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**TECHNOLOGY-BASED SELF-SERVICE KIOSKS IN RETAILING:
AN OPTIONAL CHANNEL FOR CUSTOMER SERVICE**

**A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville**

**Hyun-Joo Lee
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DEDICATION

I dedicate this dissertation to my parents,

Yong-Woo Lee and Myoung-Hee Yoo,

who inspired me to reach my dreams,
for their unwavering love and trust, encouragement,
and unbounded sacrifice.

And also to
the memory of my sister, Ji-Sun Lee

I Always Miss You!

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ABSTRACT

Over the past decade, many retailers have rapidly incorporated a variety of technological applications. One of the increasingly used technologies is the delivery of service through self-service technologies. The current study was aimed at understanding the role of technology-based self-service (TBSS) kiosks, as an optional channel for customer service, within a retail store setting by examining a nomological network of the relationships related to TBSS kiosks. To this end, two studies were conducted; study 1 empirically tested the research model for each type of TBSS kiosks (i.e., self-checkouts and information kiosks) while study 2 investigated whether the patterns of the hypothesized relationships are similar or dissimilar across two TBSS kiosks.

The results of this study affirmed that TBSS kiosk usage contributes considerably to retail store patronage through store service quality. This substantiated that retail store patronage is driven, in part, by TBSS kiosk usage, indicating the supportive role of TBSS kiosks in a retail store. This study made significant contributions by extending current theoretical and empirical knowledge on TBSS kiosks in retailing. The proposed model attempted to draw a comprehensive picture of a retail patronage model of TBSS kiosk by investigating a variety of factors relevant to TBSS kiosks in retail settings. Compared to previous studies that were limited to research on consumer acceptance or trial of such forms of service delivery, this study addressed formerly unexplored aspects of how TBSS kiosks contribute to patronage to a retail store. Based on the findings of this study, managerial implications as well as limitations and suggestions for future research were discussed.

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CHAPTER 1 - INTRODUCTION

New technologies enable new ways of doing business and revolutionize the interaction between consumers and companies. The important role of technology in the marketing process is well illustrated in the pyramid model (Colby & Parasuraman, 2003; Parasuraman, 2000) which is an extension of Kotler's (1994) triangle model. In the pyramid model, technology, positioned at the center of the model, is added as a fourth dimension along with company, customers, and employees and plays a critical role in changing the conventional marketing structure. Specifically, technology transforms and revolutionizes the three links: company-customer, employee-customer, and company-employee links: due to technology, companies can communicate directly with their customers via the Internet, employees can deliver well-fitting services to their customers as employees access relevant information through internal e-services, and technology can enhance communication efficiency and interconnection between companies (headquarters) and their employees (frontline personnel) (Colby & Parasuraman, 2003).

Retailers are also riding technology waves to gain a competitive advantage. Over the past decade, many retailers have rapidly incorporated a variety of technological applications such as virtual reality technology to present interactive 3D images of merchandise, electronic kiosks for gift & wedding registry that allow easy access to gift preferences, radio frequency identification (RFID) tags using an electronic product code (EPC) that contains product-specific information, and in-store digital signage in which message content can be manipulated in real time to respond to changing market conditions (Hyde, 2005; Porjes, 2006). The rapid advance in information technology is an

underlying driver behind the increasing use of technological applications. By doing this, retailers can offer consumers better access to services via various channels so that they can better meet consumer demand and increase consumer satisfaction (Bitner, Ostrom, & Meuter, 2002).

AN OVERVIEW OF TECHNOLOGY-BASED SELF-SERVICE KIOSKS

One of the increasingly used technologies is the delivery of service through self-service technologies. Self-service technologies are broadly defined as “technological interfaces that enable customers to produce a service independent of direct service employee involvement” (Meuter, Ostrom, Roundtree, & Bitner, 2000, p. 50). The term, technology-based self-service options, has been interchangeably used for self-service technologies. Self-service technologies can be divided into two options: on-site and off-site options. Examples of the “on-site” option are automated airline ticketing, electronic kiosks in department stores, information kiosks at hotels, and self-scanning at retail stores; “off-site” option includes telephone and online banking and shopping on the Internet (Dabholkar & Bagozzi, 2002; Meuter & Bitner, 1998).

As retailers increasingly use multiple channels of distribution (Frazier, 1999) and information technology grows at a fast pace, technology-based self-service¹ (TBSS) options in brick-and-mortar retail stores (hereafter referred to as TBSS kiosks) have become more widespread and sophisticated (Hyde, 2005). In the current retail market, consumers can see various types of TBSS kiosks such as self-checkouts, digital photo

¹ Technology-based self-service and self-service technology are interchangeably used throughout the dissertation.

kiosks, information kiosks, interactive music and movie samplers, electronic kiosks for gift & wedding registry, and automated prescription refill kiosks.

Self-checkouts have grown dramatically over the past few years. According to Food Marketing Institute (September 15, 2005), almost 56% of grocery retailers used self-checkouts in 2005, up from 38% in 2004. Self-checkout's growth is now branching to other retail categories. For example, do-it-yourself stores, such as Home Depot, have deployed self-checkouts since 2002 (Morphy, February 5, 2002). Furthermore, other retail categories including discount, drug, big box specialty, warehouse club, and department stores, are also piloting self-checkouts (NCR, 2003). In addition to self-checkouts, retailers are increasingly embracing other types of TBSS kiosks. For example, Wal-Mart has started to offer a new music service by introducing TBSS kiosks which allow consumers to select songs and burn them to a CD (Troy, 2005). Giant Food, one of the largest grocery chains on the East Coast, recently introduced an automated prescription refill kiosk ("Giant Food pilots RX pickup kiosk," 2005). Interactive information kiosks that generally provide multiple functions have been tested in high-tech pilot stores such as Giant Food in Philadelphia and Food Lion in North Carolina (Porjes, 2006). Department stores seem to be the pioneer in using electronic kiosks for gift & wedding registries. For example, Belk, Macy, and Neiman Marcus have used such kinds of kiosks for several years (Carlin, 2005; Porjes, 2006).

The installation of TBSS kiosks is beneficial to both consumers and retailers. TBSS kiosks can be used as an additional channel for improving customer service and thus can function as a part of the consumption process within the retail experience (Rowley & Slack, 2003). By providing consumers with more choices, convenience,

privacy, control, and entertainment, TBSS kiosks can enhance the in-store shopping experience. More sophisticated TBSS kiosks can support a loyalty program through providing special offers and coupons to loyalty card holders (Rowley & Slack, 2003). In addition, TBSS kiosks have great potential for functioning as a comparable alternative to mobile technologies for “customers on the move” in that consumers can use TBSS kiosks for service delivery and information provision when they pass through public concourses (Slack & Rowley, 2002). Compared to mobile technologies such as PDAs and mobile phones, TBSS kiosks have the advantage of wide screen size and easy to operate key boards (Slack & Rowley, 2002).

At the same time, TBSS kiosks can also improve organizational efficiency. Although installing TBSS kiosks costs 10% more than traditional checkouts, they can lower transaction costs and retail staffing needs (Carlin, 2005; Porjes, 2006). With self-checkouts, one cashier can operate up to eight lanes and serve multiple customers simultaneously, allowing retailers’ efficient use of labor and increasing their customer service capability and flexibility (NCR, 2003).

The Typologies of Technology-Based Self-Service (TBSS) Kiosks

There is a significant change of the role and function between early and later versions of TBSS kiosks (See Table 1-1). While early TBSS kiosks, introduced before the 21st century, have relatively simple interfaces and offer simple transactions and limited information, the latest generation of TBSS kiosks is enhanced by Web-like interfaces, touch screens supplemented by keyboards, and multiple functions including information provision, transactions, and real-time interactions between providers and users. The most

Table 1-1. Early and Later Versions of TBSS Kiosks

	Early Version	Later Version
Physical Characteristics	Uninteresting boxes, static displays	Eye-catching housings, consistent with corporate image, moving images
Dialog Design	Menu-based access to a limited number of screens. Touch screen	Web/Windows-like interfaces, with data entry dialog boxes, dropdown lists, scroll bars, pointer and hyperlinks. Touch screen supplemented by keyboard and trackball
Location	In-store, in a corner	In-store and in-public thoroughfares; always centrally positioned
Philosophy	Task based	Customer service based
Originator	Service provider or retailer	Retailer, intermediary or assembler
Transaction	Single transaction	Single or multiple transactions, together with communication and information provision
Connectivity	Stand alone or connected to one proprietary database	Internet enabled for real-time information provision and communication

Borrowed from Slack and Rowley (2002), p. 249.

notable change between early and later versions of TBSS kiosks is a shift from task focus to customer focus (Slack & Rowley, 2002).

In their initial studies, Tung and Tan (1998) differentiated TBSS kiosks by two dimensions: transactional capability and information dissemination capability. Each type of TBSS kiosk is associated with different levels of transactional capability and information dissemination capability. *Type I* kiosks have low transaction and information provision capability. The purpose of such kiosks is to basically dispense simple items, such as cards and stamps, and also to provide information that does not change frequently. *Type II* kiosks have high transaction and low information provision capability. Such kiosks are designed to perform a quick and simple transaction. *Type III* kiosks are low transaction and high information kiosks. Such kiosks provide more frequently updated or

on-line information. *Type IV* kiosks are high transaction and high information kiosks. Such kiosks not only provide updated information but also allow users to connect to databases for personal verification and updating of records.

Somewhat simply, two distinct categories of TBSS kiosks have appeared: in-store and customer-context kiosks (Slack & Rowley, 2002). *In-store kiosks* are typically located in a specific store and are used as an optional channel for service delivery with regard to retail transactions. In-store kiosks allow consumers to locate product information and related information associated with a product, such as gardening tips and cooking recipes, to check whether a product is in stock, and to place an order (Slack & Rowley, 2002, 2002). On the other hand, *customer-context kiosks* are typically located in a public concourse or thoroughfare, such as shopping centers, railway stations, hotels, and airports (Slack & Rowley, 2002).

Rowley and Slack (2003) further developed a detailed typology for in-store kiosks. Their typology incorporates two additional relationship-oriented stages into Tung and Tan's (1998) typology: information, transact, interact, and relate. *Information kiosks* provide information about products and services. Users choose the information that they require and then the information is used for purchase and other decisions. *Transact kiosks* support purchase transactions. Transaction can be completed at a kiosk such as purchasing a ticket or obtaining an invoice. *Interact kiosks* support exchange of information between the user and the kiosk through two-way dialogue. The user provides some information about his/her needs or preferences, and the kiosk gives recommendations or provides corresponding information. For example, IKEA has used a kiosk that allows a customer to view how the sofa might look when covered in the fabric

of the customer's choice. *Relate kiosks* offer relationships and communication functions, which can build customer loyalty and enhance relationships with or commitment to a retailer. For example, such kiosks allow customers who are loyalty card holders to access special offers and coupons.

Self-Checkouts and Information Kiosks in Retailing

Since 2001, Kiosk Business magazine with Gartner, a research firm, has annually conducted a kiosk benchmark study. Every year, email invitations are sent to subscribers of RIS News, Hospitality Technology, Consumer Goods Technology, and Vertical Systems Reseller magazines and the subscribers participate in the online survey. Only respondents who are currently deploying or plan to deploy kiosks are allowed to complete the entire survey. Respondents described their primary business activity as retail, hospitality/foodservice/lodging, consumer goods, and other, and their business role was corporate management, MIS (management information systems) management, and sales/marketing/promotion management. According to the 7th annual kiosk study (Carlin, 2007), the primary reasons for implementing TBSS kiosks included improving customer service, increasing customer touch points, providing information/promotions, and generating revenue. Information was the most important application, followed by self-checkout/point of sale, with 68% and 45% of respondents, respectively. They considered these applications as extremely beneficial or beneficial.

Self-checkouts are computerized point-of-sale terminals that allow consumers to scan, bag, and pay for their purchase either by themselves or with minimal assistance from a store employee in a retail store (NCR, 2003). In 2005, more than half of the U.S.

retailers had a self-checkout installation (FMI, September 15, 2005) and 94% of U.S. consumers had used self-checkouts (Holman & Buzek, 2006). At grocery stores, 15-40% of the daily transaction volume and 12-30% of the dollar volume go through self-checkouts (Holman & Buzek, 2006). Self-checkouts are expected to outnumber staffed checkout lanes by 2015 (Porjes, 2006). According to a 2003 study by IDC research firm (Framingham, MA) conducted in five countries (i.e., U.S., U.K., Germany, Italy, and Australia), 44% of consumers across all five countries reported that they preferred shopping at a store offering self-checkout options.

Information kiosks are computerized terminals that are designed to inform, educate, train, persuade or perform information-based transactions (Rowley 1995). Information kiosks, sometimes called interactive kiosks, generally implement multiple tasks. Consumers can use information kiosks to view detailed product information, product locations, product reviews, recipe ideas, nutritional information, and frequently asked questions; to pre-order the bakery, deli, or pharmacy; and to access personalized coupons and special offers (Porjes, 2006). Information kiosks vary in terms of the tasks they support. For example, IKEA uses a kiosk to allow customers to view and customize a sofa of their choice among various styles, designs, and colors of fabric, while Sainsbury's, a supermarket chain in the U.K., is testing a kiosk that provides loyalty card customers with access to special offers and coupons (Rowley & Slack, 2003). Information kiosks generally use multi-media such as audio and video clips to convey information and Internet access is, in general, restricted to a particular site (Rowley & Slack, 2003).

RESEARCH OBJECTIVES

Despite the potential benefits driven from the use of TBSS kiosks in the retail industry, TBSS kiosks used in the retail market have not drawn much interest from researchers. Limited research has empirically studied TBSS kiosks and their use (Anitsal, 2005; Rowley, 1995; Slack & Rowley, 2002). The use of TBSS kiosks at hotels, banks, and airports has received relatively more attention from media and academicians. However, TBSS kiosks in retailing remain under-researched in spite of their contribution to significant financial return and customer loyalty to a retail store (Holman & Buzek, 2006). Therefore, there is a considerable opportunity for research on TBSS kiosks in retailing.

This study is aimed at understanding the role of TBSS kiosks within a retail store setting. In this study, a TBSS kiosk is viewed as an additional channel for customer service, which is used for enhancing consumers' in-store shopping experience. The main purpose of this study is to empirically examine a nomological network of the relationships related to TBSS kiosks. Specifically, four research objectives are constructed for this study. First, this study investigates relevant individual characteristics and their impacts on cognitive evaluations of TBSS kiosks. Second is to identify key determinants of TBSS kiosk service quality. Given that retailers' key reason for embracing TBSS kiosk is to improve customer service (Carlin, 2007), it is important to know what drives high service quality for TBSS kiosks.

Third, this study attempts to explore how TBSS kiosk usage contributes to patronage of a retail store. Most of the previous studies are limited to the acceptance or

trial of such forms of kiosks (e.g., Dabholkar & Bagozzi, 2002; Meuter, Bitner, Ostrom, & Brown, 2005). However, more than 90% of U.S. consumers have used self-checkouts and some of the TBSS kiosks, such as self-service checkout and gift and wedding registry kiosks, are now moving toward a stage of maturity (Carlin, 2005). Thus, it is useful to examine how TBSS kiosks enhance customer service by providing more choices, which ultimately leads to consumer patronage toward a retail store. Fourth, another limitation shown in previous studies is that many studies have been conducted in a self-checkout setting (e.g., Anitsal, 2005; Weijters, Rangarajan, Falk, & Schillewaert, 2007). In this study, the research model will be tested related to two TBSS kiosks (i.e., self-checkout and information kiosk) to investigate whether the proposed relationships are invariant across two TBSS kiosk settings. Table 1-2 and Table 1-3 summarize previous studies on technology-based self-service options in a retail sector and all sectors, respectively.

CONCEPTUAL DEFINITIONS OF THE CONSTRUCTS

The major constructs in this study are defined as follows.

Technology-based self-service (TBSS) kiosks — Technological interfaces that enable customers to produce a service independent of direct service employee involvement (Meuter et al., 2000).

Self-checkouts — Computerized point-of-sale terminals that allow consumers to scan, bag, and pay for their purchase either by themselves or with minimal assistance from a store employee in a retail store (NCR, 2003).

Information kiosks — Computerized terminals that are designed to inform, educate, train, persuade or perform information-based transactions (Rowley 1995).

Table 1-2. Selected Past Studies on Technology-Based Self-Service: Retail Sector

Authors (Date)	Research Design and Sample	Setting	Research Focus and Finding
Anitsal and Schumann (2007)	Conceptual paper	Retailing	Developed a conceptual framework to address the customer's perceptual representation of productivity in a technology-based self-service context.
Weijters, Rangarajan, Falk, and Schillewaert (2007)	A combination of survey and observational data (497 consumers)	Self-scanning in grocery stores	Proposed and empirically tested a process model to understand the antecedents and consequences of SST usage in an in-store retail setting. Four hypothesized direct effects (usefulness, ease of use, reliability, and fun) on the attitude of customers toward using the SST were highly significant.
Anitsal and Paige (2006)	Survey (189 students)	Self-checkouts in grocery stores	Investigated the significance of service quality attributes of TBSS options in retail grocery stores.
Marzocchi and Zammit (2006)	Survey (sample size was not reported)	Self-scanning in grocery stores	Assessed the link between satisfaction with self-scanning and some of its possible antecedents and demonstrated that both the sense of control and hedonic component have a positive impact on satisfaction with self-scanning. Found that service satisfaction is an antecedent both of customers' opinion of the supermarket and their intention to patronize the store more frequently.
Anitsal and Flint (2005)	23 in-depth interviews	Self-checkouts at retail and grocery stores	Addressed the potential gaps between retailer's value offering and customer's perceptions in TBSS environments of retail and grocery stores.
Moerloose, Antioco, Lindgreen, and Palmer (2005)	22 in-depth interviews (84 customers and 9 retailers)	Information kiosks in retail stores	Focused on how information technology allows firms to deliver services by means of information kiosks. Suggested that information kiosks can be implemented successfully with up to three easy-to-use kiosks at the entrance of the mall or inside the store.
Dabholkar, Bobbitt, and Lee (2003)	Survey using closed- and open-ended questionnaire (150 consumers)	Self-scanning in grocery stores	Investigated consumer reasons for both using and avoiding self-scanning checkouts. Control, reliability, ease of use, and enjoyment were important to consumers in using the self-scanning option, while consumers who like to interact with employees avoided self-scanning option.
Rowley and Slack (2003)	8 case studies	Information kiosk in retail stores	Discussed and analyzed the application of kiosks as a channel for in-store service delivery and proposed a taxonomy that characterizes kiosks by their function.
Rowley (2000)	Case study	Loyalty kiosks in grocery stores	Described a new application of loyalty cards, which is being piloted in selected Sainsbury's stores.
Rowley (1995)	Review of pilot applications	Information kiosk in retail stores	Reviewed the very wide potential for the application of multimedia kiosks.

Table 1-3. Selected Past Studies on Technology-Based Self-Service: All Sectors

Authors (Date)	Research Design and Sample	Setting	Research Focus and Finding
Johnson, Bardhi, and Dunn (2008)	Survey (834 customers)	Online banking	Examined the role of consumer technology paradoxes within the context of SST and routes by which the paradoxes (control/chaos, fulfill needs/create needs, and freedom/enslavement) influence customer satisfaction evaluation. Revealed that the effects of these paradoxes on customer satisfaction are mediated by consumer performance ambiguity and consumer trust in technology.
Beatson, Lee, and Coote (2007)	13 in-depth interviews	SSTs in hotels	Presented a framework for investigating the impact of SST on consumer satisfaction and on a multi-dimensional measure of consumer commitment (affective, temporal, and instrumental commitment).
Simon and Usunier (2007)	115 face-to-face interviews	SSTs in rail stations, post offices, and banks	Explored the cognitive, demographic, and situational determinants of the preference for using SSTs over personnel-in-contact, with a focus on rational-experiential thinking styles.
Zhu, Nakata, Sivakumar, and Grewal (2007)	Experiment (268 consumers)	Car rental kiosk and ATM	Hypothesized the interactive effects of two SST design features, comparative information and interactivity on customers' perceived control and interface evaluations.
Lin and Hsieh (2006)	Survey/intercept method (436 respondents)	Various SSTs (airline check- in, ATM, mobile banking, etc.)	Examined how technology readiness (TR) influences customers' perception and adoption of SSTs and empirically demonstrated that TR influences perceived SST service quality and behavioral intentions, while perceived SST service quality has a positive impact on customer satisfaction and behavioral intentions toward SSTs.
Curran and Meuter (2005)	Surveys (628 respondents)	Banking SSTs (ATM, bank by phone, and online-banking)	Developed and tested a conceptual model of the adoption process for SSTs across three different technologies used in the banking industry. Provided evidence that different factors influence attitudes toward each of these technologies.
Meuter et al. (2005)	Survey (828 telephone- based SST users and 333 Internet-based SST users)	IVR (an interactive voice response) telephone-based SST and Internet-based SST	Explored key factors that influence the initial SST trial decision and showed that the consumer readiness variables of role clarity, motivation, and ability are key mediators between established adoption constructs and the likelihood of trial.
Meuter et al. (2003)	Survey (823 respondents)	A wide range of SSTs (ATMs, internet shopping, automated airline ticketing, etc.)	Explored usage patterns and benefits of using SSTs and assessed the influence of technology anxiety (TA) and particular demographics on SST usage patterns and satisfaction levels. Found that respondents with higher levels of TA use fewer SSTs and that TA is better, more consistent predictor of SST usage than are demographics.

Table 1-3. Selected Past Studies on Technology-Based Self-Service: All Sectors
(Continued)

Authors (Date)	Research Design and Sample	Setting	Research Focus and Finding
Dabholkar and Bagozzi (2002)	Survey /experimental design (392 students)	Touch screen in a fast food restaurant	Investigated the moderating effects of consumer traits and situational factors on the relationships within a core attitudinal model for technology-based self-service.
Slack and Rowley (2002)	5 case studies	Information kiosk in airport, railway station, car rental base, hotel lobby, and shopping mall	Discussed and analyzed the latest generation of information kiosks, which feature information provision/promotion, interaction, transaction and relationships.
Slack and Rowley (2002)	Case study	Information kiosk in an airport terminal	Described the development and use of different types of information kiosks in contexts where users are on the move and away from fixed technologies.
Meuter et al. (2000)	Critical incident technique (823 respondents)	A wide range of SSTs (ATMs, internet shopping, automated airline ticketing, etc.)	Through the critical incident technique (CIT), investigated the sources of dissatisfaction/satisfaction with SSTs and their relationship to customer attributions, complaining behavior, word of mouth, and repurchase intentions.
Dabholkar (1996)	Survey/scenario approach (505 students)	Touch screen in a fast food restaurant	Proposed two alternative models of service quality based on an attribute versus overall affect approach. The attribute-based model explained far more of the variance for service quality than did the overall affect model.

