the weighting matrix coefficients are not determined self-adaptively, the robustness of the result is not as good as desired. Hu Ying (2006) discusses a low cost bar code recognition method, which also has the precondition that the bar code is already located. Fan Yongfa (2003) uses a 3-step method, including image erosion, median filtering, and template matching. This method is easy to be understood, but it is time consuming too. Fan Yongfa (2003) computes the inclination angle using invariant moments. Zhao Suxia (2005) introduces the EAN-13 bar code recognition method based on image processing, and takes bar codes on a corrugated

box for illustration. This method includes steps of de-noise, rectification and so on. It is restricted to objects with a specific shape. Propose a bar code detecting algorithm based on sub-region multicharacteristics analysis. Guo Yanping (2002) presents a brief introduction to digital image processing technology for bar code recognition, including the conversion of a RGB (red, green blue) image to a grey image, and then to a binary image using a threshold, the mean-value filtration, the vertical and horizontal projection, and so on. Li Qingfeng (2006) gives a brief introduction to five methods of detecting the line angle, and analyzes their advantages and disadvantages.

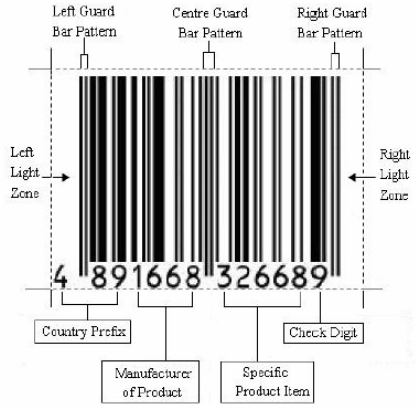


Figure 2.8 Structure of an EAN-13 bar code

The widely used one-dimensional bar code is EAN-13 bar code, the structure of which is shown in Figure 2.7. It carries information through numbers from zero to nine. This information includes the country prefix, the product manufacturer, the specific product item and the check digit. It consists of one-bit precedence code, six-bit left data, and six-bit right data; the last bit of the six-bit right data is the check digit. In the process of the bar code recognition, the algorithm reads the first six numbers, and then the subsequent six numbers. After that, it identifies the precedence code based on the left or right six numbers of different parities.

2.10 Self-service technology (SST)

Increasingly, the role of face-to-face interaction between suppliers and buyers is being replaced with self-service technologies (SSTs), which allow the buyers to produce and use these services by themselves, without direct contact with any employees of the firm. Although it is evident that SSTs are gaining in popularity as a method of doing business, it is less clear what the drivers for buyers' continued use of this kind of service are (Yen and Gwinner, 2003). Buyers' continued use is central to the survival of SSTs. Market shares and revenues of a firm depend on both the number of initial adopters and the number of continued users (Bhattacherjee, 2001). The importance of buyers' continued usage versus initial adoption is evident from the fact that acquiring new buyers may cost as much as five times more than retaining existing buyers, based on the costs of searching for new buyers, setting up new accounts, and initiating new buyers to the use (Bhattacherjee, 2001). If a firm in the insurance industry increases its buyer retention by 5 percent, it conveys savings in operating costs by 18 percent (Bhattacherjee, 2001). Therefore, for sellers that use SST, it is crucial to focus on buyers' continued usage. Buyers' continued usage depends on their acceptance of the technology and their satisfaction with service delivery. Whereas most studies examine these antecedents separately, it is likely that they both have an effect on buyers' continued use. The reason that these two antecedents of buyers' continued use have not been previously combined is that they build on two different research streams: technology acceptance and service/relationship marketing. In terms of technology acceptance, perceived usefulness has been found to be a good indicator of how a product or service relates to the buyers' or sellers' context. As defined by Davis et al. (1989), perceived usefulness is ''the extent to which a person perceives increased benefits from using the SST.'' This definition emphasizes user context by asking users to focus on perceived benefits to them, regardless of the properties of the SST itself. Even though an SST may be considered excellent, users will not perceive it as useful if it does not provide a benefit to them. The situation specificity of the users' evaluation of usefulness is central because attitudes that are situation-specific are more likely to influence actual behavior (Foxall and Yani-de-Soriano, 2005). Research has often provided weak links between attitude and behavior (Wicker, 1969), but the theory of reasoned action provided a stronger link with the introduction of behavioral

intention and behavioral expectation as intermediaries between attitude and behavior (Ajzen and Fishbein, 1980; Leone et al., 1999; Warshaw and Davis, 2001). Recent research has found that controlling for the situation in which attitudes relate to behavior provides an even stronger means of establishing a link between attitudes and behavior (Foxall and Yani-de-Soriano, 2005; McBroom and Reed, 1992). Because a user's perceived usefulness of an SST is inherently situation-specific, this paper accepts that their perceived usefulness of an SST influences their behavior and is an antecedent of SST usage. The second antecedent of continued use is buyer satisfaction, which is considered as the primary motivation for continued usage (Oliver, 1980). Buyers who are satisfied tend to continue their usage, whereas dissatisfied buyers discontinue their usage (Gianni and Franceschini, 2003; Pare et al., 2005). Studying buyers' level of satisfaction has interested many researchers, especially in the field of marketing (Cho and Park, 2001). Because the buyers' level of satisfaction is believed to affect the buyers' purchasing behavior, firms have focused on improving it (Cho and Park, 2001; Oliver, 1980). Every interaction between the firm and the buyer is a service encounter influencing the buyer's attitudes; therefore, all encounters should be considered (Oliva et al., 1992). Satisfaction refers to the SST offering, which means that satisfaction is usually an amalgamation of all channels into an interface between the selling firm and the buyer. For instance, the buyer may use the Internet to search for information during the prepurchasing stage and then visit an individual store to make the final purchasing decision (Peterson et al., 1997). In addition, buyers may want to go shopping as part of a pleasure experience and use the Internet for conducting an information search or other purchases (Balasubramanian et al., 2005). For satisfaction to be context-specific, the multichannel exchange situation must also be considered. Research studies focusing on buyer channels have identified that most buyers make use of both the Internet and stores (Rangaswamy and Van Bruggen, 2005), and that the consumers brand loyalty in the traditional market positively correlates with the attitudes towards the brand's online channels (Wang et al., 2006a), which is why the definition of buyer satisfaction used in this study comprises all channels that firms use. We use the term buyer multi channel satisfaction to emphasize this point.

2.11 Related Research

There has been wide discussion in the literature about adoption of customer service technology. Literature about adoption of customer service technology in retail by Jorna Leenheer (2008) uses multi-level models for both loyalty program adoption and perceived effectiveness. The external factors were assortment homogeneity, purchasing frequency, competitive intensity, customer profitability, diversity customer orientation technological skills, centralization company size, customer knowledge customer loyalty.

Studies	Research Title	Model	Factors
Jorna Leenheer, 2008	Which retailers adopt a loyalty program? An empirical study	multi-level models for both loyalty program adoption and perceived effectiveness	- Assortment Homogeneity - Purchasing Frequency - Competitive Intensity - Customer Profitability Diversity - Customer Orientation - Technological Skills - Centralization - Company Size - Customer Knowledge - Customer Loyalty

The results of the study reveal that assortment homogeneity, purchase frequency, competitive intensity, customer profitability differences, customer orientation, and centralization affect loyalty program adoption. Only technological skills and centralization enhance customer knowledge; centralization negatively affects customer loyalty. A loyalty program aims to attract and stimulate loyal customers, assuming that they are the most profitable customer group for the retailer.

Studies	Research Title	Model	Factors
Rita Walczuch, 2007	The effect of service employees' technology readiness on Technology acceptance	the technology readiness index (TRI) and TAM into one model	- Optimism - Innovativeness - Insecurity - Discomfort - Optimism - Innovativeness - Insecurity - Discomfort - Ease of use

The research is the effect of service employees' technology readiness on Technology acceptance by Rita Walczuch (2007). He used the technology readiness index (TRI) and TAM into one model. The external factors were optimize, innovativeness insecurity, discomfort optimism, innovativeness insecurity, discomfort, ease of use.

The results of the study reveal that the personality of the user as well as the characteristics of the technology; personality characteristics as measured in the TRI have a significant effect on technology adoption. Another point that needs attention is that TAM was intended to deal with a single technology.

Studies	Research Title	Model	Factors
Robert Stone, David Good, Lori Baker-Eveleth, 2007	The impact of information technology on individual and firm marketing performance	the Technology Acceptance Model (TAM)	- Organizational traits - Individual traits - Information quality - Ease of system use - System/Service quality - Industry traits - Attitude toward using the system - Perceived usefulness - Perceived organizational performance impacts - Tasks performed

Research by Robert Stone, David Good, Lori Baker-Eveleth (2007) in the topic is The impact of information technology on individual and firm marketing performance. They use the Technology Acceptance Model (TAM). The external factors were organizational traits, individual traits, information quality, ease of system use, system/service quality, industry traits, attitude toward using the system, perceived usefulness, perceived organizational, performance impacts and tasks performed.

The results of the study reveal that modifying the Technology Acceptance Model (Davis 1989, Davis et al. 1989), the DeLone and McLean (1992) model and Goodhue and Thompson's (1995) task-technology-individual fit proposal, this research empirically explored the organizational, individual, information, system, industry, and task traits that influence perceived organizational performance impacts from IT use mediated by ease of system use and perceived individual performance impacts, system satisfaction, and system use. It was found that through the diligent marshalling of technological, environmental, and human resources, management can enhance the impact IT has on perceived marketing organization performance.

Studies	Research Title	Model	Factors
GordonMu¨ ller-Seitz, 2007	Customer acceptance of RFID technology: Evidence from the German electronic retail sector	the Technology Acceptance Model (TAM)	- Perceived usefulness - Perceived ease of use - External variables - Attitude toward using - Behavioral intention to use - Actual system use - Security concerns

Customer acceptance of RFID technology: Evidence from the German electronic retail sector by GordonMu¨ ller-Seitz (2007) used the Technology Acceptance Model (TAM)**.** The variables were perceived usefulness, perceived ease of use, attitude toward using, behavioral intention to use, actual system use and security Concerns. This research was able to confirm the TAM with reference to RFID technology, principally. They revised the established TAM by incorporating the overall attitudes of customers toward novel technologies as well as security concerns.

Their data suggest that both aspects are crucial for the acceptance of this novel technology. By nature, this study has some limitations. Due to its exploratory nature, only vague generalizations can be made. Although our 206 respondents are a representative sample, the significance of the explanatory power is restrained. Hence, they can only suggest that the general attitude toward novel technologies might have an impact on the PEOU. This applies to the general attitude toward the protection of data privacy, as well as accompanying security concerns. Furthermore, additional research is needed to elucidate the relations between security concerns and the general attitude toward data security or PEOU and the general attitude toward new technologies.

Studies	Research Title	Model	Factors
Leroy Robinson Jr,2007	Sales force use of technology: antecedents to technology acceptance	the Technology Acceptance Model (TAM)	- Perceived usefulness - Perceived ease of use - Attitude toward using - Behavioral intention to use - Length of service/work experience - Personal innovativeness - Support services - Organizational innovativeness - Perceived control

Sales force use of technology: antecedents to technology acceptance by Leroy Robinson Jr (2007). They used the Technology Acceptance Model (TAM). The variables were perceived usefulness, perceived ease of use, attitude toward using, behavioral intention to use, length of service/work, experience personal innovativeness, support services, organizational innovativeness and perceived control.

The result of this research shows that four of the five expected regularities within the core TAM were supported in the context of our sample of salespeople, and two of the eight new hypothesized paths were supported. Within the core TAM, perceived usefulness and perceived ease of use are both related to attitude toward

technology. Attitude toward technology is directly related to behavioral intentions to use technology. However and unexpectedly, perceived usefulness is not directly related to behavioral intentions to use technology. In addition, perceived ease of use is related to perceived usefulness. Results also reveal that perceived level of availability of support services is positively related to perceived ease of use. As salespeople interact with a technology, problems may arise. These problems may be related to the use of the technology internally (e.g., administrative work, communication within the firm) or when dealing directly with customers.

CHAPTER III
RESEARCH METHODOLOGY

In this chapter the research methodology is described in terms of study methods, research tools and research schedule from the beginning until the end of research.

Research Methodology

This research is comprised of 10 operational that are used to answer the objectives. The schematics of the procedures are shown in figure 3.1. The details of each procedure are described in section 3.2-3.11.

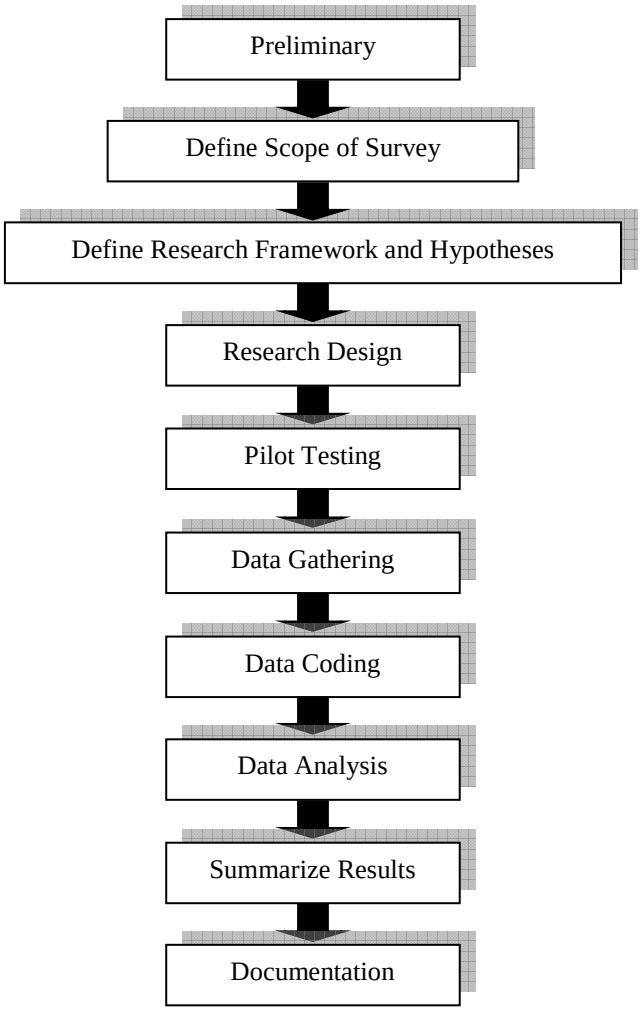


Figure 3.1 Over View of Research Methodology

3.1 Preliminary Study

Firstly, researcher study related document that involve in the characteristics of retail in Thailand. Next, study related statistics theories and gather data from the study of related researches, thesis, seminar papers, survey reports, other statistics reports, and also in the internet. The core of research focuses on as follow:

- The role and the importance of customer service technology in retail which is comprised of 5 types as follow: department store, convenience store, grocery store, supermarket and discount store.
- Current situation and statistic of customer service technology adoption in Thailand.
- The factors which acceptance of customer service technology in retail.
- Possible recommendations of widespread and successful customer service technology adoption.

