IMPROVING SELF-SERVICE TECHNOLOGIES UTILIZATION: THE POTENTIAL
IMPACTS OF TECHNOLOGY ANXIETY, NEED FOR INTERACTION WITH
SERVICE EMPLOYEES, AND EXPECTED SERVICE QUALITY

By

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DISSERTATION APPROVAL

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A Dissertation Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Doctor of Philosophy

in the field of Business Administration

Approved by:

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AN ABSTRACT OF THE DISSERTATION OF

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TITLE: IMPROVING SELF-SERVICE TECHNOLOGIES UTILIZATION: THE POTENTIAL IMPACTS OF TECHNOLOGY ANXIETY, NEED FOR INTERACTION WITH SERVICE EMPLOYEES, AND EXPECTED SERVICE QUALITY

MAJOR PROFESSOR: Dr. Gregory White

Recently, self-service technologies (SST), technological interfaces that allow customers to act as a producer and a consumer of services without direct communication with an organization's employees, have drawn attention from practitioners. While many organizations have been able to take advantage of these self-service technologies, others have failed to do so. Research in the field of self-service technologies is relatively new and has not been fully explored. This dissertation contributed to the literature, specifically in the topic of self-service technologies utilization through the investigation of behavioral intention and customer's attitudes – technology anxiety, need for interaction with service employees, and expected service quality. Hypotheses were developed and tested.

The self-checkout of retail stores, one type of self-service technologies, was used in this study. In this study, a paper-based survey was used, and data collected from 600 actual retail customers were analyzed using structural equation modeling. The results of the study indicated that the expected service quality of the self-service technology and the need for interaction with service employees significantly influence customer's intention to utilize self-service technology. Moreover, the need for interaction with service employees was also found to be a predictor of the expected service quality of the

self-service technology. However, the results revealed that technology anxiety does not have a significant impact on intention to use self-service technologies.

This study provided suggestions concerning managerial issues in the design of self-service operations. When attempting to improve utilization of self-service technologies, managers must ensure that the designed self-service technologies provide quality services. Also, managers must understand that individuals are different by nature and some of these individuals will not use self-service technologies; therefore, it is important to a have traditional or full service options available for the customers.

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CHAPTER 1

INTRODUCTION

"Service firms are no longer "cottage" industries, with a service firm taking the

top spot in the Fortune 500 for the first time in 2002, and 245 of the Fortune 500

comprised of service firms in 2004" (Boyer & Metters, 2004, p. 201).

The above statement provides evidence that services are an increasingly important part of today's competitive business environment. A special issue in service strategy and technology application in 2004 of the journal *Production & Operations Management* also gives a signal of how crucial the service industry has become recently. Although service has strong implications in the field of marketing, its concerns associated with operations cannot be neglected.

For decades, information technology has changed the way organizations do their business. In traditional service delivery (or full service), organizations' service employees directly serve customers in person. With the power of advanced information technology, many traditional services have been altered to self-services (services that customers serve themselves). For instance, in the past, customers interacted directly with bank officers in order to receive banking services if any financial transaction is required. Now, the self-service is available for, if not all, most banking services without direct contact from a firm's employees.

As mentioned above, this advanced technology, known as self-service technology, not only gives opportunities to organizations to get closer to their customers, but also provides better services than ever before. Moreover, its application can help reduce costs

of service (Bartholomew, 2002). From the operations management perspective, cost reduction is essential for achieving the organization's ultimate goal – profits. Therefore, it is interesting to look into the field of self-service technologies (SSTs) and investigate factors affecting customers' use of these technologies. Doing so does make sense according to what Margulius (2002, p. 60) stated: "if you're thinking about deploying self-service, you need to know what you are getting into."

Self-service Technologies

Self-service technologies are defined as technological interfaces that allow customers to act as a producer and a consumer of services without direct communication with an organization's employees (Meuter, Ostrom, Bitner, & Roundtree, 2003). These include a wide range of technologies such as vending machines, automatic teller machines (ATMs), online automated phone systems, information kiosks, grocery store self-checkout systems, etc. Meuter, Ostrom, Roundtree, & Bitner (2000) categorized SSTs into two groups. One group classified by interface includes telephone/interactive voice response, online/Internet, interactive kiosk, and video/CD. Another is organized by the purpose of the SST, which embraces customer service, transactions, and self-help. Table 1-1 illustrates categories and examples of SSTs use in accordance with their interface and purpose.

Table 1-1.

Categories and Examples of SSTs in Use (Adopted from Meuter et al., 2000)

Interface / Purpose	Telephone/ Interactive Voice Response	Online/Internet	Interactive Kiosks	Video/CD*
Customer Service	• Telephone banking • Flight information • Order status	• Package tracking • Account information	• ATMs • Hotel checkout	
Transactions	• Telephone banking • Prescription refills	• Retail purchasing • Financial transactions	• Pay at the pump • Hotel checkout • Car rental	
Self-Help	• Information telephone lines	• Internet information search • Distance learning	• Blood pressure machines • Tourist information	• Tax preparation software • Television/CD-based training

*Video/CD is typically linked to other technologies to provide customer service and transactions.

Statement of the Problem

Organizations have been experiencing the problem of high labor costs ("Higher wages or more job security?," 2004; Kiley, 2006; Taylor & Kaufman, 2005). This phenomenon coupled with the availability of advanced technologies encourages service firms to provide customers with self-service technology options (Dabholkar, 1996). SSTs could allow service organizations to cope with ever-increasing labor costs. Moreover, SSTs can help reduce paperwork in the workplace, increase customer loyalty, and attract new customers (Parlin, 2003; Waxer, 2001). Examples of SSTs that organizations already put into their operations are omnipresent, such as airline check-in Website, tourist information kiosk, self-checkout at retail supermarkets, etc.

Although investing in innovative information technologies is risky, numerous organizations have already spent considerable amounts of money on this equipment due

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to the fact that potential benefits can be substantial (He & Mykytyn Jr, 2006). The preceding statement suggests concerns in the self-service environment. That is, if a firm invests in often expensive self-service technologies but customers do not use them, such an investment will be wasted. Consequently, the organization's goal to reduce the ever-increasing labor cost by implementing SSTs may not be achieved.

After an extensive review of the literature, it appears that models have been developed to help promote the use of SSTs. However, service quality, one of the most discussed topics in operations management, has been researched very little pertaining to the use of SSTs. Many customers pay serious attention to quality of service and may adjust their use of SSTs accordingly. It is apparent that customers' wants dictate what organizations have to offer. And, of course, customers want quality services. Thus, if customers perceive that the offered SSTs will provide them with low quality services, it is unlikely that these customers will use the systems. Understanding how customers' expected service quality influences their SST usage could offer some insights to managers in dealing with the system utilization issue.

While many customers express concern about quality of service delivered by SSTs, others may feel that social interaction is critical to them; thus, these customers may have greater need for human interaction in service encounters (Dabholkar, 1992). Unlike these customers, some people can be very innovative and have the intention to get involved with advanced technologies (Dutta-Bergman & Wells, 2002). Interaction with service employees may influence customers' SST usage behavior (Dabholkar, 1996). Knowing how the need for interaction with service employees relates to SST usage may reveal the way to improve SST utilization.

Researchers have tirelessly developed and pushed advanced technologies to the market. Due to the fast-paced introduction of advanced and sophisticated innovations, technology anxiety may occur in customers. Not only individuals, but also organizations can be affected by this type of anxiety. To compete with others, many organizations seek differentiation in their innovative products and services; as a result, customers may feel overwhelmed and refuse to touch some products even if offered money (Mitchell, 1994; Sinkovics, Stottinger, Schlegelmilch, & Ram, 2002). From this standpoint, organizations need to be aware of how technology anxiety will affect technology-based services, especially SSTs. Therefore, investigation of this concern would provide suggestions for improving SST utilization.

From the review of literature, the Theory of Reasoned Action, Technology Acceptance Model, and Theory of Planned Behavior were found to be useful, and can be applied to study SST utilization. These behavioral theories have been well validated and suggest that behavioral intention will lead to actual behavior (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975). Therefore, the intention to use SSTs will predict SST utilization, which serves the purpose of this study.

Research Questions

As discussed, this study intends to answer the following questions:

1) How does expected service quality relate to intention to use SST?

2) How does need for interaction with service employees relate to intention to use SST?

3) How does technology anxiety relate to intention to use SST?

4) How does expected service quality relate to need for interaction with service employees?

Answers to these questions would be of interest to both academicians and practitioners.

Expected Contributions to Academic Research

The results from this study should contribute to the self-service technology literature since little research has studied service quality as a predictor of intention to use SSTs. The relationships between the need for interaction with service employees and technology anxiety, and intention to use SSTs are still unexplored. The findings from this study can support the robustness of existing theory, and provide better understanding of these relationships.

The study will use measures adapted from the literature. The results can suggest valid and reliable measures of constructs investigated for future study. Using behavioral intention theories with constructs from various fields including management information systems and marketing allows operations management researchers to approach SST utilization problems from a more comprehensive and integrative viewpoint.

Expected Contributions to Practice

Since this study will use actual customers as the subjects, it should provide the results with some generalizability. The results will suggest problems associated with intention to use SSTs. Therefore, practitioners can choose to pay more or less attention to certain aspects, in this case service quality, need for interaction with service employees, and technology anxiety, in order to improve SST utilization.

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Scope of the Study

Because there are various types of SSTs and they are quite different by nature, it is not possible to include all types of SSTs in this study. Since most previous empirical studies of SSTs in the literature have emphasized the banking industry, investigation of SST in a different industry would broaden the applicability of research in the domain of SSTs. Therefore, we used only one type of SST, the self-checkout system at retail stores. Like most behavioral survey studies, this study only examined customers' perceptions of the variables of interests.

Organization of the Dissertation

Chapter 1 presents an overview of the study that includes a statement of the problem, research questions, expected contributions for researchers and practitioners, scope of the study and organization of the study. Chapter 2 provides a literature review of related behavioral theories, intention to use SSTs, service quality, technology anxiety, and need for interaction with service employees. Then, the research model and the proposed hypotheses are presented. Chapter 3 presents the research methodology of the study and Chapter 4 summarizes the results of the study. The dissertation ends with Chapter 5 providing discussion of the results, implications, future research, and conclusion of this study.

CHAPTER 2

LITERATURE REVIEW

Operations management researchers have tried to determine the factors that maximize the utilization of any system. Information systems (IS) have been used to provide better flow of service operations within organizations. IS examples include various types of technologies ranging from very simple to highly sophisticated systems. Today, self-service technologies (SSTs), a form of IS that has revolutionized the way organizations serve their customers, are becoming more and more popular due to the advantages provided to the organizations (Parlin, 2003; Waxer, 2001). However, the research has suggested that the cost of IS implementation, including SSTs, is usually high and success rates are relatively low (Legris, Ingham, & Collerette, 2003; Olson & Boyer, 2003). Moreover, a study indicated that between 30 and 40 percent of the population resists the use of new technology (Glister, 2001). If this trend persists, the invested systems are not used as expected; organizations can suffer from the underutilization due to the ever-increasing labor costs. Therefore, it is crucial to study factors that influence and potentially improve system utilization.

The literature indicates major models related to users' actual behavior used by researchers in different fields. These models suggest the key factor that influences behavior (i.e., system usage). These models include the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Technology Acceptance Model (TAM) (Davis, 1989), 1989), and Theory of Planned Behavior (TPB) (Ajzen, 1991).

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Related Behavioral Theories

Theory of Reasoned Action

An individual's belief can explain his or her own performance of a given behavior (Morris & Dillon, 1997). To engage in an activity, the Theory of Reasoned Action (TRA) suggests that a person forms a behavioral intention before an actual behavior (Fishbein & Ajzen, 1975). In addition, TRA also proposed that the behavioral intention is influenced by attitude toward behavior and subjective norm. Figure 2-1 illustrates the Theory of Reasoned Action.
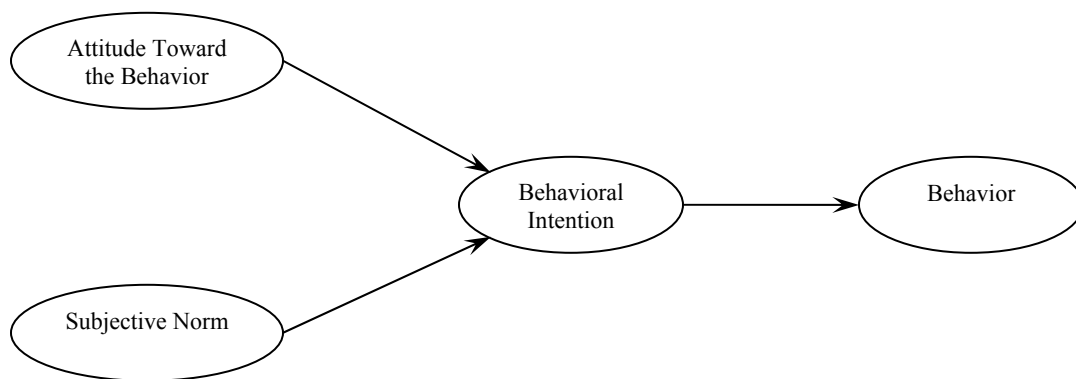
Figure 2-1. Theory of Reasoned Action (Adapted from Fishbein & Ajzen, 1975)

TRA has been widely applied in various disciplines. Based on TRA, intention was found to positively and significantly affect the consumption of fats and oils (Saba, Di Natale, & Saba, 1998). Habit had a greater impact on intention of consuming than attitudes. However, the results provided support to confirm the predictive validity of the behavioral intention in relation to the actual behavior.

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A study on Shop-Bot utilized TRA, TAM, and TPB to compare how each of these theories explains the use of Shop-Bot on the Web (Gentry & Calantone, 2002). Shop-Bot is an intelligent agent that provides information to buyers about the online retailer which gives the best price for a specific product. Although the results showed that TRA can predict Shop-Bot use, TAM explained variances in behavioral intention.

TRA was also used in the domain of knowledge management. (Kwok & Gao, 2005) investigated how extrinsic motivation, absorptive capacity, and channel richness would influence individuals' attitude toward knowledge sharing behavior. Extrinsic motivation was found to be no significant influence on attitude toward knowledge sharing behavior. Absorptive capacity had marginal support of a positive impact on attitude toward knowledge sharing. Channel richness was found to be a significant factor that influences knowledge sharing attitude.

Another study in the medical field used TRA as a base theory to determine the factors that affect breast cancer patients' intentions to supplement with CoQ10, a vitamin-linked substance (Hill, Shriver, & Arnett, 2006). While beliefs were found to be a significant factor influencing attitude, knowledge was not. Social acceptability did not have a significant impact on subjective norm, but regular social contacts did. The final results of this study still supported the robustness of TRA. That is, attitude and subjective norm influence the behavioral intention.

The studies discussed above demonstrate the usefulness of TRA. After the establishment of TRA, several models have been developed. TRA has rooted several of these most well-known theories. One of these theories is the Technology Acceptance Model.