Technology anxiety — The fear, apprehensions, and hope a consumer feels when considering use or actually using all forms of technology (Meuter et al., 2003).

Need for interaction — The importance of human interaction to a consumer in service encounters (Dabholkar, 1996).

Knowledge of self-service technologies — A consumer's subjective knowledge, reflecting confidence or perceived ability, about a broad range of self-service technologies (Beatty & Talpade, 1994).

Perceived usefulness — The degree of a consumer's belief that using a TBSS kiosk improves his/her shopping performance (Davis, 1989).

Perceived ease of use — The degree of a consumer's belief that using a TBSS kiosk is free of effort (Davis, 1989).

Perceived enjoyment — The degree of a consumer's belief that using a TBSS kiosk is intrinsically enjoyable, apart from any performance consequences that may be anticipated (Davis, Bagozzi, & Warshaw, 1992).

TBSS kiosk service quality — A consumer's evaluation about overall excellence or superiority of the service from a TBSS kiosk (Parasuraman, Zeithaml, & Berry, 1988).

Store service quality — A consumer's evaluation about overall excellence or superiority of the service from a retail store (Parasuraman et al., 1988).

Satisfaction with using TBSS kiosks — The degree of a consumer's evaluation that using a TBSS kiosk evokes positive feelings (Rust & Oliver, 1994).

Patronage intention toward a retail store — The extent to which a consumer would patronize a particular store again and recommend a particular store to others (Dabholkar, Shepherd, & Thorpe, 2000).

ORGANIZATION OF THE DISSERTATION

This dissertation is organized as follows. In Chapter 1, an overview of TBSS kiosks within a retail context was presented. By discussing the gaps in the existing body of knowledge, this chapter provided the impetus for studying the phenomenon of TBSS kiosks in retailing. The research objectives and conceptual definitions of the major constructs were also presented.

Chapter 2 serves as a theoretical framework for this dissertation. This chapter provides a review of the literature and introduces the theoretical foundations that guide the development of the conceptual model of this dissertation. Research hypotheses based on the relationship identified in the model are presented.

Chapter 3 describes the research methodology employed in this dissertation. Included are discussions on the research design, sample, data collection, measure development, pretest procedures and results, and data analysis procedures.

Chapter 4 provides a comprehensive evaluation of the proposed model and the results of each hypothesis tested.

Chapter 5 provides a discussion of the statistical findings regarding the proposed model and hypotheses tested. Contributions of this dissertation from both theoretical and managerial perspectives as well as limitations of this dissertation and suggestions for future research are also considered.

CHAPTER 2 - LITERATURE REVIEW

This chapter provides a review of the literature and introduces the theoretical foundations that guide the development of the conceptual model and research hypotheses proposed in this study. In the first section, the theoretical foundations for this study are provided: the existing literature on service quality, satisfaction, and retail patronage behavior, the attribute-based model of service quality for technology-based self-service (TBSS) options, and the technology acceptance model (TAM). The following section presents the conceptual model of this study – *A Retail Patronage Model of TBSS Kiosks*. The final section reviews the extant literature on each construct and proposed relationships among constructs. Based on the review of the literature, a series of research hypotheses are proposed.

THEORETICAL FOUNDATIONS

Service Quality

In today's competitive retail environment, it is critical for retailers to find ways to differentiate themselves from their competitors. Delivering high service quality has been considered increasingly important because it enables retailers to achieve competitive differentiation (Parasuraman et al., 1988). Accordingly, service quality has become essential to a retailer's business success. While quality of goods can be measured objectively using such indicators as durability and number of defects, some difficulties in measuring service quality are expected due to its unique features including intangibility, heterogeneity, and inseparability of production and consumption (Parasuraman, Zeithaml,

& Berry, 1985). These distinct features also make service quality an abstract and elusive construct.

Service quality has been described in various ways in the literature. First, the construct of service quality focuses on perceived quality. Different from objective quality, perceived quality is a form of attitude, related but not parallel to satisfaction, and results from an examination of both consumers' expectations and perceived performance (Parasuraman et al., 1988). Parasuraman, Zeithaml, and Berry (1988) defined perceived quality as "the consumer's judgment about an entity's overall excellence or superiority" (p. 15). This view of quality is similar in many ways to attitude. A number of researchers support that service quality is an overall evaluation similar to attitude (Olshavsky, 1985; Parasuraman et al., 1985). Second, service quality is viewed as a distinct construct from satisfaction even though two constructs are related. Service quality is an overall evaluation or attitude, whereas satisfaction is a transaction-specific measure. Even though consumers are satisfied with a specific service, their satisfaction does not directly indicate high service quality of a company. Third, service quality is determined by comparing expectations with performance. In other words, service quality is viewed as the degree and direction of difference between what consumers feel companies should offer and consumers' perceptions of the actual performance of companies offering the services (Parasuraman et al., 1985). Lewis and Booms's (1983) definition clearly reflects that service quality involves a comparison of expectations with performance:

Service quality is a measure of how well the service level delivered matches customer expectations. Delivering quality service means conforming to customer expectations on a consistent basis (p. 103).

In assessing service quality, many dimensions including tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer, and access have been suggested in the literature (Parasuraman et al., 1985). These dimensions are further served as the basic structure of the SERVQUAL scale, developed by Parasuraman et al. (1988). SERVQUAL is one of the most widely known measures of service quality, consisting of 22 items to measure five dimensions: reliability, responsiveness, assurance, empathy, and tangibles.

However, despite its popularity, some limitations in using SERVQUAL to assess service quality in a retail setting have been reported. Retail businesses, such as department or specialty stores, offer a mix of services and goods. Thus, retailer-related experiences can be divided into two categories: in-store experiences and experiences related to the merchandise (Westbrook, 1981). In-store experiences involve interactions with store personnel as well as the ease of finding the merchandise. Experiences related to the merchandise include quality and availability of merchandise. These two types of experiences influence consumers' evaluations of service quality in a retail setting. Thus, the use of SERVQUAL in a retail setting may limit its usefulness because SERVQUAL is originally developed in pure service categories. Finn and Lamb (1991) similarly argue that retailing is an example of a service industry in which using SERVQUAL is not appropriate for assessing service quality:

The service categories that were used in the development of SERVQUAL (appliance repair and maintenance, retail banking, long distance telephone, and credit cards) are very different than goods retailing, and clearly fall closer to the pure service end of the pure service – pure goods continuum than store retailing. It may well be that consumers use different criteria to evaluate competing goods retailers than they use to evaluate retailers that are primarily or exclusively service firms (p. 489).

Dabholkar, Thorpe, and Rentz (1996) also suggest that the five dimensions of SERVQUAL are not sufficient so that additional dimensions must be incorporated. Using a triangulation of research techniques, they propose that service quality for retail stores has a hierarchical factor structure with five dimensions: physical aspects, reliability, personal interaction, problem solving, and policy.

Service Quality for Technology-Based Self-Service (TBSS) Kiosks: An Attribute-Based Model of Service Quality for TBSS Options

Self-service technologies have changed the way of delivering services; consumers not only consume the service, but also actively participate in service delivery. By doing this, consumers can contribute to improved perceived service quality in self-service technology encounters (Anitsal & Schumann, 2007). Despite the distinctive aspects of service quality for self-service technologies compared with that of traditional services, a handful of studies have developed conceptual frameworks to study service quality for self-service technologies.

Dabholkar (1996) was among the first to investigate service quality for technology-based self-service (TBSS) options. By applying consumer decision making concepts to the service area, she proposed two alternative models of service quality: an attribute-based model and an overall affect model. The attribute-based model supports a cognitive approach to decision making and the main idea of this model is that consumers evaluate service quality using a compensatory process where attributes related to the TBSS option are combined. The overall affect model, based on an affective approach to decision making, suggests that evaluations of service quality are driven by overall predispositions. A comparison between two models revealed the preference for the

attribute-based model over the overall affect model; the attribute-based model had a greater explanatory power in explaining service quality than the overall affect model.

The attribute-based model (Dabholkar, 1996) suggests that five attributes of TBSS options are important determinants of service quality of TBSS option, which in turn leads to intention to use the TBSS option (See Figure 2-1). Service quality was based on expectations rather than perceptions in the attribute based model as consumers might not have experienced TBSS options in the late 1990s. Five attributes include speed of delivery, ease of use (effort and complexity), reliability (accuracy), enjoyment, and control. However, empirical support was found for only three attributes – ease of use, enjoyment, and control.

Retail Patronage Behavior

Retail patronage behavior has a long tradition of empirical research. It has been a critical issue for academicians and retail managers because retail patronage research explains the mechanism of store choice. Patronage, in the narrow sense, refers to “a customer’s commitment to purchases from a particular store”(Kelly, 1967, p. 15). This definition limits patronage to the concept of commitment. On the other hand, stressing the dynamic nature of patronage behavior, Laaksonen defines patronage as “all the possible inner features of dynamism around the shopping behavior phenomenon in terms of store choice” (Laaksonen, 1993, p. 9). This perspective envisions patronage behavior as an ongoing adaptive process with respect to specific supply conditions.

One of the key research streams has focused on the identification of relevant attributes that determine retail patronage. Using a meta-analytical approach, Pan and

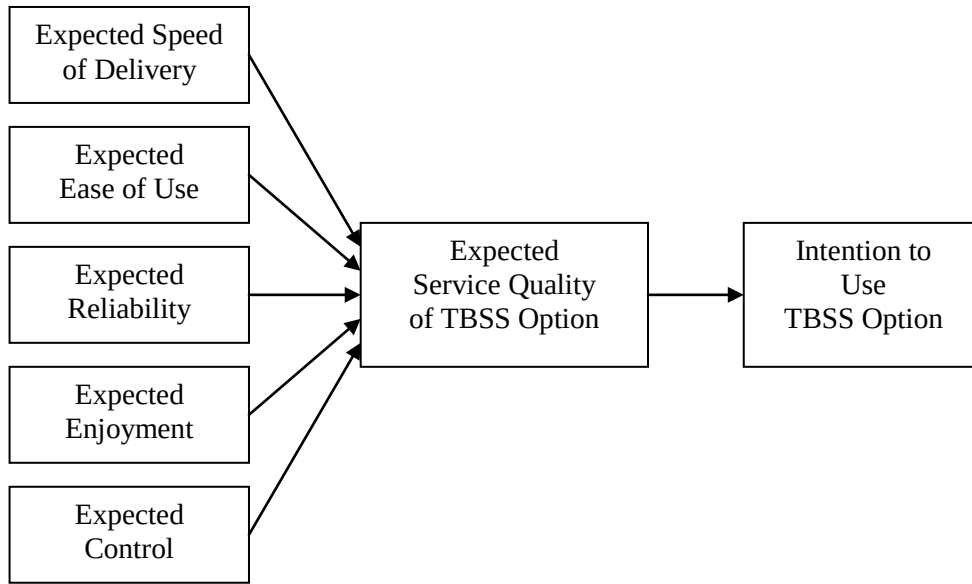


Figure 2-1. Attribute-Based Model of Service Quality

Zinkhan (2006) synthesizes previous empirical studies (45 studies) in retail patronage. They categorize a large number of determinants of retail patronage that were frequently examined in prior studies into three types of factors: product-relevant factors, market-relevant factors, and personal factors (Pan & Zinkhan, 2006). Product-relevant factors are associated with product features and attributes, for example, product quality, assortment, and price; market-relevant factors pertain to the service offered by the store with respect to convenience, service quality, store image and atmosphere, and salespeople; and personal factors are related to consumer characteristics, such as demographic characteristics. Of these three groups of antecedents, product quality, service quality and assortment were found to have the highest correlations with consumers' decisions to patronize a particular store. This finding provides evidence for the importance of service quality as a key to achieving retail patronage.

Relationships among Service Quality, Satisfaction, and Patronage Intention

The relationships among service quality, satisfaction, and patronage intention have received much attention and led to a variety of discussions in the literature (Cronin, Brady, & Hult, 2000; Cronin & Taylor, 1992; Dabholkar et al., 2000; Taylor & Baker, 1994). One of the issues has focused on whether service quality and satisfaction are conceptualized as similar or dissimilar constructs. Service quality and satisfaction are often viewed as similar constructs because satisfaction also conforms to the disconfirmation paradigm (Cronin & Taylor, 1992). Even though conflicting findings were identified, the general consensus among researchers seems to be that service quality and satisfaction are distinct but closely related constructs. Similar to attitude, service quality is an overall evaluation that stems from a comparison between expectations about a service and perceptions of performance (Parasuraman et al., 1988).

Satisfaction is defined as a cognitive or affective response and is related to a single or set of service encounters occurring over time (Rust & Oliver, 1994). Satisfaction is distinguished from service quality in that satisfaction is linked to a specific transaction, whereas service quality is a global long-run judgment (Cronin & Taylor, 1992; Parasuraman et al., 1988). Thus, even though consumers are satisfied with a service, their satisfaction does not directly indicate high service quality of a service provider (Parasuraman et al., 1988).

Such a conclusion that service quality and satisfaction are separate constructs has stimulated numerous studies on the relationship between service quality and satisfaction. Initially, service quality was expected to derive from incidents of satisfaction over time (Parasuraman et al., 1988). However, more recent empirical findings that service quality

is an antecedent to satisfaction tend to have strong favor (Dabholkar et al., 2000; Spreng & Mackoy, 1996). Bagozzi's (1992) model (appraisal → emotional response → coping framework) can be used for theoretically supporting the link from service quality to satisfaction (Cronin et al., 2000). This model proposes that service evaluation affects an emotional reaction, which in turn derives behavior. Adapting this model, this study suggests that a cognitive appraisal for service quality leads to satisfaction.

Furthermore, the role of satisfaction in the relationship between service quality and patronage intention has been addressed in the literature. Even though the direct effect of service quality on patronage intention (Parasuraman et al., 1988; Taylor & Baker, 1994) and the moderating effect of satisfaction on the relationship between service quality and patronage intention (Taylor & Baker, 1994) were found, many studies tend to support that service quality indirectly influences patronage intention through satisfaction (e.g., Cronin et al., 2000; Dabholkar et al., 2000; Gotlieb, Grewal, & Brown, 1994).

Technology Acceptance Model

The technology acceptance model (TAM) has been frequently used to examine variables that influence consumers' usage intention and behavior in a technological product or service context. Based on the theory of reasoned action (Ajzen & Fishbein, 1980), the TAM (Davis, 1989) suggests that beliefs about computer systems influence attitudes, which in turn lead to intentions and ultimately system usage (See Figure 2-2). Different from the theory of reasoned action, the TAM replaces attitudinal determinants with two variables of beliefs, perceived usefulness and perceived ease of use. Perceived usefulness refers to "the degree to which a person believes that using a particular system

would enhance his or her job performance” (Davis, 1989, p. 320). The TAM defines perceived ease of use as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). In the TAM, external variables are theorized to influence perceived usefulness and perceived ease of use. Various external variables, such as user characteristics, system characteristics, cognitive style, and situational constraints, have been proposed in the literature (Davis, Bagozzi, & Warshaw, 1989). The TAM has been extended and tested with different variables in various applications. Individuals may be induced to use the system by intrinsic motivation as well as extrinsic motivation (Deci, 1975). From this point of view, it was suggested that the TAM should include other components for providing a broader view and better prediction of users’ system acceptance (Legris, Ingham, & Colletette, 2003). Thus, perceived enjoyment was incorporated into the TAM so that users’ system adoption is determined by both extrinsic and intrinsic motivation (Davis et al., 1992). Perceived enjoyment is defined as the degree to which a person believes that using a particular system would be enjoyable in its own right, apart from any performance consequences that may be anticipated (Davis et al., 1992).

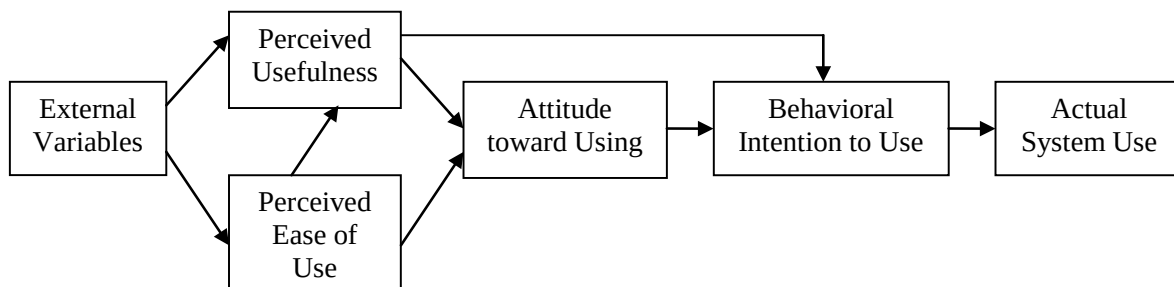


Figure 2-2. Technology Acceptance Model

CONCEPTUAL MODEL

The conceptual model of “A Retail Patronage Model of TBSS Kiosks” summarizes the hypothesized relationships between the constructs of interest (See Figure 2-3). The extant literature of the links that service quality influences satisfaction, which in turn leads to patronage intention, the attribute-based model of service quality for technology-based self-service (TBSS) options, and the technology acceptance model (TAM) provide theoretical foundations for the conceptual model of this study. Three individual characteristics (technology anxiety, need for interaction, and knowledge of self-service technologies) are incorporated as the external variables in the original TAM and are conceptualized to affect perceived ease of use. Adapting Dabholkar’s (1996) attribute-based model of service quality for TBSS options, three cognitive beliefs (i.e., perceived usefulness, perceived ease of use, and perceived enjoyment) are theorized as antecedents of TBSS kiosk service quality.

In the right portion of the conceptual model, the relationships among TBSS kiosk service quality, store service quality, satisfaction with using TBSS kiosks, and patronage intention toward a retail store, are proposed based on the extant literature. First, favorable TBSS kiosk service quality leads to increased satisfaction with using TBSS kiosks, which in turn results in positive patronage intention toward a retail store. Secondly, favorable TBSS kiosk service quality contributes to store service quality, which in turn leads to positive patronage intention toward a retail store.

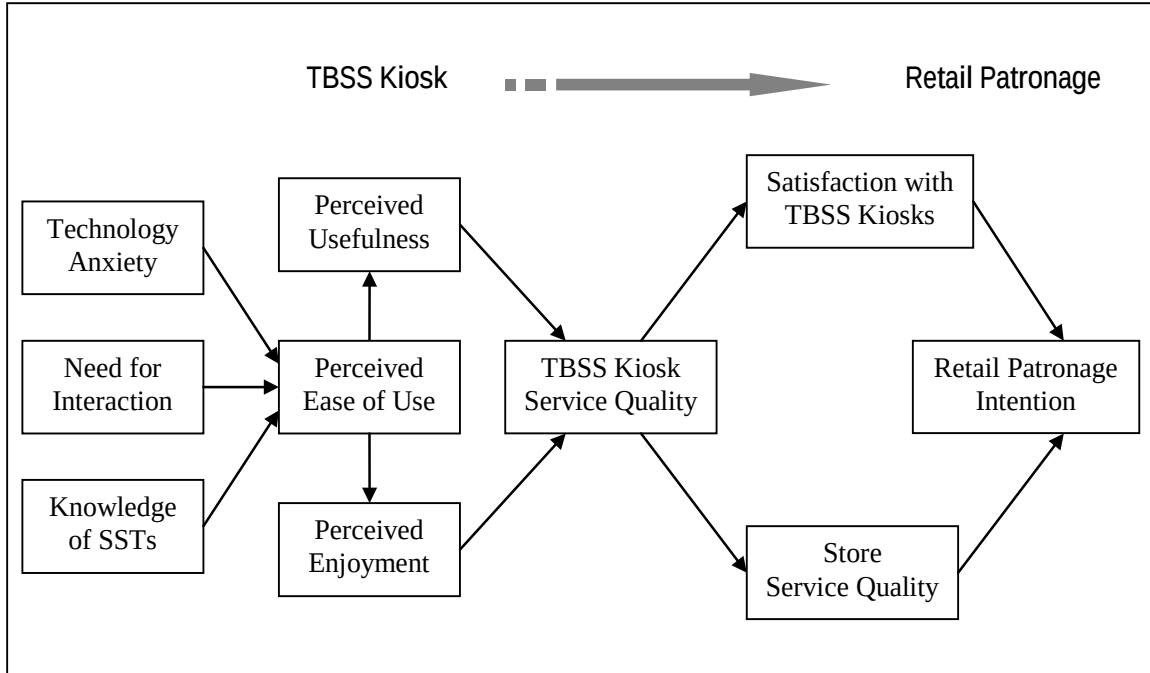


Figure 2-3. Retail Patronage Model of TBSS Kiosks

RESEARCH QUESTION AND RESEARCH HYPOTHESE

Based on the objectives of this study, 13 research hypotheses and one research question are proposed. Eleven research hypotheses are developed to examine the relationships among individual characteristics (technology anxiety, need for interaction, and knowledge of self-service technologies), cognitive (perceived usefulness, perceived ease of use, perceived enjoyment, TBSS kiosk service quality, and store service quality), affective (satisfaction with using TBSS kiosks), and behavioral (patronage intention toward a retail store) factors.

The structural invariance of all the relationships is assessed with the following research question:

- **Research Question 1:** Will the structural paths for the two TBSS kiosk samples

(self-checkouts vs. information kiosks) be invariant or not?

In addition, two research hypotheses are proposed to examine differential effects of perceived usefulness and perceived enjoyment across TBSS kiosk settings.

Individual Characteristics: Effects on Perceived Ease of Use

Three Individual characteristics—technology anxiety, need for interaction, and knowledge of self-service technologies—are incorporated as external variables that affect consumers' perceived ease of use. Even though retailers have introduced many technological applications with the growth of new technologies, consumers often respond with resistance to adopt technological applications. Therefore, it is likely to be useful to assess individual characteristics in relation to consumers' perception of self-service technologies.