3.2 Define Scope of Survey

3.2.1. Target Group

The target group of this survey is retailers in Thailand. From the National Statistical Office Thailand (National Statistical Office, 2009) divided into 5 groups as follows:

- Department Store
- Convenience Store
- Discount Store
- Supermarket
- Grocery Store

3.2.2. Population and Sampling

The population in this research is the retailers in Thailand. From survey report of the National Statistical Office Thailand in 2009 total 5,070 retails are divided in to 5 types: department store, convenience store, grocery store, supermarket and discount store. (National Statistical Office, 2009)

The definition of sampling group has two methods: finite population (knows population size or N) and infinite population method (unknown population size). Therefore, the first method, the finite population is selected and used with

R.V.Krejcie & D.W. Morgan's theoretical statistics by calculating size of sampling groups and defines the level of significance as α = .05 that are 371 samples (Silpjaru, 2008). The despondences were received from 411 Thai retailers was used in this study. The response rate is 100 percent. The respondents were asked to participate in the study whether the manager or IT section in retail.

Table 3.1 Number of Retails in Thailand (The Department of Internal Trade, 2010)

Category	**Number of retails**
Department Store	1,175
Convenience Store	327
Discount Store	333
Supermarket	691
Grocery Store	2,544
Total	5,070

From the all above, this research defines the level of significance as α = .05 and will use formula to calculate size of example as follow (Sinjaru, 2007):

$$N = \frac{n}{1+ N (e)^2}$$

n = Sample size
N = Population size
e = Level of significant

3.3 Research Framework and Hypotheses

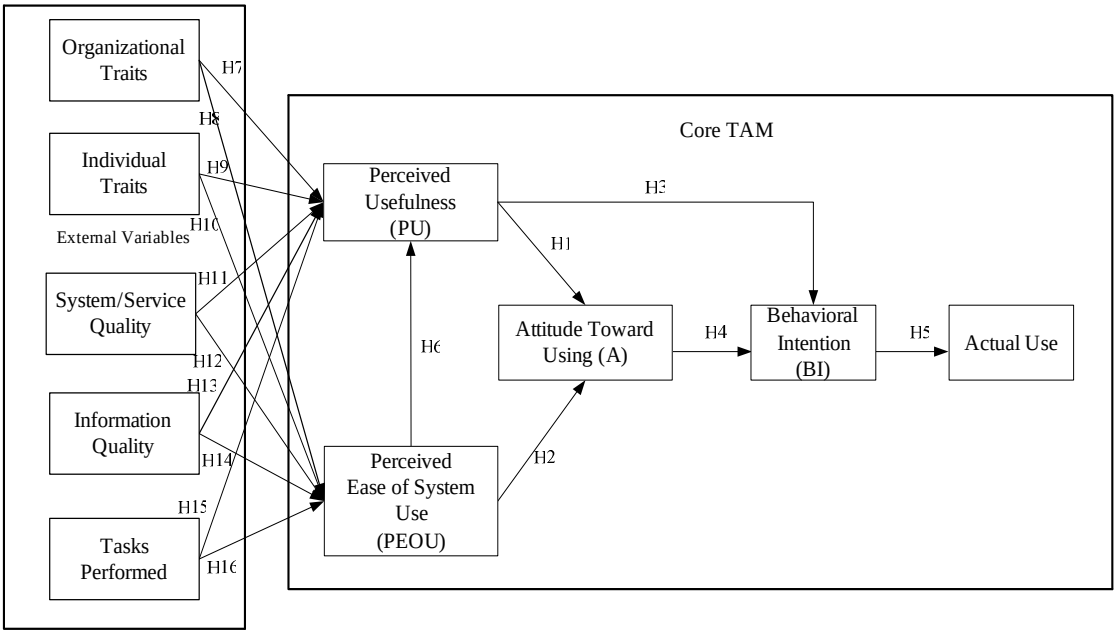


Figure 3.2 Theoretical framework

Table 3.2 Operational Definitions of Questionnaire Construct

Constructs	Definition
Organization Traits	The degree to which the characteristics of the organization and the individual impact.
Individual Traits	The degree to which the technology leadership and previous technology experience.
Information Quality	The customer service technology at work provide up to date, on time, sufficient and clear information.
System/Service Quality	The degree to which the perception of system/service quality in term of easy to use and well maintained.
Tasks Performed	The degree to which the customer service technology in retail has been important in aiding performance.
Perceived Ease of System Use	The degree to which an individual believes that using customer service technology would be free of physical and mental effort.

Constructs	Definition
Perceive Usefulness	The degrees of retailer's perceive benefits of the customer service technology.
Behavioral Intention to Use	The retailer's likelihood to use the customer service technology.
Attitude Toward Using The system	Individual preferences and interests via feelings and evaluations regarding the customer service technology.
Actual use of system	The degree to which the retailers are perceived as better than the old ideas in perceive of customer service technology

The theoretical framework is summarized by a series of hypotheses that relate to both the general model displayed in figure 3.2 and the empirical study. The research model for this study is TAM plus external variables. These external variables have organization traits, individual traits, information quality, system/service quality task perform and actual use of system. The researcher sets research hypotheses as follows.

The core concept of TAM is that a person's attitude toward using a technology is jointly determined by perceived usefulness and perceived ease of use. Technology usage is determined by behavioral intentions but differ from the theory of reasoned action in that usage is viewed as being mediated by the person's attitude toward using the technology. The attitude behavioral intentions relationship represented in TAM implies that. To summarize the regularities expected based on core TAM.

TAM is used as the baseline model and results in the following hypothesized relationships.

Hypothesis 1: There will be a positive relationship between perceived usefulness and attitude toward using the system.

Hypothesis 2: There will be a positive relationship between perceived ease of use and attitude toward using the system.

Hypothesis 3: There will be a positive relationship between perceived usefulness and behavioral intention to use the system.

Hypothesis 4: There will be a positive relationship between attitude toward using and behavioral intention to use the system.

Hypothesis 5: There will be a positive relationship between behavioral intention to use the system and actual use.

Hypothesis 6: There will be a positive relationship between perceived ease of use and perceived usefulness.

Hypotheses of the acceptance predictor "external variables"

Hypothesis 7: There will be a positive relationship between organization traits and perceived usefulness.

Hypothesis 8: There will be a positive relationship between organization traits and perceived ease of system use.

Hypothesis 9: There will be a positive relationship between individual traits and perceived usefulness.

Hypothesis 10: There will be a positive relationship between individual traits and perceived ease of system use.

Hypothesis 11: There will be a positive relationship between system/service quality and perceived usefulness.

Hypothesis 12: There will be a positive relationship between system/service quality and perceived ease of system use.

Hypothesis 13: There will be a positive relationship between information quality tasks performed and perceived usefulness.

Hypothesis 14: There will be a positive relationship between information quality and perceived ease of system use.

Hypothesis 15: There will be a positive relationship between tasks performed and perceived usefulness

Hypothesis 16: There will be a positive relationship between tasks performed and perceived ease of system use.

Expanded hypotheses of psychographic and demographic variables

In addition to acceptance predictors, further psychographic and demographic variables affect the acceptance of customer service technologies in retailing. These are depicted below and the ensuing hypotheses are set seven subsequently.

Hypothesis 17: The different retail type will be affected to the accepted of customer service technology.

Hypothesis 18: The different geographical location of retail will be affected to the acceptance of customer service technology.

Hypothesis 19: The different target group will be affected to the acceptance of customer service technology.

Organization types

Each type of organization of retailer is a key factor about adoption of 9 types of customer service technologies. It found that many key factors have customer service technology. The larger organizations have technology resources to invest in customer service technology. Conversely, the smaller organizations are more likely to be innovate and more flexible.

Additionally, it was found that there is significant correlation between company size and category of retail. Small firms have an initial investment the lowest, while large firms had spent an initial customer service technology investment the highest. In this reason, this correlation is congruous between firm size and customer service technology expenditures.

3.4 Research Design

The conceptual research framework and research hypotheses were defined, questionnaire for quantitative data gathering. The survey instrument was developed from many research papers such as Schot, 2007; The National Telecommunications Commission and National Electronics and computer Technology Center (NECTEC), 2006; Vijayaraman & Osyk, 2006; and related research. Questionnaire, it is divided in to 3 parts as shown in table 3.3.

Table 3.3 Topics of Questionnaire

Part	Topic
1	Organizational characteristics and general information
2	Customer service technology utilization
3	Acceptance/Recommendation to encourage customer service technology in retail

Part 1: Organizational characteristics and general company information

This part will make to understand the company profile, such as core business area, category of their retailer, company size, main type of customer service technology and target groups.

In this part, by check-list item type which contains 6 items were made. There are 2 items which require are replied more than one answer. The check-list item type is used frequency and percentage approaches of which results are shown in table and graph styles.

Part 2: Customer service technology utilization

This part will make to understand the customer service technology which retailer used and their reason did not to use. The most questions this part are check-list item type and rating scale. As a result, the researcher uses frequency, percentage, mean values ($\overline{X}$), Standard Deviation (S.D.) approaches of which results are shown in table and graph styles.

Part 3: Acceptance / Recommendation to encourage customer service technology in retail

This part will make to understand the acceptance customer service technology in retail. The operation definition of questionnaire constructs 10 functions as follows:

- Organization Traits
- Individual Traits
- System/Service Quality
- Information Quality
- Tasks Performed
- Perceived Ease of System Use
- Perceive Usefulness

- Behavioral Intention to Use
- Attitude Toward Using The System
- Actual Use of The System

All questions in this part which consist of rating scale 27 items. Mean values ($\overline{X}$) and Standard Deviation (S.D.) were used.

The measures

The constructs defined in the theoretical model were operationalized by several measures. These measures were stated in the hypotheses presented earlier. Each measure was formed from two or more questionnaire items. All these items are shown in table 3.4. All the measures were formed using questionnaire items that were either developed by the authors or modified from previously published scales to the technology-oriented environment in which the instrument was utilized. Specifically, innovative climate originated from work done on franchisee innovation by Koys and DeCotiis (1991) and work by Strutton et al. (1993).

Table 3.4 the Sources and the Items Summarized

Constructs	Source
Organization Traits	
Encourages me to find new ways around old problems. (OT1)	R.W. Stone et al.,2006
Encourages me to develop my own ideas. (OT2)	
Likes me to try new ways of doing things. (OT3)	
Individual Traits	
Usually, I am one of the first among my professional associates to adopt a customer service technology when it is available. (IT1)	R.W. Stone et al. (2006)
In general, I am the first of my business associates to know about customer service technology. (IT2)	
Information Quality	
The customer service technology at work provides up-to-date information. (IQ1)	R.W. Stone et al. (2006)
The customer service technology at work provides the information I need on time. (IQ2)	
The customer service technology at work provides sufficient information. (IQ3)	
The customer service technology at work provides information that is clear. (IQ4)	
Perceived Ease of System Use	
I find the customer service technology easy to use. (PEOU1)	Davis (1989), Adams et al. (1992)

Constructs	Source
I find it easy to get the customer service technology to do what I want it to do.(PEOU2)	
System/Service Quality	R.W. Stone et al. (2006)
The customer service technology at work is excellent in terms of the promptness of maintenance and repair. (SQ1)	
The customer service technology at work is the quality of maintenance and repair.(SQ2)	
Retailer previous customer service technology experience (Individual Traits)	R.W. Stone et al. (2006)
I have used customer service technology throughout my career. (IT3)	
I have used customer service technology over a long period of time. (IT4)	
Tasks Performed	R.W. Stone et al. (2006)
The customer service technology in your retail has been important in aiding performance in the following areas providing information for effective communication.(TP1)	
the customer service technology in your retail has been important in aiding performance in the following areas improving communication between my firm and customers. (TP2)	
Perceive Usefulness	Davis (1989), Chin and Todd (1995)
In my retail, customer service technology improves my work performance. (PU1)	
In my retail, customer service technology help make me more successful.(PU2)	
In my retail, customer service technology improves the quality of my work.(PU3)	
Behavioral Intention to Use	Ajzen and Fishbein (1980)
The customer service technology at work is successful by improving organizational performance.(BI1)	
The customer service technology at work lead to a more successful organization.(BI2)	
The customer service technology at work improves the marketplace success of the firm.(BI3)	
The customer service technology at work lead to higher quality of work. (BI4)	
Attitude Toward Using The system	Ajzen and Fishbein (1980)
Overall, I am content with the customer service technology at work. (ATT1)	
Overall, I am pleased with how the customer service technology at work facilitates my work.(ATT2)	
Overall, I am satisfied with the customer service technology at work. (ATT3)	
Actual use of the system	R.W. Stone et al. (2006)
I am content with the customer service technology at work. (ACT1)	
I am pleased with how the customer service technology at work facilitate my work. (ACT2)	
I am satisfied with the customer service technology at work and fit well. (ACT3)	

3.5 Pilot Testing

After design the questionnaire, a pretest was required. We asked 14 retailers listed on the collected from Google Docs websites to check understanding and complete the preliminary in questionnaire. The participants were asked to complete the questionnaire and provide comments regarding the wording of items. Then, the survey instrument had been improved and adjusted to be the most suitable for gathering relevant data. Data having been gathered, analysis of interrogations in questionnaire for reliability was carried out. The scale of reliability analysis was conducted for measurement has shown in Data Gathering.

3.6 Reliability and Validity Testing of the Instrument

Consequently, the researcher designed questionnaire for gathering data. The questionnaire was examined by 14 retailers to check their understanding clearness. Then, the researcher improved and corrected it to be ready to gathering data. Moreover, validity and reliability test were also conducted to measure the scale of reliability analysis in this study by Cronbach's alpha (α).

Cronbach's alpha scores shown in Table 3.4 indicated that each construct exhibited strong internal reliability. Convergent validity was assessed based on the criteria that the indicator's estimated coefficient was significant on its posited underlying construct factor. We evaluated the measurement scales using the two criteria suggested by Fornell and Larcker (1981).