Based on TRA, Technology Acceptance Model (TAM) excluded subjective norm which is part of TRA (Davis, 1989). TAM was particularly designed to predict technology acceptance or adoption behavior. The model proposed that adoption behavior is determined by behavioral intention while the intention, in turn, is influenced by attitude toward use of technology. Perceived usefulness and perceived ease of use were two constructs that influence attitude toward using information technology. In addition, perceived usefulness was expected to have a direct effect on behavioral intention while perceived ease of use was expected to influence perceived usefulness. Technology Acceptance Model is shown in Figure 2-2.
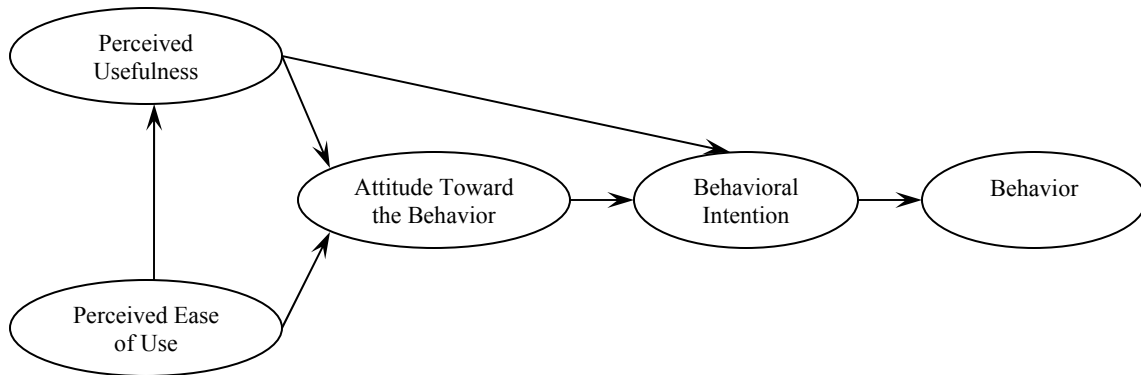
Figure 2-2. Technology Acceptance Model (Adapted from Davis, Bagozzi, & Warshaw, 1989)

TAM has had a great impact on research in the field of information technology. The model has been tested on many settings and technologies. The advantages of TAM include its predictive power, the small number of constructs to predict behavioral

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intention, and robustness; therefore, it can be applied in a wide spectrum of technologies (Agarwal & Prasad, 1999; Venkatesh & Davis, 2000).

The Internet is an influential tool of today's business. Lederer and Maupin (2000) investigated a Web application usage with TAM. The findings suggested that perceived ease of use and perceived usefulness significantly influence the Web usage. As expected, the results confirmed that perceived usefulness has a stronger effect than the perceived ease of use.

Based on TAM, Olson and Boyer (2003) studied how individuals' viewpoints and preference affect the use of Internet as a purchasing method. The results suggested that an individual's background may not influence an end user's viewpoint or preferences toward Internet purchasing. Empirical data suggested that Internet purchasing provides individuals, who feel indifferent toward the Internet or think about it as part of their job, with cost and efficiency advantages. Therefore, instead of focusing on technology-enthusiastic individuals only, the authors recommended that companies pay attention to the indifferent group as well.

Although there is a long series of factors which may encourage IS use, many of them were found to be less than practical (Legris et al., 2003). The authors studied the use of TAM and its modified model (TAM2) that includes subjective norm. They found that the two models can only explain system usage approximately 40 percent of the time. It implied that significant factors are not yet embraced in the models. The authors concluded that TAM is a useful model. However, the human and social change processes need to be integrated for improvement of the model.

Based on TAM, Vijayasarathy (2004) extended the model to determine more factors influencing the consumer intention to use on-line shopping. In addition to usefulness and ease of use, compatibility, privacy, and security were proposed to have impacts on attitude toward on-line shopping. Also, normative beliefs and self efficacy were hypothesized to influence intention to shop on-line. The results suggested that privacy is the only factor that is not a significant factor of attitude toward on-line shopping.

Even though TAM is a popular model used in predicting the use of technology, the use of another influential model, Theory of Planned Behavior (TPB), has evolved.

Theory of Planned Behavior

TPB includes all constructs in TRA and an additional construct, perceived behavioral control (Ajzen, 1991). Perceived behavioral control, as the perceived ease or difficulty of performing the behavior, was proposed to influence behavioral intention as well as actual behavior. The Theory of Planned Behavior is shown in Figure 2-3.
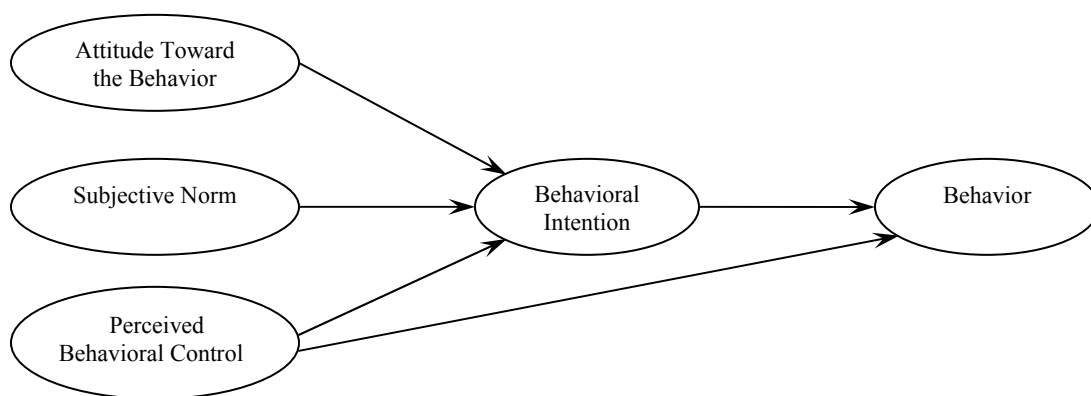
Figure 2-3. Theory of Planned Behavior (Adapted from Ajzen, 1991)

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Besides TAM, TPB has been applied to a wide rage of settings. Harrison, Mykytyn, and Riemenschneider (1997) utilized TPB in order to explain and predict small business executives' intention to adopt information technology. The results suggested that perceived positive and negative consequences for the firm as attitude, social expectations as subjective norm, and resources to overcome obstacles as perceived behavioral control significantly affect the decisions or intentions to adopt information technology. The authors also found that firm size moderates the three antecedents of decisions for information technology adoption.

TPB was also used in another study concerning technology adoption decisions. Morris and Venkatesh (2000) examined how age difference affects the adoption and sustained usage of technology in an individual level of workforce. The findings indicated that attitude toward using the technology more strongly influences technology usage decisions in younger workers while subjective norm and perceived behavioral control more strongly affect the decisions in older workers though the effect of subject norm diminished over time.

As Internet technology evolves, more specific factors that influence such usage need to be discovered. TPB was, once again, used in the WWW context. Hsu and Chiu (2004) introduced general Internet self-efficacy (GISE) and Web-specific self-efficacy (WSE) as new factors in electronic service (e-service) acceptance. The results from the study confirmed the validity of TPB. The findings suggested that GISE and WSE play important roles in e-service usage. GISE had indirect effect to e-service usage through WSE, attitude, and intention. While WSE had a direct impact on e-service usage, the indirect impact was through the behavioral intention.

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Though used in numerous IS studies, TPB has also been utilized in other disciplines. Based on several important frameworks including TPB, Froehle and Roth (2004) were able to identify and define the constructs in service operations management. Information richness, learning, usefulness, duration appropriateness, and intimacy appropriateness were categorized into customer belief domain. Influenced by customer belief domain, customer attitude domain included attitude towards contact medium, episode, and provider. In turn, customer attitude domain affected customer intention domain which embraces intention to use medium for future contact and intention to use service provider in future.

After reviewing the literature, various influential behavioral theories including TRA, TPB, and TAM, to name a few, have been validated. These theories come to the same conclusion that behavioral intention will lead to the actual behavior (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975). Therefore, it is convincing that the intention to use SSTs will lead to the SST utilization. If the factors that influence the intention to use SSTs can be determined, it is plausible that utilization of SST can then be improved.

Intention to Use Self-service Technologies

SSTs are defined as technological interfaces that allow customers to act as a producer and a consumer of services without direct communication with an organization's employees (Meuter et al., 2003). With SSTs, organizations can now transform their high-cost manual service operations to economical automated self-service (Selnes & Hansen, 2001). Self-service delivery options provide benefits to firms in terms of productivity and cost savings (Chase, 1978; Lovelock & Young, 1979; Mills &

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Moberg, 1982). Because this trend has risen, a number of researchers have studied

different aspects of SSTs. While customer satisfaction, one of the most important areas

in operations management and marketing, has been discussed often in SST literature

(Bitner, Ostrom, & Meuter, 2002; Chen, 2005; Jamal, 2004; Meuter et al., 2000; Pujari,

2004; Yen, 2005), other topics still need more investigation – namely system utilization.

System utilization is one of the concerns in operation management research.

Although the issue of SST usage has been studied to a certain extent, there is still room

for studies that can add value to the body of knowledge in this arena. An investigation on

research related to intention to use SSTs could help identify factors that would ultimately

affect SST utilization.

Intention to Use SST and Attitudes Toward Using SST

Based on behavioral theories, a number of studies utilized attitude toward using

SST as a factor influencing the intention to use SST. Incorporating several well-known

theories, Bobbitt and Dabholkar (2001) proposed a comprehensive conceptual framework

that can help illustrate the impact of attitudes on intentions and behavior related to

technology-based self-service (TBSS). Applying the Theory of Reasoned Action, the

authors proposed that there is a positive relationship between attitude toward using the

Internet for shopping and the intention to shop on the Internet, and that there also is a

relationship between intention to shop on the Internet and Internet shopping behavior.

Moreover, they also proposed that the relationship between attitude toward using the

Internet for shopping and intention to shop online will be moderated by different issues

related to the product category. High-risk categories include very expensive,

technologically sophisticated, or socially critical products while experience or service categories embrace restaurants or real estate, and credence categories are those related to medical care or auto repair. The authors suggested that products in high-risk categories, experience categories, credence categories, and low consumer experience with a product category will negatively moderate the attitude-intention relationship for purchasing while products with complete information before purchase (search products) will positively moderate the relationship. For instance, usually patients do not have enough knowledge to evaluate these services provided by doctors; thus, the products in this category expect to weaken the attitude-intention link. Customers with moderate levels of experience with online purchasing mostly use the Internet to search for information on products whereas customers with low or high levels of experience are less likely to search for information on the Internet (Bobbitt & Dabholkar, 2001). Moreover, the attitude-intention relationship will be negatively moderated by the products with less information available on the Internet than other sources while products in experience and credence categories, and product categories with more information available will have the opposite moderating effect on the relationship. For example, when customers know only little information about a product, they can assume that uncertainties about the product exist. Therefore, the intention to purchase the product with less information on the Internet would be lower than that of more information.

Suggested by the comprehensive conceptual model in Bobbitt and Dabholkar's study (2001), Dabholkar and Bagozzi (2002) empirically tested the relationship between attitude toward using TBSS and intention to use a TBSS. The result suggested that attitude toward using TBSS had a direct and positive effect on intention to use TBSS.

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Furthermore, the authors found that the positive relationship between attitude and intention toward using TBSS will be attenuated when the customer perceives a greater waiting time. Surprisingly, data collected refuted expectations. The findings suggested that the positive relationship between attitude and intention toward using TBSS was not attenuated with greater social anxiety (through perceived crowding). They explained that customers with higher social anxiety may have a tendency to rely on their attitude to determine their intentions.

Curran, Meuter, and Surprenant (2003) studied intention to use SST and attitudes in a more comprehensive approach. The authors suggested that intention to use SST can be influenced by multiple types of attitudes. They hypothesized that global attitudes toward service technology, global attitudes toward the service firm, attitudes toward employees, and attitudes toward specific SSTs will positively influence intentions to use SSTs. Three structural models were tested in the study, and the strongest model provided support for the stated hypothesis. Although global attitudes toward service technologies had a significant impact on intentions to use automatic teller machines (ATMs), bank by phone, and online banking, global attitude toward the bank only had a significant impact on intention to use the ATMs. While each of the attitudes toward specific SSTs directly influenced intentions to use its respective SST, attitude toward employees did not directly affect any intention to use SSTs. However, these results, overall, supported the suggested hypothesis.

Curran and Meuter (2005), once again, replicated the study of attitude constructs influencing the intention to use SST. They posited that attitude toward a specific SST will influence consumer's intention to use that SST. The results suggested that attitudes

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toward ATMs, bank by phone, and online banking had a significant impact on the respective SST. These findings provide evidence supporting attitudes as constructs influencing behavioral intentions (Bobbitt & Dabholkar, 2001; Curran et al., 2003; Dabholkar & Bagozzi, 2002).

Intention to Use SST and Other Constructs

Several studies investigated intention to use SST from different angles. Drawing upon consumer decision making research, Dabholkar (1996) hypothesized that there is a positive relationship between expected service quality of a TBSS option and intention to use the TBSS option. The results supported the hypothesis. This finding can intuitively imply that if people expect a self-service option to be high quality, they will use it.

Lee and Allaway (2002) proposed personal control as a factor influencing a customer's adoption decision of an SST – perceived risk, perceived value, and adoption intention. Personal control had three distinctive dimensions including predictability, controllability, and outcome desirability. On the one hand, the result suggested that each dimension of personal control was found to have a significant impact on perceived risk, perceived value, and adoption intention when considered as a set of adoption decisions of an SST. On the other hand, when each of the adoption decisions was individually considered, controllability and outcome desirability had significant effects on adoption intention whereas predictability did not.

Meuter et al. (2003) investigated consumer experiences with self-service technologies including overall satisfaction, repeat usage intention, participating in positive word-of-mouth, and attributions for the outcome. The repeat usage intention of

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SST and technology anxiety were expected to have a relationship. Although the relationship between two constructs existed, it was found to be significantly negative when customers reported a satisfactory experience. Customers with higher technology anxiety were less likely to use the same SST option again. However, for those who had an unsatisfactory experience, technology anxiety had no significant relationships with overall satisfaction or repeat usage intention.

With global competition, several researchers have tried to study intention to use SST in a cross-cultural setting. Choi and Geistfeld (2004) investigated intention to adopt online purchasing in Korea and the United States. Using the Theory of Planned Behavior, the authors conceptualized their framework using cultural differences indirectly affecting intention to adopt online purchasing. The cultural differences were uncertainty avoidance and individualism-collectivism. The former was hypothesized to indirectly affect the behavioral intention through perceived risk and subjective norm while the latter was posited to indirectly influence perceived risk and perceived self-efficacy. The results suggested that individualism-collectivism was found to be a prior variable affecting the behavioral intention in both countries as hypothesized. However, it was interesting that the results indicated uncertainty avoidance indirectly affected the intention to adopt online purchasing through perceived risk only in Korea but not in the U.S., and vice versa for perceived self-efficacy.

Recently, another investigation of acceptance of SST was conducted outside the United States. Salib and Wahba (2005) studied user intention to use self-service Internet and self-service interactive voice response (IVR) in relation to perceived ease of use, perceived usefulness and value, as well as trust and security in the Egyptian telecom

industry. The authors hypothesized that customer intention to transact online using self-service Internet is positively related to perceived ease of use as well as perceived usefulness and value. They also posited that customer intention to transact online using self-service IVR is positively related to perceived ease of use as well as perceived usefulness and value. The results showed that when they perceived self-service Internet and self-service IVR to be useful and easy to use, customers were more likely to transact online using these options. Furthermore, the authors also expected that perceived trust to be positively related to customer intention to use self-service Internet and self-service IVR. The findings suggested that customers would use these tools if they trusted the systems to be secure.