Technology Anxiety

The concept of technology anxiety has been proposed as one of the determinants of adopting new technologies (Meuter et al., 2003). Technology anxiety applies to anxiety related to technological tools in general. Technology anxiety originated from computer anxiety that relates to people's fear, apprehension, and hope they hold when considering use or when actually using computer technology (Scott & Rockwell, 1997). The construct of technology anxiety is more general than that of computer anxiety in that technology anxiety concentrates on an individual's state of mind about general technology tools, whereas computer anxiety pertains to a narrow type of anxiety related to personal computer usage (Meuter et al., 2003). Parasuraman's (2000) technology readiness is another related construct to technology anxiety. However, technology anxiety

is different from technology readiness. Technology readiness is an overall state of mind that collectively determines an individual's predisposition or tendency to be a technology pioneer, whereas technology anxiety is specifically associated with the ability and willingness of an individual to use a technological application (Meuter et al., 2003).

In Meuter et al.'s study (2003), technology anxiety was found to be more influential in predicting adoption of a wide range of technology-based self-service (TBSS) options than demographic variables. They also empirically demonstrated that adoption of technology-based services increases as technology anxiety lessens. In addition to this, technology anxiety had negative impacts on overall satisfaction, repeat usage intention, and positive word-of-mouth. In their subsequent research, technology anxiety was incorporated to predict consumer readiness for use and trial of self-service technologies (Meuter et al., 2005).

Despite the important role of technology anxiety in understanding consumer perceptions of retail technologies, to date, only a handful of studies responded to the existing call for additional research on antecedents and consequences of technology anxiety (Meuter et al., 2003). Even though technology anxiety has not been examined in many studies in relation to consumers' perceptions of TBSS options, this study includes technology anxiety because of its existence in recent self-service technology research (Meuter et al., 2005) and its anticipated relevance to consumers' perceptions of TBSS kiosks. Consumers who have greater technology anxiety tend to evaluate TBSS kiosks more negatively than those with lower technology anxiety. Accordingly, for consumers with greater technology anxiety, TBSS kiosks tend to be perceived as much less easy to use, than for consumers with lower technology anxiety. Thus,

- **Hypothesis 1:** A higher level of technology anxiety leads to a lower level of perceived ease of use.

Need for Interaction

An interpersonal interaction between consumers and service providers has been regarded as an important dimension in measuring service quality (Dabholkar, Thorpe, & Rentz, 1996; Parasuraman et al., 1988). A service employee's willingness to help customers, offer prompt service, and inspire trust and confidence is indispensable for delivering high service quality (Parasuraman et al., 1988). However, in self-service technologies settings, an interpersonal interaction is mostly replaced by a "marketspace transaction" in which products and services are delivered through information-based channels (Rayport & Sviokla, 1994). In this regard, previous studies have examined the need for interaction with a service employee as a relevant factor in TBSS environments (Curran & Meuter, 2005; Dabholkar, 1996).

The need for interaction is defined as the importance of personal contact to the customer during service encounters (Dabholkar, 1996). Several studies have found that the need for interaction negatively influences the use of TBSS options (Bateson, 1985; Dabholkar, 1996; Meuter et al., 2005). For example, Dabholkar (1996) found that the need for interaction had a negative impact on intention to use. Meuter et al. (2005) also found that the need for interaction negatively influenced consumer readiness variables (i.e., role clarity, intrinsic motivation, extrinsic motivation, and ability) that predict trial of self-service technologies. On the other hand, Curran and Meuter (2005) failed to find a significant impact of the need for interaction on attitude toward banking technologies. These disparate findings deserve further investigation. This study posits that for

consumers with a greater need for interaction, TBSS kiosks tend to be perceived as much less easy to use, than for consumers with a lower need for interaction. Thus,

- **Hypothesis 2:** A higher level of need for interaction leads to a lower level of perceived ease of use.

Knowledge of Self-Service Technologies

Consumers' existing category knowledge influences their ability to understand a new product (Moreau, Lehmann, & Markman, 2001). If consumers can transform their existing knowledge from a familiar product to a new product without any difficulty, they can easily learn about a new product. Furthermore, knowledge of a product class increases the likelihood of adopting new products within the related class (Dickerson & Gentry, 1983).

Knowledge transfer from an existing product to a new product occurs through a series of steps: access, mapping, and transfer (Gregan-Paxton & John, 1997). Potentially related knowledge from an existing product domain becomes active in an individual's memory and thus can be used as a source of information about a new product. In the next step, an individual compares the content and structure of knowledge of an existing product with a new product and thus maps elements from an existing product to elements in a new product on the basis of similarities of either attributes or relations (Gregan-Paxton & John, 1997). Knowledge of an existing product then transfers to a new product through these mappings.

Individuals who have existing category knowledge may be able to easily develop mappings between existing and new products and thus transfer useful knowledge of an existing product to a new product. In contrast, individuals with no existing category

knowledge may consider it difficult to recognize similarities between existing and new products and rely on product attributes and marketing communications (Moreau et al., 2001). Thus, the latter's understanding of a new product is likely to be more limited and lower than that of the former. For example, consumers who have used banking technologies, such as ATMs, can easily recognize similarities between ATMs and TBSS kiosks and then map items from ATMs to those in TBSS kiosks. In turn, they are more likely to develop inferences about how TBSS kiosks will perform. Previous experience of related technology was demonstrated to positively influence consumer readiness that determines consumers' trial of TBSS kiosks (Meuter et al., 2005). Thus, this study posits that as consumers gain more knowledge of self-service technologies (e.g., automated airport check-in, ATM, Internet shopping), they are likely to build more comprehension of TBSS kiosks and evaluate them more positively than those with less knowledge of self-service technologies. Accordingly, for consumers with a greater knowledge of self-service technologies, TBSS kiosks tend to be perceived as much more easy to use, than for consumers with a lower knowledge of self-service technologies.

- **Hypothesis 3:** A higher level of knowledge of self-service technologies leads to a higher level of perceived ease of use.

Three Determinants of TBSS Kiosk Service Quality

Effects of Perceived Ease of Use on Perceived Usefulness and Perceived Enjoyment

In the original TAM, perceived usefulness and perceived ease of use are distinct but related dimensions (Davis et al., 1989). Perceived usefulness pertains to the outcome of usage experience, whereas perceived ease of use is viewed as the process leading to

the final outcome (Childers, Carr, Peck, & Carson, 2001). Thus, if an individual believes that a system is easier to interact with, the system is likely to be considered as more useful (Davis et al., 1989). The positive effect of perceived ease of use on perceived usefulness has been well noted in a number of studies on various information technologies (Kleijnen, Wetzels, & Ruyter, 2004; Porter & Donthu, 2006; Wang, Lin, & Luarn, 2006).

However, scant research has examined the relationships between perceived ease of use and attitudinal determinants of usage intention, such as perceived usefulness and enjoyment, in a self-service technology context. Whereas perceived usefulness, enjoyment, and TBSS kiosk service quality can be regarded as the outcome of the usage experience, perceived ease of use can promote these outcomes by contributing to increased performance and fun. Thus, positive effects of perceived ease of use on perceived usefulness and perceived enjoyment are proposed in this study.

- **Hypothesis 4:** A higher level of perceived ease of use leads to a higher level of perceived usefulness.
- **Hypothesis 5:** A higher level of perceived ease of use leads to a higher level of perceived enjoyment.

The Effect of Perceived Usefulness on TBSS Kiosk Service Quality

Perceived usefulness has been identified as a major determinant of attitudes toward or intentions to use technology systems (Davis, 1989; Davis et al., 1989). Within the TAM model, perceived usefulness reflects extrinsic motivation of using technology systems; that is, a behavior of using the system is reinforced because it is perceived as instrumental in achieving valued outcomes (Davis et al., 1989). The significant effect of

perceived usefulness on technology adoption has been empirically demonstrated in studies of mobile services and online shopping (Childers et al., 2001; Kleijnen et al., 2004).

However, Dabholkar and Bagozzi (2002) indicated that perceived usefulness was not relevant to self-service technologies, whereas it was appropriate for computer software products. Somewhat differently, Meuter et al. (2005) identified relative advantage, a similar construct to perceived usefulness, as an important factor in a self-service technology context. Considering that utilitarian aspects of shopping such as the extent to which shopping is completed successfully in an efficient manner are major shopping values (Babin & Darden, 1994), this study considers perceived usefulness as a relevant factor for TBSS kiosks. If consumers perceive that TBSS kiosks are useful to complete their shopping, they are likely to evaluate TBSS kiosk service quality positively.

- **Hypothesis 6:** A higher level of perceived usefulness leads to a higher level of TBSS kiosk service quality.

The Effect of Perceived Enjoyment on TBSS Kiosk Service Quality

In contrast with perceived usefulness, perceived enjoyment was incorporated as an intrinsic motivation of using technology systems in the TAM model (Davis et al., 1992). People often use a technology system because they perceive it to be enjoyable in its own right, aside from any performance consequences (Davis et al., 1992). More recently, extensive studies have focused on hedonic aspects (i.e., enjoyment and fun) of online shopping (e.g., Childers et al., 2001; Novak, Hoffman, & Duhachek, 2003). Moreover, hedonic aspects were found to be strong determinants of service quality and attitudes toward self-service technologies (Dabholkar, 1996; Dabholkar & Bagozzi,

2002). It is perhaps due to TBSS kiosks' high use of video and audio clips, and graphics (Rowley & Slack, 2003) as well as the novelty aspects of TBSS kiosks. When consumers perceive that TBSS kiosks offer a fun and enjoyable retail experience, they tend to evaluate TBSS kiosk service quality favorably. Consequently, in this study, perceived enjoyment is conceptualized as a significant determinant of TBSS kiosk service quality.

- **Hypothesis 7:** A higher level of perceived enjoyment leads to a higher level of TBSS kiosk service quality.

The Role of TBSS Kiosks for Retail Patronage Behavior

Effects of TBSS Kiosk Service Quality on Satisfaction with Using TBSS Kiosks and Store Service Quality

Perceived service quality is an overall judgment of the relative excellence of a service provider's performance, which contributes to consumer satisfaction, purchase intentions, and firm performance (Cronin & Taylor, 1992). Self-service technologies have changed the way of delivering services; consumers not only consume the service, but also actively participate in service delivery. By doing this, consumers can contribute to improved perceived service quality in self-service technology encounters (Anitsal, 2005).

Despite the distinctive aspects of service quality for self-service technologies compared with that of traditional services, a handful of studies have investigated the relationship between service quality for self-service technologies and other related constructs, such as antecedent and consequent variables. This study proposes perceived usefulness, perceived ease of use, and perceived enjoyment as major direct and indirect determinants of TBSS kiosk service quality, whereas satisfaction with using TBSS kiosks and store service quality are conceptualized as consequences.

The positive impact of service quality on satisfaction has been empirically supported in the literature on traditional service encounters (Cronin & Taylor, 1992; Oliver, 1993). Moreover, research on TBSS options demonstrated the positive relationship between service quality and satisfaction (Lin & Hsieh, 2006). On the other hand, little is known about how service quality for self-service technologies relates to store service quality. Given that TBSS kiosks can act as an additional channel for service delivery and thus become a part of the retail shopping experience (Rowley & Slack, 2003), it is expected that TBSS kiosk service quality contributes to store service quality by adding benefits, such as saving time and money (Meuter et al., 2000), avoiding service personnel (Dabholkar, 1996; Meuter et al., 2000), and being in control (Dabholkar, 1996). This study is one of the first attempts to examine the relationship between TBSS kiosk service quality and store service quality.

- **Hypothesis 8:** A higher level of TBSS kiosk service quality leads to a higher level of satisfaction with using TBSS kiosks.
- **Hypothesis 9:** A higher level of TBSS kiosk service quality leads to a higher level of store service quality.

The Effect of Satisfaction with Using TBSS Kiosks on Patronage Intention toward a Retail Store

Satisfaction has been conceptualized as either a cognitive or affective response. In more recent studies, satisfaction is considered to be a customer's summary affective response to the consumption experience (Giese & Cote, 2000; Oliver, 1980; Olsen, 2002). Several studies have confirmed the positive relationship between satisfaction and patronage intention, such as positive word-of-mouth communication, likelihood of recommendation, and loyalty (Cronin et al., 2000; Cronin & Taylor, 1992; Oliver, 1997).

For example, consumers who are more satisfied with service providers are likely to exhibit more positive patronage intention (Cronin et al., 2000). In studies of self-service technologies, Lin and Hsieh (2006) found that patronage intention toward self-service technologies are positively influenced by satisfaction with TBSS. However, scant research has examined the impact of satisfaction with using TBSS kiosks on patronage intention toward a retail store. Marzocchi and Zammit's (2006) study may be the first one in which satisfaction with self-scanning was empirically found as an antecedent of customers' intention to repatronize a store. Thus, this study expects that an increase in satisfaction with using TBSS kiosks leads to an increase in patronage intention toward a retail store.

- **Hypothesis 10:** A higher level of satisfaction with using TBSS kiosks leads to a higher level of patronage intention toward a retail store.

The Effect of Store Service Quality on Patronage Intention toward a Retail Store

The delivery of high service quality has been considered more important than ever before because it enables a company to achieve competitive differentiation. In line with this, service quality has become a cornerstone of a company's strategy for business success. Most researchers have acknowledged that service quality is a primary determinant of patronage intention (Cronin et al., 2000; Parasuraman et al., 1988).

Consumers' perception of service quality for retail stores are different from that of pure services in that retail stores provide a mix of products and services (Dabholkar et al., 1996; Grace & O'Cass, 2005). In this regard, Dabholkar et al. (1996) suggest that measures of service quality for retail stores should include additional dimensions beyond those generally used in pure services. They also recommended that viewing service

quality for retail stores at the attribute (multi-dimensional) level would be more useful than at the integrated (global) level. Despite the difference between retail and pure service settings, the positive impact of service quality for a retail store on patronage intention has been supported in the retail literature; positive assessment of service quality of a retail store led to favorable patronage intention, such as recommendations of the retail store to others and expressions of preference for the retail store over other stores (Dabholkar et al., 1996; Sivadas & Baker-Prewitt, 2000).

- **Hypothesis 11:** A higher level of store service quality leads to a higher level of patronage intention toward a retail store.

Structural Invariance across Two TBSS Kiosks

The Differential Effects of Perceived Usefulness and Perceived Enjoyment on TBSS Kiosk Service Quality across the TBSS Kiosks

Tung and Tan (1998) differentiate TBSS kiosks by two dimensions: transactional capability and information dissemination capability. Each type of TBSS kiosks is associated with two levels (high vs. low) of transactional capability and information dissemination capability. Based on Tung and Tan's (1998) typology of kiosks, self-checkouts can be classified as a high transaction and low information kiosk because they perform a quick and simple transaction. On the other hand, information kiosks can fall into the kiosk type that is low in transaction and high in information.

Based on the preceding discussion, it is reasonable to expect some distinctions between the two different TBSS kiosks in terms of service experiences that each TBSS kiosk provides to consumers. Compared to information kiosks, consumers are more likely to be motivated to use self-checkouts because of their functional and instrumental aspects

of service such as supporting purchase transactions and reducing the checkout time, which in turn helps consumers purchase products in an efficient and timely manner. On the other hand, information kiosks usually have a high-resolution screen to support the display of images and offer extensive animation, video and audio clips, and graphics to promote products (Rowley & Slack, 2003). Regardless of purchasing, consumers can use information kiosks. Taken together, therefore, compared to self-checkouts, non-instrumental, intrinsic, and experiential aspects of service are more likely to motivate consumers to use information kiosks.

Theoretically, perceived usefulness and perceived enjoyment are conceptualized to reflect extrinsic and intrinsic motivations of using technology systems, respectively (Davis et al., 1992). Thus, it is supposed that the impact of perceived usefulness, reflecting extrinsic motivation of using technology systems, on TBSS kiosk service quality is likely to be stronger in a self-checkout setting than in an information kiosk setting. In a similar line of logic, perceived enjoyment is likely to play a greater role in determining TBSS kiosk service quality in an information kiosk setting than in a self-checkout setting. Thus,

- **Hypothesis 12:** The effect of perceived usefulness on TBSS kiosk service quality will be greater in a self-checkout than in an information kiosk.
- **Hypothesis 13:** The effect of perceived enjoyment on TBSS kiosk service quality will be greater in an information kiosk than in a self-checkout.

CHAPTER 3 - METHODOLOGY

The main purpose of this study was to understand the role of technology-based self-service (TBSS) kiosks within a retail store by empirically investigating the interrelationships that exist between the constructs of interest pertaining to TBSS kiosks. To this end, the following research objectives were determined: (1) examine relevant individual characteristics and their impacts on cognitive evaluations of TBSS kiosks, (2) investigate key determinants of TBSS kiosk service quality, (3) explore how TBSS kiosk usage influences patronage toward a retail store, and (4) examine whether the proposed relationships are invariant across two TBSS kiosks. Specifically, two causal paths (i.e., perceived usefulness → TBSS kiosk service quality and perceived enjoyment → TBSS kiosk service quality) were considered to be different. The remaining paths were thought to be invariant across two TBSS kiosks. This chapter describes the methods employed in this study, including the research model and design, population and sampling, data collection, measure development, and data analysis procedures.

RESEARCH MODEL AND DESIGN

The research model consists of three exogenous constructs (i.e., technology anxiety, need for interaction, and knowledge of self-service technologies) and seven endogenous constructs (i.e., perceived usefulness, perceived ease of use, perceived enjoyment, TBSS kiosk service quality, satisfaction with using TBSS kiosks, store service quality, and patronage intention toward a retail store).

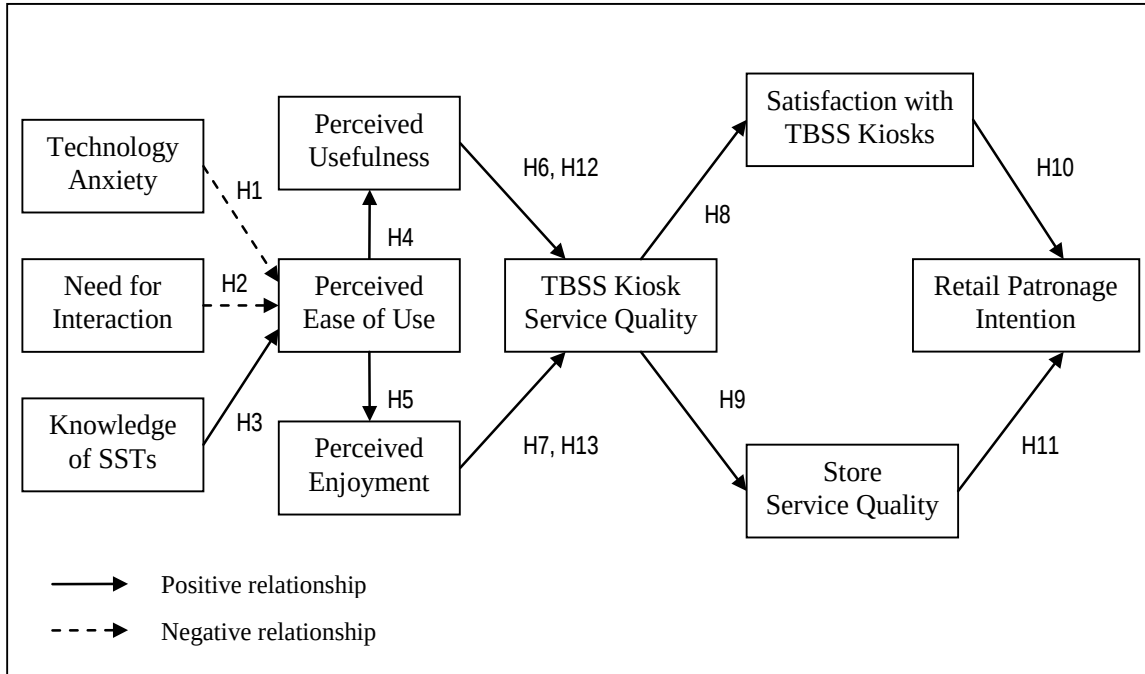


Figure 3-1. Research Model

Figure 3-1 illustrates the research model that depicts the relationships among the constructs by identifying the hypotheses to be tested. Two studies were conducted based on the objectives of this study. The primary purpose of study 1 was to empirically test the research model for each type of TBSS kiosks. Thus, two research models, one for self-checkout and the other for information kiosk, were developed and tested to examine whether or not the hypothesized relationships between the constructs held for both TBSS kiosk samples. For study 1, the following hypotheses were developed based on the literature review:

- **Hypothesis 1:** A higher level of technology anxiety leads to a lower level of perceived ease of use.
- **Hypothesis 2:** A higher level of need for interaction leads to a lower level of

perceived ease of use.

- **Hypothesis 3:** A higher level of knowledge of self-service technologies leads to a higher level of perceived ease of use.
- **Hypothesis 4:** A higher level of perceived ease of use leads to a higher level of perceived usefulness.
- **Hypothesis 5:** A higher level of perceived ease of use leads to a higher level of perceived enjoyment.
- **Hypothesis 6:** A higher level of perceived usefulness leads to a higher level of TBSS kiosk service quality.
- **Hypothesis 7:** A higher level of perceived enjoyment leads to a higher level of TBSS kiosk service quality.
- **Hypothesis 8:** A higher level of TBSS kiosk service quality leads to a higher level of satisfaction with using TBSS kiosks.
- **Hypothesis 9:** A higher level of TBSS kiosk service quality leads to a higher level of store service quality.
- **Hypothesis 10:** A higher level of satisfaction with using TBSS kiosks leads to a higher level of patronage intention toward a retail store.
- **Hypothesis 11:** A higher level of store service quality leads to a higher level of patronage intention toward a retail store.

Study 2 was designed to investigate whether the patterns of the hypothesized relationships are similar or dissimilar across two TBSS kiosks. The structural invariance of all the relationships was examined with the following research question:

- **Research Question 1:** Will the structural paths for the two TBSS kiosk samples be invariant or not?