- All indicator factor loading (λ) should be significant and exceed 0.50
- Construct reliabilities should exceed 0.70

Cronbach's alpha coefficient which is reliability analysis of questionnaire is suitable for testing with Likert scale of data type. Therefore, there are 27 questions which are divided into 10 main factors were tested reliability as follow:

- Organization Traits
- Individual Traits
- System/Service Quality
- Information Quality
- Tasks Performed

- Perceived Ease of System Use
- Perceive Usefulness
- Behavioral Intention to Use
- Actual Use of The System

It is suitable for further data gathering. The result of reliability testing is apparent that all factors of Cronbach's alpha coefficient are greater than 0.70, as shown in Table 3.4

Table 3.5 All Results of Reliability Analysis by Cronbach's Alpha Values

Scale items	Item	Cronbach's alpha
Organization Traits	4	0.88
Individual Traits	2	0.80
System/Service Quality	2	0.88
Information Quality	4	0.85
Ease of System Use	2	0.92
Perceive Usefulness	3	0.90
Task Perform	2	0.91
Attitude Toward Using The system	3	0.86
Behavioral Intention to Use	2	0.88
Actual Use of The System	3	0.88

3.7 Data Gathering

This step is comprised of 2 methods to gather data from sample groups. Data Gathering Approaches

Quantitative Data Gathering by Questionnaire Instrument

Questionnaires had been distributed for 2,220 copies to company by an explanatory letter with postage on returned envelope with the questionnaire for 3 months from November 2009 to January in 2010. The researcher also included direct observes. The questionnaire is divided into 3 parts.

Part 1: Profile of retailers

This part will help to understand the retailer profile such as types of retail, number of employees, core business area, characteristic of their retail and their target groups. This part use tools are check list questionnaire 7 items.

Part 2: Strategies and direction of retailers

This second part will provide strategies to developed customer service technology. It will help to understand the customer service technology acceptance and requirement to improve the customer service technology.

Part 3: The third part will determine the acceptance of the customer service technology in retail.

This part will help to understand the current status of IT tools such as bar codes/scanner, self-service technologies, credit/debit card payment and smart card. And this part is also comprised of rating scale. Mean values ($\overline{X}$) and Standard Deviation (S.D.) were used. With regard to level of mean value in Likert's scales, there were 5 levels which were rearranged and translate (Siljaru, 2008) as following:

Point average 4.50 – 5.00 = highest level
Point average 3.50 – 4.49 = high level
Point average 2.50 – 3.49 = medium level
Point average 1.50 – 2.49 = low level
Point average 1.00 – 1.49 = lowest level

The table 3.6 shows the factor analysis was used to confirm the validity of all constructs. Construct validity was examined principal factor analysis by using the varimax rotation. Factor loading of every constructs exceeding the value of 0.5 is acceptable (Hair et al., 1995). As show in table 3.16 factor loading of all constructs have greater load exceeding 0.5, factor loading value of this study range from 0.732 to 0.911.

Table 3.6 Overall Perception of all constructs

Construct/indicator	Item	Factor loading	Cronbach's alpha
Organization Traits	OT1	0.866	0.88
	OT2	0.846	
	OT3	0.852	
	OT4	0.837	
Individual Traits	IT1	0.871	0.80
	IT2	0.843	
Information Quality	IQ1	0.870	0.85
	IQ2	0.879	
	IQ3	0.837	
	IQ4	0.879	
System/Service Quality	SQ1	0.771	0.88
	SQ2	0.753	
Perceived Ease of System Use	PEOU1	0.905	0.92
	PEOU2	0.931	
Perceive Usefulness	PU1	0.879	0.90
	PU2	0.891	
	PU3	0.812	
Tasks Performed	TP1	0.715	0.91
	TP2	0.845	
Behavioral Intention to Use	BI1	0.912	0.88
	BI2	0.839	
Attitude Toward Using The system	ATT1	0.907	0.86
	ATT2	0.870	
	ATT3	0.858	
Actual Use	ACT1	0.839	0.88
	ACT2	0.931	
	ACT3	0.846	

3.8 Data Coding

After the questionnaires had been returned, data were screened and uncompleted answers were eliminated. Respondents who had never experienced with customer service technology were also excluded from this study. The data was put in Microsoft Excel then converted to SPSS and LISREL (8.80) student edition.

3.9 Data Analysis

All of respondences that received are used to describe by descriptive statistics for each question. These measures were used to describe the general view of Thailand's Retailing. Hypotheses testing which was proven in the research consist of 3 parts. Data was analyzed by using SPSS (Statistical Package for the Social Science for Windows) version 17.0 for window. The acceptable statistical significant level was set

at 0.05. There are two steps for data analysis: 1) descriptive statistics to describe a qualitative data. 2) Inference statistical tests to test hypothesis.

Third part was analysis by LISREL (8.80) student edition for window. It can estimate a measurement and structure model, and achieve a good model fit after analysis and modification. In addition, It can integrates factor analysis, principal components analysis, discriminant analysis, path analysis.

Part 1 and 2: Inference statistics

Which were used difference test between medians of various population groups (more than 2 groups) It was mostly and commonly employed when there was one nominal variable and one measurement variable, and the measurement variable did not converge at normality assumption of ANOVA. Therefore, the One-way ANOVA, median value for testing is utilized instead of mean value and ranked value. Similarly, the method transformed measurement / conditions / interval variables to become in the ranked data. This method is more appropriate for small samples than parametric statistics; it produces high statistical confidence and power. Moreover, it is suitable for the ordinal number.

Part 3: LISREL(Linear Structure Relationship)

This part consist of the constructs of system quality, information quality, service quality, perceived usefulness, perceived ease of use and intention to use. The characteristic of this part is rating scale, have 27 items. The researcher use mean value ($\overline{X}$) and standard deviation (SD) analyzed the data, the result that show in table and graph styles. Each item was measured using a five-point Likert-type scale, with answer choices ranging from strongly disagree (1) to strongly agree (5). The perceptions were also interpreted for the five levels in Likert's scale (Silpjaru, 2007) which is a parametric statistics approach were adopted to analyze relationship between variables that are related scale measurement. It was used when variable of normality testing was merely normal distribution.

The Spearman's Rank Correlation Coefficient was applied to analyze relationship between variables that is ordinal scale. Factor analysis is one of these techniques that can serve the purpose of data reduction. In this technique, many

variables are reduced into smaller number of factor. Factor analysis is statistical tools for analyzing scores on large number of variable of determine whether there are many identifiable dimensions that can be used to be describe many of the variables under study (Munro, 2004).

The reliability and validity of the measurement model was assessed by a confirmatory factor analysis (CFA) using the LISREL software was to perform the structure modeling analysis. Model fit using the Comparative;

Model Fit Measures	Recommended Value
1. χ^2/d.f.	< 2.0
2. Goodness-of-fit index (GFI)	> 0.9
3. Adjusted GFI (AGFI)	> 0.8
4. Normed fit index (NFI)	> 0.9
5. Non-normed fit index (NNFI)	> 0.9
6. Relative fit index (RFI)	> 0.9
7. Incremental fit index (IFI)	> 0.9
8. Root mean square residual (RMR)	< 0.05
9. Root mean square error of approximation (RMSEA)	< 0.08
10. Critical N	> 200

This step was used to test if the empirical data conformed to the presumed model Hypotheses testing include against:

- Organization Traits
- Individual Traits
- Information Quality
- System/Service Quality
- Tasks Performed
- Perceived Ease of System Use
- Perceive Usefulness
- Behavioral Intention to Use
- Actual Use of The System
- Attitude Toward Using The system

3.10 Summary of results

Thereafter, data analysis was operated by quantitative and qualitative method. All of data analyzed and results were summarized and discussed. The final results, research limitations and recommendations for future researches were presented and conclusively summarized.

3.11 Documentation

The result of this study will be analyzed, concluded and presented with recommendation for future development. All documents related and concerned had been carefully found out, considered, inspected, and referred for confident reliability.

3.12 Research Tools

Hardware

CPU	:	Intel Core 2 Duo T6600
Hard Disk	:	At least 2 GB
RAM	:	2 GB
Monitor	:	Wide Screen Flat Panel LCD Monitor

Software

Peripheral Devices	:	Mouse, Printer
Operating System	:	Microsoft window XP
Statistical Program	:	SPSS V.17 (Statistical Analysis System), LISREL V 8.80 (Student Edition)
PDF View Tool	:	Adobe Acrobat 7.0 Professional
Document Generator	:	Microsoft Word 2003

3.13 Research Schedule

Activity	Time (Months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Preliminary	→											
Define scope of survey		→										
Define Research Framework and hypotheses			→	→								
Design Research instrument			→	→								
Pilot Testing				→								
Data Gathering					→	→	→	→	→			
Data Coding								→	→			
Data analysis										→	→	→
Summarize Results										→	→	→
Documentation	→	→	→	→	→	→	→	→	→	→	→	→

CHAPTER IV
RESULTS AND DISCUSSION

The main objective of this chapter is to propose the report of the survey to support discussion of results. This chapter is divided into two main parts.

Firstly, investigate the general picture of Thailand's retailers that was gathered from the questionnaires survey. For the survey results, there are three main parts which include (i) profile of the retailer respondents, (ii) the current status of customer service technology incident and impacts which affect with Thailand's retailers.

The second part present the results of hypotheses testing that study the influences of factors on the customer service technology adoption and incidents of Thailand's retailers. The hypotheses testing can be divided into two parts. Firstly, researcher used Spearman's non-parametric correlation to test relationship between variables which were ordinal or scale base on factor analysis as (i) experienced handling of customer service technology, (ii) customer service technology adoption, (iii) customer service technology awareness, and dependent variable as (iv) customer service technology occurrence. Secondly, researcher used One-Way Analysis of Variance (ANOVA) to analysis of Variance by Rank Test to test hypotheses which independent variable as norminal scale and dependent variable as more than ordinal scale (National statistical office of Thailand, 2004).

The third part present the results of perform the structural modeling analysis. This showed that the constructs was supported all of the coefficients for the measure by retailers. The model was tested using LISREL contains the correlation matrix generated by it.

4.1 The General Picture of Thailand's Retailing Survey

From the survey, the population in this research is 2,200 questionnaires were distributed to a broad range of five major retailing sectors, respondences were received

Table 4.1 Summaries of respondents	
Total survey dispatched	2,220
Total response received	411
Incomplete data	40
Total usable response	371

From 411 Thai retailers was used in this study. Table 4.1 illustrates the summary of all respondences and Table 4.2 illustrates the questionnaire respond rate by retailing sectors.

The sample size of respondences which usable can be confirmed because researcher use the table of R.V.Krejcie and D.W.Morganthere to calculate the target sampling as 371 samples (Silpjaru, 2007) with significance as $\alpha = 0.05$ Therefore, researchers believe the answers to be reliable.

Table 4.2 Questionnaire response rate by retailing sector

Retailing groups	Number of responses	Percentage (%)
Department Store	57	15.36
Convenience Store	28	7.54
Discount Store	98	26.41
Supermarket	86	23.18
Grocery Store	102	27.49
Total	371	100

Table 4.3 Sample demographics

Measure	Item	Frequency	Percentage (%)
Categorization of retailing	Department Store	57	15.36
	Convenience Store	28	7.54
	Discount Store	98	26.41
	Supermarket	86	23.18
	Grocery Store	102	27.49
Number of employee	Below 50	162	43.66
	51-200	114	30.73
	Above 201	95	25.61
Owner	Thai's shareholders > 30%	302	81.40
	Thai's shareholders < 30%	57	15.36
	Foreigner owner	12	3.23
Number of branch	Yes	58	15.63
	No	313	84.37
Location	Town center	73	19.68
	Nearly residence	227	61.19
	Nearly street	59	15.90
	Gas station	12	3.23
Target group	Top	172	46.36
	Medium	312	84.10
	low	255	68.73

Descriptive statistics of respondents were shown in Table 4.3. According to table 4.2, researcher can describe as the least of respondents are Department Store (15.36%), Convenience Store (7.54%), Discount Store (26.41%), the most of respondents are Supermarket (23.18%) and Grocery Store (27.49%). In figure 4.1. Percentage ratios of retailers who were sending mail questionnaires and all of respondents are compared by retailing sectors.

4.2 Demographic Characteristics of the Sample

- **Profile of respondents**

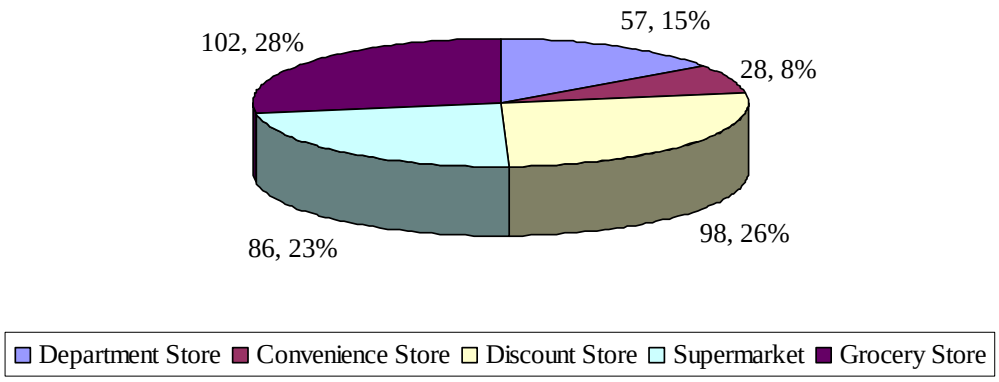


Figure 4.1 Comparison of population ratio and respondents ratio divided by retailing sectors

As figure 4.1 shows a percentage of retail of the respondents, the total of respondent was 371. Among 371 the respondents are Department Store (15.36%), Convenience Store (7.54%), Discount Store (26.41%), the most of respondents are Supermarket (23.18%) and Grocery Store (27.49%).

- **Number of employee**

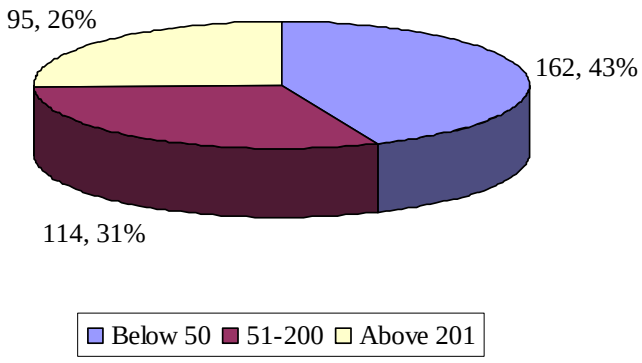


Figure 4.2 Comparison of population ratio and respondents ratio divided by number of employee

The following figure 4.2 shows that a number of employee respondents, the majority of the respondents forty three percent (43.0%) have below 50 employees. Whereas, there is respondents have above 200 employees is the smallest 26.0%. The 31.0% of respondents have 51-200 employees respectively. The demographic profile showed that the largest groups of respondents are below 50 employees. The smallest respondents are above 201 employees.