Boyer and Hult (2005) investigated behavioral intentions for online grocery purchases examining order fulfillment and customer experience level. They postulated that service quality, product quality, product freshness, and time savings correlated with increased customer behavioral intention. Even though the results showed that service quality, product quality, and product freshness had significant positive effects as expected, the effect was reversed for time savings. In addition, the finding indicated that customer behavioral intentions were different in customer experience levels (new or repeat) as well as in picking method for selecting items (store-based or distribution center-based). The authors also found that an interaction effect exists between product experience level and picking method for customer behavioral intention.

Service Quality

Considerable research has been conducted in the area of quality. The issue of quality has been discussed in the areas of products and services. Although products and services are outputs of operations, they are not completely the same. The distinction between products and services is that some form of contact between customers and service providers exists where it may not always be the case for products (Soteriou & Chase, 1998). Therefore, quality of service is to be measured differently from that of products.

Harvey (1998) pointed out different aspects of service quality. These aspects included, but were not limited to, quality of results and quality of process; search and experiential qualities; reality and perception; expectations and satisfaction. The author also suggested approaches to performance improvement. Quality function deployment (also known as QFD or house of quality), technical quality, utilization of visibility and accessibility line, blueprinting, and failsafing (also called mistake proofing or poka yoke) were suggested for improving design quality. Moreover, guaranteeing, mystery shopping (disguised quality check), recovering, setting standards and measuring, statistical process control (SPC), and customer involvement were recommended for improving conformance quality.

This section categorizes service quality into three major topics including service quality measurement, customer satisfaction, and other related issues. Each topic is to be discussed accordingly.

Service Quality Measurement

Since quality became a pivotal concern in the 1980s, the ground breaking model of service quality was first developed with ten dimensions to be determinants of service quality (Parasuraman, Zeithaml, & Berry, 1985). With the determinants, service quality was proposed to be measured by confirming expectation with performance of the service delivered. Using a similar approach, Parasuraman et al. (1988) developed a multiple-item instrument called SERVQUAL which includes five distinct dimensions – tangibles, reliability, responsiveness, assurance, and empathy.

Even though SERVQUAL has been very influential, Cronin and Taylor (1992) suggested the instrument might be inadequate. They argued that when evaluating performance of a service, customers already incorporated expectation in the evaluation. Thus, the authors suggested that performance-based measure (SERVPERF) improves means of measuring service quality. Moreover, their findings indicated that service quality is an antecedent of customer satisfaction, customer satisfaction has a significant effect on purchase intentions, and service quality has less effect on purchase intentions than does customer satisfaction. Due to the critical review of service quality measurement ground breakers, SERVPERF and SERVQUAL were brought to reconciliation (Cronin Jr & Taylor, 1994). The two controversial service quality measures brought great attention to academicians.

Using SERVQUAL, Sachdev and Verma (2002) investigated the difference of 'should' and 'would' expectation instruments for measuring service quality. The findings indicated that 'should' expectations significantly differed from 'would' expectations; moreover, 'would' expectations scored closer to performance levels for each dimension.

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Thus, this initiated important concerns about how questions asked affected the evaluation of service expectation-performance based service quality. In addition, the authors found that although all dimensions of SERVQUAL are important to customers, the five-factor structure may not be static as proposed by Parasuraman et al. (1988). This finding suggested that there is a need to explore the inconsistency of the structure of the instrument.

Due to the proliferation of web-based services, Li, Tan, and Xie (2002) used the SERVQUAL as a starting point to measure web-based service quality. They suggested that the SERVQUAL instrument needs to be modified to match the context of web-based services. The authors, therefore, proposed that integration of digital and traditional communication as well as quality of information could be included in the web-based service quality measurement. Furthermore, they hypothesized that the tangible dimension from the original SERVQUAL is not important in the context of this measurement. The results from factor analysis suggested six dimensions for web-based service quality including responsiveness, competence, quality of information, empathy, web assistance, and call-back systems.

It is undeniable that SERVQUAL has had a great impact on the measurement of service quality over the years; however, several researchers have questioned the applicability of the SERVQUAL instrument (Anderson, 1992; Carman, 1990; Cronin Jr & Taylor, 1992; 1994). Therefore, Morrison Coulthard (2004) critically reviewed research using SERVQUAL and indicated that evidence shows serious conceptual, methodological, and interpretative problems associated with SERVQUAL. The author concluded that there is significant support that SERVPERF can predict overall measure

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of service quality as effectively as SERVQUAL even though "the gap/disconfirmation concept has the theoretical strength of parsimony and it is intuitively appealing" (Iacobucci, Grayson, & Ostrom, 1994, p. 2). Since SERVQUAL has continued to be used, but the consensus has yet been determined, further research, replication, and new approaches are still in need (Brady, Cronin, & Brand, 2002; Morrison Coulthard, 2004).

SERVQUAL and SERVPERF constitute the two major service quality measurement scales in the literature. Whether the former or the latter is superior has been questionable. Jain and Gupta (2004) assessed both SERVQUAL and SERVPERF scales. They indicated that empirical studies showed that while SERVPERF embraces the validity, reliability, and methodological soundness of service quality scales, it is problematic in the case of SERVQUAL (Morrison Coulthard, 2004). Despite being superior methodologically, they found that SERVPERF lacks diagnostic power to identify areas for managerial interventions in the event of service quality shortfalls. The authors, therefore, suggested that the SERVPERF scale should be used when overall service quality is to be assessed, and the SERVQUAL scale is recommended when the objective is to pinpoint service quality shortfalls for possible intervention by managers.

Online shopping has increased in popularity; however, research on measuring online shopping service quality is limited. Recently, Parasuraman, Zeithaml, and Malhotra (2005) developed a multiple-item scale for measuring the service quality delivered by Web sites. The authors suggested that two different scales were necessary in order to capture electronic service quality. They indicated that the electronic service quality (E-S-QUAL) scale includes four dimensions: efficiency, fulfillment, system availability, and privacy while the electronic recovery service quality (E-RecS-QUAL)

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scale contains three dimensions: responsiveness, compensation and contact. The author indicated that E-RecS-QUAL is to be used when customers had non-routine encounters with Web sites.

Service Quality and Customer Satisfaction

Practitioners have used customer evaluations as a means to help establish competitive advantages of their businesses. However, the distinction between service quality and customer satisfaction was unclear, and sometimes the term 'quality' and 'satisfaction' were used interchangeably in both practice and academia as they are the same constructs , stated Iacobucci, Ostrom, and Grayson (1995). Focusing on the voice of the customer, they investigated if quality could be distinguishable from satisfaction. From the customer's perspective, the authors found that certain purchase attributes were more likely to affect judgments of service quality while others were more likely to affect perceptions of customer satisfaction. The findings suggested that perceptions of satisfaction are perhaps affected by factors that impact the experiential process aspects of the service from the consumer's standpoint whereas service quality is perhaps affected by those controlled by management.

The research on customer satisfaction has been a major issue discussed in a customer's point of view; however, this topic has recently brought attention to researchers in managerial perspectives. Voss, Roth, Rosenzweig, Blackmon, and Chase (2004) investigated how service firms' abilities to meet customer requirements relate to customer satisfaction in the United Kingdom and the United States. The findings suggested that service quality will positively influence the level of customer satisfaction

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in both countries while other factors hold constant. As expected, they found that U.K. customers will tolerate poorer service quality than U.S. customers will. However, this does not signify that the U.K. customers will be less responsive to good service than U.S. customers. Although the literature suggested that service quality may have a nonlinear relationship with the level of customer satisfaction (Mittal, Ross, & Baldasare, 1998), the results from this study indicate that service quality has no diminishing influence on both U.K. and U.S. customer satisfaction while other factors remain constant. The authors advocated that the use of customer feedback may be beneficial in service management. They hypothesized that the use of systematic procedures for capturing customer feedback and complaints will moderate the relationship between service quality and customer satisfaction. Although the stated hypothesis was not supported, the results suggested that the influence of using such systematic approaches will be greater for U.K. services than for U.S. services.

Tam (2004) stated that customer satisfaction, service quality, and perceived value are increasingly recognized as foundations of achieving strategic positions in business; therefore, she studied the relationships among these variables leading to post-purchase behavior. The author postulated that perceived service quality will have a positive effect not only on customer satisfaction, but also on perceived value. The results indicated that the postulations were supported. The findings suggested that managers can integrate perceived value with customer satisfaction and perceived service quality to manage the customers' post-purchase behavior. Hong and Goo (2004) also indicated that service quality is positively related to customer satisfaction. This empirical study was conducted

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to discover the causal relationship of customer loyalty in professional service firms and confirmed the findings from Tam's (2004) study.

While most research discusses service quality and customer satisfaction regarding external (outside service organizations) factors, the operations management literature suggested that unhappy employees tend to deliver poor customer service , and employee satisfaction is associated with improved levels of quality, productivity, and overall business performance (Deming, 1985; Ishikawa, 1985; Schlesinger & Heskett, 1991). Furthermore, the service profit chain indicated that overall service quality can be improved by increasing employee satisfaction (Heskett, Jones, Loveman, Sasser Jr, & Schlesinger, 1994; Meyer & Collier, 2001). The study conducted by Voss, Tsikriktsis, Funk, Yarrow, and Owen (2005) investigated the relationships of service quality with employee satisfaction, quality procedures, and customer satisfaction. The results suggested that the use of quality procedures and employee satisfaction led to service quality and that service quality led to customer satisfaction. These findings were consistent with findings from previous studies.

Service Quality and Other Constructs

As discussed in the previous section, the literature indicates the close relationship between service quality and customer satisfaction; however, other constructs pertaining to service quality have been investigated as well. Dabholkar (1996) developed alternative models of service quality using attribute-based and affect-based approaches. For the attribute-based model, expected speed of delivery, expected ease of use, expected reliability, expected enjoyment, and expected control were hypothesized to have a

positive effect on the expected service quality of technology-based self-service (TBSS) option. Besides the significant relationship between expected service quality and the intention to use TBSS, the results only provided support for the relationships between expected service quality, expected enjoyment and expected control. For the affect-based model, the author hypothesized that the expected service quality of TBSS option will be positively affected by the attitude toward using technological products, but negatively affected by the need for interaction with service employees. The results provided support for these relationships. For both models, the same expected service quality construct was, in turn, hypothesized to have a positive influence on intention to use the TBSS option, and the results indicated a strong support.

Soteriou and Chase (1998) indicated that, as part of service, customer contact became an important construct pertaining to perceived service quality. Utilizing the measure of contact developed by Kellogg and Chase (1995), the authors developed a conceptual model to link customer contact to perceived service quality, and the customer contact, in this study, included two dimensions – communication time (total time spent in communication between customer and server) and intimacy (mutual confiding and trust). Employing SERVQUAL, Soteriou and Chase linked and tested the relationships between communication time and each of five SERVQUAL dimensions as well as the relationship between an intimacy and each of those SERVQUAL dimensions. The results indicated that, within a certain period of communication time, customers' perceptions of reliability and assurance on average will be higher than those perceptions outside of that period. The results also showed that customers' perceptions of responsiveness within a certain period will be negatively correlated with the communication time of that period whereas

the perceptions of tangibles and empathy showed no relationship with communication time of a short or long episode. The authors concluded, in general, that within a certain period of communication time, customers' perceptions of service quality will be higher than those perceptions of service quality outside of that period. Similar results supported the relationships between intimacy and reliability or assurance. The data analysis also revealed that, for a given time, intimacy levels will be positively related to a customer's perceptions of responsiveness and empathy at that period while such a relationship did not show in case of tangibles. In summary, this study suggested that desirable levels of communication time and intimacy of customer contact exist at the episode level and influence the SERVQUAL dimensions.

Because electronic commerce has played a major role in today's business, Liu, Arnett, and Litecky (2000) tried to understand if there is a relationship between service quality and the design quality of Web sites. The authors used quick responsiveness, assurance, empathy and follow-up service to measure the service quality construct and found that service quality is positively related to a well-designed Web site. The findings, therefore, suggested that business managers and Web developers should pay close attention to the design of the Web site in order to improve quality of service.

Boyer and Hult (2005) developed an integrated model of operations and marketing focused on the online grocery industry. As part of the integration, the service quality offered by a company was hypothesized to be positively related to a customer's behavioral intention to use online grocery services in the future. The results revealed support to the stated hypothesis. The authors anticipated that online accessibility and attitude toward Internet ordering would moderate the relationship between service quality

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and customer's behavioral intention; however, overall neither online accessibility nor attitude toward Internet ordering was found to have a significant impact on the relationship.

Boyer and Hult (2006) again tested the relationship between service quality and behavioral intention in the context of online grocery services. The results confirmed the findings in their previous study. They also hypothesized that customers will perceive service quality differently due to their grocery shopping experience levels and different methods of picking up grocery. The results revealed that the picking method is the key, not the levels of online grocery shopping experience. However, the results also showed that interaction effect existed between the level of experience and picking method.

Managers have tried to determine factors that help improve service quality. Recently, Hays and Hill (2006) identified several constructs that could be useful in order to improve service quality. The authors developed the construct called "service guarantee strength." They postulated that high service guarantee strength will lead to higher service quality, customer satisfaction, and customer loyalty through three different constructs: marketing communication impact, employee motivation and vision, and learning through service failure. While many behavioral research studies measured only a customer's perceptual data, this study utilized data from both employees and customers. The results from the data analysis indicated that firms with higher marketing communications impact, as well as those with higher levels of employee motivation and vision, will have higher service quality, customer satisfaction, and customer loyalty. Nonetheless, the results showed no support that firms with higher learning through service failure will have higher service quality, customer satisfaction, and customer loyalty. As anticipated,

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the results revealed statistically significant support that firms with higher levels of service guarantee strength will have higher service quality, customer satisfaction, and customer loyalty.

A study investigated service quality in the banking industry. Al-Hawari (2006) attempted to understand the relationship among automated service quality, bank financial performance and customer retention. While automated service quality of automatic teller machines (ATMs) and telephone banking options positively affected customer retention, the results indicated that the Internet banking service quality did not. The author expected that service quality would have a positive direct impact on a bank's financial performance, but the results revealed no support for the relationship. Customer retention was found to mediate the relationship between service quality and a bank's financial performance. To confirm the effect of this mediation, the author further investigated by comparing the original research model with different alternative models. The results from the structural equation analysis suggested the original model that automated service quality directly affected bank financial performance and indirectly affected the financial performance through customer retention yields superior results over alternative models. Thus, the effect of customer retention was confirmed with a partial mediation.

Technology Anxiety

Academicians have been conducting research in technology anxiety for the past several decades due to the fact that there is evidence that people have some difficulty keeping up with technology in our ever changing society. Technology anxiety can be defined as a negative response that reflects apprehension or fear of technology (Baron,

2002; Suri, Lee, Manchanda, & Monroe, 2003). Researchers use different terms for technology anxiety including techno-anxiety, technophobia, techno stress, cyber phobia, computer aversion, computerphobia and computer anxiety (Baron, 2002; Sinkovics et al., 2002). Technology anxiety can affect how individuals live their lives or how organizations run their businesses. Craig (1993) stated that even though users have much experience using a computer, they can still experience anxiety that would negatively affect their job performance. Rosen and Weil (1995) studied computer anxiety in university students in ten countries and found that technological gadgets cause different problems to them in different countries.

Technology anxiety research has been conducted in various areas such as psychology, education, information sciences, information systems, management, marketing, and medical technology to name a few. The following discusses three major constructs in relation to technology anxiety including self efficacy, technology usage, and demographics.

Self-efficacy

Currently, utilizing technology is critical in today's competitive business, and organizations can suffer from employees' poor performance. Bandura (1977) suggested that self-efficacy, "a judgment of one's ability to execute a particular behavior pattern" (Bandura, 1978, p. 240), can influence individual performance. Based on the literature, several studies reported on the relationship between self-efficacy and computer anxiety.