In addition, it was particularly assessed whether there were differential effects of perceived usefulness and perceived enjoyment on TBSS kiosk service quality across two TBSS kiosks. This was assessed with the following hypotheses:

- **Hypothesis 12:** The effect of perceived usefulness on TBSS kiosk service quality will be greater in a self-checkout than in an information kiosk.
- **Hypothesis 13:** The effect of perceived enjoyment on TBSS kiosk service quality will be greater in an information kiosk than in a self-checkout.

POPULATION AND SAMPLE

The population of interest for this study was general consumers who have used technology-based self-service (TBSS) kiosks. Because TBSS kiosks have been installed only by some retailers in the Southeast region, a sample was drawn from a consumer panel from an online survey agent. Utilizing a consumer panel through a survey agent has advantages and appropriateness to this study. First, online survey agents recruit and maintain respondents in the form of a consumer panel. Such pre-recruited and maintained panels can be used as a sample frame. Thus, every individual in this frame has the same probability to be selected, which makes it possible for a researcher to calculate the probability of sampling (Dillman, 2000). Second, using a consumer panel seems to be more efficient in terms of time and cost. A consumer panel should complete the task within a designated time frame so that survey data is obtained more quickly through a survey agent and automatically coded data avoids time-intensive manual entry of

responses into a database (Bhatnagar & Ghose, 2004). Also, administering an online survey tends to be less costly, compared to a mail survey, because it eliminates printing, mailing, and other survey costs (Kennedy, Kuh, & Carini, 2000).

Among market research firms that specialized in conducting web-based consumer surveys, e-Rewards.com was selected. This online survey agent was deemed appropriate because this company has a large pool of consumer panels, consisting of over 4.5 million members who are representative of the U.S. population. In addition, e-Rewards.com offers tailored consumer panels to meet the specific sample frame for this study.

DATA COLLECTION

Data was collected through an online survey in March 2008. To request participation in the surveys, e-Rewards.com distributed invitation emails to potential participants with the link to the URL for the survey. Respondents who agreed to participation in the survey were asked to click the URL address. The sample frame for this study was general consumers age 18 or older who have used either a self-checkout or an information kiosk at least once in their regular shopping at a retail store in the past six months. Every participant of the survey thus encountered the screening question, *“Have you ever used a self-checkout (or information kiosk) in a retail store in the past six months?”* Respondents who had no experience with TBSS kiosks were automatically excluded from the survey. Thus, only qualified respondents who answered “Yes” to the screening question were included in the surveys. A total of 600 usable surveys (300 for the self-checkout survey and 300 for the information kiosk survey) were collected.

MEASURE DEVELOPMENT

Two versions of the survey questionnaire were developed for each TBSS kiosk with the word *self-checkouts* (e.g., using the self-checkout) and the word *information kiosks* (e.g., using the information kiosk). After the opening page of each survey, the term “self-checkout” was defined as “a computerized system that allow consumers to purchase tangible products unassisted in a retail store”; the term “information kiosk” was defined as “a computerized system that is designed to provide digital information or e-transactions to customers at a retail store.” A number of usage examples were also given for the information kiosk (e.g., view images of the products; compare products; find detailed product information; determine whether a product is in stock; and order a product).

Each questionnaire consisted of five sections designed to measure (1) individual characteristics, (2) cognitive and affective evaluations of the TBSS kiosk, including perceived usefulness, perceived ease of use, perceived enjoyment, TBSS kiosk service quality, and satisfaction with using TBSS kiosks, (3) store service quality, (4) patronage intention toward a retail store, and (5) demographic and background information. An initial pool of measurement items was generated based on the literature review. Most of the measurement items were adapted to properly reflect the self-service technology context. A copy of the survey questionnaire can be found in Appendix A.

Content Validity and Pre-Test

The survey questionnaire was pre-tested in two ways for refining and validating the measures introduced in the previous section. The purpose of a validity test was to

determine if the operationalization of a variable actually measures the concept as it was defined (Bagozzi, Yi, & Phillips, 1991). First, content validity was assessed by academic expert reviews to secure whether or not the scale items actually measure the construct it represents. During this process, two measurement scales were replaced with other scales. Knowledge of self-service technologies measured using a frequency scale ranging from “never” to “always” following the self-service technologies: automated teller machines (ATMs), automated hotel checkout, Internet banking, shopping on the Internet, price checkers (price look up points), and automated airport check-in. Experts judged that this scale would not adequately reflect the content of the construct because the scale items contained a limited set of self-service technologies. Thus, another scale developed by Beatty and Talpade (1994) was adopted and slightly modified to increase the appropriateness of the scale to the context of self-service technologies. The scale items for store service quality were initially derived from Grace and O’Cass (2005). Their scale included three dimensions that were composed of core services, employee service, and servicescape. However, it was found that one dimension, core services, was not clearly defined based on the experts’ reviews. Thus, another scale was adopted from Dabholkar et al. (1996). Their scale was specifically developed to measure service quality for retail stores by including additional dimensions in addition to those for pure services.

Second, the revised set of items was further refined by conducting a pre-test through an online survey. Respondents were recruited in undergraduate classes at a major southeastern university during October through November of 2007. College students were deemed to be appropriate subjects for the pre-test survey because they frequently use TBSS kiosks in a variety of retail stores. Participation in the pre-test survey was

voluntary. Only qualified students who have used either a self-checkout or an information kiosk at least once were included in the survey. 107 students responded to the self-checkout survey and 89 students responded to the information kiosk survey, yielding a total of 196 completed surveys. Respondents were asked to complete the questionnaire and then address any problem that they might encounter while answering the questionnaire. Results of the pre-test were used for rewording items to clarify the meanings and improve the flow of the final version of the questionnaire. All the scale items used in the pre-test survey are listed in the following sections.

Measures of Individual Characteristics

Individual characteristics were composed of three constructs: technology anxiety, need for interaction, and knowledge of self-service technologies. A total of sixteen items were used to measure individual characteristics and the items were randomly ordered in the questionnaire. All measurement items for individual characteristics were rated on a 7-point Likert scale ranging from “strongly disagree” to “strongly agree.”

Technology Anxiety

Technology anxiety is defined as the fear, apprehensions, and hope a person feels when considering use or actually using all forms of technology (Meuter et al., 2003). Nine measurement items for technology anxiety were adopted from Meuter et al. (2003). The reliability coefficient for the original scale was 0.90.

1. I have avoided technology because it is unfamiliar to me.
2. I have difficulty understanding most technological matters.
3. I am sure of my ability to interpret technological output.

4. I am confident I can learn technology-related skills.
5. When given the opportunity to use technology, I fear I might damage it in some way.
6. Technological terminology sounds like confusing jargon to me.
7. I hesitate to use technology for fear of making mistakes I cannot correct.
8. I am able to keep up with important technological advances.
9. I feel apprehensive about using technology.

Need for Interaction

Need for interaction is defined as the importance of human interaction to a person in service encounters (Dabholkar, 1996). Measurement items for need for interaction were adopted from Dabholkar (1996). The original scale consisted of four items and the reliability coefficient of the scale was 0.83.

1. I like interacting with the person who provides the service.
2. It bothers me to use a machine when I could talk with a person instead.
3. Personal attention by the service employee is not very important to me.
4. Human contact in providing services makes the process enjoyable for me.

Knowledge of Self-Service Technologies

In this study, knowledge of self-service technologies is defined as a person's subjective knowledge, reflecting confidence or perceived ability, about a broad range of self-service technologies (Beatty & Talpade, 1994). Three measurement items for this construct were adapted from Beatty and Talpade (1994). The reliability coefficient for the original scale was 0.86.

1. I would have described myself as being very familiar with technologically based products and services.
2. As compared to the average person, I would have said that I was highly knowledgeable about technologically based products and services.
3. I have a lot of experience with technologically based products and services.

Measures of Evaluations of TBSS Kiosks

The second section of the questionnaire consisted of questions relating to consumers' evaluations of TBSS kiosks, including perceived usefulness, perceived ease of use, perceived enjoyment, TBSS kiosk service quality, and satisfaction with using TBSS kiosks. A total of 17 items for these constructs were rated on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree." Items were randomly ordered in the questionnaire.

Perceived Usefulness

Perceived usefulness is defined as the degree of a consumer's belief that using a TBSS kiosk improves his/her shopping performance (Davis, 1989). Three measurement items measuring perceived usefulness were adapted from Childers et al. (2001). The reliability coefficient for the original scale was 0.92 to 0.93.

1. The self-checkout (information kiosk) improves my shopping productivity.
2. The self-checkout (information kiosk) enhances my effectiveness in shopping.
3. The self-checkout (information kiosk) improves my shopping ability.

Perceived Ease of Use

Perceived ease of use is defined as the degree of a consumer's belief that using a TBSS kiosk is free of effort (Davis, 1989). Three measurement items measuring perceived ease of use were adapted from Childers et al. (2001). The reliability coefficient for the original scale was 0.79 to 0.99.

1. Using the self-checkout (information kiosk) is clear and understandable.
2. Using the self-checkout (information kiosk) does not require a lot of mental effort.
3. The self-checkout (information kiosk) is easy to use.

Perceived Enjoyment

Perceived enjoyment is defined as the degree of a consumer's belief that using a TBSS kiosk is intrinsically enjoyable, apart from any performance consequences that may be anticipated (Davis et al., 1992). Four measurement items measuring perceived enjoyment were adapted from Childers et al. (2001). The reliability coefficient for the original scale was 0.88 to 0.93.

1. Using the self-checkout (information kiosk) makes me feel good.
2. Using the self-checkout (information kiosk) is boring.
3. Using the self-checkout (information kiosk) is exciting.
4. Using the self-checkout (information kiosk) is enjoyable.

TBSS Kiosk Service Quality

TBSS kiosk service quality is defined as a consumer's evaluation about overall excellence or superiority of the service from a TBSS kiosk (Parasuraman et al., 1988).

Four measurement items measuring TBSS kiosk service quality were adapted from Dabholkar et al. (2000). The reliability coefficient for the original scale was 0.92.

1. I believe that the overall service quality at the self-checkout (information kiosk) is excellent.
2. I think the overall service I usually receive from the self-checkout (information kiosk) is of high quality.
3. The overall quality of the service at the self-checkout (information kiosk) is generally a high standard of service.
4. Most of time, I consider the overall service quality at the self-checkout (information kiosk) to be superior.

Satisfaction with Using TBSS Kiosks

Satisfaction with using TBSS kiosks is defined as the degree of a consumer's evaluation that using a TBSS kiosk evokes positive feelings (Rust & Oliver, 1994). Three measurement items measuring satisfaction with using TBSS kiosks were adapted from Dabholkar et al. (2000). The reliability coefficient for the original scale was 0.92.

1. I am satisfied with the service provided at the self-checkout (information kiosk).
2. I am pleased with the service provided at the self-checkout (information kiosk).
3. I am delighted with the service provided at the self-checkout (information kiosk).

Measures of Store Service Quality

The third section consists of questions relating to store service quality. Store service quality is defined as a consumer's evaluation about overall excellence or superiority of the service from a retail store (Parasuraman et al., 1988). A total of 28 scale

items for this construct were derived from Dabholkar et al. (1996). Their scale consisted of 28 items, 17 of which were originated from the Parasuraman et al.'s (1988) SERVQUAL and the remaining 11 items were developed based on the researchers' qualitative research. Dabholkar et al.'s (1996) scale was composed of five dimensions: physical aspects, reliability, personal interaction, problem solving, and policy. In their scale, the *physical aspects* dimension was more broadly defined than was the SERVQUAL tangibles dimension. It refers to the convenience of store layout as well as the appearance of the physical facilities such as the cleanliness of the store, the general appearance of the store, and the appearance of public facilities. The *reliability* dimension pertains to the ability to keep promises and do things right. The *personal interaction* dimension is designed to measure two subdimensions, "service employees inspiring confidence and being courteous/helpful." The *problem solving* dimension, addressing not only complaints but also the handling of returns and exchanges, was newly proposed by Dabholkar et al. (1996). Another new dimension, *policy*, reflects aspects that directly relate to store policy. In their study, the reliabilities for personal interaction, physical aspects, reliability, policy, and problem solving were 0.90, 0.85, 0.90, 0.92, and 0.87, respectively. All items for this construct were rated on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree." Items were randomly ordered in the questionnaire.

Physical Aspects

1. Materials associated with this store's service (such as shopping bags, catalogs, or statements) are visually appealing.
2. This store has modern-looking equipment and fixtures.

3. The store layout at this store makes it easy for customers to move around in the store.
4. The physical facilities at this store are visually appealing.
5. The store layout at this store makes it easy for customers to find what they need.
6. This store has clean, attractive, and convenient public areas (restrooms, fitting rooms).

Reliability

1. This store provides its services at the time it promises to do so.
2. When this store promises to do something by a certain time, it will do so.
3. This store has merchandise available when the customers want it.
4. This store performs the service right the first time.
5. This store insists on error-free sales transactions and records.

Personal Interaction

1. Employees in this store have the knowledge to answer customers' questions.
2. The behavior of employees in this store instills confidence in customers.
3. Employees in this store give prompt service to customers.
4. Employees in this store are never too busy to respond to customer's requests.
5. Customers feel safe in their transactions with this store.
6. Employees of this store treat customers courteously on the telephone.
7. Employees in this store tell customers exactly when services will be performed.
8. Employees in this store are consistently courteous with customers.
9. This store gives customers individual attention.

Problem Solving

1. This store willingly handles returns and exchanges.
2. Employees of this store are able to handle customer complaints directly and immediately.
3. When a customer has a problem, this store shows a sincere interest in solving it.

Policy

1. This store offers its own credit card.
2. This store offers high quality merchandise.
3. This store accepts most major credit cards.
4. This store provides plenty of convenience to all their customers.
5. This store has operating hours convenient to all their customers.

Measures of Patronage Intention toward a Retail Store

Patronage intention toward a retail store is defined as the extent to which a consumer would patronize the retail store again and recommend the retail store to others (Dabholkar et al., 2000). Three measurement items for patronage intention toward a retail store were adapted from the Cronin et al.'s (2000) scale and were rated on a 7-point Likert-type scale ranging from "very low" to "very high." The reliability coefficient for the original scale was 0.87.

1. The probability that I will shop at this store again is.
2. The likelihood that I would recommend this store to a friend is.
3. If I had to do it again, I would still shop at this store.

Demographic and Background Information

The final section of the questionnaire asked respondents to provide information related to age, gender, marital status, ethnic identification, education, income, and self-service technology usage. This information was obtained for description purposes only. Open-ended choice response for age was used.

Pre-Test Data Analysis

The primary objective of pre-test data analysis was to assess unidimensionality and internal consistency of the measures. Cronbach's alpha values and item-to-total correlations for each construct were examined for assessing reliability. Reliability statistics for all constructs except two dimensions of store service quality were satisfactory, which exceeded the minimum criteria of 0.70 (See Table 3-1).

Table 3-1. Pre-Test: Reliability Coefficients of Constructs

Construct	Number of items	Reliability	
		Self-checkout	Information kiosk
Technology Anxiety	9	0.860	0.885
Need for Interaction	4	0.768	0.720
Knowledge of Self-Service Technologies	3	0.769	0.795
Perceived Usefulness	3	0.871	0.862
Perceived Ease of Use	3	0.878	0.826
Perceived Enjoyment	4	0.907	0.931
TBSS Kiosk Service Quality	4	0.941	0.927
Satisfaction with Using TBSS Kiosks	3	0.912	0.944
Store Service Quality			
Physical Aspects	6	0.773	0.897
Reliability	5	0.808	0.868
Personal Interaction	9	0.885	0.952
Problem Solving	3	0.598	0.892
Policy	5	0.419	0.632
Patronage Intention toward a Retail Store	3	0.882	0.900

Reliability of the policy dimension was 0.419 for the self-checkout sample and 0.632 for the information kiosk sample, respectively. Low item-to-total correlations were found, ranging from 0.002 to 0.391 for the self-checkout sample and ranging from 0.258 to 0.574 for the information kiosk sample. Reliability and item-to-total correlations of the problem solving dimension for the self-checkout sample were also problematic ($\alpha = 0.598$, item-to-total correlations ranged between 0.157 and 0.586), but not for the information kiosk sample. However, no items were dropped for closer examination in the main data analysis.

Next, confirmatory factor analysis was conducted to identify the factor structure of the constructs and whether there were any items that loaded on different factors, cross-loaded, or did not load strongly on any constructs. The results of confirmatory factor analysis revealed that all standardized regression weights were significant: for the self-checkout, the path weights ranged from 0.47 to 0.93 ($p < 0.001$); and for the information kiosk, from 0.45 to 0.97 ($p < 0.001$). It was also found that TBSS service quality and satisfaction were highly correlated in both models ($r = 0.961$ for the self-checkout; 0.971 for the information kiosk). Thus, discriminant validity between these two constructs could be questionable.

Revisions to Measures

The measurement items for knowledge of self-service technologies were reworded to clarify the meaning based on the pre-test respondents' feedback. Some respondents reported that the meaning of "technologically based products and services" was unclear. Thus, each item was reworded into "self-service technologies" and a number

of examples (“such as automated ticketing, automated teller machines, or Internet shopping”) were added. The final measurement items are summarized in Table 3-2 and the descriptions of the measurement items used in the main study are presented in Appendix B.

DATA ANALYSIS

Data Analysis for Study 1

Descriptive statistics using SPSS 15.0 described the sample and data distribution characteristics. Structural equation modeling (SEM) was employed to validate the measurement model and test the proposed hypotheses in each model. Adopting a two-step SEM analysis (Anderson & Gerbing, 1988), the structural model depicting the relationships among the latent constructs was then estimated, once the measurement model was validated through confirmatory factor analysis (CFA). AMOS graphics version 6.0 was used to analyze the data and parameters were estimated using the maximum likelihood method. The following preliminary analysis was conducted prior to CFA.

Preliminary Analysis

Multivariate normality should be required because a lack of multivariate normality can lead to large differences in the chi-square statistic, creating upward bias in critical values for determining coefficient significance (Hair, Anderson, Tatham, & Black, 1998). To validate the assumption of multivariate normality, values for skewness and kurtosis, outliers, and standard errors were examined.

Table 3-2. Summary of Final Measures

Construct	Measurement Items
Technology Anxiety	I have avoided technology because it is unfamiliar to me I have difficulty understanding most technological matters I am sure of my ability to interpret technological output (r) I am confident I can learn technology-related skills (r) When given the opportunity to use technology, I fear I might damage it in some way Technological terminology sounds like confusing jargon to me I hesitate to use technology for fear of making mistakes I cannot correct I am able to keep up with important technological advances (r) I feel apprehensive about using technology
Need for Interaction	I like interacting with the person who provides the service It bothers me to use a machine when I could talk with a person instead Personal attention by the service employee is not very important to me (r) Human contact in providing services makes the process enjoyable for me
Knowledge of Self-Service Technologies	I would have described myself as being very familiar with self-service technologies (such as automated airline ticketing, ATM, or Internet shopping) As compared to the average person, I would have said that I was highly knowledgeable about self-service technologies (such as automated airline ticketing, ATM, or Internet shopping) I have a lot of experience with self-service technologies (such as automated airline ticketing, ATM, or Internet shopping)
Perceived Usefulness	The self-checkout (information kiosk) improves my shopping productivity The self-checkout (information kiosk) enhances my effectiveness in shopping The self-checkout (information kiosk) improves my shopping ability
Perceived Ease of Use	Using the self-checkout (information kiosk) is clear and understandable Using the self-checkout (information kiosk) does not require a lot of mental effort The self-checkout (information kiosk) is easy to use
Perceived Enjoyment	Using the self-checkout (information kiosk) makes me feel good Using the self-checkout (information kiosk) is boring (r) Using the self-checkout (information kiosk) is exciting Using the self-checkout (information kiosk) is enjoyable
TBSS Kiosk Service Quality	I believe that the overall service quality at the self-checkout (information kiosk) is excellent I think the overall service I usually receive from the self-checkout (information kiosk) is of a high quality The overall quality of the service at the self-checkout (information kiosk) is generally a high standard of service Most of time, I consider the overall service quality at the self-checkout (information kiosk) to be superior
Satisfaction with Using TBSS Kiosks	I am satisfied with the service provided at the self-checkout (information kiosk) I am pleased with the service provided at the self-checkout (information kiosk) I am delighted with the service provided at the self-checkout (information kiosk)

Table 3-2. Summary of Final Measures (Continued)

Construct	Measurement Items
Store Service Quality	<i>Physical Aspects</i> Materials associated with this store's service (such as shopping bags, catalogs, or statements) are visually appealing This store has modern-looking equipment and fixtures The store layout at this store makes it easy for customers to move around in the store The physical facilities at this store are visually appealing The store layout at this store makes it easy for customers to find what they need This store has clean, attractive, and convenient public areas (restrooms, fitting rooms)
	<i>Reliability</i> This store provides its services at the time it promises to do so When this store promises to do something by a certain time, it will do so This store has merchandise available when the customers want it This store performs the service right the first time This store insists on error-free sales transactions and records
	<i>Personal Interaction</i> Employees in this store have the knowledge to answer customers' questions The behavior of employees in this store instills confidence in customers Employees in this store give prompt service to customers Employees in this store are never too busy to respond to customer's requests Customers feel safe in their transactions with this store Employees of this store treat customers courteously on the telephone Employees in this store tell customers exactly when services will be performed Employees in this store are consistently courteous with customers This store gives customers individual attention
	<i>Problem Solving</i> This store willingly handles returns and exchanges Employees of this store are able to handle customer complaints directly and immediately When a customer has a problem, this store shows a sincere interest in solving it
	<i>Policy</i> This store offers its own credit card This store offers high quality merchandise This store accepts most major credit cards This store provides plenty of convenience to all their customers This store has operating hours convenient to all their customers
Patronage Intention toward a retail store	The probability that I will shop at this store again is The likelihood that I would recommend this store to a friend is If I had to do it again, I would still shop at this store

Note. (r) denotes that scale items are reverse coded.

Measurement Model Evaluation

Overall Model Evaluation

The measurement model was evaluated by examining various goodness-of-fit statistics including the comparative fit index (CFI), the Tucker-Lewis index (TLI or NNFI), and the root mean square error of approximation (RMSEA), as well as the chi-square statistic. Each of the goodness-of-fit statistics primarily used was summarized in the following.