- **Owner**

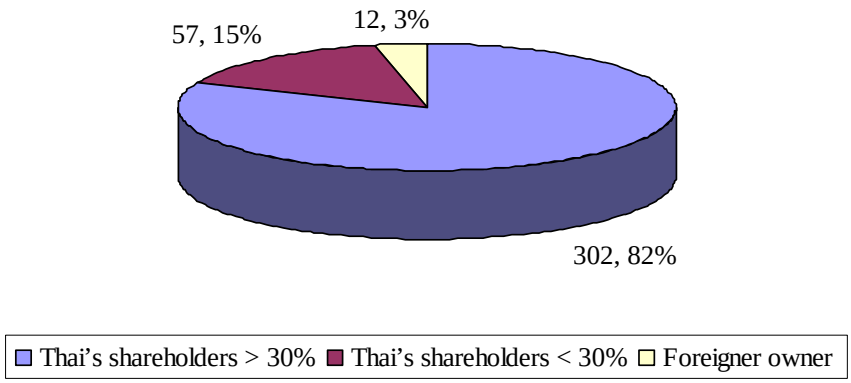


Figure 4.3 Comparison of population ratio and respondents ratio divided by category of owner

From figure 4.3, eighty two percent (82%) of respondents indicated that they have more than 30% Thai's shareholders. Fifteen percent (15%) of respondents indicated that they have less than 30% Thai's shareholders. Three percent (3%) of respondents indicated that they have foreigner owner. The demographic profile showed that the largest groups of respondents are more than 30% Thai's shareholders. The smallest respondents are foreigner owner.

- **Number of branch**

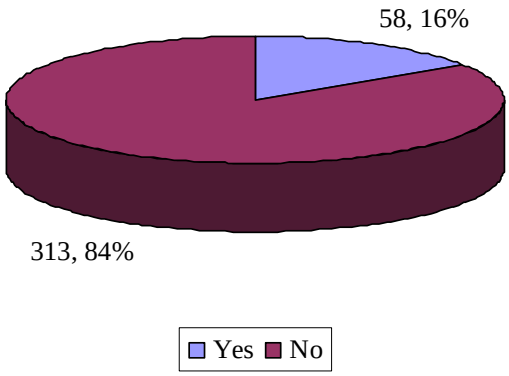


Figure 4.4 Comparison of population ratio and respondents ratio divided by brunch

From figure 4.4, eighty four percent (84%) of respondents indicated that they have brunch. Sixteen percent (16%) of respondents indicated that they have not brunch. The demographic profile showed that the largest groups of respondents are no have brunch. The smallest respondents have brunch.

- **Location**

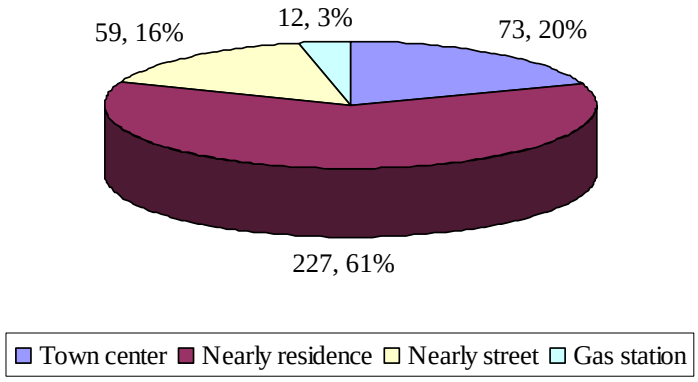


Figure 4.5 Comparison of population ratio and respondents ratio divided by location

From figure 4.5, sixty one percent (61%) of respondents indicated that they stay nearly residences. Twenty percent (20%) of respondents indicated that they stay nearly street. sixteen percent (16%) of respondents indicated that they stay at town center. Three percent (3%) of respondents indicated that they stay at gas station. The demographic profile showed that the largest groups of respondents are nearly residences. The smallest respondents are gas station.

- **Target group**

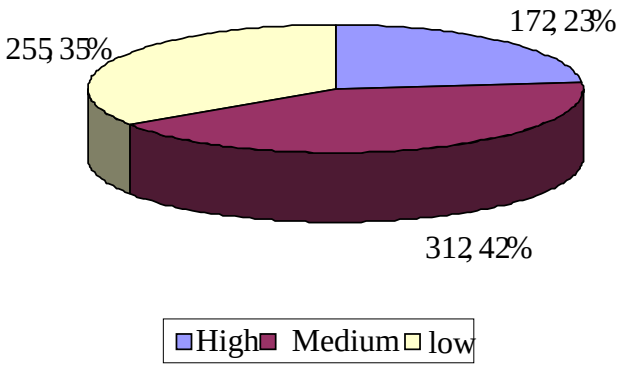


Figure 4.6 Comparison of population ratio and respondents ratio divided by target group.

From figure 4.6, forty two (42%) of respondents indicated that they have medium target group. Thirty five (35%) of respondents indicated that they have low target group. Twenty three (23%) of respondents indicated that they have high target group. The demographic profile showed that the largest groups of respondents are medium target group. The smallest respondents are high target group.

4.3 Customer Service Technology Adoption

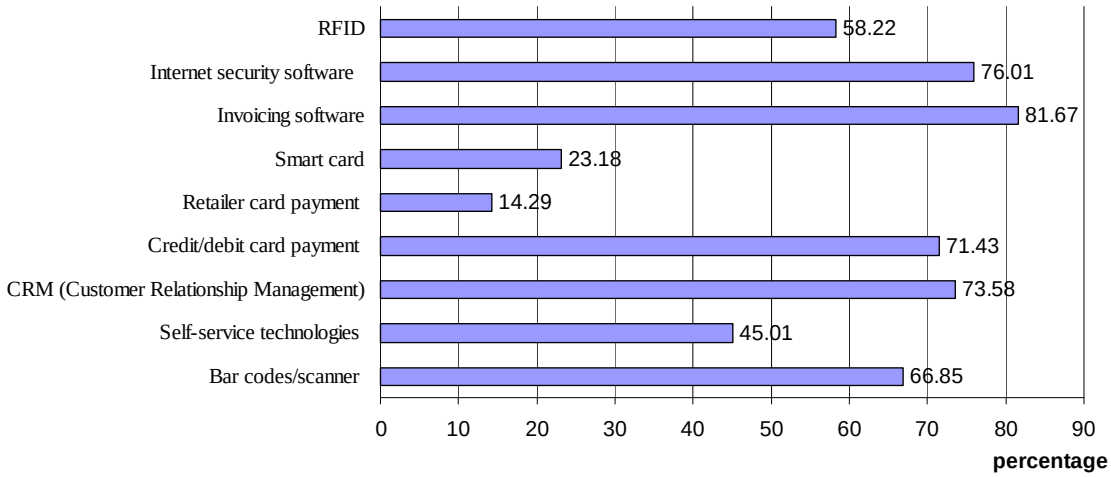


Figure 4.7 The Customer service technology adoption

According to figure 4.7, from the survey in retail part about eighty one percent (81.6%) of respondents indicated that they have usage of invoicing software. About seventy six percent (76%) of respondents indicated that they have usage of internet security software. About seventy three percent (73.5%) of respondents indicated that they have usage of CRM (Customer Relationship Management). About seventy one percent (71.4%) of respondents indicated that they have usage of credit/debit card payment. About sixty six percent (66.8%) of respondents indicated that they have usage of bar codes/scanner. About fifty eight percent (58.22%) of respondents indicated that they have usage of RFID. About forty five percent (45%) of respondents indicated that they have usage of self-service technology. About twenty three percent (23.1%) of respondents indicated that they have usage of smart card and The smallest respondents are retailer card payment about fourteen percent (14.2%).

4.4 Customer Service Technology Problems in Retails

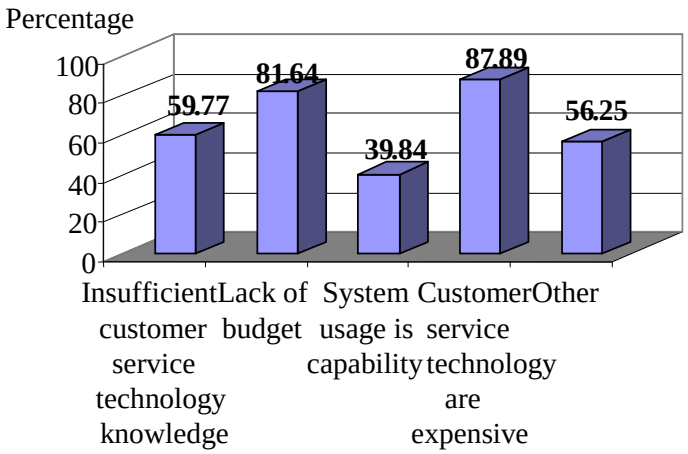


Figure 4.8 The Customer Service Technology problems in retails

According to figure 4.8, from the survey about eighty seven percent (87.8%) of respondents indicated that they have problem is the expensive cost's customer service technology. About eighty one percent (81.6%) of respondents indicated that they have problem is do not have budget apportionment in purchasing customer service technology. About fifty nine percent (59.7%) of respondents indicated that they have problem is do not have customer service technology knowledge. Other, about fifty six percent (56.2%) of respondents indicated that they have problem in customer service technology knowledge. The last problem about thirty nine percent (39.8%) of respondents indicated that they have problem is have unnecessary for usage customer service technology.

4.5 Future Direction to Customer Service Technology in Retail

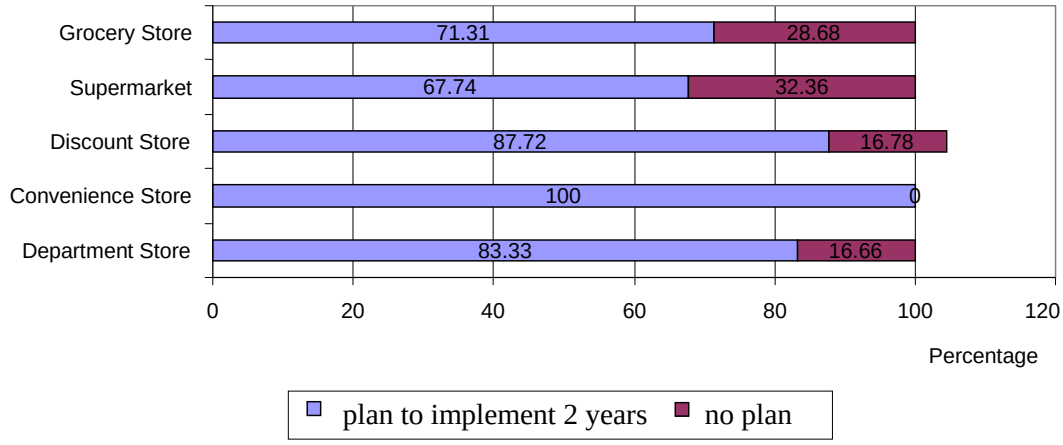


Figure 4.9 Shows the Status of Using in Customer Service Technology

According to figure 4.9, shows the status of retail implementation in customer service technology. From the survey, the top 3 retails are convenience store (100%), discount store (87%), and department store (83%) of respondents indicated that they have planning in customer service technology.

4.6 Descriptive Analysis

4.6.1 Organization Traits

The table 4.4 present respondents' perception toward organization traits of customer service technology. The result of organization traits show that all of the item means are over 3, The highest perception have on OT1 (improve work) in high, mean scores is 4.14 (SD = 0.816), follow by OT2 (higher quality) in high, mean score is 3.96 (SD = 0.743) follow by OT3 (improve marketplace) in high, mean score is 4.03 (SD = 0.736) and the least perception is OT4 (more profit) in high, the mean scores is 4.00 (SD = 0.707).

The results indicate that the respondents have perception of organization traits of customer service technology in high level and highest score on OT1 (improve work). This suggested that the retail feel customer service technology can improve their work.

Table 4.4 Organization Traits Perception of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. OT1: Customer service technology are successful by improving organization performance.	4.14	0.816	1	5	High
2. OT2: Customer service technology lead to higher quality of wok.	3.96	0.743	1	5	High
3. OT3: Customer service technology can improve the marketplace success of the shop**.**	4.03	0.736	1	5	High
4. OT4: I prospect for future profit is better.	4.00	0.707	1	5	High

The table 4.5 present respondents' perception toward individual traits of customer service technology. The result of individual traits show that all of the item means are over 3, The highest perception have on IT1 (first adoption) in high, mean scores is 3.67 (SD = 0.896), follow by IT2 (first to know) in high, mean scores is 3.96 (SD = 0.840).

The results indicate that the respondents have perception of individual traits of customer service technology in high level and highest score on IT1 (first adoption). This suggested that the retail feels the first adoption customer service technology.

Table 4.5 Individual Traits Perception of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. IT1: I am the first to adopt customer service technology even if other do not.	3.67	0.896	1	5	High
2. IT2: I am the first to know about customer service technology	3.64	0.840	1	5	High

The table 4.6 present respondents' perception toward information quality of customer service technology. The result of information quality show that all of the item means are over 3, The highest perception have on IQ4 (clear information) in high, mean scores is 3.96 (SD = 0.811). Follow by IQ3 (sufficient information) in high, mean scores is 3.86 (SD = 0.845), follow by IQ2 (on time) in high, mean scores is 3.84 (SD = 0.796), and The least perception have on IQ1 (real time) in high, mean scores is 3.85 (SD = 0.780).

The results indicate that the respondents have perception of information quality of customer service technology in medium level and highest score on IQ4 (clear information). This suggested that customer service technology provide clear information.

Table 4.6 Information Quality Perception of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. IQ1: Customer service technology provide up-to-date information (Real time).	3.85	0.780	1	5	High
2. IQ2: Customer service technology provide the information I need on time.	3.84	0.796	1	5	High
3. IQ3: Customer service technology provide sufficient information.	3.86	0.845	1	5	High
4. IQ4: Customer service technology provide information that is clear.	3.96	0.811	1	5	High

The table 4.7 present respondents' perception toward system/service quality of customer service technology. The result of system/service quality show that all of the item means are lower 3, The highest perception have on SQ1 (quickly to solve problems) in medium, mean scores is 2.59 (SD = 1.060). Follow by SQ2 (quality to maintenance and repair) in low, mean scores is 2.37 (SD = 1.044).