Brosnan (1998a) investigated the relationship between computer anxiety, self-efficacy, and performance using 50 second-year university students. The results

suggested that computer anxiety is directly related to self-efficacy. The author also indicated that low levels of anxiety predicted high levels of self-efficacy.

Since virtual organizations have evolved, computer anxiety can affect how remote workers perform their tasks. Staples, Hulland, and Higgins (1999) anticipated that the employee's computer anxiety level will be positively related to the employee's remote work self-efficacy. After collecting and analyzing data from 18 North American organizations, the results demonstrated that computer anxiety has a negative relationship with remote work self-efficacy. It means that a lower level of computer anxiety can indicate a greater ability to use information technology effectively.

Coffin and MacIntyre (1999) used 59 male and 52 female undergraduate students to study motivational influence on different computer-related affective states. Computer-related anxiety was used to predict computer-related self-efficacy which, in turn, leads to academic performance. Data analysis indicated that computer self-efficacy is negatively predicted by computer-related anxiety and positively influences academic performance. In addition, the authors also found that computer-related anxiety was negatively affected by three constructs including attitudes towards computers, motivation for success and self-efficacy, and previous experience with computers.

Based on Bandura's social cognitive theory, Compeau, Higgins, and Huff (1999) examined individual reactions to computing technology. In contrast to the aforementioned studies, the authors proposed that computer self-efficacy influences anxiety. A longitudinal study was conducted. Data analysis used a sample consisting of 394 responses. In contrast to the study by Coffin and MacIntyre (1999), the result

indicated that self-efficacy is a significant predictor of anxiety. However, the analysis showed consistently that the relationship between anxiety and self-efficacy is negative.

Thatcher and Perrewe (2002) empirically investigated whether individual traits can predict computer anxiety and computer self-efficacy. In this study, they hypothesized that computer anxiety will be negatively related to computer self-efficacy. Negative affectivity and trait anxiety were anticipated to have positive relationships with computer anxiety, whereas personal innovativeness in information technology was proposed to be positively related to computer anxiety. The results provided support for expected relationships except the one with computer anxiety and negative affectivity. In addition, computer anxiety was hypothesized to mediate the relationships between personal innovativeness, negative affectivity, trait anxiety and computer self-efficacy. This mediation was only partially supported.

Fagan, Neill, and Wooldridge (2003) explored the relationship between computer self-efficacy, experience, anxiety, support, and usage. Computer self-efficacy, experience, and organizational support were hypothesized to have negative relationships with computer anxiety. Data were collected from 978 business students. Results from the analysis only provided support for the relationships of computer self-efficacy and experience. Organizational support and computer anxiety were found to have no empirical relationship.

According to the previously mentioned empirical studies, it can be concluded that computer anxiety and self-efficacy have a negative relationship. The notion whether computer anxiety actually influences self-efficacy, or vice versa, is not to be investigated due to the fact that it is beyond the scope of this study. Besides self-efficacy, computer

anxiety or technology anxiety was found to have an impact on other constructs, and technology usage is one of them.

Technology Usage

Organizations have invested in technology to improve their business performance. Many users (both employees and customers) are afraid of the technology introduced to them and do not use the systems (i.e., technology anxiety). There is evidence in the study by Rosen, Sears, and Weil (1987): "The very word 'computer' scares most consumers, so we deliberately avoid using it as much as possible." However, if the technology has already been implemented, a large amount of technology investment seems to be wasted (Ganzel, 1998; McCarroll, 1991). A study revealed that the turnover rate of pharmacy department employees of a company was dramatically increased during the first eight months after the implementation of the computer system (Salloway, Counte, & Kjerulff, 1986). These facts call upon researchers to investigate the relationship of technology anxiety and technology usage.

A series of studies indicated that physician utilization rates of a hospital information systems are low (Anderson & Jay, 1984; Anderson, Jay, Schweer, & Anderson, 1985; Anderson, Jay, Schweer, & Anderson, 1987). Kjerulff, Pillar, Mills, and Lanigan (1992) defined technology anxiety as "a fear of working with medical equipment," and used technology anxiety as a potential mediating factor that may affect medical technology usage. Responses of 414 nurses from nine nursing units were used for data analysis. The results indicated that nurses high on technology anxiety were less likely to use nursing diagnoses on a regular basis. Moreover, they were more likely to

view their work environment as a source of stress and frustration, feel stressed and frustrated by their work, and perceive the physicians they work with negatively.

Scott and Rockwell (1997) investigated the role of computer anxiety, communication apprehension, and writing apprehension on future use of new communication technology. The study used data collected from 178 undergraduate students. The authors hypothesized that increased computer anxiety will result in a decreased likelihood to use any new technology, especially those involving applications that are more technical or mathematical in nature. Results from the analysis only provided partial support to this hypothesis.

Technology anxiety has an impact not only on an organization's technology usage, but also on usage of the product (both goods and services) the organization has to offer. A study reported that some people, in extremes, may refuse to touch certain products even if offered money (Mitchell, 1994). Sinkovics et al. (2002) stated that customers may feel overwhelmed by the proliferation of new technology available in the market. They developed a technophobia scale using data collected from seven countries on different continents. The authors concluded that the level of technology anxiety in customers is an important factor influencing technology-related product innovations and this anxiety may serve as an indicator of customers' intention to buy the products. Thus, the level of technology anxiety could indicate the use of technological products.

Meuter et al. (2003) pointed out that technology anxiety may influence some customers' choice not to use new technologies nor realize changes as improvements. For that reason, the authors studied the role of technology anxiety influencing self-service technology usage and the experience of using a self-service technology. They

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hypothesized that a higher level of technology anxiety will decrease usage of self-service technologies. Data collected form 823 on-line surveys were used in the analysis. The results indicated that overall technology anxiety is a predictor of self-service technology usage, which means as level of technology anxiety increases, self-service technology usage decreases. Moreover, the results from respondents with satisfactory experiences showed that there are negative relationships between overall satisfaction, word of mouth intentions, and repeated usage intention and technology anxiety. Surprisingly, the results showed that there is a significant negative relationship between technology anxiety and word of mouth intentions. However, no significant relationships between technology anxiety and overall satisfaction or repeated usage intention were found.

Fagan et al. (2003) also studied the relationship between computer anxiety and computer usage. They anticipated that computer anxiety would be negatively associated with computer usage. However, the findings showed no support for this relationship. In fact, the results showed that computer anxiety had a positive significant relationship with computer usage, contrary to the findings from Meuter et al.'s (2003) study. The authors further explained that perhaps participants thought a computer was required. Consequently, anxious participants spent even more time on the computer.

Reviewing the technology anxiety studies above suggested that technology anxiety has a great propensity to have a significant negative relationship with technology usage although findings from these studies were found to be inconsistent. In addition to technology usage, one of the issues that has long been discussed in technology anxiety literature is demographics.

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Need for Interaction

Interaction

In traditional services (i.e., full services), service employees serve customers in person. Therefore, it is inevitable that some sort of interaction must occur while service is being delivered. This interaction plays a major role in evaluating the service consumed, and it occurs between customer and service provider through different types of communications (Gronroos, 1982; Solomon, Surprenant, Czepiel, & Gutman, 1985; Sundaram & Webster, 2000).

Gronroos (1982) indicated that interactions between buyer and seller can be classified into three categories including customer versus the physical or technical resources, customer versus the contact personnel, and customer and customers. Clarifying the first type of interaction, Bitner (1992) indicated that environmental dimensions (e.g. ambient conditions, space/function, and signs, symbols and artifacts) can ultimately impact customers' behavior. To illustrate the second type of interaction, studies reported that making eye contact with customers would increase satisfaction and restaurant customers touched by servers were inclined to be positive toward the servers and cooperative with requests from the servers (Hornik, 1992; Ketrow & Perkins, 1986). The following example demonstrates the last type of interaction. For instance, you would probably experience that other customers look at and talk about you if you do not dress properly to dine in a fancy gourmet restaurant in a big city. As a result, you would feel uncomfortable because of the customers.

As discussed, not only verbal but also non-verbal communication can affect the evaluation process for quality in service encounters (Gabbott & Hogg, 2001; Sundaram &

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Webster, 2000). Therefore, it is critical to pay attention to elements of interactions between service provider and customer. The underlying basis of why people interact may be explained by individual differences such as need for affiliation, extraversion, and allocentrism.

Need for affiliation

As one of the three needs developed by David McClelland, need for affiliation is defined as "the desire for friendly and close interpersonal relationship" (Robbin & Judge, 2007, p. 192). Research on need for affiliation has been done in various fields especially in psychology. Carrera (1964) stated that need for affiliation has both an approach and an avoidance aspect; therefore, he defined need for affiliation as "a need for friendships or a need for social acceptance." He differentiated need for affiliation into positive and negative. The reason was that both positive and negative need for affiliation people can be friendly; nevertheless, their motivation was different. Those with a high positive need for affiliation believe that other people are a reliable source of pleasure and gratification whereas those with a high negative need for affiliation try to defend against recurring rejection and social isolation.

A study by Ang and Chang (1999) examined how domain-specific locus of control would impact need for achievement and affiliation. Data collected from 335 students in Singapore were analyzed, and the results suggested that domain-specific measures of locus of control can predict behavior better with respective domain-relevant goals than that with the non-related realm. For instance, the authors suggested that the

person-oriented measures would be a better predictor of affiliation rather than the task-oriented ones.

Need for affiliation was used in relation to organization identification. Wiesenfeld, Raghuram, and Garud (2001) investigated the role of need for affiliation in context of virtual work. They suggested that organization identification may help the organization shape employee behavior because of diminishing visible and tangible dimensions. Therefore, they hypothesized that there is a positive relationship between need for affiliation and strength of organizational identification. It was also hypothesized that the relationship between need for affiliation and organization identification will be moderated by levels of perceived work-based social support. A total of 250 fully-complete responses were used in data analysis. The results provided support for the hypotheses. The finding suggested that identification among virtual employees can be improved by providing social support to those with relatively low need for interaction.

Extraversion

The subject of personality-related research has long been studied. Several factors or dimensions of personality have been identified and named over decades, some of the agreeable factors include extraversion, agreeableness, conscientiousness, neuroticism, and openness (Digman, 1990; McCrae & John, 1992). Extraversion (also called surgency) is one of the major components of psychological tests for personality, and individuals with low extraversion can be described as quiet, reserved, retiring, shy, and

withdrawn, (John, 1990; McCrae & John, 1992). Researchers have tried to discover the potential impact of this personality trait on organizations from various perspectives.

Personality can be related to individuals' performance. Using the five factors, Hayes, Roehm, and Castellano (1994) studied the relationships between personality and performance of employees in a total quality manufacturing environment. Data were collected form 136 automobile plastic-part injection molding machine operators. Results from regression analysis suggested that differences in personality were associated with successful performance of the employees suggesting the guideline for potential high performers in a total quality manufacturing environment. The authors indicated that employees with a lower score on openness and extraversion tend to be more successful, contrary to the total quality experts' expectations. Moreover, advanced education was found to be an unreliable indicator of high performance in quality settings.

As Internet technology has evolved, social Internet use becomes an important issue. Koch and Pratarelli (2004) explored the effects of extraversion and gender on social Internet use. The authors hypothesized that the individuals with low extraversion (i.e., introverts) would be more comfortable using the Internet (vs. face-to-face contact) for social interaction, and that males may exhibit significant differences in social Internet use from females. The study surveyed 240 university students. The results from data analysis indicated that those with low extraversion expressed substantial preference for on-line communications rather than face-to-face ones indicating potential social interaction problems in the Internet era. Furthermore, the findings suggested that males made greater use of the Internet than females did.

A study by Robinson, Meier, and Vargas (2005) investigated extraversion, threat categorizations, and negative affect in relation to avoidance motivation. In this study, threat categorization referred to individuals' skill at classifying threatening words including abuse, cancer, death, gun, knife, snake, train wreck, and weapon. Conducting three studies, the authors indicated rather inconsistent results. However, the results provided some interesting findings that individuals with high extraversion were slower to categorize threats relative to introverts, and that extraversion was significantly correlated with daily experiences of negative affect. The authors indicated that threat categorization tendencies inherent in introverts can activate the avoidance motivation.

Allocentrism

Much research argued that people of a certain culture may behave differently from those of dissimilar cultures. Allocentrism, similar to collectivism, has been discussed in relation to social relationships. Therefore, reviewing the literature associated with allocentrism would help understand the need for human interaction.

Hofstede (1980) indicated that individualism–collectivism is one of national cultures. While characteristics of collectivist culture include, but are not limited to, harmony, family security, social hierarchies, cooperation, low levels of competition and affiliation, individualist cultures embrace characteristics such as independence, detachment from in-groups, and self-reliance (Hui & Villareal, 1989; Triandis, 1989, , 1994). Unlike the cultural dimension of individualism–collectivism, Triandis, Leung, Villareal, and Clark, (1985) defined idiocentrism–allocentrism as a psychological dimension. Allocentrics are those who prefer social relationships and interdependence.

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Several studies investigated how allocentrism affects different spectrums of organizations.

Proposing the cross-cultural consumer behavior model, Lee (2000) adapted and integrated Triandis's model of subjective culture and social behavior relations into the consumer behavior concept. Surveys were used to collect the data, and the final sample consisted of 815 responses from five different countries. The results provided strong support for the proposed model. When compared with idiocentrics, referent expectation had greater influence on purchase intention for allocentrics, attitude toward the purchase had less influence on purchase intentions, and referent past experience had more influence on referent expectation. Rather than idiocentrics, allocentrics were found to be greatly influenced by the consideration of resources.

Lam, Chen, and Schaubroeck (2002) studied participative decision making and employee performance in different cultures. The analysis used the data collected from both individualist and collectivist cultures. The results indicated that allocentrism and domain-specific efficacy perception significantly predict the level of participative decision making effects. Allocentrism was also found to mediate the relationship between societal difference in two countries (Hong Kong and the United States) and group performance.

Looking at customer orientation, Dutta-Bergman and Wells (2002) utilized a descriptive approach to find the values and lifestyles of idiocentrics and allocentrics in an individualist culture. A total response of 3,870 was received, and data were collected through 48 states except Alaska and Hawaii. From the analysis, the results indicated allocentrics were less satisfied with their present lives, and they had a lot of spare time.

Idiocentrics tended to illustrate a higher level of innovativeness than allocentrics. This was explained by the greater intention to purchase computers, modems, and interactive computer services. Moreover, allocentrics were less interested in other cultures and tended to live in the same town for their whole life. The time they spent in food preparation, cleaning the house, and doing laundry was much greater than idiocentrics.

Bordia and Blau (2003) investigated the effect of allocentism as a moderator of the relationship between pay referent comparison and pay level satisfaction. Questionnaires were used to collect the data from three Indian organizations with the total response of 146. Results from data analysis, when controlling age-tenure and pay level, suggested that more variance in pay level satisfaction was explained by pay referent comparisons for allocentrics. Then, allocentrism was found to marginally moderate the relationship between family referent comparison and pay level satisfaction. Furthermore, while idiocentrism was found to marginally moderate the relationship between the pay level and pay level satisfaction, its moderating effect was not found in the relationship between personal worth and pay level satisfaction.