- 1) The likelihood ratio chi-square is an absolute measure of fit that indicates the degree to which the model fits the data (i.e., the predicted correlations and covariances equal their observed counterparts). Given that the chi-square statistic is highly sensitive to the sample size, a conclusion solely based on the chi-square statistic is not sufficient (Byrne, 2001). When the sample size is over 200, significant differences (i.e., the observed matrix is significantly different from the estimated matrix) tend to be found for most models (Garver & Mentzer, 1999).
- 2) The ratio of chi-square to degrees of freedom (CMIN/DF) is the ratio of chi-square divided by the degrees of freedom. Because the chi-square statistic is strongly influenced by the sample size, it is generally recommended to assess CMIN/DF. The acceptable range of this value lies between two to five (Marsh & Hovecar, 1985).
- 3) The comparative fit index (CFI) is a relative comparison of the proposed model to the null model. It is one of a class of fit statistics known as incremental fit indexes, which are among the most widely used in SEM. The

CFI values of 0.90 or greater represent an adequate fit (Baumgartner & Homburg, 1996).

- 4) The Tucker-Lewis index (TLI) is an incremental fit statistic that combines a measure of parsimony into a comparative index between the proposed model and null model. It is also known as the nonnormed fit index (NNFI). The TLI values range from zero to 1.00. The TLI Values of 0.90 or greater are considered representative of a good model fit (Hu & Bentler, 1999).
- 5) The root mean square error of approximation (RMSEA) is the discrepancy per degrees of freedom measured in terms of population (not the sample) (Hair et al., 1998). RMSEA values ranging from 0.08 to 0.10 indicate mediocre fit, and those greater than 0.10 indicate poor fit (MacCallum, Brown, & Sugawara, 1996). However, Hu and Bentler (1999) suggested a value of 0.06 or lower to be indicative of good fit, but they also cautioned that RMSEA tends to over-reject true population models when the sample size is small.

Unidimensionality

To achieve a unidimensional measurement, each set of indicators has only one underlying trait or construct in common (Hair et al., 1998). Strong evidence for construct unidimensionality is ensured when standardized parameter estimates are at least 0.70, statistically significant, and in the appropriate direction that is consistent with the theory (Hulland, Chow, & Lam, 1996). In addition, unidimensional constructs should possess small standardized residuals. Standardized residuals that are greater than 2.58 are considered as a potential threat to unidimensionality (Garver & Mentzer, 1999).

Construct Validity

Tests for convergent and discriminant validity were conducted for evaluations of construct validities of the latent constructs. The convergent validity was assessed by three measures: factor loadings, composite reliability, and the average variance extracted (AVE). All factor loadings should be significant ($p < .001$); the composite reliabilities of the latent constructs should exceed the acceptable criteria of 0.70 (Nunnally & Bernstein, 1994) ; and the AVEs for all latent variables should be greater than the threshold value of 0.50 (Fornell & Larcker, 1981).

Discriminant validity was assessed in two ways suggested by Anderson and Gerbing (1988) and Fornell and Larcker (1981). First, it was examined whether the AVE was larger than the shared variance (i.e., squared correlation coefficients) between all possible pairs of latent constructs (Formell and Larcker, 1981). Second, as another complementary test of discriminant validity, it was assessed whether the confidence intervals (the correlation estimates ± 2 standard error) for all construct correlations include 1.00 (Anderson & Gerbing, 1988).

Structural Model Evaluation

The structural model was also evaluated based on the set of goodness-of-fit statistics used for the measurement model. Hypotheses were tested after evaluating the overall model fit of the structural model. All significant relationships between the constructs in the hypothesized direction are presumed to validate a causal structure of the proposed model (Byrne, 2001).

Data Analysis for Study 2

A multiple-group analysis was conducted to determine the structural invariance of all the paths across the self-checkout and information kiosk samples. The unconstrained model in which all the structural paths were freely estimated was compared with the constrained model in which all the structural paths were specified to be constant across the two TBSS kiosk samples. Then, whether the structural invariance exists was determined by results of the chi-square difference test and model fit indices (e.g., CFI and RMSEA). To evaluate the structural invariance further, the invariance of each structural path was tested separately. In each test, the constrained model in which only one path was fixed to be constant was compared with the unconstrained model in which no paths were fixed to be constant. Then, each chi-square difference was examined. A significant χ^2 difference indicates significant deterioration in the fit of the constrained model, and provides evidence for the non-invariance of the constrained paths between the self-checkout and information kiosk model. Next, to determine whether (1) the effect of perceived usefulness on TBSS kiosk service quality was greater in a self-checkout than in an information kiosk, and (2) the effect of perceived enjoyment on TBSS kiosk service quality was greater in an information kiosk than in a self-checkout, the structural paths between the two TBSS kiosks were compared on the basis of unstandardized regression path weights.

CHAPTER 4 - DATA ANALYSIS AND RESULTS

The results of the data analysis and each hypothesis tested are presented in this chapter. First, sample characteristics are reported in relation to demographics and self-service technology (SST)/Internet usage, followed by the descriptive statistics of the sample, including mean, standard deviation, skewness, and kurtosis. Next, the process of assessing store service quality as a hierarchical factor structure is described. Then, the steps for improving measurement model, measurement model evaluation, and assessment of construct validity are outlined. Finally, structural model evaluation and results of each hypothesis tested are presented.

SAMPLE CHARACTERISTICS

The demographic characteristics of the samples are described in Table 4-1. The self-checkout sample (N = 300) included 44% of males and 56% of females. More than half of the respondents (55%) were the ages of 25 and 44, with a mean age of 42 years. The income category of \$50,000 to \$74,999 had the largest percentage of the respondents (28%) compared to the other income categories. The majority attained some college degree or higher education (84%), were Caucasian (86%), and married (58%). The information kiosk sample consisted of 43% of males and 57% of females. Over half of the respondents were between the ages of 25 and 44 (58%), with a mean age of 41 years. Twenty-seven percent had an annual household income of \$30,000 to \$49,999, followed by 24.7% of \$50,000 to \$74,999. The majority of the respondents attained some college degree or higher education (82%), were Caucasian (83%), and married (52%).

Table 4-1. Demographic Characteristics of the Samples

Demographic Characteristics		Self-Checkout (N = 300)		Information kiosk (N = 300)	
		Frequency	%	Frequency	%
Gender	Male	133	44.3	128	42.7
	Female	167	55.7	172	57.3
Age	18-24	16	5.3	12	4.0
	25-34	83	27.7	104	34.7
	35-44	82	27.3	70	23.3
	45-54	66	22.0	63	21.0
	55-64	40	13.3	37	12.3
	65 or more	13	4.3	14	4.7
Income	Under \$20,000	21	7.0	21	7.0
	\$20,000-\$29,999	24	8.0	28	9.3
	\$30,000-\$49,999	68	22.7	81	27.0
	\$50,000-\$74,999	84	28.0	74	24.7
	\$75,000-\$99,999	47	15.7	49	16.3
	\$100,000 or more	56	18.7	47	15.7
Education	High School or less	49	16.3	53	17.7
	Associate Degree	74	24.7	65	21.7
	Bachelor's Degree	104	34.7	118	39.3
	Master's Degree	52	17.3	38	12.7
	Doctoral Degree	6	2.0	9	3.0
	Professional Degree	6	2.0	9	3.0
	Other	9	3.0	8	2.7
Marital Status	Single	83	27.7	101	33.7
	Married	173	57.7	157	52.3
	Separated or Divorced	36	12.0	37	12.3
	Widowed	8	2.7	5	1.7
Ethnicity	Caucasian/White	258	86.0	250	83.3
	African-American	10	3.3	7	2.3
	Native American	2	0.7	1	.3
	Asian/Pacific Islander	12	4.0	17	5.7
	Hispanic	11	3.7	15	5.0
	Multiracial	4	1.3	5	1.7
	Other	3	1.0	5	1.7

Results from the statistical analysis indicated that demographic characteristics of the two groups did not significantly differ (Table 4-2). The descriptive information on self-service technologies (SSTs) usage and Internet usage was also presented in Table 4-3 and Table 4-4. The majority of the self-checkout sample were aware or used a wide range of SSTs, including ATM, hotel checkout, airport check-in, Internet banking, price checkers, and mobile shopping. Most respondents (69%) used the Internet on average for 1 to 4 hours a day. About 31% had made 1 to 5 online purchases over the past 12 months, with 22.7% had made 6 to 10 online purchases.

The majority of the information kiosk sample were aware or used a wide range of SSTs, including ATM, hotel checkout, airport check-in, Internet banking, price checkers, and mobile shopping. About 40% of the respondents used the Internet on average for 3 to 4 hours a day, followed by 28% for 1 to 2 hours. Slightly over quarter (25.3%) had made 6 to 10 online purchases over the past 12 months, with 25% had made 1 to 5 online purchases.

Table 4-2. Sample Comparison: Chi-Square (χ^2) Analysis

Sample Characteristics	χ^2	<i>df</i>	<i>P-value</i>
Gender	0.17	1	0.68
Age	4.10	5	0.54
Income	2.90	5	0.72
Education	5.06	6	0.54
Marital Status	3.24	3	0.36
Ethnicity	3.08	6	0.80

Table 4-3. Self-Service Technologies (SSTs) Usage Profile of the Samples

Self-Service Technologies Usage	Unaware		Aware, But Not Used		Aware and Used	
	Frequency	%	Frequency	%	Frequency	%
<i>Self-Checkout</i>						
ATMs	2	0.7	23	7.7	275	91.7
Hotel Checkout	42	14.0	94	31.3	164	54.7
Airport Check-in	18	6.0	54	18.0	228	76.0
Internet Banking	2	0.7	49	16.3	249	83.0
Price Checkers	17	5.7	48	16.0	235	78.3
Online Shopping	2	0.7	8	2.7	290	96.7
Mobile Shopping	74	24.7	192	64.0	34	11.3
<i>Information Kiosk</i>						
ATMs	2	0.7	23	7.7	275	91.7
Hotel Checkout	29	9.7	77	25.7	194	64.7
Airport Check-in	14	4.7	58	19.3	228	76.0
Internet Banking	1	0.3	46	15.3	253	84.3
Price Checkers	14	4.7	31	10.3	255	85.0
Online Shopping	1	0.3	11	3.7	288	96.0
Mobile Shopping	42	14.0	230	76.7	28	9.3

Table 4-4. Internet Usage/Online Shopping Profile of the Samples

Internet Usage/ Online Shopping	Self-Checkout (N = 300)		Information kiosk (N = 300)	
	Frequency	%	Frequency	%
<i>Internet Usage</i>				
Less than an hour	14	4.7	18	6.0
1 - 2 hours	116	38.7	84	28.0
3 - 4 hours	91	30.3	121	40.3
5 - 6 hours	42	14.0	43	14.3
7 or more hours	37	12.3	34	11.3
<i>Online Shopping</i>				
0 times	7	2.3	9	3.0
1 - 5 times	92	30.7	75	25.0
6 - 10 times	68	22.7	76	25.3
11- 15 times	51	17.0	50	16.7
16 - 20 times	28	9.3	28	9.3
21 or more times	54	18.0	62	20.7

Preliminary Analysis

Descriptive statistics including mean, standard deviation, skewness, and kurtosis can be found in Appendix C. All items were measured on a 7-point Likert-type scale. The mean values were between 1.95 and 6.34 with standard deviations ranging from 0.83 to 1.66 for the self-checkout dataset; and between 1.92 and 6.32 with standard deviation ranging from 1.01 to 1.69 for the information kiosk dataset. Four items, “this store accepts most major credit cards”, “the probability that I will shop at this store again is”, “the likelihood that I would recommend this store to a friend is”, and “if I had to do it again, I would still shop at this store”, showed relatively high mean values, greater than 6.0. Maximum likelihood estimation used in SEM assumes that the distribution of the observed variables is multivariate normal (Anderson & Gerbing, 1988). All values for skewness and most values for kurtosis were less than ± 1.96 . Only a few items exhibited a moderate level of kurtosis, among which the highest one was 5.22. Given that all items did not have an extreme level of kurtosis (i.e., over 8.0 to 20.0) (Kline, 2005), all items were retained for further investigation.

STORE SERVICE QUALITY: SECOND-ORDER CONFIRMATORY FACTOR ANALYSIS

Following Dabholkar et al.’s (1996) suggestion, store service quality was assessed as a second-order factor structure with five dimensions: physical aspects (6 items), reliability (5 items), personal interaction (9 items), problem solving (3 items), and policy (5 items). Prior to a confirmatory factor analysis (CFA), reliability for each dimension was calculated using Cronbach’s alpha. The reliability coefficients of all constructs

except the policy dimension were greater than the acceptable level of 0.70. Only the policy dimension for the self-checkout sample showed poor reliability of 0.566 because of the problematic item of PO01 (“this store offers its own credit card”). The item-to-total correlation for this item was 0.103, which was far below the recommended 0.50 (Hair et al., 1998). Thus, PO01 was dropped. The construct correlations, along with the means and standard deviations were also examined (See Table 4-5).

To evaluate convergent and discriminant validity, the first-order CFA model with partial disaggregation was constructed for each sample, guided by previous research (Dabholkar et al., 1996). The partial disaggregation method:

Allows one to proceed with meaningful research by combining items into composites to reduce higher levels of random error and yet it retains all the advantages of structural equations, including accounting for measurement error, allowing for multiple, multidimensional variables, and testing for hierarchical factor structure (p. 9).

Items relating to each of the five latent constructs were randomly aggregated so that two or three combined indicators were created for each construct. The first-order CFA model for each self-checkout and information kiosk sample included 11 combined indicators with five latent constructs. For each sample, convergent validity was evidenced by three findings: all regression weights were significant ($p < .001$); the composite reliabilities of all constructs, ranged from 0.80 to 0.95 (self-checkout) and from 0.81 to 0.95 (information kiosk), and were greater than the minimum criteria of 0.70 ; and the average variance extracted (AVE) values for all constructs, ranged from 0.67 to 0.87 (self-checkout) and from 0.68 to 0.86 (information kiosk), and exceeded the threshold value of 0.50 (Fornell & Larcker, 1981).

Table 4-5. Store Service Quality: Mean, Standard Deviation, and Construct Correlations

	Mean	Std. Dev.	Physical Aspects	Reliability	Personal Interaction	Problem Solving	Policy
Physical Aspects	5.00 (5.33)	0.92 (0.99)	0.83 (0.88)				
Reliability	4.97 (5.23)	0.97 (0.97)	0.75 (0.78)	0.88 (0.86)			
Personal Interaction	4.89 (5.21)	1.06 (0.99)	0.74 (0.80)	0.91 (0.90)	0.94 (0.94)		
Problem Solving	5.06 (5.34)	1.05 (1.10)	0.63 (0.70)	0.85 (0.82)	0.86 (0.83)	0.80 (0.85)	
Policy	5.64 (5.72)	0.77 (0.86)	0.72 (0.79)	0.70 (0.81)	0.70 (0.80)	0.62 (0.74)	0.72 (0.80)

Note: Values in parentheses indicate values for the information kiosk sample; values on the diagonal indicate reliability (Cronbach's alpha) of each construct.

Discriminant validity among the five constructs was tested in two ways suggested by Fornell and Larcker (1981) and Anderson and Gerbing (1988). First, it was examined whether the average variance extracted (AVE) values were larger than the shared variances (i.e., squared correlation coefficients) between all possible pairs of latent constructs. On the basis of this test, lack of discriminant validity among reliability, personal interaction, and problem solving was found. In the self-checkout sample, the squared intercorrelations between reliability-personal interaction (0.96) and reliability-problem solving (0.94) were larger than the shared variance extracted by the reliability construct (0.83); personal interaction-reliability (0.96) and personal interaction-problem solving (0.92) were larger than the shared variance extracted by the personal interaction construct (0.87); and problem solving-reliability (0.94) and problem solving-personal interaction (0.92) were larger than the shared variance extracted by the problem solving construct (0.76). In the information kiosk sample, the squared intercorrelations between reliability-personal interaction (0.95) and reliability-problem solving (0.90) were larger

than the shared variance extracted by the reliability construct (0.81); personal interaction-reliability (0.95) was larger than the shared variance extracted by the personal interaction construct (0.86); and policy-reliability (0.90) was larger than the shared variance extracted by the policy construct (0.76).

Second, another complementary test of discriminant validity is to determine whether the confidence intervals (the correlation estimates ± 2 standard error) for all construct correlations include 1.00. The confidence intervals around the correlation estimates between reliability-personal interaction, reliability-problem solving, and reliability-personal interaction included 1.00, suggesting that reliability, personal interaction, and problem solving are not distinct constructs. Hence, the three constructs were combined to form a new dimension named *personnel service*.

The final first-order CFA model for each self-checkout and information kiosk sample consisted of three latent constructs with 11 combined indicators. Once again, the final model for each sample was evaluated by goodness-of-fit statistics, reliability, convergent validity, and discriminant validity. The final model exhibited acceptable fit for both samples: for self-checkout, $\chi^2 (41) = 116.92$, $p < 0.001$; $\chi^2/df = 2.85$; CFI = 0.98; GFI = 0.93; TLI = 0.97; RMSEA = 0.079; and for information kiosk, $\chi^2 (41) = 150.02$, $p < 0.001$; $\chi^2/df = 3.66$; CFI = 0.97; GFI = 0.92; TLI = 0.96; RMSEA = 0.094. For both samples, all path weights were significant ($p < .001$) and all R^2 values exceeded 0.50 (Hildebrandt, 1987); the composite reliabilities of all constructs were between 0.81 and 0.97; and all AVEs were between 0.68 to 0.82, supporting convergent validity (See Table 4-6). Using the same formula as before, the confidence interval (the correlation estimate ± 2 standard error) for each construct correlation was computed. Because the resulting

confidence intervals between physical aspects-personnel service (0.81, SE = 0.03 for self-checkout; and 0.87, SE = 0.02 for information kiosk), physical aspects-policy (0.85, SE = 0.03 for self-checkout; and 0.92, SE = 0.02 for information kiosk), and personnel service-policy (0.80, SE = 0.03 for self-checkout; and 0.94, SE = 0.02 for information kiosk) did not include 1.00, discriminant validity among constructs was satisfied in a moderate sense, indicating that constructs are highly correlated, but significantly less than 1.00.

The second-order CFA model for each self-checkout and information kiosk sample was created with the three first-order factors (See Figure 4-1). This model fit the data well for both samples: CFI = 0.97-0.98; GFI = 0.92-0.93; TLI = 0.96-0.97; RMSEA = 0.079-0.094. All regression path weights were greater than 0.70 and *t*-values for all coefficients were found to be significant at the 0.01 level, demonstrating convergent validity for both samples (See Table 4-7). Results of the second-order CFA model can be found in Appendix D.

Table 4-6. Store Service Quality: Reliability and the Variance Extracted

Dimensions	Cronbach's Alpha		Composite Reliability ^a		Variance Extracted ^b	
	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk
Physical Aspects	0.875	0.902	0.881	0.903	0.787	0.823
Personnel Service	0.964	0.960	0.966	0.962	0.802	0.783
Policy	0.800	0.808	0.806	0.809	0.675	0.679

Note. ^aComposite reliability = (Sum of standardized loading)²/(Sum of standardized loading)² + Sum of indicator measurement error

^bVariance extracted = Sum of squared standardized loadings/Sum of squared standardized loadings + Sum of indicator measurement error

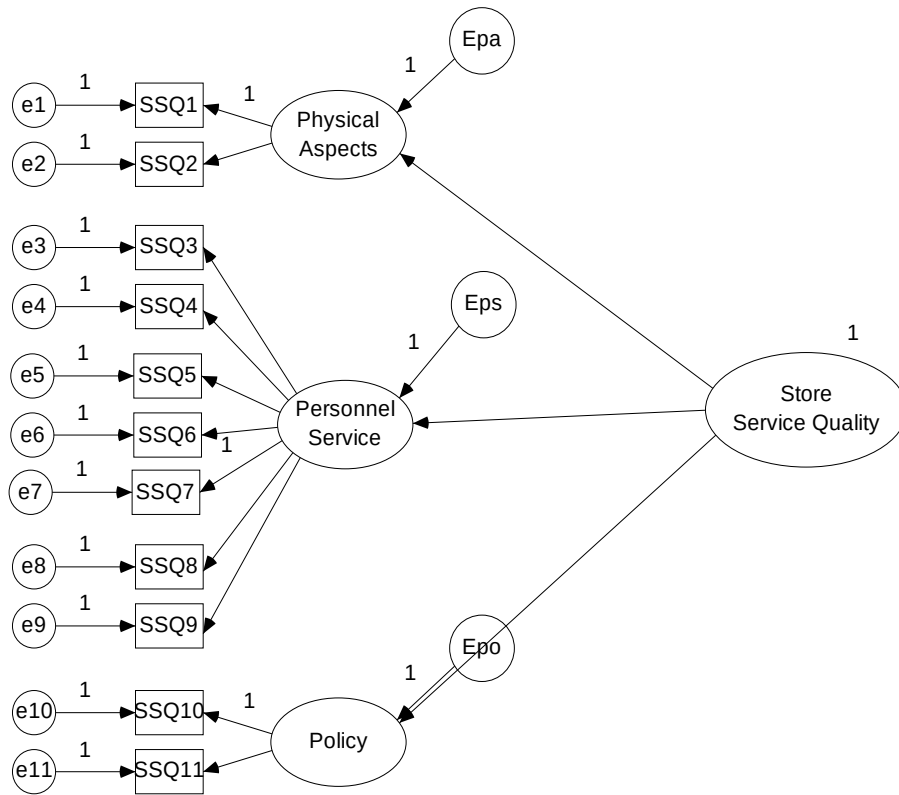


Figure 4-1. Second-Order CFA Model: Store Service Quality

Following Matsuno and Mentzer's (2000) approach, separate dimensions of the store service quality (physical aspects, personnel service, and policy) were treated as indicators of the store service quality latent construct, with each dimension being an aggregation of items (unweighted composite scores). This method was deemed valid to use because the second-order store service quality scale has been established. Also, the main advantage of this aggregation is that it allows maximization of the degrees of freedom in estimating path coefficients and reduces higher levels of random error while accounting for measurement error and retaining the three-dimensional scale of store service quality (Matsuno & Mentzer, 2000).