The results indicate that the respondents have perception of system/service quality of customer service technology in low level and highest score on SQ1 (quickly solve problems). This suggested that technician quickly helps to solve this problems.

Table 4.7 System/Service Quality Perception of Customer Service Technology

Measurement items	**Mean (n=371)**	**Standard deviation (n = 371)**	**Min**	**Max**	**Interpretation**
1. SQ1: Customer service technology are excellent in terms of technician quickly helps solve problems.	2.59	1.060	1	5	Medium
2. SQ2: Customer service technology are excellent in terms of the quality of maintenance and repair**.**	2.37	1.044	1	5	Low

The table 4.8 present respondents' perception toward task performed of customer service technology. The result of task performed show that all of the item means are over 3, The highest perception have on TP1 (effective communication) in high, mean scores is 3.84 (SD = 0.691). Follow by TP2 (improve communication between customers) in high, mean scores is 3.93 (SD = 0.657).

The results indicate that the respondents have perception of task performed of customer service technology in high level and highest score on TP1 (effective communication). This suggested customer service technology provide information for effective communication.

Table 4.8 Task Performed Perception of Customer Service Technology

Measurement items	**Mean (n=371)**	**Standard deviation (n = 371)**	**Min**	**Max**	**Interpretation**
1. TP1: Customer service technology provide information for effective communication.	3.84	0.691	1	5	High
2. TP2: Customer service technology improve communication between customers of my shop.	3.93	0.657	1	5	High

The table 4.9 present respondents' perception toward perceived ease of system use of customer service technology. The result of perceived ease of system use show that all of the item means are over 3, The highest perception have on PEOU2 (easy to get) in high, mean scores is 3.72 (SD = 0.748). Follow by PEOU1 (easy to use) in high, mean scores is 3.72 (SD = 0.748).

The results indicate that the respondents have perception of perceived ease of system use of customer service technology in high level and highest score on PEOU2 (easy to get). This suggested customer service technology provide easy to get the customer service technology to do what they want it to do.

Table 4.9 Perceived Ease of System Use of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. PEOU1: I find the customer service technology easy to use.	3.72	0.748	1	5	High
2. PEOU2: I find it easy to get the customer service technology to do what I want it to do.	3.94	0.946	1	5	High

The table 4.10 present respondents' perception toward perceived usefulness of customer service technology. The result of perceived usefulness show that all of the item means are over 3, The highest perception have on PU3 (increase quality) in high, mean scores is 4.14 (SD = 0.771). Follow by PU2 (more successful) in high, mean scores is 3.97 (SD = 0.714). The least perception have on PU1 (improve performance.) in medium, mean scores is 3.86 (SD = 0.683).

The results indicate that the respondents have perception of perceived usefulness of customer service technology in high level and highest score on PU3 (increase quality). This suggested customer service technology increase the quality of their work.

Table 4.10 Perceived Usefulness of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. PU1: Customer service technology improve my work performance.	3.86	0.683	1	5	High
2. PU2: Customer service technology help make me more successful.	3.97	0.714	1	5	High
3. PU3: Customer service technology increase the quality of my work.	4.14	0.771	1	5	High

The table 4.11 present respondents' perception attitude toward using of customer service technology. The result of perceived attitude toward show that all of the item means are over 3, The highest perception have on ATT1 (encourage to new ways) in high, mean scores is 3.86 (SD = 0.961). Follow by ATT2 (develop ideas) in high, mean scores is 3.97 (SD = 0.853). The least perception have on ATT3 (likes to try new ways) in high, mean scores is 4.14 (SD = 0.830).

The results indicate that the respondents have perception of attitude toward of customer service technology in high level and highest score on ATT1 (encourage to new ways). This suggested customer service technology encourage them to find new ways around old problems.

Table 4.11 Attitude Toward using of Customer Service Technology

Measurement items	Mean (n= 371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. ATT1: Customer service technology encourage me to find new ways around old problems.	3.86	0.961	1	5	High
2. ATT2: Customer service technology encourage me to develop my own ideas.	3.97	0.853	1	5	High
3. ATT3: Customer service technology likes me to try new ways of doing things.	4.14	0.830	1	5	High

The table 4.12 present respondents' perception behavioral intention to use of customer service technology. The result of perceived behavioral intention to use show that all of the item means are over 3, The highest perception have on BI1 (use throughout work) in high, mean scores is 3.57 (SD =0.947). The least perception have on BI2 (use long period) in medium, mean scores is 3.21 (SD = 0.920).

The results indicate that the respondents have perception of behavioral intention to use of customer service technology in high level and highest score on BI1 (use throughout work). This suggested that they use the customer service technology throughout their work.

Table 4.12 Behavioral Intention to Use of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. BI1: I use the customer service technology throughout my work.	3.57	0.947	1	5	High
2. BI2: I use the customer service technology over a long period of time.	3.21	0.920	1	5	Medium

The table 4.13 present respondents' perception actual use of customer service technology. The result of actual use of customer service technology that all of the item means are over 3, The highest perception have on ACT3 (satisfied) in high, mean scores is 4.08 (SD = 0.804). Follow by ACT2 (facilitate) in high, mean scores is 3.93 (SD = 0.781). The least perception have on ACT1 (content) in high, mean scores is 3.80 (SD = 0.682).

The results indicate that the respondents have perception of actual use of customer service technology in high level and highest score on ACT3 (satisfied). This suggested that they satisfied with the customer service technology at work and fit well.

Table 4.13 Actual Use of Customer Service Technology

Measurement items	Mean (n=371)	Standard deviation (n = 371)	Min	Max	Interpretation
1. ACT1: I am content with the customer service technology at work.	3.80	0.682	1	5	High
2. ACT2: I am pleased with how the customer service technology at work facilitate my work.	3.93	0.781	1	5	High
3. ACT3: I am satisfied with the customer service technology at work and fit well.	4.08	0.804	1	5	High

4.6.2 Overall Perception of all constructs

The table 4.14 shows the mean, standard deviation for all of perceptions. The most perception about behavior or personality traits the score were high level of agreement. The highest value of external factors in perception was organization traits follow by tasks performed, information quality, individual traits and system/service quality, respectively. The highest value of the core concept of TAM was perceive usefulness and attitude toward using the system follow by actual use perceived ease of system use and behavioral intention to use in order. But the mean value of system/service quality has the lowest level of agreement. This suggested that the retailers did not interested in system/service quality but they believed in the organization traits have offered the useful customer service technology to them.

Table 4.14 Perception of all constructs

Item	Mean (n = 371)	Standard deviation (n = 371)	Interpretation
Organization Traits	4.03	0.751	High
Individual Traits	3.66	0.868	High
Information Quality	3.88	0.808	High
System/Service Quality	2.48	1.052	Low
Tasks Performed	3.89	0.674	High
Perceived Ease of System Use	3.83	0.847	High
Perceive Usefulness	3.99	0.723	High
Attitude Toward Using The system	3.99	0.882	High
Behavioral Intention to Use	3.39	0.934	Medium
Actual Use	3.94	0.756	High

4.7 Hypotheses Testing

In this study, researcher has conducted the following statistical analysis to test our hypotheses. Firstly, researcher used one-way analysis of variance (ANOVA) technique to test the possible effects of level of the categorization of retailing, number of employee, owner number of branch, location, and target group on overall constructs. Secondly, researcher uses multiple regression analysis for investigated factor that influence customer service technology from retailers' acceptance.

4.7.1 One-way analysis of variance (ANOVA)

In order to use one-way analysis of variance (ANOVA) that was divided in three parts. Firstly, we conducted one-way analysis of variance (ANOVA) to compare the means of all constructs in the dimension of categorization of retailing. Secondly, we test the possible effect of location of retailing on overall constructs. Finally, we compare the means of all constructs in the dimension of customer service technology from retailers' acceptance

- **Categorization of Retailing**

From the table 4.15 data were also analyzed to examine the influence of categorization of retailing on all factors. When being compare the mean of categorization of retailing toward the overall perceptions. The categorization of retailing include department store, convenience store, discount store, supermarket and grocery store. The tables 4.13 that suggest retailers who have difference categorization are significant difference perception on organization traits and system/service quality. Additionally, the significant difference were found organization traits p value = 0.032 and system/service quality p value = 0.046. The results show that for two factors organization traits, system/service quality) the mean value of department store higher over other groups.

For individual traits, information quality, tasks performed, perceived ease of system use, perceive usefulness, attitude toward using the system, behavioral intention to use and actual use was no significant differences were found among the five groups.

Table 4.15 One way ANOVA analysis for difference in overall construct

Scale items	Mean value of Department Store (n = 57)	Mean value of Convenience Store (n = 28)	Mean value of Discount Store (n= 98)	Mean value of Supermarket (n = 86)	Mean value of Grocery Store (n=102)	Significance
Organization Traits	4.48	3.30	3.35	3.37	3.31	0.032*
Individual Traits	3.41	3.48	3.31	3.43	3.60	0.720
Information Quality	3.36	3.25	3.27	3.41	3.65	0.635
System/Service Quality	3.87	3.60	3.76	3.86	3.48	0.046*
Tasks Performed	3.37	3.65	3.72	3.14	3.37	0.831
Perceived Ease of System Use	3.14	3.12	3.07	3.31	3.41	0.870
Perceive Usefulness	3.43	3.51	3.53	3.57	3.72	0.789
Attitude Toward Using The system	3.32	3.48	3.60	3.32	3.07	0.166
Behavioral Intention to Use	3.41	3.57	3.56	3.27	3.57	0.445
Actual Use	3.46	3.68	3.74	3.57	3.57	0.172

Remark: *= Significance at the 0.05

• Location of retailing

From the table 4.16 data also analyzed to examine the difference of location toward overall construct. When being compare the mean of the same construct among the location into the four groups include town center, nearly residence, nearly street and gas station. The significant were found on organization traits (p = 0.000), system/service quality (p = 0.000) and tasks performed (p = 0.023). These results can be described as retailers who have the difference of location are significant difference perception on organization traits, system/service quality and tasks performed in customer service technology acceptance.

For individual traits, information quality, perceived ease of system use, perceive usefulness, attitude toward using the system, behavioral intention to use and actual use no significant differences were found among in the four groups.

Table 4.16 One way ANOVA analysis for difference in overall construct

Scale items	Mean value of town center (n = 73)	Mean value of nearly residence (n = 227)	Mean value of nearly street (n= 59)	Mean value of gas station (n=12)	Significance
Organization Traits	3.90	3.30	3.72	3.34	0.000*
Individual Traits	3.12	3.48	3.31	3.41	0.720
Information Quality	3.36	3.25	3.27	3.65	0.635
System/Service Quality	3.87	3.60	3.76	3.48	0.000*
Tasks Performed	3.12	3.34	3.72	3.34	0.023*
Perceived Ease of System Use	3.14	3.12	3.07	3.41	0.870
Perceive Usefulness	3.43	3.51	3.53	3.72	0.789
Attitude Toward Using The system	3.32	3.34	3.60	3.07	0.166
Behavioral Intention to Use	3.41	3.34	3.56	3.57	0.445
Actual Use	3.46	3.68	3.72	3.57	0.172

Remark: *= Significance at the 0.05

- **Owner of retailing**

From the table 4.17 data also analyzed to examine the difference of owner toward overall construct. When being compare the mean of the same construct among the owner into the tree groups include more than 30% Thai's shareholders, less than 30% Thai's shareholders and foreigner owner. The significant were found on organization traits (p = 0.000). These results can be described as retailers who have the difference of owner are significant difference perception on organization traits in customer service technology acceptance.

For individual traits, information quality, system/service quality, tasks performed, perceived ease of system use, perceive usefulness, attitude toward using the system, behavioral intention to use and actual use was no significant differences among the three groups.

Table 4.17 One way ANOVA analysis for difference in overall construct

Scale items	Mean value of more than 30% Thai's shareholders (n = 73)	Mean value of less than 30% Thai's shareholders (n = 227)	Mean value of foreigner owner (n= 59)	Significance
Organization Traits	3.34	3.30	3.72	0.000*
Individual Traits	3.71	3.48	3.31	0.720
Information Quality	3.36	3.03	3.12	0.635
System/Service Quality	3.03	3.60	3.76	0.350
Tasks Performed	3.12	3.34	3.72	0.658
Perceived Ease of System Use	3.14	3.12	3.07	0.870
Perceive Usefulness	3.43	3.51	3.12	0.789
Attitude Toward Using The system	3.71	3.34	3.60	0.166
Behavioral Intention to Use	3.41	3.34	3.56	0.445
Actual Use	3.46	3.68	3.72	0.172

Remark: *= Significance at the 0.05

4.8 Confirmatory Factor Analysis of the Customer Service Technology Model.

The hypothesized were tested using a confirmatory factor analysis (CFA) was performed to determine whether the measure variables reliably reflect the hypothesized latent variables. The 27 items used to measure the customer service technology acceptance was subjected to confirmatory factor analysis. Many indices can be used to evaluate the fit of a model,

- χ^2/d.f. should be less than 2;
- goodness-of-fit index (GFI) should be more than 0.9;
- adjusted GFI (AGFI) should be more than 0.8;
- normed fit index (NNFI) should be more than 0.9;
- non-normed fit index (NNFI) should be more than 0.9;
- relative fit index (RFI) should be more than 0.9;
- incremental fix index (IFI) should be more than 0.9;
- root mean square residual (RMR) should be less than 0.05;
- root mean square error of approximation (RMSEA) should be less than 0.08;
- and critical N should be more than 200.

In general, the closer the observed data is to the theoretical model, the better the fit of the model, and the easier it will be to satisfy the thresholds of the above indices. If the threshold of an index cannot be met, it means the model must be modified. This working method is based on the conviction that the variables with a high correlation matrices here as well that no correlation smaller than 0.20 still appears. From the results obtained this way, we perform two operations. One variables are deleted because of the low values. The table 4.18 shows the result of correlation analysis of variables.