Research Model

The research framework for this study utilized the concept of reputable behavioral theories mentioned earlier in this chapter including Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), and Theory of Planned Behavior (TPB). These theories provide the foundation that behavioral intention will lead to the actual behavior. Therefore, intention to use self-service technologies will predict self-service technology

utilization. Figure 2-4 demonstrates the structural research model. Each relationship is

to be discussed in the hypotheses section.
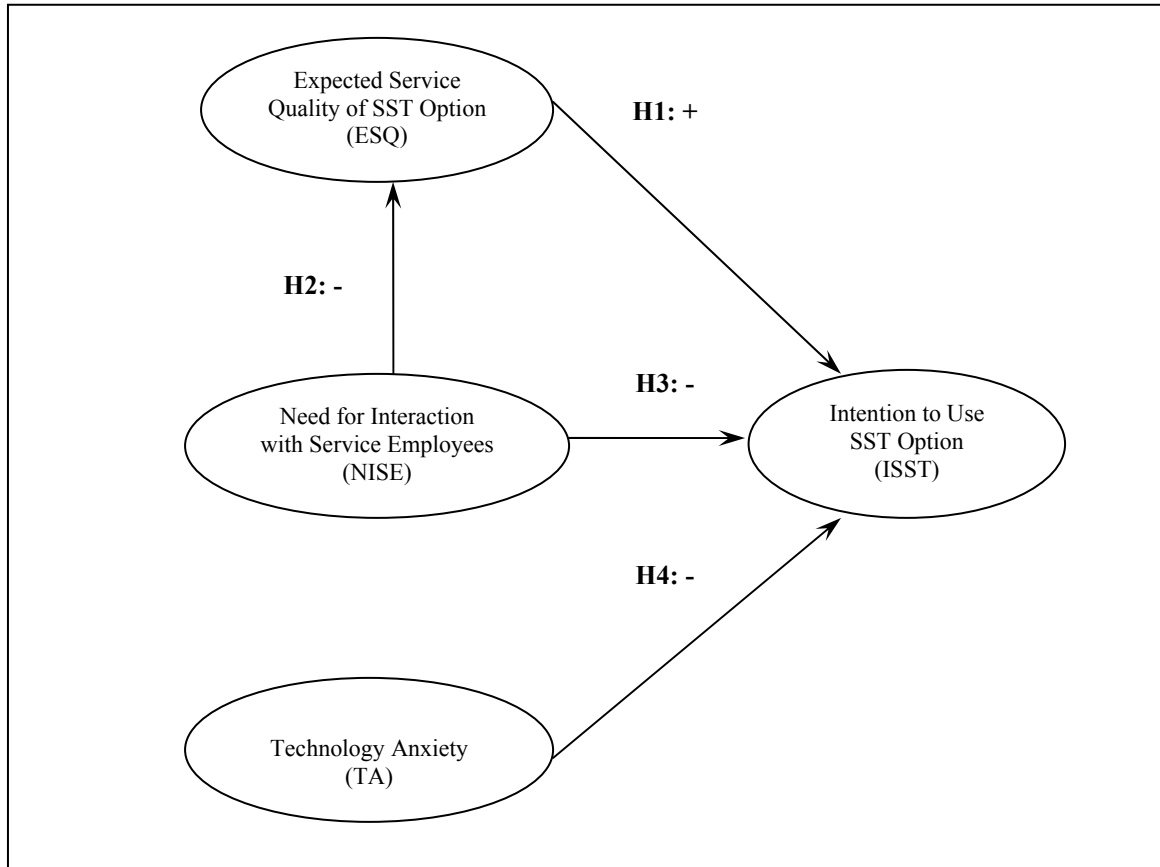
Figure 2-4. Structural Research Model

Hypotheses

There are four hypotheses in the proposed research model. Each of the

hypotheses is discussed below.

Intention to Use Self-service Technologies

Self-service technologies (SSTs) are defined as technological interfaces that allow

customers to act as a producer and a consumer of services without direct communication with an organization's employees (Meuter et al., 2003). In this study, intention to use SSTs is defined as the users' reported intent to utilize SSTs. As discussed earlier in the section of related behavioral theories, the behavioral intention as an antecedent of actual behavior has been widely used (Gentry & Calantone, 2002; Hsu & Chiu, 2004; Lederer & Maupin, 2000).

Expected Service Quality of Self-service Technologies

Service quality is difficult to measure by nature. On the one hand, customers want a certain level of service quality to be delivered. Since customers are those who evaluate quality of service, service quality must be defined from their perspective and must be relevant for the situation where it is measured (Gronroos, 1984). Parasuraman et al. (1988) suggested that service quality was to be measured by confirming expectation with performance. Due to the fact that behavioral intention is an antecedent of actual behavior, intention to use SSTs must occur before the actual SST usage. Therefore, for the purpose of this study, it is logical to measure only expected service quality rather than service quality of the entire service encounter. In this study, expected service quality of SSTs refers to the customers' perception of how SSTs will provide the service to them.

In the case of self-service delivery, SSTs act as service providers. An empirical study by Boyer and Hult (2005) indicated that service quality provided by an online grocery service provider can have a positive relationship with a customer's repeated behavioral intention to use the online grocery service. Another study revealed that service quality is correlated with increased customer behavioral intention (Boyer & Hult,

2006). The findings above provide evidence of the link between service quality and behavioral intention. Therefore, if one believes that the SST option provides high quality services, he or she will be inclined to use the SST option when situational factors are the same as other service delivery options.

Hypothesis 1: Expected service quality of a self-service technology option will be positively related to intention to use that option.

Need for Interaction with Service Employees

Interaction is the two-way communication between two entities. Human interaction is extremely crucial in many service encounters, and this interaction plays an important part in evaluating the delivered service (Gronroos, 1982; Solomon et al., 1985; Sundaram & Webster, 2000). Need for interaction is defined as "the need that some individuals feel for interacting with the service employees in a service encounter" (Dabholkar, 1992, p. 564). Interaction with service employees can be completed through verbal or nonverbal communications. Both types of communication can influence the evaluation process for quality in service encounters (Gabbott & Hogg, 2001; Sundaram & Webster, 2000). For instance, a respectful verbal greeting by a service employee can instinctively influence how customers perceive quality of the service, while making eye contact or touching customers warmly would increase satisfaction and cooperation from customers if it were wanted (Hornik, 1992; Ketrow & Perkins, 1986). Unlike full services, direct communication with service employees is excluded in self-service delivery, which, in turn, may diminish quality of service perceived by customers.

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Hypothesis 2: Need for interaction with service employees will be negatively related to expected service quality of self-service technology option.

Since human interaction is involved in traditional service encounters (i.e., full services), the need for interaction with service employees can be explained by individual differences related to social interaction. From a psychological perspective, one would engage in a social contact as a result of need for affiliation. One would interact with other people if one found that other people are a dependable source of pleasure and gratification or if he or she prevents recurring rejection and social isolation (Carrera, 1964). Thus, a high level of need for affiliation encourages social interaction (in this case, need of interaction) rather than interaction with a machine.

Individuals with low extraversion can be described as quiet, reserved and shy (John, 1990; McCrae & John, 1992). They would be more comfortable using the Internet rather than engaging in face-to-face contact for social interaction, and their threat categorization tendencies can activate avoidance motivation (Koch & Pratarelli, 2004; Robinson et al., 2005). Hence, the need for interaction with service employees could be low for individuals with low extraversion, and they may prefer to interact with a machine.

Allocentrics prefer social relationships and interdependence, and are more likely to participate in social interactions (Triandis et al., 1985). They have more spare time, spend more time on activities related to family, and are less innovative than idocentrics (Dutta-Bergman & Wells, 2002). These points suggest that allocentrics may possess a higher need of interaction with a human service employee.

The above arguments lead to the conclusion that the higher the need for interaction with service employees, the less the tendency the customer will use self-service technology option. Therefore, the third hypothesis is as follows:

Hypothesis 3: Need for interaction with service employees will be negatively related to intention to use self-service technology option.

Technology anxiety

Technology is referred to as application of integrated scientific processes, methods, knowledge, and material to achieve an object. Technology anxiety can be defined as a negative response that reflects apprehension or fear of technology (Baron, 2002; Suri et al., 2003). Negatively associated with technology anxiety, self-efficacy was defined as "a judgment of one's ability to execute a particular behavior pattern" (Bandura, 1978; Brosnan, 1998b; Compeau et al., 1999; Fagan et al., 2003). In self-service situation, if one possesses a high level of anxiety, one would have low self-efficacy. Thus, that person is less likely to use a self-service technology option.

Customers may feel overwhelmed by the proliferation of new technology available in the market (Sinkovics et al., 2002). Results from several studies suggested the people with a high level of technology anxiety may not be less likely to use certain technologies (Kjerulff et al., 1992; Meuter et al., 2003; Scott & Rockewell, 1997).

Hypothesis 4: Technology anxiety will be negatively related to intention to use self-service technology option.

CHAPTER 3

METHODOLOGY

This section presents an overview of the research methodology. Procedures used for conducting the research are discussed, which include determining population, sample, and method of the study, instrument development, survey administration, and data analysis.

An Overview of Research Methodology

First, the population was determined. In the second step, the subject was identified and sample size was estimated based on the objective and the statistical technique used in the study. Third, the method of study was selected, considering the objectives of the study, the availability of data sources, the type of data, and the cost of obtaining the data. Then, the fourth step included development of the instrument, pilot sample selection, pilot test, and instrument revision. Survey administration was step five. In the sixth step, data collected from the previous steps were analyzed. This step included data examination and structural equation modeling. Then, the results are reported and discussed in the subsequent sections. Figure 3-1 presents an overview of research methodology used in this study.

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┌─────────────────────────────────────────┐
│        Determining Population            │
│          (Retail Customers)              │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│          Determining Sample             │
│ (Retail Customers in a Midwestern part  │
│        of the United States)            │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│       Determining Method of Study        │
│               (Survey)                   │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│        Instrument Development            │
│   • Development of the Instrument        │
│   • Pilot Sample Selection               │
│   • Pilot Test                           │
│   • Instrument Refinement (if necessary) │
└─────────────────────────────────────────┘
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                    ▼
┌─────────────────────────────────────────┐
│         Survey Administration            │
└─────────────────────────────────────────┘
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                    ▼
┌─────────────────────────────────────────┐
│            Data Analysis                 │
│   • Data Examination                     │
│   • Structural Equation Modeling         │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│         Interpreting the Model           │
│             (Chapter 4)                  │
└─────────────────────────────────────────┘
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Figure 3-1. Research Methodology

Population

As indicated in Chapter 1, the scope of the study covered only retail stores. Based on the Theory of Planned Behavior, previous experience may influence individuals' perceptions. Customers who used the self-checkout of a retail store before would provide some reasons why the implemented self-checkout was underutilized. Therefore, the population of this study included retail customers who used the self-checkout before at any retail store.

Sample

It is impossible to collect the data from the entire population; for this reason, a convenience sample was used to represent the population. Generally, anybody is considered a customer of at least a retail store. Therefore, anyone who used the self-checkout before at any retail store was an appropriate subject for this study. Subjects who have never used the self-checkout before were excluded from the study using the instrument discussed later in the section of instrument development.

The research was conducted at a large university in the Midwestern part of the United States. The university is near several large health care facilities and industrial parks, and the student body includes traditional, non-traditional, and international students from more than 100 countries. Although using students as subjects may pose problems of external validity, the results can simply be used by service organizations to target college students (Dabholkar, 1996). Therefore, using students as subjects was not irrelevant for this study. More details of the sample characteristics are discussed in data examination in the next chapter.

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No single criterion dictates the necessary sample size when using structural equation modeling (Hair, Tatham, Anderson, & Black, 1998). However, Ding, Velicer, and Harlow (1995) reported that several studies using structural equation modeling consider 100 to 150 subjects to be an acceptable sample size. Schumacker and Lomax (2004) indicated that the rules of thumb in statistics, such as ten or twenty subjects per variables, can be used.

There are 14 variables to be observed in this study. The number of individuals who participated in the study was 653. The sample size of this study included usable 600 subjects, and this number far exceeded the minimum recommended sample size even when considering 20 subjects per variable. Therefore, the study used the appropriate sample size for data analysis.

Method of Study

The survey study provides an inexpensive and efficient means of gathering information from the targeted population (Zikmund, 2000). Considering mobility, cost of data collection, and the type of information to be gathered (i.e., perceptions), the survey approach was appropriate for this study. Because one of the constructs measured was technology anxiety, the paper-based survey was used in survey administration.

Instrument Development

The paper-based questionnaire with seven-point Likert-type scales was used as the instrument for the survey. The questionnaire in English was utilized due to the fact that this study was conducted in the United States. The questionnaire contained three

sections: demographic information measures, measures for previous experience with self-checkout, and measures for the variables of interest.

The first section included questions for gathering demographic information, such as ethnicity, age, gender, and level of education. The information from this section was used for classification purposes only (not for identifying the respondent), and this was clearly stated on the questionnaire.

The second section provided a brief description of the self-checkout, explaining that the self-checkout can provide services offered by the traditional one. This section also included the question that identifies whether the customers have ever used the self-checkout before.

The third section includes all measures for the variables of interest. The section began with the hypothetical situation that the respondent was at a retail store that has self-checkout and he or she responded to the statements assuming that the length of the line was the same for both traditional and self-service options. All of measures for each of the variables of interest were modified from existing scales to fit the context of the study. In addition to this modification, two items were added to measure the construct of expected service quality. Since the modification may affect the reliability and validity of these measures, the reliability and validity were tested before testing the hypothesis. These issues are discussed later in chapter 4. Table 3-1 to Table 3-4 demonstrate the original and modified scales for each construct. The full instrument used for this study is displayed in Appendix A.

Face, convergent, and discriminant validities were used to assess construct validity. After several reviews and refinements, the instrument appeared to have

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reasonable face validity. Convergent and discriminant validities were examined using

confirmatory factor analysis, and these examinations are discussed in chapter 4.

Table 3-1.

Original (Q) and Modified (ESQ) Measurement Items for Expected Service Quality of

SST Option (Dabholkar, 1996)

Code	Measurement Items	Scale						
Q 1	What level of service quality would you receive from the touch screen ordering option?	Low 1	2	3	4	5	6	High 7
Q 2	Using the touch screen ordering will provide _____ service.	Poor 1	2	3	4	5	6	Excellent 7
Q 3	The touch screen ordering option will provide a high level of service quality.	Strongly Disagree 1	2	3	4	5	Strongly Agree 6	7
ESQ 1	The level of service quality I will receive from the self-checkout system is_____.	Low 1	2	3	4	5	6	High 7
ESQ 2	Using the self-checkout system will provide _____ service.	Poor 1	2	3	4	5	6	Excellent 7
ESQ 3	The service provided by the self-checkout system will be _____.	Poor 1	2	3	4	5	6	Excellent 7
ESQ 4	I will receive better service from the self-checkout system.	Strongly Disagree 1	2	3	4	5	Strongly Agree 6	7
ESQ 5	The self-checkout system will provide a high level of service quality.	Strongly Disagree 1	2	3	4	5	Strongly Agree 6	7

Note: Cronbach's alpha of the original study using a touch screen ordering system = 0.85

Table 3-2.