Table 4-7. Store Service Quality: Results of Second-Order CFA

Path	Standardized Estimate		t-value	
	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk
Physical Aspects → SSQ1 ^a	0.89	0.90	—	—
Physical Aspects → SSQ2	0.88	0.91	19.90***	23.19***
Personnel Service → SSQ3	0.89	0.89	26.93***	25.25***
Personnel Service → SSQ4	0.92	0.89	29.68***	25.85***
Personnel Service → SSQ5	0.92	0.91	29.08***	26.83***
Personnel Service → SSQ6	0.92	0.93	30.64***	29.16***
Personnel Service → SSQ7 ^a	0.94	0.92	—	—
Personnel Service → SSQ8	0.83	0.81	21.82***	20.21***
Personnel Service → SSQ9	0.84	0.84	22.94***	21.96***
Policy → SSQ10 ^a	0.83	0.85	—	—
Policy → SSQ11	0.82	0.80	14.91***	16.76***
Store Service Quality → Physical Aspects	0.93	0.93	16.58***	17.32***
Store Service Quality → Personnel Service	0.87	0.94	16.61***	18.55***
Store Service Quality → Policy	0.92	0.99	14.57***	17.57***
Fit Indices				
χ^2 (df)	116.923 (41)		150.016 (41)	
χ^2 /df	2.852		3.659	
CFI	0.978		0.970	
GFI	0.932		0.921	
TLI	0.971		0.960	
RMSEA	0.079		0.094	

Note: ^a The corresponding parameter is fixed to a value of 1.00 to set the scale of measurement.

SSQ1 = PA02+PA01+PA05; SSQ2 = PA04+PA06+PA03; SSQ3 = RE01+RE03+RE05; SSQ4 = RE02+RE04; SSQ5 = PI01+PI04+PI07; SSQ6 = PI02+PI05+PI08; SSQ7 = PI03+PI06+PI09; SSQ8 = PS01+PS02; SSQ9 = PS03; SSQ10 = PO02+PO05; SSQ11 = PO04+PO03

*** Significant at $p < 0.001$.

MEASUREMENT MODEL

A Priori Model

A priori measurement model was estimated using the maximum likelihood which has been predominantly used in previous studies. The variance of each latent construct was set to 1.00. A priori model for each self-checkout and information kiosk dataset is presented in Figure 4-2 and Figure 4-3. Three nested measurement models (congeneric, tau-equivalent, and parallel) were compared through confirmatory factor analysis. The congeneric model did not impose any equality constraints except that the variance of each latent construct was fixed to one. For the tau-equivalent model, additional equality constraints were imposed on the factor loadings (each indicator to its latent construct was constrained to be equal each other) to the congeneric model. The parallel model was created by imposing additional constraints that require equal error variances to the tau-equivalent model. As shown in Table 4-8, the congeneric model provided the most satisfactory fit, thus, leading us to retain the congeneric measurement model for further analysis.

Table 4-8. A Priori Model Fit Indices: Congeneric, Tau-Eauivalent, and Parallel Models

Model	CMIN/DF ¹	CFI ²	TLI ³	RMSEA ⁴
Congeneric	2.457 (2.474)	0.903 (0.901)	0.891 (0.888)	0.070 (0.070)
Tau-Equivalent	2.997 (3.003)	0.861 (0.859)	0.850 (0.848)	0.082 (0.082)
Parallel	4.850 (4.754)	0.722 (0.725)	0.711 (0.715)	0.113 (0.112)

¹ < 5 indicates acceptable fit level, < 2 = good fit

² ≥ 0.80 = acceptable fit, ≥ 0.90 = good fit

³ ≥ 0.80 = acceptable fit, ≥ 0.90 = good fit

⁴ < 0.05 = very good, < 0.08 = acceptable, < 0.10 = mediocre, ≥ 0.10 = poor errors of approximation (Byrne, 2001)

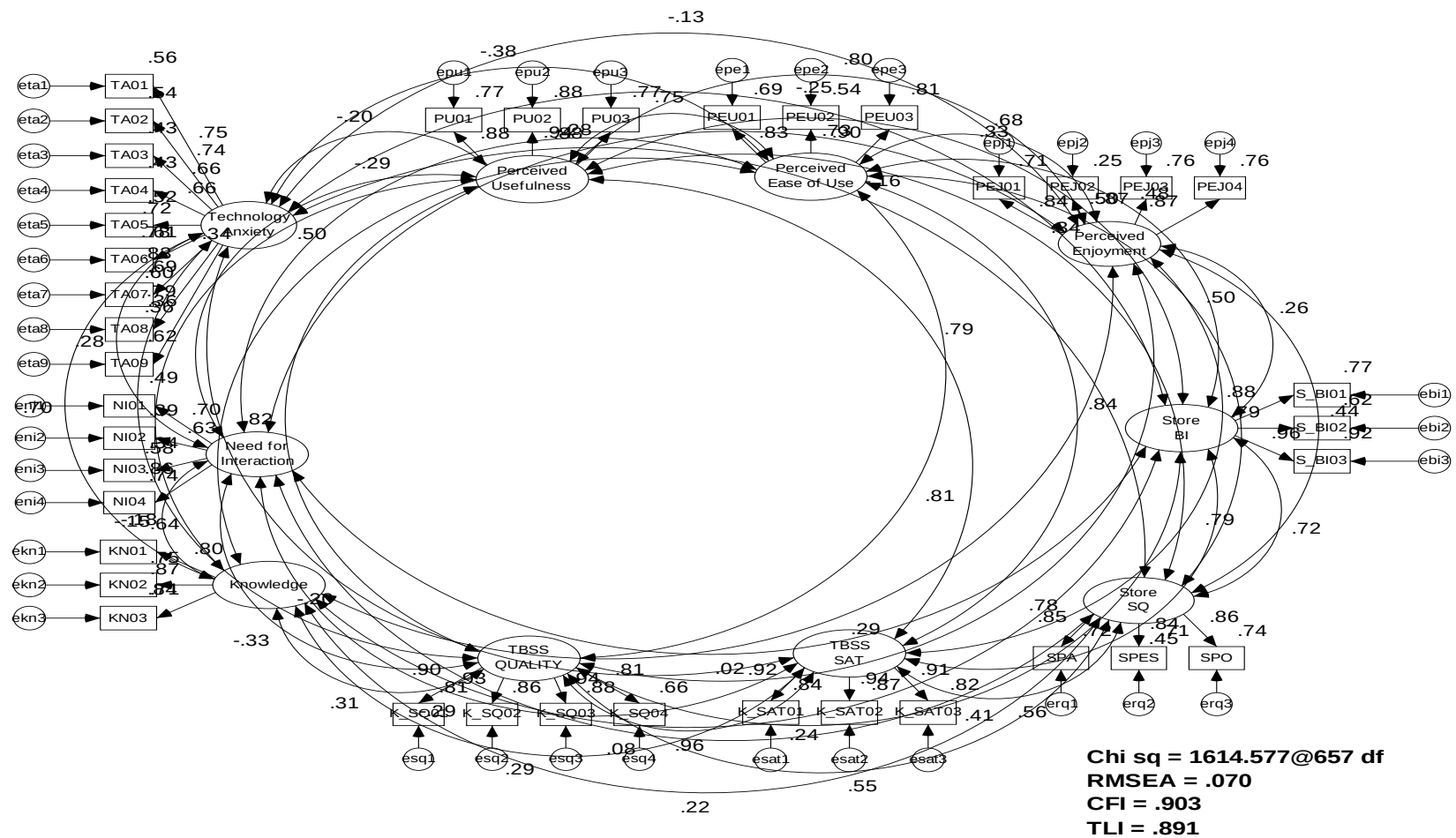


Figure 4-2. A Priori Model: Self-Checkout

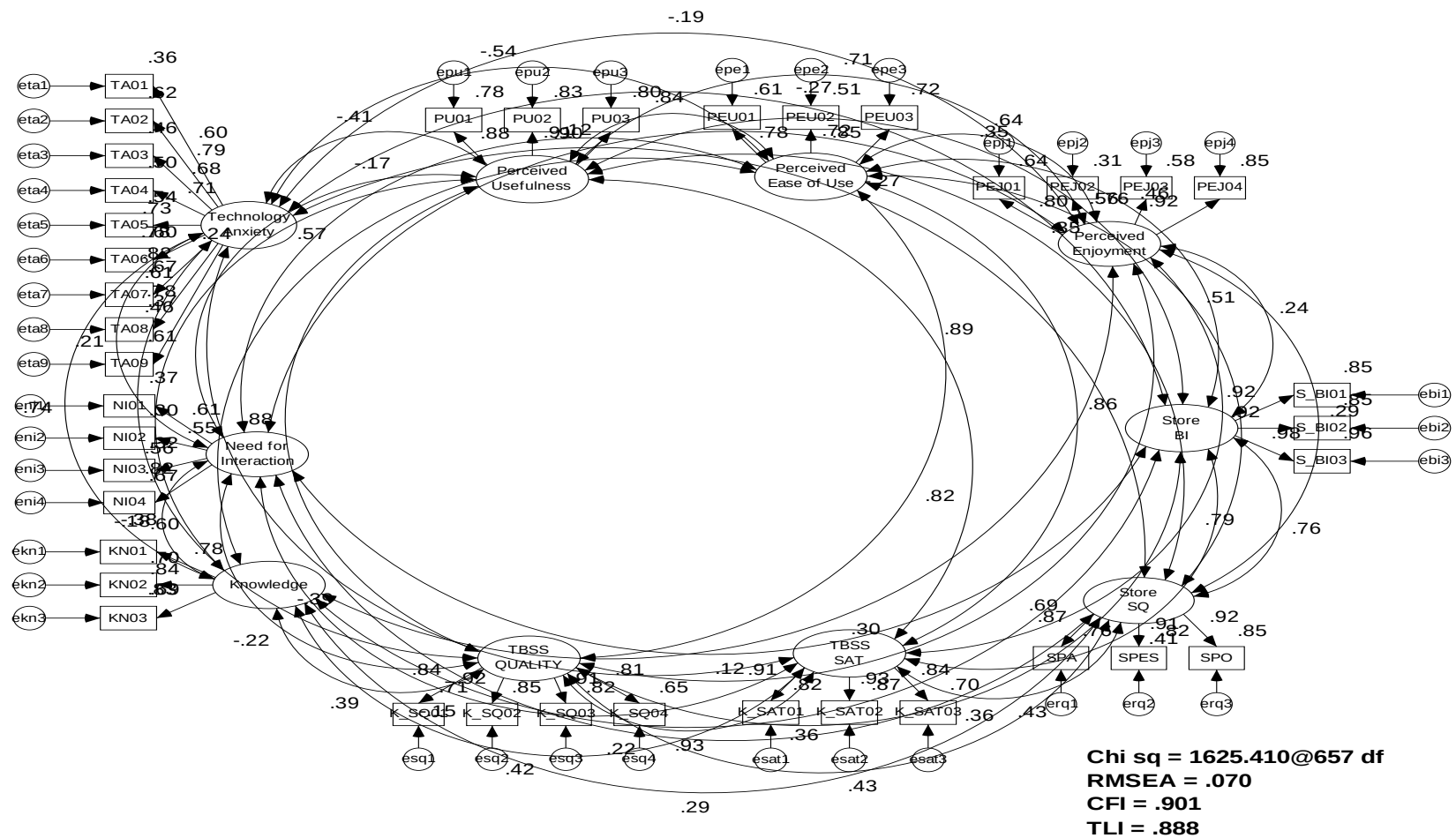


Figure 4-3. A Priori Model: Information Kiosk

Model Improvement

The overall fit of a priori model was first assessed based on multiple fit statistics. A priori model showed a marginally acceptable fit level. Thus, model revisions were needed to achieve better model fit. Various SEM outputs, such as standardized regression weights, squared multiple correlations, modification indices (MI), and standardized residuals were scrutinized for model improvements.

One item (“using the self-checkout/information kiosk is boring”) for perceived enjoyment exhibited low squared multiple correlations of below 0.30. This item also yielded low standardized regression weight less than 0.50. Furthermore, large standardized residuals greater than ± 2.58 were associated with other items used to measure the different latent construct. One item for technology anxiety (“I am confident I can learn technology-related skills”) was also problematic due to high levels of kurtosis of 4.46-5.22 and large standardized residuals of above ± 2.58 . Large standardized residuals greater than ± 2.58 were also found with two items for need for interaction (“it bothers me to use a machine when I could talk with a person instead” and “personal attention by the service employee is not very important to me”), indicating a lack of unidimensionality (Garver & Mentzer, 1999). Thus, these four items were excluded from the model. Next, modification indices (MI) were used as a guideline for model improvements. The value of modification indices represents the reduction in overall chi-square value if the coefficient were to be freely estimated (Byrne, 2001). Examination of modification indices revealed that three item pairs were highly correlated in terms of the error variances. After three correlations were added, the improved model fit was achieved (See Table 4-9).

Table 4-9. Model Modifications and Fit Indices

Model	CMIN	DF	CMIN/DF	CFI	TLI	RMSEA
A Priori Model (Congeneric)	1614.58 (1625.41)	657 (657)	2.457 (2.474)	0.903 (0.901)	0.891 (0.888)	0.070 (0.070)
Modification						
1. Drop PEJ02 based on low squared multiple correlations, low standardized path weights, and large standardized residuals 2. Drop TA04 based on high kurtosis and large standardized residuals 3. Drop NI02 and NI03 based on large standardized residuals						
Model 1	1249.04 (1283.17)	515 (515)	2.425 (2.492)	0.920 (0.916)	0.908 (0.903)	0.069 (0.071)
Modification → Correlate eta3 and eta8 based on large value of modification indices: M.I. = 51.45 (13.94)						
Model 2	1193.56 (1268.73)	514 (514)	2.322 (2.468)	0.926 (0.917)	0.915 (0.904)	0.066 (0.070)
Modification → Correlate epj1 and epj3 based on large value of modification indices: M.I. = 26.81 (36.76)						
Model 3	1133.15 (1214.24)	513 (513)	2.209 (2.367)	0.933 (0.923)	0.922 (0.911)	0.064 (0.068)
Modification → Correlate eta5 and eta7 based on large value of modification indices: M.I. = 21.55 (15.36)						
Final Model	1108.87 (1196.50)	512 (512)	2.166 (2.337)	0.935 (0.925)	0.925 (0.913)	0.062 (0.067)

Note. Values in parentheses indicate values for the information kiosk.

Measurement Model Evaluation

The final model consisted of 10 latent constructs with 34 observed variables (See Figure 4-4 and Figure 4-5). For self-checkout, the overall fit statistics met accepted standards: $\chi^2 (512) = 1108.87, p < 0.001$; $\chi^2/df = 2.17$; CFI = 0.94; TLI = 0.93; RMSEA = 0.06. The chi-square statistic was significant ($p < 0.001$), which is not unusual for most models with a sample size over 200 (Garver & Mentzer, 1999). The ratio of chi-square to degrees of freedom was in the acceptable range of 2 to 5. The values for CFI, TLI, and root mean square error of approximation (RMSEA) were close to the cutoff criteria for good fit (Hu & Bentler, 1999). Similar results were found for the overall fit of information kiosk: $\chi^2 (512) = 1196.50, p < 0.001$; $\chi^2/df = 2.34$; CFI = 0.93; TLI = 0.91; RMSEA = 0.07 (See Table 4-10). In both models, as presented in Table 4-11, all standardized path weights are significant ($p < .001$) and each item was uniquely loaded on the appropriate latent construct at least 0.56. Nearly all R^2 values were greater than or close to 0.50 and no large residuals among constructs were found. All Cronbach's alpha values and composite reliabilities were well above or close to 0.70. The AVEs for all constructs accounted for more than 0.50 of the total variance. Thus, construct unidimensionality and convergent validity were established for both models (Table 4-12).

Table 4-10. Final Measurement Model Fit Indices

Fit Indices	Self-Checkout	Information Kiosk
CMIN	1108.87	1196.50
DF	512	512
CMIN/DF	2.166	2.337
CFI	0.935	0.925
TLI	0.925	0.913
RMSEA	0.062	0.067