Table 4.18 The Result of Correlation Analysis of Variables

Variables	1	2	3	4	5	6	7	8	9	10
PU	1									
PEOU	0.2275**	1								
A	0.3894**	0.3674**	1							
BI	0.3547**	0.3602**	0.3518**	1						
ACT	0.2845**	0.3214**	0.3499**	0.2594**	1					
OT	0.3580**	0.3847**	0.3888**	0.3689**	0.3679**	1				
IT	0.2877**	0.3923**	0.3180**	0.2503**	0.2995**	0.3676**	1			
IQ	0.3926**	0.4656**	0.3338**	0.3214**	0.4662**	0.3609**	0.3703**	1		
SQ	0.3059**	0.3802**	0.3605**	0.2567**	0.2035**	0.2330**	0.2869**	0.3869**	1	
TP	0.3440**	0.3737**	0.3135**	0.0861**	0.2825**	0.3615**	0.2087**	0.2910**	0.3861**	1

**** Correlation is significant at the 0.01 level (2-tailed).**

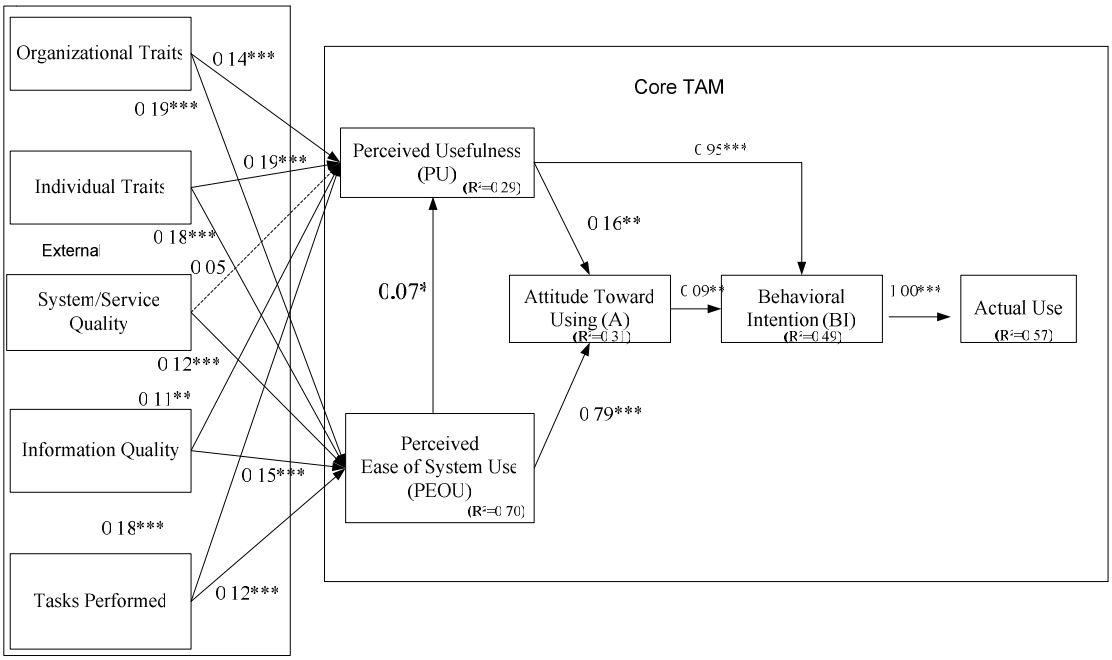
4.9 LISREL model

The LISREL analysis of path model developed in this study shows reasonable fit for the structural model in figure 2.24 $\chi^2 = 2.51$, d.f. = 9, P-value = 0.98, χ^2/d.f. = 0.2788, goodness-of-fit index (GFI) = 1.00, adjusted GFI (AGFI) = 0.99, normed fit index (NNFI) = 1.00, non-normed fit index (NNFI) = 1.02, relative fit index (RFI) = 0.99, incremental fix index (IFI) = 1.00, root mean square residual (RMR) = 0.0072, root mean square error of approximation (RMSEA) = 0.00 and critical N = 371.

Generally, fit statistics grater than or equal to 0.9 for GFI, NFI, RFI, and CFI indicate a good model fit (Bagozzi et al., 1991; Hair et al., 1998). From this results suggested that our model fit was acceptance. This fit provides support for the appropriateness of the relationship between the intended latent constructs and their indicators.

Table 4.19 Statistics of Model Fit Measures

Model Fit Measures	Recommended Value	Model Value
1. χ^2/d.f.	<2.0	0.2788
2. Goodness-of-fit index (GFI)	>0.9	1.00
3. Adjusted GFI (AGFI)	>0.8	0.99
4. Normed fit index (NFI)	>0.9	1.00
5. Non-normed fit index (NNFI)	>0.9	1.02
6. Relative fit index (RFI)	>0.9	0.99
7. Incremental fit index (IFI)	>0.9	1.00
8. Root mean square residual (RMR)	<0.05	0.0072
9. Root mean square error of approximation (RMSEA)	<0.08	0.000
10. Critical N	>200	371



*** 0.05 significance level.**

**** 0.01 significance level.**

***** 0.001 significance level.**

Figure 4.10 Results of Structural Modeling Analysis.

4.9.1 Model Testing Result

The result are summarized in figure 4.10. Like previous researchers, we made some modifications to fit the entire model, such that the actual values of the ten indices listed are above the thresholds of the recommended values. The entire model presents a good fit, which means the collected data matches the research model.

Figure 4.10 shows the causal relationship between the constructs and the standardized path coefficients and square multiple correlation(R^2). We applied a t-test to examine the statistical significance, and found that organization traits had a significant positive effect on perceived usefulness (β = 0.14, p < 0.001), perceived ease of use (β = 0.19, p < 0.001). Hypotheses H7and H8 were therefore supported.

Individual traits had a significant positive effect on perceived usefulness (β = 0.19, p < 0.001), perceived ease of use (β = 0.18, p < 0.001). Hypotheses H9 and H10 were therefore supported. System/Service quality had a significant positive effect

on perceived usefulness (β = 0.05, p < 1.96), perceived ease of use (β = 0.12, p < 0.001). Hypotheses H11 was not supported (non signicantly) but H12 was therefore supported. Information quality had a significant positive effect on perceived usefulness (β = 0.11, p < 0.01), perceived ease of Use (β = 0.15, p < 0.001). Hypotheses H13 and H14 were therefore supported. Tasks performed had a significant positive effect on perceived usefulness (β = 0.18, p < 0.001), perceived ease of use (β = 0.12, p < 0.001). Hypotheses H5 and H16 were therefore supported.

The core concept of TAM is that a person's attitude toward using a technology is jointly determined by perceived usefulness and perceived ease of use. Technology usage is determined by behavioral intentions but differ from the theory of reasoned action in that usage is viewed as being mediated by the person's attitude toward using the technology. The attitude behavioral intentions relationship represented in TAM implies that.

To summarize the regularities expected based on core TAM. The results show the causal relationship between the constructs and the standardized path coefficients and R^2. We applied a t-test to examine the statistical significance, and found that perceived usefulness had a significant positive effect on attitude toward using the system (β = 0.16, p < 0.01), and perceived usefulness had a significant positive effect on behavioral intention to use the system (β = 0.95, p < 0.001). Hypotheses H1and H3 were therefore supported. Perceived ease of use had a significant positive effect on attitude toward using (β = 0.79, p < 0.001). Hypotheses H2 was therefore supported. Attitude toward using had a significant positive effect on behavioral intention to use (β = 0.09, p < 0.01). Hypotheses H4 was therefore supported. Behavioral intention to use had a significant positive effect on the actual use (β = 1.00, p < 0.001). Hypotheses H5 was therefore supported. Perceived ease of use had a significant positive effect on perceived usefulness (β = 0.07, p < 0.5). Hypotheses H6 was therefore supported. The explained variances include perceived usefulness (R^2 = 0.29), perceived ease of use (R^2 = 0.70), attitude toward using the system (R^2 = 0.31), behavioral intention to use (R^2 = 0.49), actual use (R^2 =0.57). This results had a good fit, however some paths had non significant at p < 1.96.

Path that affect in figure 4.10 shows that the determinant with the strongest impact on perceived usefulness the customer service technology is individual traits (β

= 0.19), followed by tasks performed (β = 0.18), organization traits (β = 0.14), information quality (β = 0.11) in order. System/service quality has not effect on perceived usefulness. In other word, the retailers that believes the customer service technology will be useful may be expected to have a good individual traits.

And shows that the determinant with the strongest impact on perceived ease of use the customer service technology is organization traits (β = 0.19)) followed by individual traits (β = 0.18), information quality (β = 0.15) in order. System/service quality (β = 0.12) and tasks performed (β = 0.12) are equal. In other word, the retailers that believes the customer service technology will be ease of using may be expected to have a good organization traits.

Path that affect shows that the determinant with the strongest impact on attitude toward using the customer service technology is perceived usefulness (β = 0.16), followed by perceived ease of use (β = 0.79), in order. Perceived ease of use is directly related to attitude toward using. It is also important to note that. In other word, the retailers that believes the customer service technology will have attitude toward using may be expected to have perceived ease of use.

Finally, the relationship between behavioral intention to use in perceived usefulness and attitude toward using implies that perceived usefulness is strongest impact. In the other word, retailers will form behavioral intention to use the customer service technology because of their positive affect perceived useful it. And actual use had a significant positive effect on behavioral intention to use. Imply that retailers will form behavioral intention to use the customer service technology because of their positive affect intention to use it.

Table 4.20 Summary of hypotheses testing

Hypotheses	Description	Result
Hypothesis 1	There will be a positive relationship between perceived usefulness and attitude toward using the system.	**Supported**
Hypothesis 2	There will be a positive relationship between perceived ease of use and attitude toward using the system.	**Supported**
Hypothesis 3	There will be a positive relationship between perceived usefulness and behavioral intention to use the system.	**Supported**
Hypothesis 4	There will be a positive relationship between attitude toward using and behavioral intention to use the system.	**Supported**
Hypothesis 5	There will be a positive relationship between behavioral intention to use the system and actual use.	**Supported**
Hypothesis 6	There will be a positive relationship between perceived ease of use and perceived usefulness.	**Supported**
Hypothesis 7	There will be a positive relationship between organization traits and perceived usefulness.	**Supported**
Hypothesis 8	There will be a positive relationship between organization traits and perceived ease of system use.	**Supported**
Hypothesis 9	There will be a positive relationship between individual and perceived usefulness.	**Supported**
Hypothesis 10	There will be a positive relationship between individual traits and perceived ease of system use.	**Supported**
Hypothesis 11	There will be a positive relationship between system/service quality and perceived usefulness.	**Not Supported**
Hypothesis 12	There will be a positive relationship between system/service quality and perceived ease of system use.	**Supported**
Hypothesis 13	There will be a positive relationship between information quality tasks performed and perceived usefulness.	**Supported**
Hypothesis 14	There will be a positive relationship between information quality and perceived ease of system use.	**Supported**
Hypothesis 15	There will be a positive relationship between tasks performed and perceived usefulness	**Supported**
Hypothesis 16	There will be a positive relationship between tasks performed and perceived ease of system use.	**Supported**

4.10 Discussions

The results of this study also confirm factor findings on customer service technology acceptance and examined a model for explain by applying the factors of characteristics of customer service technology (organization traits, individual traits, information quality, system/service quality, tasks performed) on acceptance in customer service technology. The results provide support for the research model present in figure 4.10 and for hypotheses regarding the directional linkage among the model's variable accept H11 was not support. The overall explanatory power of our research model had R^2 of 57% for actual to use customer service technology, R^2 of 49% for behavioral intention to use customer service technology and R^2 of 31% for attitude toward using the system. Suggesting that the extend TAM is capable of explaining a relatively high proportion of intention to adoption customer service technology.

The objective was to analyze the introduction of customer service technology in a retail setting. The results provide support for the core concepts of the TAM model (perceived usefulness and perceived ease of use in technology acceptance) among retailers. A retailer that believes the customer service technology will be useful may be expected to have a more positive attitude toward that customer service technology. This ease of system use is primarily the subjective probability that using the technology will increase their job performance within the organizational context.

Davis (1989) defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance their job performance", whereas perceived ease of use was defined as "the degree to which a person believes that using a particular system would be free of effort". The results were to examine more closely the mixed results between perceived usefulness and perceived ease of use positive with attitude toward using. In the studies reviewed, six studies indicated that perceived ease of use was the stronger determinant, whereas, ten studies revealed that perceived ease of use was stronger. A possible explanation of these mixed results might be the difference of technology employed. Future research might attempt to classify studies based on the technology. Adopting constructs from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), the original TAM (Davis, 1989)

identified perceived usefulness and perceived ease of use as major determinants of intention to use a technology. Behavioral intention to use can predict of actual usage could be made.

Although both perceived usefulness and perceived ease of use were statistically proven to be significant determinants of attitude toward using. Results of perceived ease of use was a significantly stronger determinant than perceived usefulness. This phenomena was explained that regardless of perceived as beneficial or did not help improve their job performance if it was not easy to use. Perceived usefulness was considered irrelevant by the user. The first priority for users is ease of use followed by usefulness followed. Another finding indicated that perceived usefulness was stronger than attitude toward using indicated that perceived usefulness as major determinant of behavioral intention to use. The results indicated and suggested that if the provider want to increase behavioral intention to use. They must be pay attention and improve their performance on perceived usefulness directly.

Many studies show just conducted a study among 152 full-time teachers enrolled in a part-time Bachelor of Education program. Moon and Kim (2001) examined World Wide Web acceptance by 152 graduate students. Shih (2004) looked at Internet utilization behavior of 203 Taiwanese office workers. Finally, Brown, Massey, Montoya- Weis, and Burkman (2002) evaluated 107 bank employees using a computer banking system. In each case, perceived ease of use was shown to be a stronger determinant than perceived usefulness.

The lack of meaningful relationships for system/service quality to perceived usefulness indicate that system/service quality have no influence on perceived usefulness. These results are surprising given who interact significantly with the system/service of the retail. Each of these studies either showed perceived ease of use as a stronger determinant on attitude toward using than perceived usefulness or showed that perceived usefulness was not a significant determinant.

The results indicated and suggested that the provider should implement customer service technology because retailers accepted and positively with them. They should pay attention to organization traits because it is the most importance influencing on perceive ease of system use. The ease of system use is the most importance influenced on attitude toward using which can derived to acceptance

customer service technology. If provider need to retailers have a high behavioral intention to use. They should pay attention to perceive usefulness because it is the most importance influencing on behavioral intention to use and also pay attention on individual traits.

The results also emphasize that organization traits with the customer service technology is principal which explains perceived ease of use of customer service technology for retail. Organization traits are highly. This might well be related to the attitude toward using of customer service technology. Our results also express that general retailers demographics such categorization of retailing, location and owner do no differentiating in perceive on acceptance the customer service technology. It is significant for customer service technology providers to be able to predict the extent to which using the customer service technology is perceived to be acceptable to their customers. Likewise, it is important for them to understand why usage of this customer service technology. We believe that our findings have interesting managerial implications. Customer service technology providers could create more opportunities for retailers to try and observe the customer service technology as a distribution channel.