Original (Q) and Modified (NISE) Measurement Items for Need for Interaction with

Service Employees (Meuter, Bitner, Ostrom, & Brown, 2005)

Code	Measurement Items	Scale
Q 4	Personal contact with an employee makes ordering a prescription refill enjoyable for me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7
Q 5	Personal attention by a customer service employee is important to me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7
Q 6	It bothers me to use a machine when I could talk to a live person instead.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7
NISE 1	Personal contact with an employee makes checking out merchandise enjoyable for me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7
NISE 2	Personal attention by the service employee is very important to me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7
NISE 3	It bothers me to use a machine when I could checkout with a person instead.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7

Note: Cronbach's alpha of the original study using an interactive voice response telephone system = 0.88
       Cronbach's alpha of the original study using an Internet ordering system for prescription refills = 0.87

Table 3-3.

Original (Q) and Modified (TA) Measurement Items for Technology Anxiety (Meuter et

al., 2005)

Code	Measurement Items	Scale						
Q 7	I feel apprehensive about using technology.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
Q 8	Technical terms sound like confusing jargon to me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
Q 9	I have avoided technology because it is unfamiliar to me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
Q 10	I hesitate to use most forms of technology for fear of making mistakes I cannot correct.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
TA 1	I feel nervous about using technology.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
TA 2	Technical terms are confusing to me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
TA 3	I have avoided technology because it is unfamiliar to me.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						
TA 4	I hesitate to use most forms of technology for fear of making mistakes I cannot correct.	Strongly Disagree Strongly Agree 1 2 3 4 5 6 7						

Note: Cronbach's alpha of the original study using an interactive voice response telephone system = 0.93
        Cronbach's alpha of the original study using an Internet ordering system for prescription refills = 0.93

Table 3-4.

Original (Q) and Modified (ISST) Measurement Items for Intention to Use SST Option

(Dabholkar & Bagozzi, 2002)

Code	Measurement Items	Scale						
Q11	Would you intend to use the touch screen?	Likely Unlikely 1 2 3 4 5 6 7						
		Possible Impossible 1 2 3 4 5 6 7						
ISST 1	What is the likelihood that you will use the self-checkout system?	Likely Unlikely 1 2 3 4 5 6 7						
ISST 2	It is _____ that I will use the self-checkout system.	Possible Impossible 1 2 3 4 5 6 7						

Note: Cronbach's alpha of the original study using a touch screen ordering system = 0.90

Pilot Sample Selection, Pilot Test, and Instrument Refinement

A pilot study was conducted before the actual survey administration to test the clarity and appropriateness of the questions contained in the instrument. Subjects of the pilot study were 40 college students from different colleges within the university, including Applied Sciences and Arts, Business and Administration, Education and Human Services, Engineering, Liberal Arts, Mass Communication and Media Arts, and Science majors. These students were asked to fill out the questionnaires and provide opinions or comments whether the questions are clear and appropriate. Feedback from the pilot test was used to refine the instrument to minimize errors that may occur during the survey.

Survey Administration

The refined instrument was used for the survey. Classes were randomly selected and the research was conducted with permission of the instructor of the classes only. The short description of the study was provided to students, and then they were asked to carefully respond to the survey using self-report procedure. The subjects were also informed that their participation is completely voluntary and they are free to withdraw from the study at anytime. In general, it took about ten minutes to complete the survey. The researcher attempted to administer the survey at the beginning of each class selected. However, not all surveys were administered in that manner due to the request of the instructor. Extra credits, candies, and some pens from Thailand were used as incentives in this study.

Data Analysis

Data Examination

Responses from the survey were coded into a file for statistical analysis. To prevent poor results, data were examined and invalid or incomplete responses were excluded from the analysis. An examination for outliers was necessary due to the fact that they can affect the results of data analysis. Since Hair et al. (1998) suggested that the structural equation modeling (SEM) technique is sensitive to multivariate normality of the data and SEM was used for this study, this factor was carefully examined.

Structural Equation Modeling

This study used structural equation modeling because of several advantages suggested by Hair et al. (1998). First, this technique can accommodate multiple

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interrelated dependence relationships. Second, SEM has a capability to incorporate latent (unobserved) variables into the analysis. Third, SEM has the capability of assessing or correcting for measurement error. Therefore, SEM provides a more accurate interpretation of the model with a reasonable number of cases.

The two types of variables in the SEM model are exogenous and endogenous variables. Exogenous variables are independent variables that are not caused or predicted by any other variables in the model, and endogenous variables are dependent variables caused or predicted by one or more constructs. In SEM, rectangles or squares are used to indicate manifest (measured) variables whereas ovals or circles represent latent (unobserved) variables. The letter E represents errors pointing toward manifest variables. According the theory developed in Chapter 2, the proposed structural equation model of this study is shown in Figure 3-2.
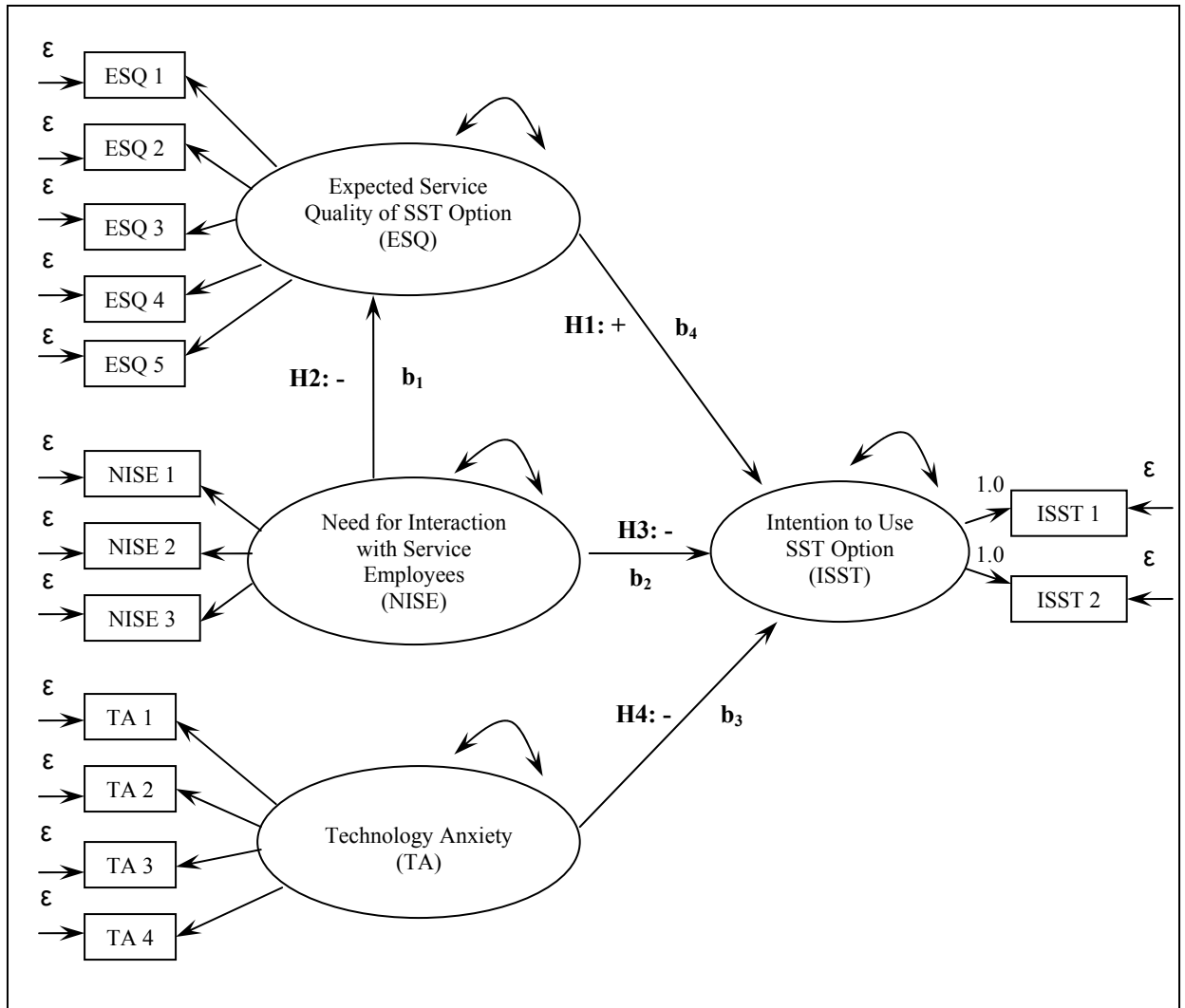
Figure 3-2. Structural Equation Model

Table 3-5 illustrates the translation for each of the path diagrams in Figure 3-2 in structural equations. Each endogenous variable (Y_j) can be predicted either by exogenous variables (X_j) or by other endogenous variables. For each hypothesized effect, a structural coefficient (b_{jm}) was estimated.

Table 3-5.

Translation of Path Diagrams into Structural Equations

Endogenous Variable (Y_j)	=	Exogenous Variables (X_j)	+	Endogenous Variable (Y_j)	+	Error (ε)
ESQ	=	b_1NISE			+	ε
ISST	=	b_2NISE + b_3TA	+	b_4ESQ	+	ε

Note: ESQ $\rightarrow$ Expected service quality of SST option
NISE $\rightarrow$ Need for interaction with service employees
TA $\rightarrow$ Technology Anxiety
ISST $\rightarrow$ Intention to use SST option

Software Selection: EQS 6.1 for Windows was used for this study. First, it was selected because it allows researchers to use raw scores, correlation, or covariance matrices as input data for SEM. Second, it had a function that can run corrected statistics in case of non-normal data. Third, the software was available at no additional cost in conducting the research. Therefore, the selection of EQS 6.1 for Windows as a program was reasonable.

Estimation Procedure: Maximum likelihood (ML) was used for our model estimation. Kline (1998) indicated that researchers can use the normal distribution methods such as ML in case of non-normal data, but corrected test statistics are needed to reduce bias. As indicated previously, EQS 6.1 for Windows provides this corrected statistics function. Therefore, using ML estimation was appropriate.

Model Identification: Identification of the proposed model using degrees of freedom was determined. According to the structural equation model in Figure 3-2, the number of parameters (or paths) estimated was 32 (the number of arrows in the model), and the number of non-redundant manifest variables was 105 (derived from p [p+1] / 2,

where p was the number of indicator variables). The degrees of freedom, the number of data points minus the number of parameters estimated in the model, were 71. Since the number of degrees of freedom was much greater than zero, the model was overidentified. Therefore, the use of SEM was appropriate with this model.

Goodness-of-Fit Evaluation: Hair et al. (1998) suggested that the goodness-of-fit must be assessed at several levels: (1) the overall model, (2) the measurement and (3) the structural model. In general, this assessment can be carried out using several goodness-of-fit measures (Hair et al., 1998; Joreskog & Sorbom, 1993; Kelloway, 1998). Several measures can be used to evaluate the overall model fit including the likelihood-ratio chi-square test (χ^2), the goodness of fit index (GFI), the root mean squared residual (RMR), and the root mean squared error of approximation (RMSEA).

Overall Model Fit: Joreskog and Sorbom (1993) indicated that χ^2 measures the discrepancy between the sample covariance or correlation matrix and the fitted covariance or correlation matrix. Hence, non-significant χ^2 suggests that there is no difference between the sample and fitted covariance, therefore indicating a good fit. GFI is the squared residuals from prediction compared with the actual data, ranging from 0 (poor fit) to 1.0 (perfect fit). Hair et al. (1998) indicated that the higher the GFI, the better the model fit. RMR is an average of the residuals between observed and estimated input matrices. Kelloway (1998) suggested that an RMR value of 0.05 or less indicates a good fit to the data. Finally, RMSEA, similar to RMR, is the discrepancy per degree of freedom, but measured in terms of the population. Steiger (1990) suggested that RMSEA values below 0.10 indicate a good fit to the data, and values below 0.05 signify a very good fit.

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Because of non-normal data, a different chi-square test was used. The robust statistics option available in EQS 6.1 for Windows provides a robust chi-square, known as Satorra-Bentler scaled chi-square (S-B χ^2), which has been corrected for non-normal data. Schumacker and Lomax (2004) suggested the use of S-B χ^2 for data that do not meet the assumption of multivariate normality. In addition to S-B χ^2, the software also provides other indices such as Bentler-Bonett non-normed fit index (NNFI), comparative fit index (CFI), Bollen fit index (IFI), and root mean squared error of approximation (RMSEA), which have been corrected for non-normal data.

Measurement Model Fit: Confirmatory factor analysis was used to examine the measurement model. Examining indicator loading for statistical significance and assessing construct reliability and variance extracted were the two steps to assess the measurement for each construct (Hair et al. 1998). The former was similar to conducting factor analysis in which each indicator should load on the proposed factor. The t-value was assessed at the significance level of 0.05. The latter consists of two parts: construct reliability and variance extracted. Reliability is the measure of the internal consistency of the construct indicators. Variance extracted indicates the overall amount of variance in the indicators accounted for by the latent constructs. Therefore, higher variance extracted values suggest that the indicators truly represent the latent constructs. The guideline for reliability and variance extracted of each construct is the threshold value of 0.70 and 0.50, respectively (Hair et al., 1998). The measurement model of this study is discussed later in chapter 4.

Structural Model Fit: The significance of estimated coefficients was used to examine the structural model. For each path in the structural model, the significance

level of 0.05 was used to test for significance. In general, a one-tailed test of significance can be employed when a positive or negative relationship is hypothesized, while a two-tailed significant test is used when no direction is specified for the relationship. Hair et al. (1998) indicated that the critical t-value used to assess significance for the one-tailed test is 1.65 whereas the critical t-value of 1.96 is used for the two-tailed one. As discussed in Chapter 2, the direction was specified for each relationship; therefore, the former critical t-value was used in this study. The structural model section in chapter 4 provides more details of the structural model of this study.

Interpreting the Model

The final step in data analysis is interpreting the results. The two main interests are the results from the assessment of measurement and structural model fit. The examination of the measurement model provides statistical support for indicators and constructs in this study. The significant loadings indicate the appropriate indicators used to capture the latent variables (constructs) and the high reliability measures suggest the internal consistency of the constructs. The examination of the structural model provides statistical confirmation of the proposed hypotheses. The test for statistical significance indicates whether the null hypotheses of this study should be rejected or not. The results from these assessments are reported and discussed in Chapter 4.

CHAPTER 4

RESULTS

Chapter 4 provides results from the statistical analysis including data examination, descriptive statistics, and examination of the measurement and structural models of the study.

Data Examination

Data examination can help ensure that the results obtained for the multivariate analysis are truly valid and accurate (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, it is important to examine the data before application of the structural equation modeling technique.

A total of 653 individuals participated in the survey. Since this study only investigated intention to use self-checkout of experienced retail customers, 22 responses from individuals who have never used the self-checkout were excluded from this study. In addition, 31 responses were found to be invalid and not included in the statistical analysis. These responses represent individuals who demonstrated that they did not carefully respond to the questionnaire. For instance, the subjects reported that they have never used the self-checkout but responded to statements regarding previous use of the system, they circled more than one number on any item, or they did not complete the survey.

After preliminary data screening, data entry was conducted using the total of 600 responses. To minimize possible discrepancies between data entered and actual data, the dataset was entered by two people and both were compared. Approximately 0.40% of the

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total number of data points was inconsistent. These inconsistencies were corrected accordingly.

Demographics

Descriptive statistics revealed information regarding ethnicity, age, gender, level of education, and academic major of respondents. The majority of respondents were female (52.83%) and the range of age was from 18 to 63 years old with the mean of 24.63 and the standard deviation of 6.96. Most respondents were white (80.17%) and were undergraduate program without any associate degree – some college education (47.00%). The sample was a mixture of over 100 majors from different colleges including Agricultural Sciences, Applied Sciences and Arts, Business and Administration, Education and Human Services, Engineering, Law, Liberal Arts, Mass Communication and Media Arts, and Science. Table 4-1 presents the analysis of demographics of participants based on 600 usable responses and Table 4-2 shows the descriptive statistics of manifest variables.