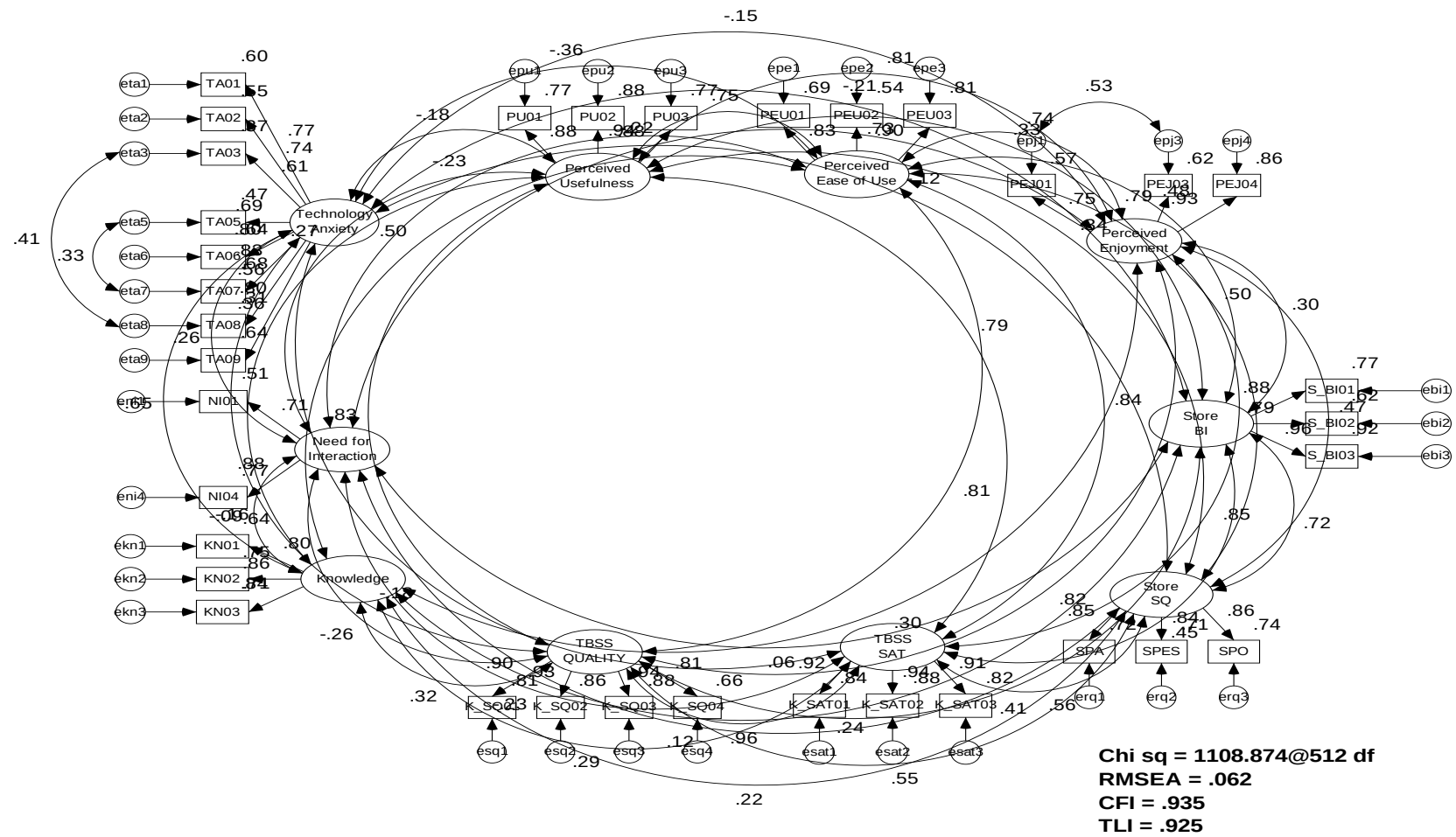


Figure 4-4. Final Measurement Model: Self-Checkout

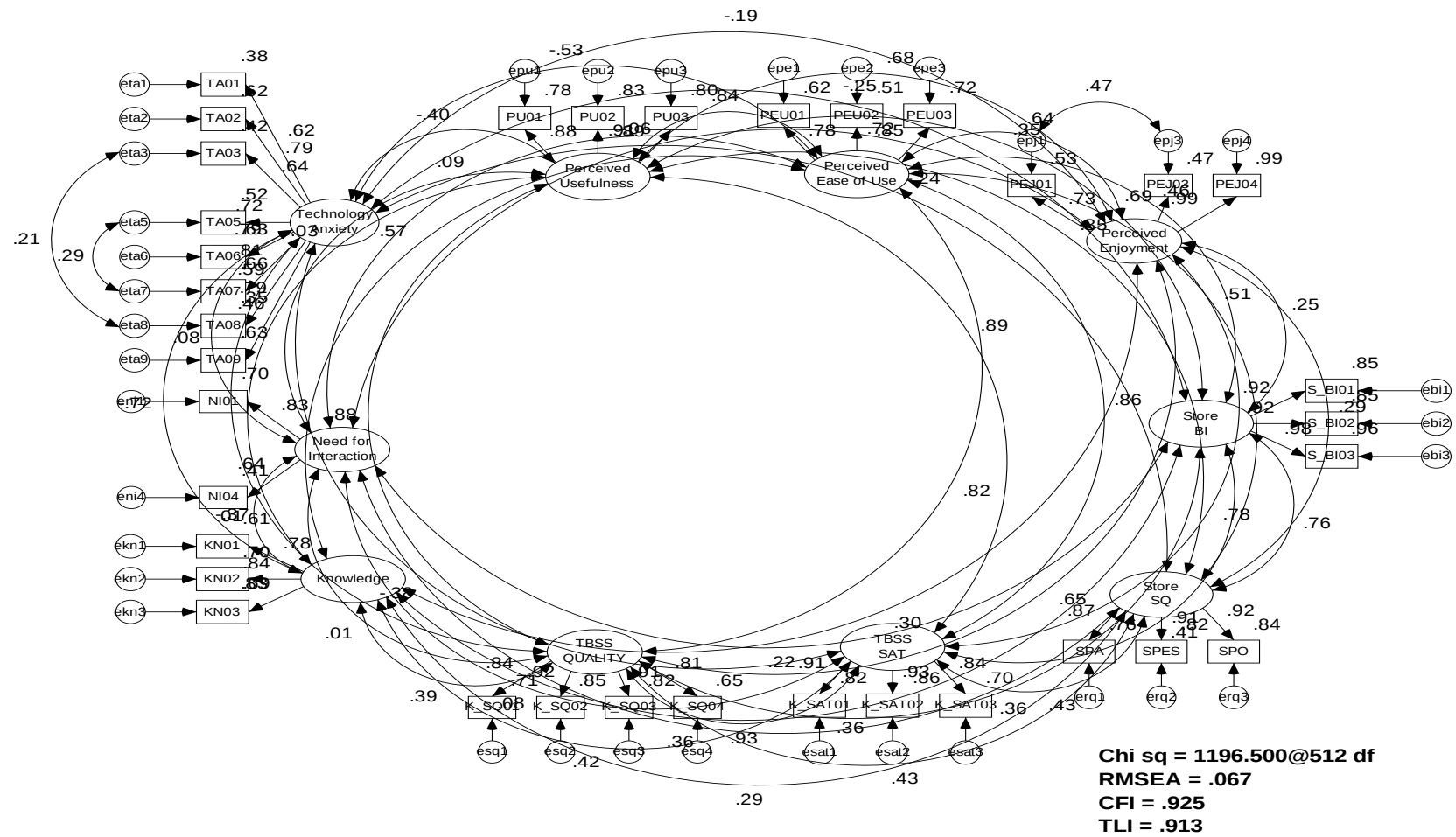


Figure 4-5. Final Measurement Model: Information Kiosk

Table 4-11. Measurement Model: Results of CFA

Path	Standardized Estimate		t-value	
	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk
Technology Anxiety → TA01	0.77	0.62	15.39***	11.44***
Technology Anxiety → TA02	0.74	0.79	14.59***	15.85***
Technology Anxiety → TA03	0.61	0.65	11.25***	12.02***
Technology Anxiety → TA05	0.69	0.72	12.96***	13.85***
Technology Anxiety → TA06	0.80	0.79	16.29***	15.95***
Technology Anxiety → TA07	0.83	0.82	16.98***	16.62***
Technology Anxiety → TA08	0.56	0.59	10.03***	10.69***
Technology Anxiety → TA09	0.80	0.79	16.25***	15.97***
Need for Interaction → NI01	0.71	0.83	10.59***	9.67***
Need for Interaction → NI04	0.88	0.64	12.23***	8.46***
Knowledge of SSTs → KN01	0.80	0.78	15.96***	15.23***
Knowledge of SSTs → KN02	0.86	0.84	17.87***	16.88***
Knowledge of SSTs → KN03	0.84	0.83	17.18***	16.69***
Perceived Usefulness → PU01	0.88	0.88	19.08***	19.29***
Perceived Usefulness → PU02	0.94	0.91	21.35***	20.31***
Perceived Usefulness → PU03	0.88	0.90	19.09***	19.67***
Perceived Ease of Use → PEU01	0.83	0.79	17.14***	15.67***
Perceived Ease of Use → PEU02	0.73	0.72	14.34***	13.76***
Perceived Ease of Use → PEU03	0.90	0.85	19.50***	17.49***
Perceived Enjoyment → PEJ01	0.76	0.73	14.85***	14.02***
Perceived Enjoyment → PEJ03	0.79	0.69	15.81***	13.11***
Perceived Enjoyment → PEJ04	0.93	0.99	20.17***	21.58***
TBSS Kiosk Service Quality → K_SQ01	0.90	0.84	19.95***	17.86***
TBSS Kiosk Service Quality → K_SQ02	0.93	0.92	21.06***	20.85***
TBSS Kiosk Service Quality → K_SQ03	0.94	0.91	21.60***	20.23***
TBSS Kiosk Service Quality → K_SQ04	0.81	0.81	17.03***	16.69***
Satisfaction with TBSS Kiosk → K_SAT01	0.92	0.91	20.67***	20.21***
Satisfaction with TBSS Kiosk → K_SAT02	0.94	0.93	21.49***	21.14***
Satisfaction with TBSS Kiosk → K_SAT03	0.91	0.84	20.23***	17.79***
Store Service Quality → SPA	0.85	0.87	17.61***	18.79***
Store Service Quality → SPES	0.84	0.91	17.52***	20.07***
Store Service Quality → SPO	0.86	0.92	18.07***	20.40***
Patronage Intention → S_BI01	0.88	0.92	18.92***	20.92***
Patronage Intention → S_BI02	0.79	0.92	16.04***	20.78***
Patronage Intention → S_BI03	0.96	0.98	21.92***	23.25***

*** Significant at $p < 0.001$.

Table 4-12. Measurement Model: Reliability and the Variance Extracted

Constructs	Cronbach's Alpha		Composite Reliability ^a		Variance Extracted ^b	
	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk
Technology Anxiety	0.902	0.897	0.900	0.897	0.534	0.525
Need for Interaction	0.770	0.698	0.778	0.710	0.640	0.555
Knowledge of SSTs	0.873	0.854	0.874	0.856	0.698	0.664
Perceived Usefulness	0.925	0.925	0.927	0.925	0.809	0.805
Perceived Ease of Use	0.861	0.820	0.863	0.826	0.678	0.614
Perceived Enjoyment	0.897	0.882	0.865	0.852	0.684	0.664
TBSS Kiosk Service Quality	0.939	0.925	0.942	0.926	0.802	0.758
Satisfaction with Using TBSS Kiosks	0.941	0.916	0.943	0.921	0.846	0.796
Store Service Quality	0.883	0.925	0.887	0.927	0.724	0.809
Patronage Intention toward a Store	0.888	0.956	0.910	0.958	0.772	0.885

Note. ^aComposite reliability = (Sum of standardized loading)²/(Sum of standardized loading)² + Sum of indicator measurement error

^bVariance extracted = Sum of squared standardized loadings/Sum of squared standardized loadings + Sum of indicator measurement error

For discriminant validity, this study used two tests suggested by Anderson and Gerbing (1988) and Fornell and Larcker (1981). First, as a stronger test of discriminant validity, this study evaluated whether the average variance extracted (AVE) by the underlying construct is larger than the shared variance (i.e., squared correlation coefficients) between all possible pairs of latent constructs (Fornell & Larcker, 1981). As presented in Table 4-13 and Table 4-14, several exceptions were found in both samples. In the self-checkout sample, satisfaction with using TBSS kiosks was highly correlated with perceived ease of use, perceived enjoyment, and TBSS kiosk service quality. In the information kiosk sample, perceived ease of use was highly correlated with perceived usefulness, TBSS kiosk service quality, and satisfaction with using TBSS kiosks; and TBSS kiosk service quality was highly correlated with perceived usefulness and satisfaction with using TBSS kiosks. These high correlations among constructs could violate discriminant validity. Based on this test, therefore, discriminant validity was achieved in a weak sense.

Second, this study examined the correlation confidence interval between two constructs (Anderson & Gerbing, 1988). All confidence intervals (± 2 standard error) around the correlation estimates between all possible pairs of constructs in the measurement model did not include 1.00 (See Appendix E). Thus, all constructs were considered to be distinctively different, possessing discriminant validity. Results of the measurement model can be found in Appendix E.

Table 4-13. Measurement Model: Discriminant Validity (Self-Checkout)

	Technology Anxiety	Need for Interaction	Knowledge of SSTs	Perceived Usefulness	Perceived Ease of Use	Perceived Enjoyment	TBSS Kiosk Service Quality	Satisfaction with Using TBSS Kiosks	Store Service Quality	Patronage Intention
Technology Anxiety	0.53									
Need for Interaction	0.07	0.64								
Knowledge of SSTs	0.43	0.01	0.70							
Perceived Usefulness	0.03	0.08	0.13	0.81						
Perceived Ease of Use	0.13	0.05	0.25	0.56	0.68					
Perceived Enjoyment	0.02	0.05	0.09	0.66	0.55	0.68				
TBSS Kiosk Service Quality	0.03	0.07	0.10	0.68	0.66	0.68	0.80			
Satisfaction with Using TBSS Kiosks	0.03	0.05	0.09	0.62	0.71	0.72	0.93	0.85		
Store Service Quality	0.02	0.01	0.05	0.12	0.25	0.22	0.30	0.31	0.72	
Patronage Intention	0.05	0.00	0.06	0.11	0.23	0.09	0.17	0.21	0.52	0.77

Note: Diagonal entries show the average variance extracted by the construct.

Off-diagonal entries represent the variance shared (squared correlation) between constructs.

Table 4-14. Measurement Model: Discriminant Validity (Information Kiosk)

	Technology Anxiety	Need for Interaction	Knowledge of SSTs	Perceived Usefulness	Perceived Ease of Use	Perceived Enjoyment	TBSS Kiosk Service Quality	Satisfaction with Using TBSS Kiosks	Store Service Quality	Patronage Intention
Technology Anxiety	0.53									
Need for Interaction	0.01	0.55								
Knowledge of SSTs	0.51	0.00	0.66							
Perceived Usefulness	0.16	0.00	0.21	0.80						
Perceived Ease of Use	0.28	0.01	0.33	0.71	0.61					
Perceived Enjoyment	0.04	0.00	0.09	0.46	0.41	0.66				
TBSS Kiosk Service Quality	0.13	0.00	0.16	0.77	0.68	0.42	0.76			
Satisfaction with Using TBSS Kiosks	0.15	0.01	0.18	0.79	0.75	0.61	0.86	0.80		
Store Service Quality	0.06	0.13	0.08	0.12	0.26	0.09	0.18	0.19	0.81	
Patronage Intention	0.06	0.05	0.13	0.12	0.21	0.06	0.13	0.16	0.58	0.88

Note: Diagonal entries show the average variance extracted by the construct. Off-diagonal entries represent the variance shared (squared correlation) between constructs.

STRUCTURAL MODEL

Once the measurement model was validated through CFA, the next step was to evaluate the overall fit of the structural model and examine the hypothesized relationships among constructs. All significant relationships between the constructs in the hypothesized direction will acknowledge nomological validity of a causal structure of the proposed model (Byrne, 2001). Thus, the structural model was constructed for each self-checkout and information kiosk sample. While fitting the structural models, the offending estimate was encountered. That is, the error variance for need for interaction (eni4) was estimated as negative, sometimes called Heywood cases, which is the most frequently occurring improper solutions when utilizing structural equation modeling (Bentler & Chou, 1987). One of the recommended approaches for dealing with negative error variance estimates is constraining the error variances to zero or a small positive number (Chen, Bollen, Paxton, Curran, & Kirby, 2001; Dillon, Kumar, & Mulani, 1987). Following this approach, the error variance for need for interaction was set to 0.005 in both models. After reestimating the models, acceptable model fit was obtained for each sample (Table 4-15). The structural model for each self-checkout and information kiosk dataset is presented in Figure 4-6 and Figure 4-7 and results of the structural model can be found in Appendix F.

Table 4-15. Structural Model Fit Indices

Fit Indices	Self-Checkout	Information Kiosk
CMIN	1314.68	1391.23
DF	544	544
CMIN/DF	2.417	2.557
CFI	0.917	0.907
TLI	0.909	0.899
RMSEA	0.069	0.072

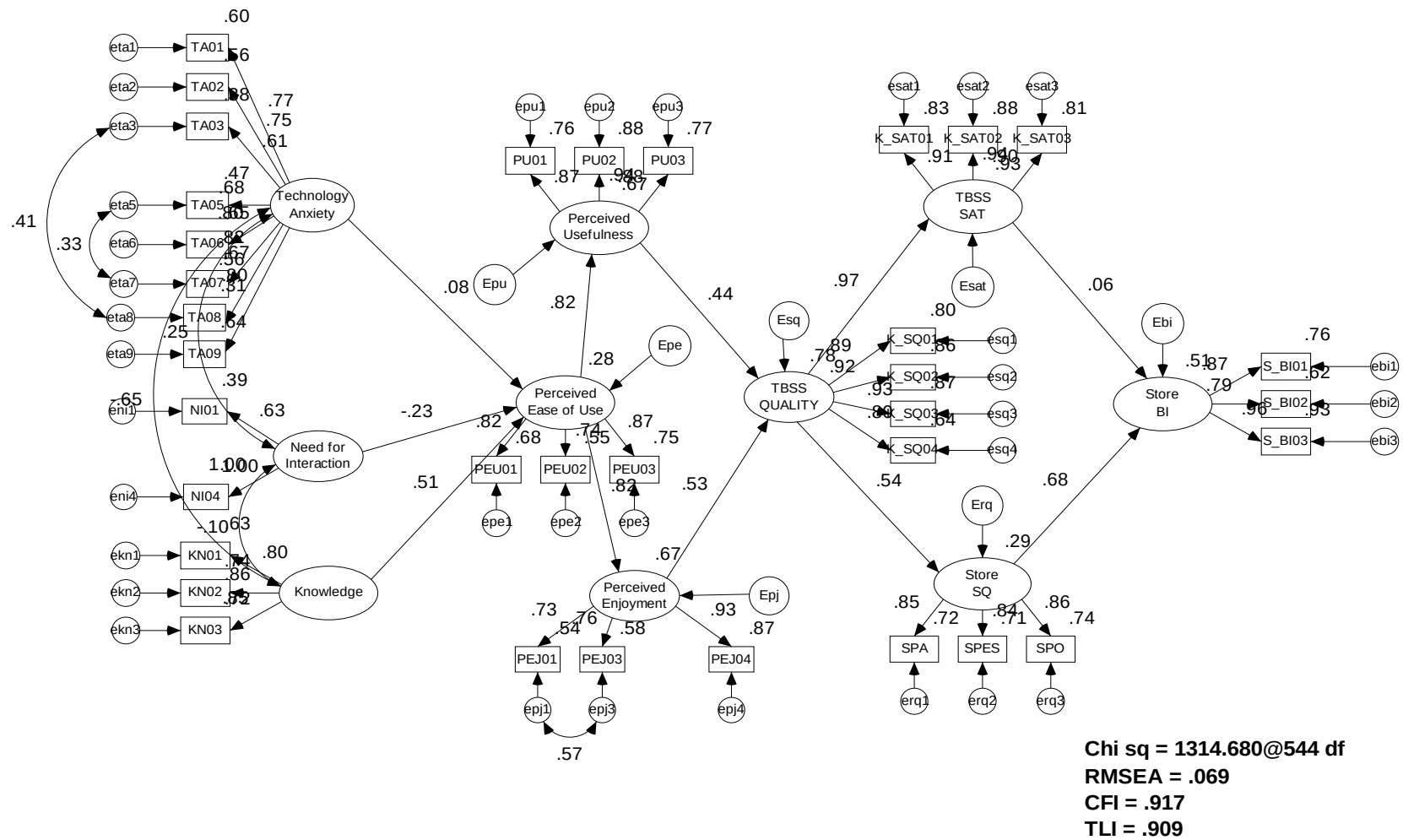


Figure 4-6. Structural Model: Self-Checkout

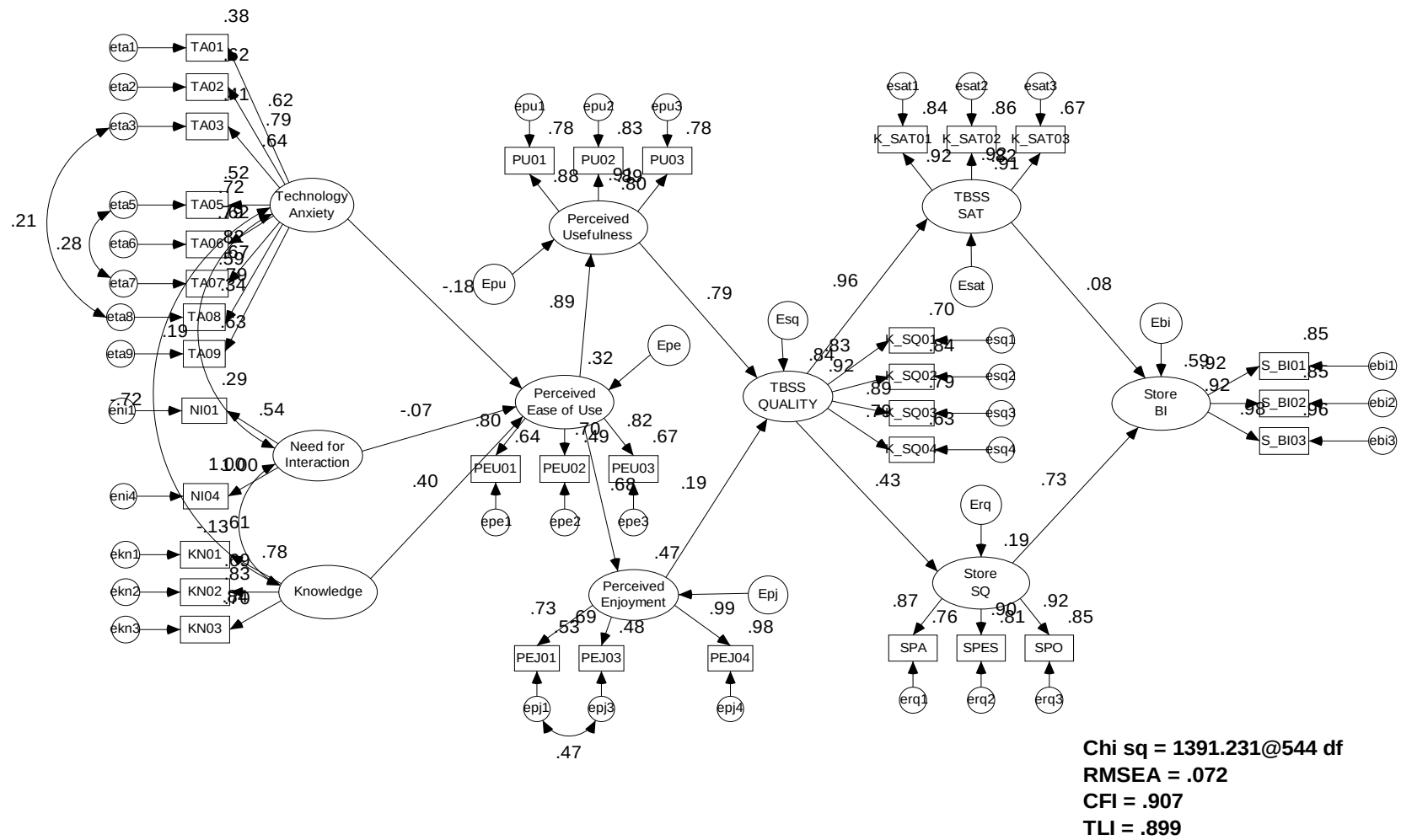


Figure 4-7. Structural Model: Information Kiosk

HYPOTHESIS TESTING

Hypothesis 1

Hypothesis 1 posited that a higher level of technology leads to a lower level of perceived ease of use. H1 was not supported for the self-checkout sample ($\gamma = 0.08, p = 0.35$), whereas the negative effect of technology anxiety on perceived ease of use was significant ($\gamma = -0.18, p < 0.05$). Thus, H1 was supported for the information kiosk sample.

Hypothesis 2

Hypothesis 2 proposed that need for interaction has a negative impact on perceived ease of use. H2 was supported by the significant negative effect of need for interaction on perceived ease of use ($\gamma = -0.23, p < 0.001$) for the self-checkout sample. However, this hypothesis did not hold for the information kiosk sample, in which no significant effect was detected ($\gamma = -0.07, p = 0.17$).

Hypothesis 3

Hypothesis 3 postulated that knowledge of self-service technologies (SSTs) positively influences perceived ease of use. Support for H3 was found for both self-checkout ($\gamma = 0.51, p < 0.001$) and information kiosk ($\gamma = 0.40, p < 0.001$) samples, with positive significant effect of knowledge of SSTs on perceived ease of use. The results of H1, H2, and H3 testing are summarized in Table 4-16.

Table 4-16. Results of H1, H2, & H3 Testing

Kiosk Type	H	Path	Standardized Estimate	C.R.	Result
Self-Checkout	H1	Technology Anxiety → Perceived Ease of Use	0.08	0.93	Not Supported
Information Kiosk			-0.18	-2.00*	Supported
Self-Checkout	H2	Need for Interaction → Perceived Ease of Use	-0.23	-3.97***	Supported
Information Kiosk			-0.07	-1.38	Not Supported
Self-Checkout	H3	Knowledge of SSTs → Perceived Ease of Use	0.51	5.94***	Supported
Information Kiosk			0.40	4.29***	Supported

*Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$.

Hypothesis 4 & Hypothesis 5

Perceived ease of use was hypothesized to positively influence perceived usefulness (H4) and perceived enjoyment (H5). The results indicated that perceived ease of use had the positive effect on perceived usefulness ($\beta = 0.82$, $p < 0.001$ for the self-checkout; $\beta = 0.89$, $p < 0.001$ for the information kiosk) and perceived enjoyment ($\beta = 0.82$, $p < 0.001$ for the self-checkout; $\beta = 0.68$, $p < 0.001$ for the information kiosk), supporting H4 and H5 for both samples.

Hypothesis 6

H6 hypothesized that perceived usefulness is positively related to TBSS kiosk service quality. From the results, it was verified that TBSS kiosk service quality increased with positive perceived usefulness ($\beta = 0.44$, $p < 0.001$ for the self-checkout; $\beta = 0.79$, $p < 0.001$ for the information kiosk), supporting H6 for both samples.

Table 4-17. Results of H4, H5, H6, & H7 Testing

Kiosk Type	H	Path	Standardized Estimate	C.R.	Result
Self-Checkout	H4	Perceived Ease of Use → Perceived Usefulness	0.82	14.71***	Supported
Information Kiosk			0.89	15.37***	Supported
Self-Checkout	H5	Perceived Ease of Use → Perceived Enjoyment	0.82	15.77***	Supported
Information Kiosk			0.68	12.43***	Supported
Self-Checkout	H6	Perceived Usefulness → TBSS Kiosk Service Quality	0.44	8.06***	Supported
Information Kiosk			0.79	13.60***	Supported
Self-Checkout	H7	Perceived Enjoyment → TBSS Kiosk Service Quality	0.53	9.07***	Supported
Information Kiosk			0.19	4.44***	Supported

*Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$.

Hypothesis 7

H7 stated that a higher level of perceived enjoyment leads to a higher level of TBSS kiosk service quality. H7 was supported by the significant positive effect of perceived enjoyment on TBSS kiosk service quality for both self-checkout ($\beta = 0.53$, $p < 0.001$) and information kiosk ($\beta = 0.19$, $p < 0.001$) samples. The results of H4, H5, H6, and H7 testing are summarized in Table 4-17.