Our findings suggest that individual traits (support, training) with retailers as a distribution channel can serve as beneficial segmentation bases. It appears that growth can only be expected from those retailers who are perceive useful with the customer service technology and have an interest in customer service technology. This might provide a more realistic basis for future planning.

The results of this study have important implications for top managers in retails in retails that implement customer service technology. First, our findings suggest that the importance of efficiency for adoption behavior became already evident in study on TAM, where perceive usefulness and perceive ease of system use, measured as enhanced effectiveness, productivity and improved performance have been the best predictors of adoption intention to use customer service technology.

CHAPTER V
CONCLUSION AND RECOMMENDATIONS

This study aimed to analyze which factors are crucial for successful introduction of customer service technology. Base on the results in previous chapter, researcher will present conclusions of this study. Limitation and recommendation for future research also will present in this chapter.

5.1 Conclusions

This study also confirm factor findings on customer service technology acceptance and examined a model for explain by applying the factors of characteristics of customer service technology (organization traits, individual traits, information quality, system/service quality, tasks performed) on acceptance in customer service technology. The results provide support for the research model present in figure 4.10 and for hypotheses regarding the directional linkage among the model's variable accept H11 was not support. The overall explanatory power of our research model had R^2 of 57% for actual to use customer service technology, R^2 of 49% for behavioral intention to use customer service technology and R^2 of 31% for attitude toward using the system. Suggesting that the extend TAM is capable of explaining a relatively high proportion of intention to adoption customer service technology.

Understanding to what degree a strategic tool benefits the retail is a critical issue. Modifying the Technology Acceptance Model (Davis et al., 1989), the DeLone and McLean (1992) model fit proposal, this research empirically explored the organizational trait, individual trait, information quality, system/service quality, and task performed that influence perceived organizational performance impacts from customer service technology use mediated by ease of system use and perceived usefulness impacts on system satisfaction. It was found that through the diligent marshalling of customer service technology, organizational trait, individual trait,

information quality, system/service quality, and task performed can enhance the impact customer service technology has on perceived retailing performance.

The results of the study provide retailers about the planning of customer service technology and technology selection. In the planning and development of customer service technology, software developers and provider should pay attention to organizational trait, individual trait, information quality, system/service quality, and task performed that influence perceived ease of system use. They should pay attention to organizational trait, individual trait, information quality, and task performed that influence perceived usefulness. In the retailing process of customer service technology experts should.

Customer service technology is becoming an integral part of work of professionals, making the planning of factors critical to technology acceptance by them essential for its success. Our research has produced insights that influence technology acceptance by professionals, extending the existing literature by proposing a novel and coherent perspective to integrate variable of research and to assess its empirical applicability to individual retailers who are becoming increasingly dependent on customer service technology by taking an integrative approach. We can develop a rich understanding of customer service technology acceptance. The factors that have been identified as important here should be actively managed and manipulated to fully realize the expected benefits from the investment in customer service technology

Many of the relationships in the theoretical model have been examined previously in the literature. It is worthwhile to compare the results presented here for the retailers to the more general results in the literature. System/service quality was found for retailers to have not a meaningful impact on perceived usefulness while organization traits, individual traits, information quality, tasks performed influence on perceived usefulness have a meaningful.

System/service quality negatively impacts perceived usefulness. This finding was not expected. A possible explanation is that system/service quality are more critical towards technology since they are aware of easy to use the system to fulfill highest demands. System/service quality had a negative impact on perceived usefulness. Showed that, retailers scoring high on this dimension felt overwhelmed by the

complexity to benefit of customer service technology. System/service quality has no impact on perceived usefulness. As predicted, system/service of retailers perceived customer service technology as less useful.

Some of the differences between these results for retailers and those reported in the literature could well be due to application of the TAM to retailers. This raises questions requiring additional investigation. The research presented here examines customer service technology use and its impacts on performance for the retailer. An interesting question is how will these results differ based on the need for, and use of customer service technology in retailing.

Obviously, organization trait was found to be a very important determinant. This determinant strongly related to improve work, higher quality, improve marketplace made more profit influence on easy to use. Individual trait was found to be a very important determinant. This determinant strongly related to leadership and previous technology experience influence on usefulness, so it would be benefit for further research to find out about these determinant that would be suitable for retailers in order to promote their firms.

5.2 Limitations and recommendation for future research

The sample for this research was taken from retail in Thailand in one country and thus deals with only culture. This may make our results less generalizable to other countries. Also, the use of retailers may have had an impact: a more technology company may show different results especially for customer service technology acceptance.

Secondary, the data gathering which divided into questionnaire part. For questionnaire part, some retails cannot suddenly answer the questionnaire because they must pass many processes. For this reason is cause of lateness for reply the questionnaire to surveyor. Hence, we must wait for respondents and postpone for data analysis.

5.3 Recommendations

For retailers, the research provides some guidelines to improving their services. Researcher provides recommendations from this study to suggestions for retailers and retailer service provider as follows;

- **Recommendations for retailers**

To improve their service, we deem this aspect to be of importance, since customer service technology is likely to be diffused at an escalating rate, not only in retailing. Thus being prepared to deal with customer service technology might be beneficial for retailers. Our data suggest that retailers are likely to accept this customer service technology. Retailers should increase their customer service technology by encouraging or supporting their employees for new customer service technology as well as by training and educating their employee to become intelligent workers and leadership organization.

- **Recommendations for customer service technology providers**

To improve their service, many retails in Thailand to adopt customer service technology. Advance customer service technology play a critical role in expecting further growth of the retail in Thailand. This research investigates the determinants of the adoption of customer service technology. Base on the research results, it is found that most of retailers emphasis easy to use on organizational trait, individual trait, information quality, system/service and task performed factors in customer service technology. There is a trend that customer service technology provider will rely more on benefit of organizational trait, individual trait, information quality, and task performed factors to enhance their supply chain management. It found that retailers with more influence perceived ease of system use favorable attitude toward adopting customer service technology will attain better performance. Organizational trait, individual trait, information quality, and task performed on perceived ease of system use. Their significantly affect the adoption of customer service technology can raise the capability to adopt customer service technology.

- **Recommendations for government**

Thailand has become an important investment destination for multinational corporations. More and more foreign companies invest in Thailand to take advantage

of low labor cost and the potentially huge market. However, the cost of customer service technology is still high compared to many developed countries.

To solve this problem is one of the major policies of Thailand's government. Moreover, Thailand's government should provide financial incentives to stimulate the retailing to adopt customer service technology. Customer service technology will be reinforced if the government can provide various supports and resources, and continuous encouragement policies.

5.4 Direction for Future Research

The study reported here is based on the survey and case studies of retail in Thailand. Future studies can extend the existing frameworks by integrating the impact of these factors on the formation of retailers satisfaction and continued usage as well as other post-adoption variables.

Future studies should analyze the Feasibility Analysis will be continually the results of ANOVA. For example, the different type of retail spent technology costs and willingness to pay for customer service technology were used to estimate by Feasibility Analysis.

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APPENDIX

แบบสอบถามเพื่อการวิจัย

คำชี้แจง: แบบสอบถามนี้แบ่งออกเป็น 3 ตอน มีจำนวน 7 หน้า

ตอนที่1 เป็นแบบสอบถามข้อมูลเกี่ยวกับสภาพทั่วไปของธุรกิจค้าปลีก ลักษณะแบบสอบถามเป็นแบบตรวจสอบรายการ (Check List) มีจำนวน 6 ข้อ

ตอนที่2 เป็นแบบสอบถามเกี่ยวกับการใช้เทคโนโลยีของธุรกิจค้าปลีก ลักษณะแบบสอบถามเป็นแบบตรวจสอบรายการ (Check List) มีจำนวน 3 ข้อ

ตอนที่3 เป็นแบบสอบถามข้อมูลเกี่ยวกับปัจจัยที่มีผลต่อการตัดสินใจในการใช้เทคโนโลยี ลักษณะแบบสอบถามเป็นแบบมาตราส่วนประเมินค่า (Rating Scale) มีจำนวน 27 ข้อ

คำนิยาม

1. ห้างสรรพสินค้า (Department Store) หมายถึง ร้านค้า ปลีกขนาดใหญ่ที่รวมของสินค้าทุกชนิด ทุกระดับแบบครบวงจร มีการจัดวางสินค้าแบ่งออกเป็นหมวดหมู่ เน้นการจำหน่ายสินค้าจำพวก Soft Lines อาทิ เสื้อผ้า เครื่องสำอาง รองเท้า กระเป๋า มีการบริหารที่ซับซ้อน ใช้พนักงานจำนวนมาก และเน้นการบริการที่สะดวกและ สร้างความประทับใจให้กับลูกค้า สถานที่มักตั้งอยู่ในที่ชุมชน ตัวอย่างผู้ประกอบการค้าปลีกประเภทนี้ ได้แก่ ห้างสรรพสินค้าเซ็นทรัล เดอะมอลล์ โรบินสัน ตั้งฮั่วเส็ง อิมพีเรียล เป็นต้น

2. ร้านสะดวกซื้อ (Convenience Store)หมายถึง รูปแบบหนึ่งของการค้าปลีก ซึ่งมีสถานที่ตั้งที่ให้ความสะดวกสบายในการซื้อสินค้า มีที่ตั้งที่สะดวกสำหรับผู้เดินเข้ามาซื้อของ และหรือ สามารถจอดรถริมถนนได้ มีช่วงระยะการทำงานยาวนานกว่าปกติ หรือบางแห่งให้บริการตลอด 24 ชั่วโมง สินค้าที่ขายในร้านเป็นสินค้าที่ขายในร้านของชำโดยทั่วไป เช่น เครื่องดื่ม อาหารว่าง ยาสูบ เป็นต้น

3. ร้านขายของชำ(Grocery store) หมายถึง ร้านค้าแบบดั้งเดิมจำหน่ายสินค้าอุปโภคบริโภคขนาด 1-2 คูหา ซึ่งผู้ทำหน้าที่ในการบริหารยังคงเป็นสมาชิกในครอบครัวหรือเพื่อนฝูง ร้านค้าแบบมินิมาร์ท จะต้องมีส่วนของอาหารสด (fresh food) ประกอบกับสินค้าอุปโภคบริโภคทั่วไป การจัดตั้งใช้เงินลงทุนน้อย ค่าใช้จ่ายต่ำ

4. ร้านดิสเคาน์สโตร์ (Discount store) หรือ ซุปเปอร์เซ็นเตอร์ (Super center) หมายถึงร้านที่จำหน่ายสินค้าที่มีราคาถูกที่จำเป็นต่อชีวิตประจำวัน แต่ไม่เน้นสินค้าที่มียี่ห้อดัง เพราะร้านลักษณะนี้จะใช้ราคาเป็นกลยุทธ์ดึงดูดลูกค้าเข้ามาในร้าน เช่น เทสโก้-โลตัส บิ๊กซี จัสโก้ บิ๊กคิง เป็นต้น นอกจากนี้ร้านค้าที่มาจากยุโรปเช่น คาร์ฟูร์และโอชอง อาจจะเรียกว่า ไฮเปอร์มาร์เก็ต (Hypermarket)

5. ซุปเปอร์มาร์เก็ต (Supermarket) หมายถึง ร้านค้าปลีกที่เน้นจำหน่ายสินค้าอุปโภคบริโภค ให้ความสำคัญกับสินค้าที่สด ใหม่ และหลากหลาย โดยเฉพาะสินค้าประเภทอาหารสด ตลอดจนสินค้าอุปโภคบริโภคต่าง ๆ ที่จำเป็นต่อชีวิตประจำวัน ตัวอย่างผู้ประกอบการค้าปลีกประเภทนี้ ได้แก่ Tops Supermarket, Food Land เป็นต้น

6. Bar codes หมายถึงรหัสที่ประกอบด้วยเส้นหลายเส้นที่มีขนาดว้างต่าง ๆ กัน มักจะมีอยู่บนสินค้านานาชนิด

7. Scanner หมายถึง อุปกรณ์ชนิดหนึ่ง ที่ใช้ต่อกับเครื่องคอมพิวเตอร์ใช้สำหรับนำข้อความหรือภาพเข้าไปเก็บไว้ในหน่วยความจำได้ด้วยวิธีการกราดแสงผ่าน

8. Self-service technologies หมายถึง เทคโนโลยีที่เอื้อให้ลูกค้าบริการตนเองได้

9. CRM (customer Relationship Management) หมายถึง การบริหารลูกค้าสัมพันธ์ ซึ่งก็คือการความสัมพันธ์กับลูกค้า โดยการใช้เทคโนโลยีและการใช้บุคลากรอย่างมีหลักการ เพื่อเพิ่มระดับการให้บริการแก้ลูกค้า สร้างความเข้าใจในความต้องการของลูกค้า รวมทั้งตอบสนองความต้องการของลูกค้าทั้งในด้านผิตภัณฑ์ และการบริการ

10. Credit/debit card payment หมายถึง การทำธุรกรรมทางการเงินผ่านบัตรเครดิต/เดบิต ออนไลน์

11. Retailer card payment หมายถึง การชำระผ่านบัตรเครดิตเครื่องรูดบัตร (Offline Credit Card Payment)

12. Smart card หมายถึงบัตรเงินสดดิจิตอล เปรียบเสทอนกระเป๋าเงินเคลือนที่ เช่น บัตรเงินสด Smart Purse เป็นต้น

13. Office software หมายถึง ซอฟต์แวร์ที่ใช้เพื่อเพิ่มประสิทธิภาพของการทำธุรกิจ ช่วยลดความซับซ้อนของการทำงานร่วมกัน

14. Internet security software หมายถึง โปรแกรมที่ใช้สำหรับควบคุมดูแลให้ความปลอดภัยแก่ข้อมูล และจะอนุญาตให้เฉพาะผู้ที่มีสิทธิเท่านั้น ที่จะล่วงล้ำเข้าไปดึงข้อมูลออกมาใช้ได้

15. Invoicing software หมายถึงโปรแกรมที่ช่วยทำหน้าที่ออกบิลและออกใบแจ้งหนี้ เช่น Invoice Management Program, ModernBill, AWBS, ClientExec, Whoiscart เป็นต้น