Missing data

Missing data were identified from the data entry process, and they were corrected before running the analysis. When a Likert-type scale is used and the number of respondents with missing data and the number of items missing are less than 20%, the item mean substitution method is appropriate (Downey & King, 1998). Since the data collected had less than 2% of missing data, the item mean substitution was conducted using EQS 6.1.

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Table 4-1.

Demographics of Participants

Variables	Categories	Frequency (n=600)	Percent
Ethnicity	White	481	80.17
	Black	72	12.00
	Hispanic	12	2.00
	Asian	17	2.83
	Others	17	2.83
	No response	1	0.17
Gender	Male	280	46.67
	Female	317	52.83
	No response	3	0.50
Age	18-25	428	71.33
	26-35	79	13.17
	36-45	28	4.67
	>45	20	3.33
	No response	45	7.50
Highest Level of Education	High school diploma	7	1.17
	Some college	282	47.00
	Associate degree	178	29.67
	Bachelor degree	95	15.83
	Master's degree	27	4.50
	Doctor degree	3	0.50
	No response	8	1.33
College	Agricultural Sciences	13	2.17
	Applied Sciences & Arts	35	5.83
	Business	189	31.50
	Education & Human Services	125	20.83
	Engineering	22	3.67
	Law	1	0.17
	Liberal Arts	163	27.17
	Mass Communication & Media Arts	27	4.50
	Science	18	3.00
	No response	7	1.17

Table 4-2.

Descriptive Statistics of Manifest Variables

Manifest Variables	Range	Minimum	Maximum	Mean	Std. Deviation
ISST1: What is the likelihood that you will use the self-checkout system?	6.00	1.00	7.00	4.66	1.95
ISST2: It is possible that I will use the self-checkout system?	6.00	1.00	7.00	5.39	1.55
ESQ1: The level of service quality I will receive from the self-checkout system is _____.	6.00	1.00	7.00	4.76	1.55
ESQ2: Using the self-checkout will provide _____ service.	6.00	1.00	7.00	4.80	1.36
ESQ3: The service provided by the self-checkout system will be _____.	6.00	1.00	7.00	4.84	1.37
ESQ4: I will receive better service from the self-checkout system.	6.00	1.00	7.00	3.89	1.52
ESQ5: The self-checkout system will provide a high level of service quality.	6.00	1.00	7.00	4.28	1.50
TA1: I feel nervous about using technology.	6.00	1.00	7.00	1.84	1.23
TA2: Technical terms are confusing to me.	6.00	1.00	7.00	1.88	1.22
TA3: I have avoided technology because it is unfamiliar to me.	6.00	1.00	7.00	1.76	1.17
TA4: I hate to use most forms of technology for fear of making mistakes I cannot correct.	6.00	1.00	7.00	1.98	1.35
NISE1: Personal contact with an employee makes checking out merchandise enjoyable for me.	6.00	1.00	7.00	3.97	1.63
NISE2: Personal attention by the service employee is very important to me.	6.00	1.00	7.00	3.71	1.73
NISE3: It bothers me to use a machine when I could checkout with a person instead.	6.00	1.00	7.00	2.75	1.80

Outliers

Although outliers can seriously distort the statistical tests, only problematic ones should be excluded from statistical analysis. With SPSS 15.0, outliers were detected using the Mahalanobis distance measure. The calculation of the distance divided by the degrees of freedom was employed to detect potential outliers with the threshold of 4 due

to large samples (Hair et al., 2006). Three cases were detected as potential outliers. After closely reviewing these cases, the responses did not indicate problems of understanding the question on the questionnaire, answering the questions incorrectly, or malingering. They were just simply different from other respondents in the population. Thus, these cases were included in the analysis.

Normality

The SEM technique is sensitive to multivariate non-normality, and it is important to check that the data meet the required assumption. The data were preliminarily assessed using univariate skewness and kurtosis. All indicator variables of the technology anxiety construct were positively skewed and leptokurtic. After a logarithmic transformation, all indicator variables in general demonstrated an acceptable normality. Although the univariate normality examination is helpful, it is not sufficient for SEM (West, Finch, & Curran, 1995).

Developed by Mardia (1970), the measures of skewness and kurtosis to assess multivariate normality were used to examine the data. A large positive value of the normalized estimate indicates a substantial positive kurtosis while a large negative value demonstrates a significant negative kurtosis (Bentler, 1989). EQS 6.1 was utilized and Mardia's normalized estimate was 34.44. When the data exhibit a high value of this estimate, it indicates that the data are not normally distributed (Byrne, 1994)

Although the data from this study were not normally distributed, SEM can be accomplished using corrected statistics. This function, known as the robust method, is available in EQS 6.1. ML with robust statistics provided a χ^2 statistic, Satorra-Bentler

scaled chi-square (S-B χ^2) and standard errors that have been corrected for a non-normal data distribution. The program also provided the Bentler-Bonett normed fit index (NFI), Bentler-Bonett non-normed fit index (NNFI), comparative fit index (CFI), Bolen fit index (IFI), and root mean-square error of approximation (RMSEA). These fit indices were used to evaluate the goodness-of-fit in the measurement model.

Measurement Model

Since modified existing scales were used for all variables of interest, confirmatory factor analysis (CFA) was used to assess the measurement model. Convergent and discriminant validity were examined. It is imperative to assess the measurement model before the structural model due to the fact that the latter is based on the former (Byrne, 2001).

Convergent Validity

CFA was employed to examine convergent and discriminant validities. The former demonstrates that the measured or observed variables only represent one underlying construct. Convergent validity can be assessed through factor loadings, reliability, and variance extracted.

A construct meets an acceptable level of convergent validity when all of the standardized loadings of indicators for the construct are 0.50 or above (Hair et al. 2006). In this study, the standardized loading of all measured variables were statistically significant and above the cutoff, ranging from 0.68 to 0.96. Therefore, the convergent validity was achieved. Table 4-3 represents the standardized loading for each item.

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Table 4-3.

Standardized Loading

Constructs	Items/Indicators	Standardized Loadings
Intentions to Use SST (ISST)	ISST 1	0.82
	ISST 2	0.94
Expected Service Quality (ESQ)	ESQ 1	0.90
	ESQ 2	0.96
	ESQ 3	0.95
	ESQ 4	0.70
	ESQ 5	0.82
Need for Interaction with Service Employees (NISE)	NISE 1	0.84
	NISE 2	0.85
	NISE 3	0.68
Technology Anxiety (TA)	TA 1	0.81
	TA 2	0.84
	TA 3	0.91
	TA 4	0.83

Average percentage of variance extracted (AVE) indicates the variation explained among items that represent a latent construct. A good rule of thumb suggesting an adequate convergence is the AVE value of 0.50 or higher (Hair et al., 2006). In this study, the AVE value for all constructs ranged from 0.63 to 0.78 indicating adequate convergent validity

Construct reliability indicates internal consistency of the measured variables representing a latent variable. The reliability estimate of 0.70 or above demonstrates good reliability (Hair et al., 2006). The reliability of each construct was above the cut off ranging from 0.84 to 0.94 suggesting sufficient convergence or internal consistency. Table 4-4 presents average percent of variance extracted and reliability of each construct.

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Table 4-4.

Average Percent of Variance Extracted and Construct Reliability

Constructs	Average Percent of Variance Extracted	Construct Reliability
Intentions to Use SST (ISST)	0.78	0.88
Expected Service Quality (ESQ)	0.76	0.94
Need for Interaction with Service Employees (NISE)	0.63	0.84
Technology Anxiety (TA)	0.72	0.91

Note: $\sum$(Std Error) = $\sum$(1- Std Loading^2)
Composite Reliability = $(\sum$Std Loading$)^2$ / $[(\sum$Std Loading$)^2 + \sum$(Std Error)]
Average variance extracted = $\sum$(Std Loading^2) /[$\sum$(Std Loading^2) + $\sum$(Std Error)]

Discriminant Validity

Discriminant validity indicates how a construct is truly distinct from others and captures some phenomena that others do not. When the square roots of AVE for both of any two constructs are greater than the correlation estimate between these two constructs, there is evidence of discriminant validity (Fornell & Larcker, 1981). Results from the analysis met the aforementioned criterion. Therefore, discriminant validity was achieved. Table 4-5 presents the discriminant validity matrix.

Different types of validities were used to examine construct validity. Factor loadings, AVE, and construct reliability demonstrated adequate convergent validity. As discussed above, there was evidence of discriminant validity. Face validity was not an issue because validated items were used in this study. After the examination of construct validity, the structural model can now be examined.

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Table 4-5.

Discriminant Validity Matrix

	ISST	ESQ	NISE	TA
ISST	0.88	0.74*	-0.44*	-0.21*
ESQ		0.87	-0.46*	-0.20*
NISE			0.79	0.30*
TA				0.85

Note: ISST → Intention to use SST option
ESQ → Expected service quality of SST option
NISE → Need for interaction with service employees
TA → Technology Anxiety
* Correlation significant at 0.05 level
Diagonal elements represent the square root of average percentage of variance extracted
Non-diagonal elements represent the correlation estimate

Structural Model

Structural equation modeling (SEM) was used to test the theoretical model for this study. The model fit was examined and hypotheses were tested.

Model Fit

Before hypothesis testing, the overall fit of the structural model was assessed using Satorra-Bentler scaled chi-square (S-B χ^2) and other fit indices. In general, three or four good fit indices are enough to provide evidence of model fit (Hair et al., 2006). The Satorra-Bentler scaled chi-square was significant (S-B χ^2 (73) = 452.51, p < 0.00). The acceptable cutoff value for NFI, NNFI, CFI, and IFI is 0.90, and for RMSEA is 0.10 (Hair et al, 2006). In this study, NFI, NNFI, CFI, and IFI were above 0.90 and the RMSEA value was below the threshold. Therefore, the structural model demonstrated a

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relatively good fit to the data. Table 4-6 presents model fit indices of the structural

model.

Table 4-6.

Model Fit Indices of the Structural Model

Fit Indices	Acceptable Fit Thresholds	Fit indices of the Structural Model
NFI	> 0.90	0.92
NNFI	> 0.90	0.92
CFI	> 0.90	0.93
IFI	> 0.90	0.93
RMSEA	< 0.10	0.09

Hypothesis Testing

The hypothesized relationships between constructs were examined using

estimated coefficients. As discussed in Chapter 3, two constructs are said to have a

statistically significant positive or negative relationship when the estimated t-value

exceeds the value of 1.65 at the significance level of 0.05. In this study, four hypotheses

were tested. All paths were significant at the 0.05 level except one (TA → ISST). Table

4-7 presents the unstandardized path coefficients and standard errors of the structural

model. Figure 4-1 demonstrates the hypothesized structural model with standardized

coefficients and variance explained. Table 4-8 provides a summary of the hypotheses

tested in this study. Except hypothesis 4, all other hypotheses were supported at the 0.05

level.

Table 4-7.

Unstandardized Path Coefficients and Standard Errors

Parameter Estimates Structural Paths	Unstandardized Path Coefficients	Standard Errors
H1: ESQ --> ISST	0.73*	0.04
H2: NISE --> ESQ	-0.48*	0.05
H3: NISE --> ISST	-0.13*	0.05
H4: TA --> ISST	-0.29	0.28

Note: ISST $\rightarrow$ Intention to use SST option
        ESQ $\rightarrow$ Expected service quality of SST option
        NISE $\rightarrow$ Need for interaction with service employees
        TA $\rightarrow$ Technology Anxiety
        * Significant at 0.05 level
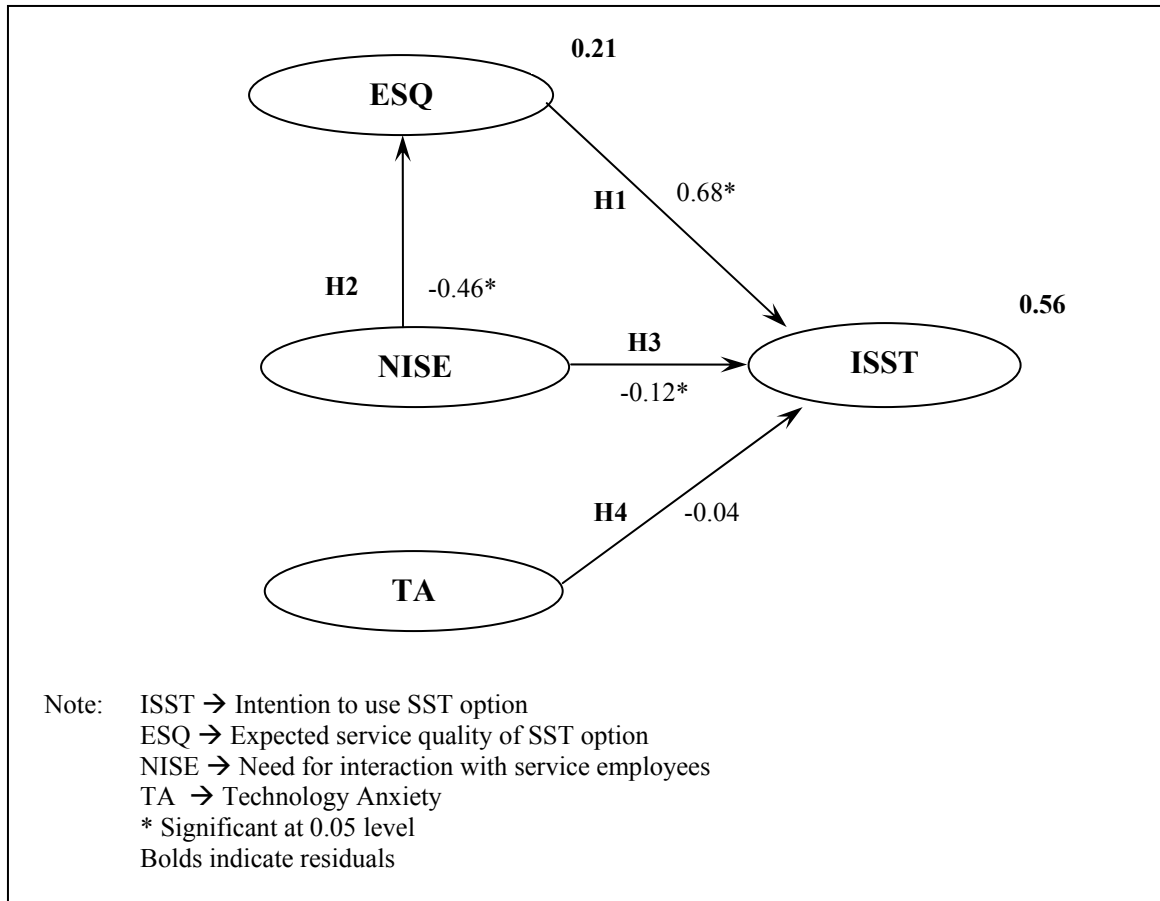
Figure 4-1. Hypothesized Structural Equation Model with Standardized Coefficients and

Variance Explained

Table 4-8.

Results of Hypothesis Testing

Reference Number	Hypothesis	Results
H1	*Expected service quality of the self-service technology option will be positively related to intention to use that option.*	Supported
H2	*Need for interaction with service employees will be negatively related to expected service quality of self-service technology option.*	Supported
H3	*Need for interaction with service employees will be negatively related to intention to use self-service technology option.*	Supported
H4	*Technology anxiety will be negatively related to intention to use self-service technology option.*	Not Supported

CHAPTER 5

DISCUSSION AND CONCLUSION

This final chapter presents discussion of the results. Also, this chapter provides implications for practice and research, limitations, and conclusions of the study.

Discussion of Results

The purpose of this study was to examine factors that can eventually affect self-service technologies utilization. The Theory of Reason Action (TRA), Technology Acceptance Model (TAM), and Theory of Planned Behavior (TPB) suggest that behavioral intention will lead to actual behavior. Factors that significantly influence intention to use self-service technologies can ultimately impact self-service technologies utilization. In this study, service quality, need for interactions with service employees, and technology anxiety were examined to determine if they are factors affecting the intention to use self-service technologies. The structural research model (see Figure 2-4) was developed to explain the relationship between these factors and the intention to use self-service technologies. The study was investigated under the hypothetical situation that a customer in a retail store is getting ready to check out when the length of the line is the same for both traditional and self-checkout options. The following sections discuss the results of this study.

Hypothesis 1: Expected service quality of a self-service technology option will be positively related to intention to use that option.

As anticipated, the positive relationship between expected service quality of a self-service technology option and the intention to use that option was significant. Therefore, hypothesis 1 was supported. The finding was consistent with the previous studies in the field of self-service technologies (Boyer & Hult, 2005; 2006).

The result suggested that the high level of customer's expected service quality of the self-service technology option will lead to intention to use that option. This result supported the assumption that when service organizations provide quality services, customers will use more of their services (Dabholkar, 1996). Otherwise, providing quality services would not benefit the organizations. This result suggested that retail stores should ensure the quality of a self-service technology option to encourage customers to utilize that option.

Hypothesis 2: Need for interaction with service employees will be negatively related to expected service quality of self-service technology option.

Although earlier studies (Langeard, Bateson, Lovelock, & Eiglier, 1981) did not find the relationship to be significant, in this study need for interaction with service employees was found to have a significant negative influence on expected service quality of the self-service technology option. Therefore, hypothesis 2 was supported. The finding was consistent with the study by Dabholkar (1996).

This result suggests that customers have different levels of need for interaction with service employees, and that they evaluate the quality of service provided by the self-service technology option differently. In this study, individuals who have a high level of

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need for interaction will perceive that the self-service technology option will provide poor quality service and vice versa. Retail stores must understand that the different levels of need for interaction with service employees exist in their customers. Therefore, evaluation of service quality can be affected by the levels of customers' need for interaction in a certain situation.

However, need for interaction with service employees accounted for only 21.4 % of variance in service quality of the self-checkout option. Thus, future research should examine other factors that could better help explain service quality of the self-service technology option.

Hypothesis 3: Need for interaction with service employees will be negatively related to intention to use self-service technology option.

Need for interaction with service employees was found to have a significant negative relationship with intention to use self-service technology option providing support to hypothesis 3. Although Dabholkar (1996) included these two constructs in her study, the two were not hypothesized nor tested to determine if the relationship exists. To our knowledge, the current study is one of the first studies that reports the relationship between the two constructs when the customers used the self-service technology before at any retail stores. Therefore, one finding contributed by this study is that the relationship between these two constructs exists. However, more empirical studies should further investigate this relationship to validate the result from this study.

The result suggested that a low level of need for interaction with service employees will lead to intention to use the self-service technology option. This consumer trait can influence not only service quality (suggested by hypothesis 2) but also the intention to use self-service technology. Thus, some customers will not utilize the self-service technology option simply due to the customers' characteristics.

Hypothesis 4: Technology anxiety will be negatively related to intention to use self-service technology option.

The negative relationship between technology anxiety and intention to use a self-service technology option was not significant at the $p < 0.05$. Thus, hypothesis 4 was not supported. The Wald's test suggested dropping the path between technology anxiety and intention to use a self-service technology option. However, there is no theoretical support that these two constructs should not have the relationship. Therefore, this path was included in the model.

One explanation why the relationship was found to be insignificant is that there was not enough statistical variability of data collected for technology anxiety. Each item for technology anxiety had a mean ranging from 1.76 to 1.98 on the 7-point Likert scale. This was probably because the respondents, who were students, are usually exposed to cutting edge technologies provided by the university, so most subjects did not indicate a high level of technology anxiety.

One interesting observation was that some of respondents with majors in technical fields, such as aviation and technical resource management, indicated a higher level of

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technology anxiety than those in the much less technical fields, namely history, fine arts, or linguistics. Perhaps, the former group of respondents felt that technology has a critical impact on them either personally or professionally, whereas the latter group may find the opposite to be true. A future study should examine the mean and variance of technology anxiety in a sample from the general population. The results could support the appropriateness of using a student sample to represent the population, and could provide insight into whether technology anxiety still exists in the general population after the introduction of advanced technologies over the years.

The variance explained of intention to use a self-service technology option in this study was approximately 56%. It suggests that expected service quality of a self-service technology option, need for interaction with service employees, and technology anxiety accounted for more than one half of the variance in intention to use a self-service technology option.

Implications

The findings from this study are expected to contribute to the domain of self-service technologies for both practitioners and researchers.

Implications for Practice

Since all subjects have ever used the self-checkout before, the results of this study suggest that expected service quality of a self-service technology option is the most important predictor of continuing intention to use self-service technologies. If customers perceive that the self-service technology option will provide poor services, they will be

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more likely to not use that option, suggesting the underutilization of the self-service technology option. This implies that managers must ensure that the self-service technology option is designed to provide quality services to the customers. Otherwise, the level of self-service technology utilization may not be improved.

The consumer trait of need for interaction with service employees is also an important predictor of both expected service quality and intention to use a self-service technology option. The results suggest that individuals have different levels of need to interact with service employees. They will be less likely to use the self-service technology and will perceive the quality of service provided by the self-service technology option to be poor regardless of how well that option was designed. Thus, the self-service technology should not be the only option available for customers because customers who have a high level of need for interaction with service employees will not use it. Otherwise, these customers may choose to do business with other organizations that have a full service option available.

As discussed in the preceding section, most student customers did not indicate a high level of technology anxiety. It is worth noting that these customers are not afraid of using technology. Therefore, when targeting a student dominant market, managers may choose to emphasize other factors that affect the intention to a use self-service technology option (i.e., service quality). Perhaps, managers can adopt a more advanced technology to improve their service operations if the technology provides high quality of services.

Implications for Research

This study has several contributions to the field of service operations management. First, the study provided a more comprehensive conceptual model of intention to use self-service technologies by including constructs from different fields such as operations management, marketing, and information systems. This study joins a limited number of empirical studies that attempt to approach problems in service operations with a multidisciplinary point of view rather than from one single functional area.

Second, to our knowledge, this study is one of the first studies to discover the relationship between need for interaction with service employees and intention to use self-service technology, particularly when the customers have used the self-service technology before. This study can be used as a stepping stone for future examination of such a relationship.

Third, the results from this study provide a contribution to support the existing theories suggesting that service quality of self-service technology is an important predictor of intention to use self-service technologies. Since service quality has not been well explored from the operations management standpoint, the results from this study contribute to the body of knowledge in the literature.

Fourth, this study demonstrates that all measures of the constructs investigated in this study were reliable and valid. According to chapter 4, none of the items was dropped, all construct reliability values were relatively high, and there were no special concerns about convergent and discriminant validities. This can attest to the reliability

and validity of the measures used in this study. Researchers can be confident when using these measures for future research.

Limitations

Like others, this research has limitations. First, this study only investigated one type of self-service technology. As mentioned in chapter 1, there are many types of self-service technologies. Thus, the results from this study might not be applicable to other types of self-service technologies.

Second, the study was conducted in the United States only. Several types of self-service technologies are available in other countries around the globe. Different cultures may have an influence on the relationships between constructs (Hofstede, 1980). Therefore, the results form this study might not be as useful for those countries that have a different culture from the U.S.

Third, the majority of the sample falls in the range of ages 18-25. Although the age range appears to be narrow, the results from this study can be used for certain markets, industries, or geographic locations where younger people are the predominant customers.

Fourth, different types of incentives were used in this study. The results of this study might have included some bias toward individuals who seek for incentives, even though many respondents chose not to obtain any incentives for completing survey.

Given the above limitations, it is imperative to note that the results from this study should be used cautiously. Applying the results from this study to use without paying attention to its limitations may obtain unexpected outcomes.

Future Research

The recommendations for future research include issues dealing with the limitations presented in the previous section, and expanding the model. Further studies can replicate this study using different types of self-service technologies to verify the reliability of the results from this study. Conducting future research using non-student samples from the U.S. and other countries can be more representative of the population and would significantly improve the generalizability of the results.

Since expected service quality of self-service technology option, need for interaction with service employees, and technology anxiety explained approximately 56% of the variance in intention to use self-service technology option, there is still room to better explain the intention. Therefore, future research can explore other related constructs that can better predict intention to use a self-service technology option, such as trust in the organization, previous experience, and previous satisfaction with self-service technologies.

Expected service quality has been confirmed to be an important predictor of intention to use self-service technologies. It is known to be a multi-dimensional construct. Although Jain and Gupta (2004) indicated that the SERVQUAL scale is powerful to pinpoint problems associated service quality, Li et al. (2002) suggested that the scale be modified to fit the context of what is being measure. Future research can explore and identify the important dimensions of service quality of self-service technologies. Therefore, practitioners can use identified elements to design and manage their service operations.

Conclusion

Previous research has examined the intention to use self-service technologies. However, little research has discussed the issue of self-service technology utilization. This study built upon the foundation of existing theories, the Theory of Reasoned Action, Technology Acceptance Model, and Theory of Planned Behavior – suggesting factors that impact self-service technologies utilization. The research model of this study included constructs from the fields of operations management, marketing, and information systems.

This research was conducted using subjects who used a certain self-service technology of retail stores. In this study, expected service quality of a self-service technology option and need for interaction with service employees were important predictors of intention to use self-service technologies whereas technology anxiety was not. Moreover, need for interaction was found to have a significant influence on expected service quality of the self-service technology option.

In closing, this study provided suggestions concerning managerial issues in the design of self-service operations. When attempting to improve utilization of self-service technologies, managers must ensure that the designed self-service technologies provide quality services. Also, managers must understand that individuals are different by nature and some of these individuals will not use self-service technologies; therefore, it is important to have traditional or full service options available for the customers.

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APPENDICES

APPENDIX A

Consent Form

My name is Kiattisak Phongkusolchit. I am a graduate student at Southern Illinois University-Carbondale.

I kindly ask you to participate in my research study.   The purpose of my study is to examine the relationships between intention to use self-service technology and technology anxiety, need for interaction with service employees, and expected service quality.

Participation is completely voluntary. If you choose to participate in the study, it will take approximately 5 - 10 minutes of your time. You will be asked to respond to statements related to beliefs that could be associated with intention to use self-service technologies, technology anxiety, need for interaction with service employee, expected service quality, and some information about yourself.

All your responses will be kept confidential within reasonable limits. Only those directly involved with this project will have access to the data.

If you have any questions about the study, please contact me or my advisor.

Dr. Gregory White   Kiattisak Phongkusolchit
Professor and Chair   Ph.D. Candidate
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Thank you in advance for your participation.

I, _____, hereby declare that completion and return of this survey indicates voluntarily consent to participate in this study.

This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Research Development and Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: siuhsc@siu.edu

Signature _____   Date_____

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Questionnaire

Perceptions of Self-Checkouts

Section A: Please answer the following questions. This demographic information will be used for classification only.

A1. What is your ethnicity?   White   Black   Hispanic   Asian   Other (please specify):_____

A2. What is your gender?   Male   Female   A3. What is your age?   _____

A4. What is your highest level of education?

High school graduate	Some college	Associate degree	Bachelor degree	Master's degree	Doctor degree

A5. What is your major?   _____

A6. What is your status in college?   Freshman   Sophomore   Junior   Senior   Graduate Student

Section B: You may have noticed that self-checkouts are available at several retail stores such as grocery, discount, office supply, home improvement stores. These self-checkouts use touch screen and offer the same payment types available in traditional checkout service.

B1. Have you ever used a self-checkout at any retail store before?   Yes   No   (If "No", Please skip to Section C.)

	Never						Always
B2. When you go to a retail store, how often do you use self-checkout?	1	2	3	4	5	6	7
B3. When you go to a retail store, how often do you use traditional checkout?	1	2	3	4	5	6	7
	Strongly Disagree				**Strongly Agree**		
B4. I am generally satisfied with the service provided by the self-checkout system.	1	2	3	4	5	6	7
B5. I am generally delighted with the service provided by the self-checkout system.	1	2	3	4	5	6	7
B6. I am generally unhappy with the service provided by the self-checkout system.	1	2	3	4	5	6	7

Section C: Imagine that right now you are at a retail store that has self-checkout. **Assume that the length of the line is the same for both traditional and self-checkout options**. **Imagine that you are getting ready to check out right now.**

Which store are you imagining shopping at right now? _____

Please circle the number that reflects your best response to each of following statements.

	Unlikely						Likely
C1. What is the likelihood that you will use the self-checkout system?	1	2	3	4	5	6	7
	Impossible						**Possible**
C2. It is _____ that I will use the self-checkout system.	1	2	3	4	5	6	7

	Low						High
C3. The level of service quality I will receive from the self-checkout system is_____.	1	2	3	4	5	6	7
	Poor						**Excellent**
C4. Using the self-checkout system will provide _____ service.	1	2	3	4	5	6	7
C5. The service provided by the self-checkout system will be _____.	1	2	3	4	5	6	7
	Strongly Disagree					**Strongly Agree**	
C6. I will receive better service from the self-checkout system.	1	2	3	4	5	6	7
C7. The self-checkout system will provide a high level of service quality.	1	2	3	4	5	6	7
C8. I feel nervous about using technology.	1	2	3	4	5	6	7
C9. Technical terms are confusing to me.	1	2	3	4	5	6	7
C10. I have avoided technology because it is unfamiliar to me.	1	2	3	4	5	6	7
C11. I hesitate to use most forms of technology for fear of making mistakes I cannot correct.	1	2	3	4	5	6	7
C12. Personal contact with an employee makes checking out merchandise enjoyable for me.	1	2	3	4	5	6	7
C13. Personal attention by the service employee is very important to me.	1	2	3	4	5	6	7
C14. It bothers me to use a machine when I could checkout with a person instead.	1	2	3	4	5	6	7
C15. I believe this store could not be relied upon to keep its promises.	1	2	3	4	5	6	7
C16. I believe this store is trustworthy.	1	2	3	4	5	6	7
C17. I find it necessary to be cautious in dealing with this store.	1	2	3	4	5	6	7
C18. Overall, I believe this store is honest.	1	2	3	4	5	6	7
C19. I would be satisfied with the service provided by the self-checkout system.	1	2	3	4	5	6	7
C20. I would be delighted with the service provided by the self-checkout system.	1	2	3	4	5	6	7
C21. I would be unhappy with the service provided by the self-checkout system.	1	2	3	4	5	6	7
C22. If I had to do it in the future, I would use the self-checkout system.	1	2	3	4	5	6	7
	Low						High
C23. The probability that I will use the self-checkout system in the future is_____.	1	2	3	4	5	6	7
C24. The likelihood that I would recommend the self-checkout system to a friend is_____.	1	2	3	4	5	6	7

What are the main reasons that make you decide to use or not use the self-checkout at the retail store?

_____

VITA

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