16. RFID Radio Frequency Identification หมายถึง ป้ายอิเล็กทรอนิกส์ (RFID Tag) ที่สามารถอ่านค่าได้โดยผ่านคลื่นวิทยุจากระยะห่าง เพื่อตรวจ ติดตามและบันทึกข้อมูลที่ติดอยู่กับป้าย ซึ่งนำไปฝังไว้ในหรือติดอยู่กับวัตถุต่างๆเช่น ผลิตภัณฑ์ กล่อง หรือสิ่งของใดๆ สามารถติดตามข้อมูลของวัตถุ 1 ชิ้นว่า คืออะไร ผลิตที่ไหน ใครเป็นผู้ผลิต

<u>ตอนที่ 1</u> ข้อมูลสภาพทั่วไปของธุรกิจค้าปลีก

<u>คำชี้แจง</u> โปรดทำเครื่องหมาย ✓ลงในช่อง ○ หน้าคำตอบที่ตรงกับสภาพความเป็นจริงเพียง 1 ข้อ ถ้าไม่มีการระบุไว้เป็นอย่างอื่น และหากท่านเลือกคำตอบที่ระบุว่า อื่นๆ กรุณาระบุรายละเอียดเพิ่มเติมในช่องว่าง

1. ประเภทธุรกิจค้าปลีก

○ 1.) ห้างสรรพสินค้า (Department Store)
○ 2.) ร้านสะดวกซื้อ(Convenience Store)
○ 3.) ดิสเคานท์สโตร์ (Discount Store)
○ 4.) ซุปเปอร์มาร์เก็ต (Supermarket)
○ 5.) ร้านขายของชำ (Grocery Store)

2. ขนาดขององค์กร (จำนวนบุคลากร/คน)

○ 1.) ขนาดเล็ก (จำนวนพนักงาน ตั้งแต่ 1-50 คน)
○ 2.) ขนาดกลาง (จำนวนพนักงาน 50-200 คน)
○ 3.) ขนาดใหญ่ (จำนวนพนักงาน 200 คน ขึ้นไป)

3**.** ที่มาของธุรกิจค้าปลีก

○ 1.) องค์กรในประเทศไทย ที่มีการถือหุ้นในส่วนของคนไทย **มากกว่า 30%**
○ 2.) องค์กรในประเทศไทย ที่มีการถือหุ้นในส่วนของคนไทย **น้อยกว่า 30%**
○ 3.) บรรษัทข้ามชาติ
○ 4.) อื่น ๆ (โปรดระบุ)…… …… ……

4. ธุรกิจค้าปลีกของท่านมีสาขาหรือไม่

○ 1.) มี จำนวน.....สาขา
○ 2.) ไม่มี

5.ทำเลที่ตั้งของธุรกิจค้าปลีกของท่านตั้งอยู่ในย่านการค้าประเภทใด **<u>(ตอบได้มากกว่า 1 ข้อ)</u>**

○ 1.) ย่านการค้าใจกลางเมือง
○ 2.) ย่านการค้าที่อยู่ใกล้ที่อยู่อาศัย
○ 3.) ย่านการค้าตามแนวถนน
○ 4.) ย่านสถานบริการน้ำมัน

6. ลักษณะกลุ่มลูกค้าเป้าหมาย **<u>(ตอบได้มากกว่า 1 ข้อ)</u>**

○ 1.) กลุ่มลูกค้าระดับบน
○ 2.) กลุ่มลูกค้าระดับกลาง
○ 3.) กลุ่มลูกค้าระดับล่าง

<u>ตอนที่ 2</u> แบบสอบถามเกี่ยวกับการใช้เทคโนโลยีในส่วนของ Customer service

<u>คำชี้แจง</u> โปรดทำเครื่องหมาย ✓ลงในช่อง ○ หน้าคำตอบที่ตรงกับสภาพความเป็นจริงเพียง 1 ข้อ ถ้าไม่มีการระบุไว้เป็นอย่างอื่น และหากท่านเลือกคำตอบที่ระบุว่า อื่นๆ กรุณาระบุรายละเอียดเพิ่มเติมในช่องว่าง

1. คุณได้ใช้เทคโนโลยีในส่วนของ Customer service ในธุรกิจค้าปลีกของคุณหรือไม่

○ 1.) ใช้

○ 2.) ไม่ใช้ **<u>(ข้ามไปตอบข้อ 3)</u>**

2. ธุรกิจค้าปลีกของคุณใช้เทคโนโลยีในส่วนของ Customer service ชนิดใดบ้าง **<u>(ตอบได้มากกว่า 1 ข้อ หากทำข้อนี้แล้วให้ข้ามไปตอบตอนที่ 3)</u>**

○ 1.) Bar codes/scanner

○ 2.) Self-service technologies

○ 3.) CRM (customer Relationship Management)

○ 4.) Credit/debit card payment

○ 5.) Smart card

○ 6.) Retailer card payment

○ 7.) Invoicing software

○ 8.) Internet security software

○ 9.) RFID

○ 10.) อื่นๆ (โปรดระบุ)……..……..……..……

3. คุณไม่ใช้เทคโนโลยีในส่วนของ Customer serviceในธุรกิจค้าปลีกของคุณเพราะเหตุใด **<u>(ตอบได้มากกว่า 1 ข้อ)</u>**

○ 1.) ขาดความรู้เรื่องเทคโนโลยีในส่วนของ Customer service

○ 2.) ขาดเงินลงทุน

○ 3.) ระบบเดิมที่ใช้ดีอยู่แล้ว

○ 4.) ระบบเทคโนโลยีในส่วนของ Customer service มีราคาแพงเกินไป

○ 5.) อื่นๆ (โปรดระบุ) …….

ตอนที่ 3 แบบสอบถามข้อมูลเกี่ยวกับปัจจัยที่มีผลต่อการตัดสินใจในการใช้เทคโนโลยีในส่วนของ Customer service

คำชี้แจงโปรดเลือกตัวเลขที่ตรงกับความคิดเห็นของคุณมากที่สุด เรียงลำดับดังนี้

ข้อ 1 = เห็นด้วยน้อยที่สุด

ข้อ 2 = เห็นด้วยน้อย

ข้อ 3 = เห็นด้วยปานกลาง

ข้อ 4 = เห็นด้วยมาก

ข้อ 5 = เห็นด้วยมากที่สุด

ปัจจัยที่มีผลต่อการยอมรับการใช้เทคโนโลยี ในส่วนของ Customer service	ระดับความคิดเห็น				
	เห็นด้วยน้อยที่สุด	เห็นด้วยน้อย	เห็นด้วยปานกลาง	เห็นด้วยมาก	เห็นด้วยมากที่สุด
คำถามเกี่ยวกับความคิดในการใช้เทคโนโลยี					
1. เทคโนโลยีในส่วนของ Customer service ที่คุณใช้นี้ช่วยให้คุณพบวิธีทางแก้ปัญหาเดิมๆในการดำเนินธุรกิจ	1	2	3	4	5
2. เทคโนโลยีในส่วนของ Customer service ที่คุณใช้นี้ได้ช่วยพัฒนาความคิดในการดำเนินงานในธุรกิจค้าปลีกของคุณ	1	2	3	4	5
3. เทคโนโลยีในส่วนของ Customer service ที่คุณใช้นี้มีส่วนช่วยสนับสนุนให้คุณทดลองวิธีการดำเนินธุรกิจในรูปแบบใหม่	1	2	3	4	5
คำถามเกี่ยวกับความเป็นผู้นำทางด้านเทคโนโลยี					
4. โดยปกติแล้วธุรกิจค้าปลีกของคุณเป็นองค์กรลำดับต้นๆในการนำเทคโนโลยีในส่วนของ Customer service มาใช้ในขณะที่ธุรกิจค้าปลีกอื่นๆยังคงรูปแบบเดิม	1	2	3	4	5
5. ธุรกิจค้าปลีกของคุณเป็นองค์กรแรกๆในการรับรู้เกี่ยวกับเทคโนโลยีในส่วนของ Customer service	1	2	3	4	5
คำถามเกี่ยวกับคุณภาพของข้อมูล					
6. เทคโนโลยีในส่วนของ Customer service ที่คุณใช้อยู่ในปัจจุบันได้ให้ข้อมูลที่ทันสมัยตลอดเวลา (Real time)	1	2	3	4	5
7. เทคโนโลยีในส่วนของ Customer service ได้ช่วยให้ธุรกิจค้าปลีกของคุณได้รับข้อมูลตรงตามความต้องการอย่างทันที	1	2	3	4	5
8. เทคโนโลยีในส่วนของ Customer service ที่คุณใช้ได้ให้ข้อมูลที่เพียงพอต่อความต้องการ	1	2	3	4	5
คำถามเกี่ยวกับความง่ายในการใช้งาน					
10. เทคโนโลยีในส่วนของ Customer service ที่คุณใช้สามารถใช้งานได้ง่าย	1	2	3	4	5
11. เมื่อเกิดความผิดพลาดขึ้นกับเทคโนโลยีในส่วนของ Customer service คุณสามารถแก้ไขได้อย่างง่ายดาย	1	2	3	4	5

ปัจจัยที่มีผลต่อการยอมรับการใช้เทคโนโลยี ในส่วนของ Customer service	ระดับความคิดเห็น				
	เห็นด้วยน้อยที่สุด	เห็นด้วยน้อย	เห็นด้วยปานกลาง	เห็นด้วยมาก	เห็นด้วยมากที่สุด
คำถามเกี่ยวกับคุณภาพของระบบและคุณภาพของการให้บริการ					
12. คุณได้รับการดูแลรักษาและการซ่อมแซม จากบริษัทผู้ดูแลอย่างทันทีที่คุณต้องการ	1	2	3	4	5
13. คุณได้รับการดูแลรักษาและการซ่อมแซมระบบ Customer service อย่างมีคุณภาพ	1	2	3	4	5
คำถามเกี่ยวกับประสบการณ์การใช้เทคโนโลยี					
14. การทำงานในธุรกิจค้าปลีกของคุณได้ใช้เทคโนโลยีในส่วนของ Customer service อยู่ตลอดเวลา	1	2	3	4	5
15. ธุรกิจค้าปลีกของคุณได้ใช้เทคโนโลยีในส่วนของ Customer service มาเป็นเวลานาน	1	2	3	4	5
คำถามเกี่ยวกับการปฏิบัติงาน					
16. เทคโนโลยีในส่วนของ Customer service ช่วยทำให้การติดต่อสื่อสารของคุณเป็นไปอย่างมีประสิทธิภาพ	1	2	3	4	5
17. เทคโนโลยีในส่วนของ Customer serviceช่วยทำให้การติดต่อสื่อสารระหว่างธุรกิจค้าปลีกของคุณกับลูกค้าเป็นไปอย่างมีประสิทธิภาพ	1	2	3	4	5
คำถามเกี่ยวกับการรับรู้ถึงประโยชน์ที่ได้รับ					
18. เทคโนโลยีในส่วนของ Customer service สามารถเพิ่มประสิทธิภาพในการดำเนินงานในธุรกิจค้าปลีกของคุณ	1	2	3	4	5
คำถามเกี่ยวกับการรับรู้ถึงประโยชน์ที่ได้รับ					
19. เทคโนโลยีในส่วนของ Customer service ช่วยให้การดำเนินงานในธุรกิจค้าปลีกของคุณประสบความสำเร็จมากขึ้น	1	2	3	4	5
20. เทคโนโลยีในส่วนของ Customer service สามารถเพิ่มคุณภาพในการดำเนินงานในธุรกิจค้าปลีกของคุณ	1	2	3	4	5

ปัจจัยที่มีผลต่อการยอมรับการใช้เทคโนโลยี ในส่วนของ Customer service	ระดับความคิดเห็น				
	เห็นด้วยน้อยที่สุด	เห็นด้วยน้อย	เห็นด้วยปานกลาง	เห็นด้วยมาก	เห็นด้วยมากที่สุด
คำถามเกี่ยวกับการรับรู้ถึงประสิทธิภาพขององค์กร					
21. คุณเห็นด้วยว่าการนำเอาเทคโนโลยีในส่วนของ Customer service มาใช้นั้นจะมีประสิทธิภาพก็ต่อเมื่อมีการพัฒนาองค์กร	1	2	3	4	5
22. เทคโนโลยีในส่วนของ Customer service นำธุรกิจค้าปลีกของคุณไปสู่คุณภาพของงานที่สูงขึ้น	1	2	3	4	5
23. เทคโนโลยีในส่วนของ Customer service ได้เพิ่มการถือครองส่วนแบ่งทางการตลาดให้กับธุรกิจค้าปลีกของคุณ	1	2	3	4	5
24. คุณคาดว่าอนาคตข้างหน้าคุณจะได้รับผลกำไรเพิ่มมากขึ้นจากการใช้เทคโนโลยีในส่วนของ Customer service	1	2	3	4	5
คำถามเกี่ยวกับความพึงพอใจในระบบ					
25. คุณมีความพึงพอใจในการใช้เทคโนโลยีในส่วน Customer service	1	2	3	4	5
26. เมื่อมีการใช้เทคโนโลยีในส่วนของ Customer service ทำให้การดำเนินงานในธุรกิจค้าปลีกของคุณเป็นไปอย่างง่ายขึ้น	1	2	3	4	5
27. คุณคิดว่าเทคโนโลยีในส่วนของ Customer service ที่คุณใช้ในปัจจุบันนั้นอยู่ในระดับที่ดี	1	2	3	4	5

ปัญหาและข้อเสนอแนะอื่น ๆ เกี่ยวกับการนำเอาเทคโนโลยีในส่วนของ Customer service มาใช้ในธุรกิจค้าปลีก

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ขอขอบพระคุณผู้ตอบแบบสอบถามทุกท่านสำหรับการสละเวลาอันมีค่าของท่านเป็นอย่างยิ่ง และ หากท่านประสงค์ที่จะรับสำเนาผลการวิจัย กรุณาใส่ชื่อ-นามสกุล และรายละเอียดของท่านด้านล่างนี้

ชื่อ-นามสกุล : .....

ตำแหน่ง : .....

ชื่อบริษัท : .....

โทรศัพท์ : .....โทรสาร : .....

E-mail : .....

BIOGRAPHY

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PUBLICATIONS	**Thitalampoon S**, Naenna T. Technology Acceptance Model to RFID for Retailing in Thailand. 1st International Conference on Computing for Science and Technology (ICCST-I), Chiang Mai, Thailand, 4-6 August 2010. **Thitalampoon S**, Naenna T. The Technology Acceptance Model to Self-service Technology for Retailing in Thailand (Manuscript in Preparation).