Hypothesis 8 & Hypothesis 9

TBSS kiosk service quality was hypothesized to positively influence satisfaction with using TBSS kiosks (H8) and store service quality (H9). Support for H8 and H9 was found for both samples; TBSS kiosk service quality was positively related to satisfaction with using TBSS kiosks ($\beta = 0.97$, $p < 0.001$ for self-checkout; $\beta = 0.96$, $p < 0.001$ for information kiosk) and store service quality ($\beta = 0.54$, $p < 0.001$ for self-checkout; $\beta =$

0.43, $p < 0.001$ for information kiosk). The results of H8 and H9 testing are summarized in Table 4-18.

Hypothesis 10

H10 posited that satisfaction with using TBSS kiosks has a positive impact on patronage intention toward a retail store. However, this hypothesis was neither supported for self-checkout ($\beta = 0.06$, $p = 0.26$) nor information kiosk ($\beta = 0.08$, $p = 0.74$) samples.

Hypothesis 11

H11 stated that a higher level of store service quality leads to a higher level of patronage intention toward a retail store. The path from store service quality to patronage intention toward a retail store was positive and significant for both samples ($\beta = 0.68$, $p < 0.001$ for self-checkout; $\beta = 0.73$, $p < 0.001$ for information kiosk). Thus, H11 was supported for both samples. The results of H10 and H11 testing are summarized in Table 4-19.

Table 4-18. Results of H8 & H9 Testing

Kiosk Type	H	Path	Standardized Estimate	C.R.	Result
Self-Checkout	H8	TBSS Kiosk Service Quality → Satisfaction with Using TBSS Kiosks	0.97	18.24***	Supported
Information Kiosk			0.96	15.42***	Supported
Self-Checkout	H9	TBSS Kiosk Service Quality → Store Service Quality	0.54	8.83***	Supported
Information Kiosk			0.43	7.15***	Supported

*Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$.

Table 4-19. Results of H10 & H11 Testing

Kiosk Type	H	Path	Standardized Estimate	C.R.	Result
Self-Checkout	H10	Satisfaction with Using TBSS Kiosks → Patronage Intention toward a Retail Store	0.06	1.13	Not Supported
Information Kiosk			0.08	1.78	Not Supported
Self-Checkout	H11	Store Service Quality → Patronage Intention toward a Retail Store	0.68	10.18***	Supported
Information Kiosk			0.73	13.41***	Supported

*Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$.

Hypothesis 12 & Hypothesis 13

H12 and H13 were developed to identify differential effects of perceived usefulness and perceived enjoyment on TBSS kiosk service quality across the self-checkout and the information kiosk samples. To test these hypotheses, the nested models were constructed and compared based on chi-square difference. Then unstandardized coefficients of the paths were examined. Four nested models were followed: (1) the unconstrained model in which all structural paths were freely estimated; (2) the constrained model in which the path from perceived usefulness to TBSS kiosk service quality was set to be equal; (3) the constrained model in which the path from perceived enjoyment to TBSS kiosk service quality was set to be equal; and (4) the constrained model in which both paths from perceived usefulness to TBSS kiosk service quality and from perceived enjoyment to TBSS kiosk service quality were set to be equal. Significant deterioration in the fit of each constrained model was found ($p < 0.001$), indicating that the strengths of (1) the effect of perceived usefulness on TBSS kiosk service quality and (2) the effect of perceived enjoyment on TBSS kiosk service quality are structurally different between the two TBSS kiosk samples (See Table 4-20).

Table 4-20. Chi-Square Difference Test for H12 and H13

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Constrained Model 1 (PU → TBSS KSQ)	1	19.604	0.000	0.001	0.001	0.001	0.001
Constrained Model 2 (PEJ → TBSS KSQ)	1	17.053	0.000	0.001	0.001	0.001	0.001
Constrained Model 3 (PU → TBSS KSQ & PEJ → TBSS KSQ)	2	23.408	0.000	0.001	0.001	0.001	0.001

Next, the structural paths between the two TBSS kiosks were compared on the basis of unstandardized regression weights (Chelminski & Coulter, 2007). Contrary to expectations, counter hypothesized results emerged. The effect of perceived usefulness on TBSS kiosk service quality for the information kiosk sample (unstandardized estimate of 0.40, $p < 0.001$) was greater than for the self-checkout sample (unstandardized estimate of 0.78, $p < 0.001$). In addition, the effect of perceived enjoyment on TBSS kiosk service quality for the self-checkout sample (unstandardized estimate of 0.48, $p < 0.001$) was greater than for the information kiosk sample (unstandardized estimate of 0.16, $p < 0.001$). Thus, H12 and H13 were not supported. The results of H12 and H13 testing are summarized in Table 4-21. Figure 4-8 (self-checkout) and Figure 4-9 (information kiosk) summarize the results of hypotheses tested.

TESTING FOR STRUCTURAL INVARIANCE ACROSS THE TBSS KIOSKS

To identify the structural invariance across the self-checkout and information kiosk samples, the invariance of the 11 structural paths was tested. To test the invariance of all the paths simultaneously, a multiple-group analysis using AMOS 6.0 was employed. Two nested models were constructed: (1) the unconstrained model in which all the

Table 4-21. Results of H12 & H13 Testing

Hypothesis	Unstandardized Estimate		Standardized Estimate		χ^2 Test	Result
	Self-Checkout	Information Kiosk	Self-Checkout	Information Kiosk		
H12: The effect of perceived usefulness on TBSS kiosk service quality will be greater in a self-checkout than in an information kiosk	0.40***	0.78***	0.44***	0.79***	19.60	Not Supported
H13: The effect of perceived enjoyment on TBSS kiosk service quality will be greater in an information kiosk than in a self-checkout	0.48***	0.16***	0.53***	0.19***	17.05	Not Supported

*Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$.

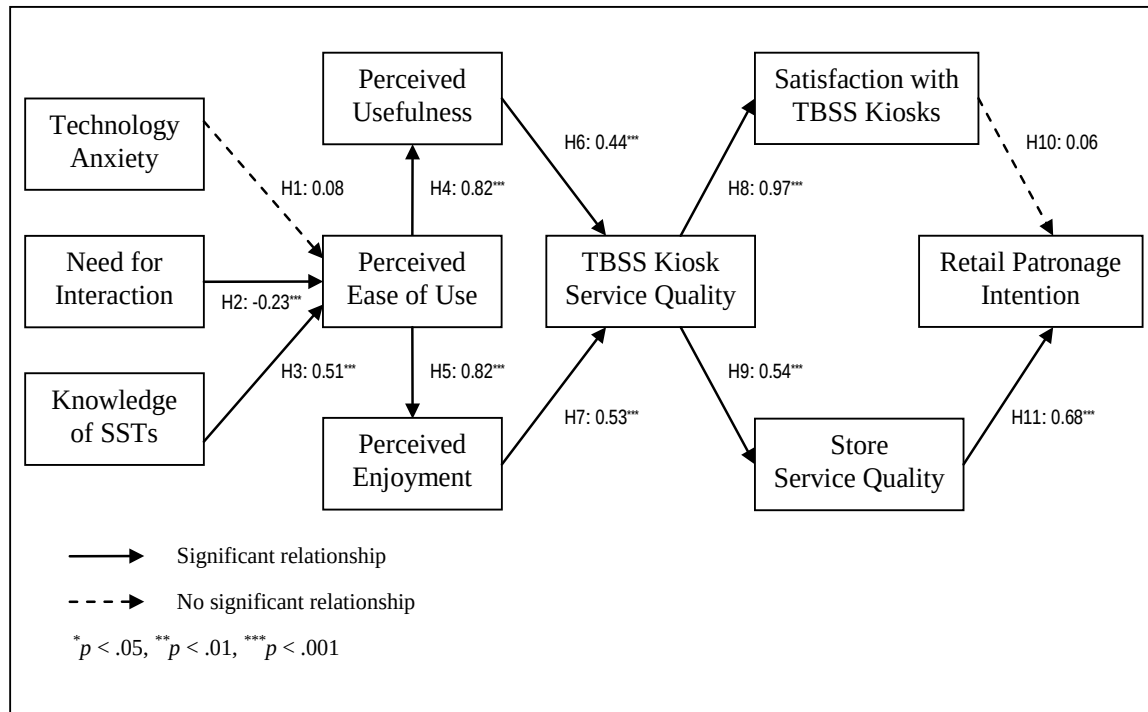


Figure 4-8. Results of Hypotheses Tested: Self-Checkout

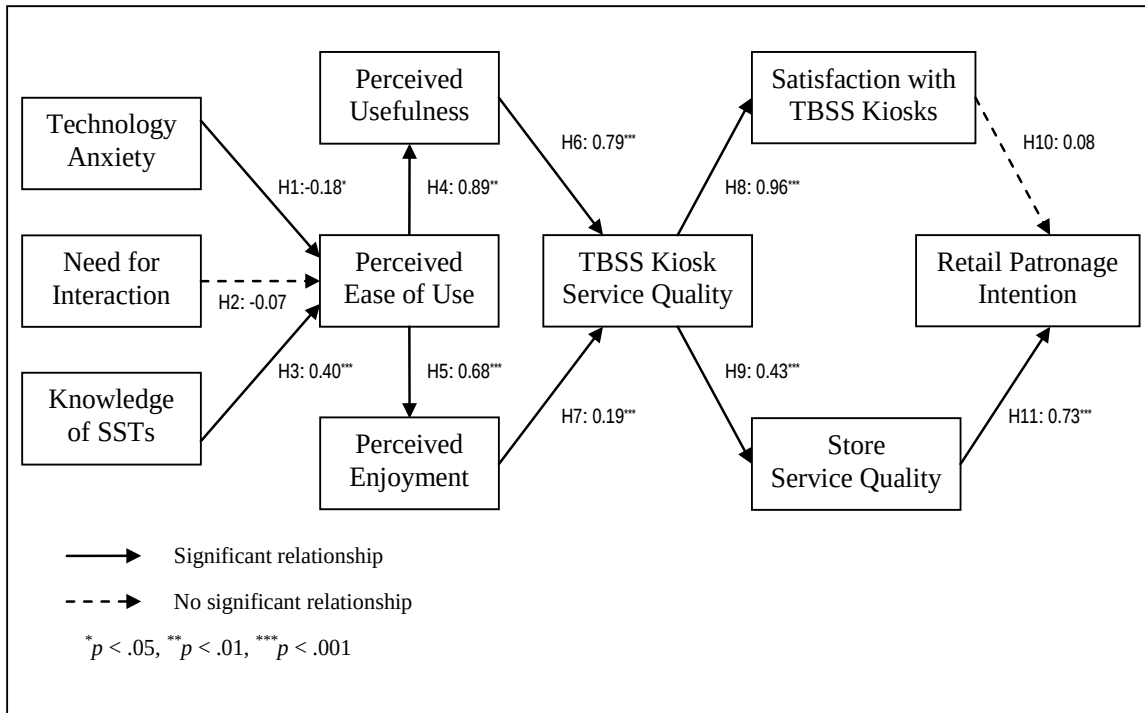


Figure 4-9. Results of Hypotheses Tested: Information Kiosk

structural paths were freely estimated; and (2) the constrained model in which all the structural paths were specified to be constant across the two TBSS kiosk samples. Then, whether the structural invariance exists was determined by results of the chi-square difference test and model fit indices (e.g., CFI and RMSEA). The chi-square difference ($\Delta\chi^2 = 40.145$, $p < 0.001$) was significant, suggesting there is no invariant pattern of structural paths. However, when the constrained model was compared with the unconstrained model based on model fit indices, only a slight difference was detected (See Table 4-22).

To evaluate the structural invariance further, the invariance of each structural path was tested separately. In each test, the constrained model in which only one path was fixed to be constant was compared with the unconstrained model in which no paths were

fixed to be constant. Then, each chi-square difference was examined. The results of the model comparison indicated that eight of the 11 paths were invariant across TBSS kiosks (See Table 4-23 and Figure 4-10).

Table 4-22. Model Fit Indices of the Nested Models

Model	NPAR	CMIN	DF	P	CMIN/DF	CFI	RMSEA
Unconstrained Model	172	2705.910	1088	0.000	2.487	0.912	0.050
Constrained Model	161	2746.056	1099	0.000	2.499	0.910	0.050

Table 4-23. Chi-Square Difference Test for Each Structural Path

Structural Path	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Technology Anxiety → Perceived Ease of Use	1	3.831	0.050	0.000	0.000	0.000	0.000
Need for Interaction → Perceived Ease of Use	1	6.158	0.013	0.000	0.000	0.000	0.000
Knowledge of SSTs → Perceived Ease of Use	1	3.727	0.054	0.000	0.000	0.000	0.000
Perceived Ease of Use → Perceived Usefulness	1	3.480	0.062	0.000	0.000	0.000	0.000
Perceived Ease of Use → Perceived Enjoyment	1	0.131	0.717	0.000	0.000	0.000	0.000
Perceived Usefulness → TBSS Kiosk Service Quality	1	19.604	0.000	0.001	0.001	0.001	0.001
Perceived Enjoyment → TBSS Kiosk Service Quality	1	17.053	0.000	0.001	0.001	0.001	0.001
TBSS Kiosk Service Quality → Satisfaction	1	1.667	0.197	0.000	0.000	0.000	0.000
TBSS Kiosk Service Quality → Store Service Quality	1	0.001	0.971	0.000	0.000	0.000	0.000
Satisfaction with Using TBSS Kiosks → Patronage Intention	1	0.401	0.526	0.000	0.000	0.000	0.000
Store Service Quality → Patronage Intention	1	0.890	0.346	0.000	0.000	0.000	0.000

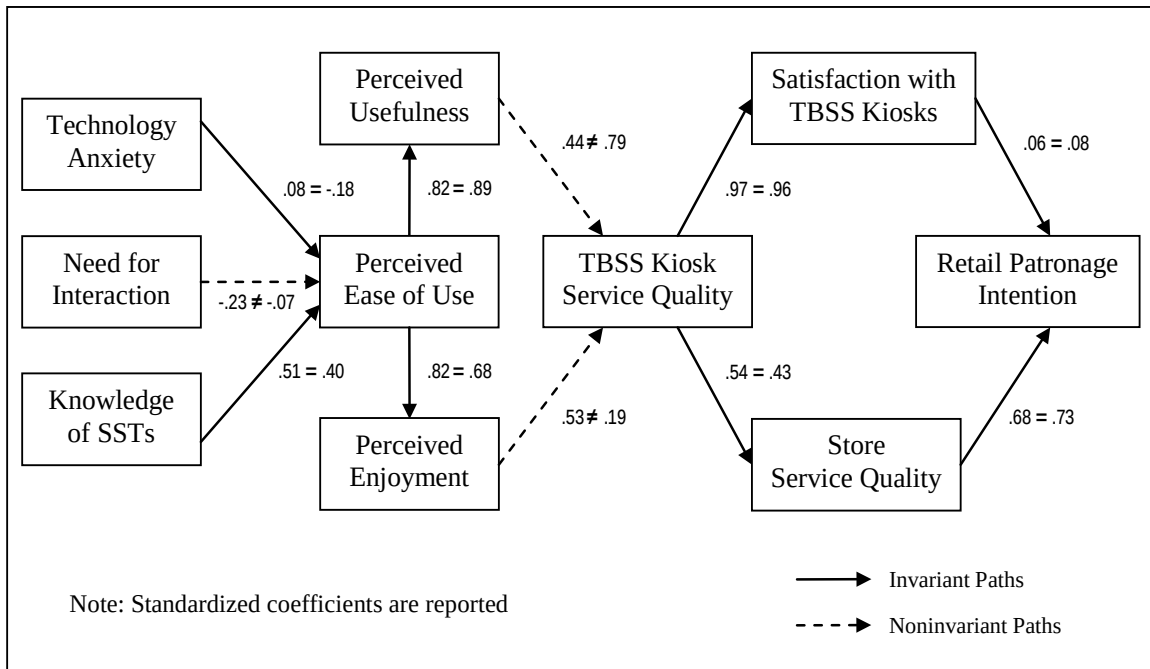


Figure 4-10. Hypothesized Relationships: Structural Invariance Results

CHAPTER 5 - DISCUSSION AND IMPLICATION

This chapter provides a discussion of the statistical findings regarding the research model and hypotheses tested. Contributions of this study from both theoretical and managerial perspectives are then discussed. The chapter concludes with the limitations of this study and suggestions for future research.

DISCUSSION OF FINDINGS

This study was designed to investigate the role of technology-based self-service (TBSS) kiosks, as an additional channel for customer service, within a retail store setting. The main purpose of this study was to empirically examine the interrelationships that exist between the constructs of interest pertaining to TBSS kiosks. To this end, one research question and 13 research hypotheses were developed and tested. The findings from testing the research model are discussed in greater depth in the following section.

Research Model

Conceptually guided by the extant literature on service quality, satisfaction, and retail patronage behavior and the technology acceptance model (TAM), the research model was constructed for testing the hypothesized relationships among the individual, cognitive, and affective factors, relevant to self-service technologies, and retail store patronage. Prior to fitting the measurement model for the whole research model, the second-order measurement model was first developed to evaluate store service quality as a hierarchical factor structure, capturing the dimensions of store service quality. However,

this study failed to find five distinct dimensions (i.e., physical aspects, reliability, personal interaction, problem solving, and policy) suggested by Dabholkar et al. (1996); a clear distinction among the reliability, personal interaction, and problem solving dimensions were not supported for this study. By combining these dimensions, this study reconstructed the second-order measurement model consisting of three first-order factors. The second-order measurement model achieved acceptable fit for both samples. Overall, the measurement model was proven to be valid and fitted the data well for both self-checkout and information kiosk samples. Reliability and convergent validity met accepted standards. However, discriminant validity among constructs was marginally satisfied due to a number of high correlations among constructs (i.e., TBSS kiosk service quality – satisfaction with using TBSS kiosks and perceived ease of use – satisfaction with using TBSS kiosks).

The suggested structural model also exhibited sufficient fit for both samples. Most of the causal relationships were significant in the hypothesized direction, which grants nomological validity of a causal structure of the research model. Both the measurement and structural models had a better fit with the data from the self-checkout as compared to their performance within the information kiosk context. A discussion of findings from each hypothesis testing is followed.

Individual Characteristics Associated with Evaluations of TBSS Kiosks

Even though self-service technologies have become prevalent in retail markets, not all consumers feel comfortable with the technological applications. Adoption of technology-based products or services is known to be greatly influenced by consumers'

demographic, socioeconomic, and personal characteristics (Hirunyawipada & Paswan, 2006; Im, Bayus, & Mason, 2003). In this study, three individual characteristics including technology anxiety, need for interaction, and knowledge of self-service technologies (SSTs) were hypothesized to positively or negatively affect consumers' perception of ease of using TBSS kiosks. The negative effect of technology anxiety on perceived ease of use was presumed in hypothesis 1. For this hypothesis, mixed results were found. H1 was supported for the information kiosk sample, but not for the self-checkout sample. The negative relationship that technology anxiety has with perceived ease of use for the information kiosk sample supports the previous finding that technology anxiety led to a reduced perception of one's ability to use this self-service technology (Meuter et al., 2005). However, interestingly, technology anxiety was not a significant predictor affecting perceived ease of use for the self-checkout sample. One reason might be that consumers have become more comfortable with using self-checkouts, as self-checkout systems' penetration of the grocery, DIY, and discount marketplace has reached a threshold level of acceptance. Another reason might be retailers' significant effort to install more user-friendly self-checkout systems, by utilizing an advanced graphical user interface (GUI) and touch screen technology to cater to consumers with a greater level of technology anxiety. This might reduce the effect of technology anxiety on perceived ease of use.

Hypothesis 2 was postulated to examine whether need for interaction was negatively related to perceived ease of use. Similar to hypothesis 1, mixed results were obtained. H2 was supported for the self-checkout sample, but not for the information kiosk sample. Need for interaction is a significant determinant of perceived ease of use

for the self-checkout sample. This supports Meuter et al.'s (2005) finding that need for interaction decreased consumers' perceived ability of how self-service technologies work. However, for the information kiosk sample, the role of need for interaction as an influence on perceived ease of use was not supported by this study. Curran and Meuter (2005) also failed to find a significant impact of need for interaction on attitude toward banking technologies.

Knowledge of self-service technologies (SSTs) was tested as to whether it is positively related to perceived ease of use. Findings from this hypothesis (H3) indicate that TBSS kiosks tend to be perceived as much more easy to use, as consumers gain more knowledge of SSTs. This was true for both samples. Consumers who are very familiar with or knowledgeable about SSTs, such as automated airline ticketing, ATM, or Internet shopping, tend to easily develop inference of how TBSS kiosks will work with their internal knowledge, which allows them to perceive TBSS kiosks as easy to use. The effect of knowledge of SSTs on perceived ease of use was much stronger statistically than those of technology anxiety and need for interaction on perceived ease of use. It appears that a consumer's knowledge of SSTs is a critical factor in determining perceived ease of using TBSS kiosks.

Three Determinants of TBSS Kiosk Service Quality

Three consumers' cognitive beliefs (perceived usefulness, perceived ease of use, and perceived enjoyment) are theorized as determinants of TBSS kiosk service quality for this study. Hypotheses 4 through 5 were constructed to investigate the relationships among perceived ease of use, perceived usefulness, and perceived enjoyment. H4 was

supported for both samples, reflecting that perceived ease of use positively influences perceived usefulness. When a consumer believes that using TBSS kiosks is clear and understandable, then the consumer might view using TBSS kiosks as also being useful. H5 was also supported for both samples. Perceived ease of use also positively influences perceived enjoyment. Likewise, when a consumer believes that using TBSS kiosks does not require a lot of mental effort, then the consumer might consider using TBSS kiosks as also being enjoyable. This clearly demonstrates Childers et al.'s (2001) assertion that perceived ease of use is the process for achieving a particular outcome, whereas perceived usefulness and perceived enjoyment relate to the outcome that exists at the end of usage experience.

This study also tested the roles of perceived usefulness and perceived enjoyment as significant determinants of TBSS kiosk service quality. These two hypotheses (H6 and H7) were supported for both samples. Increases in perceived usefulness and perceived enjoyment are likely to enhance consumers' evaluation of TBSS kiosks service quality. Perceived ease of use was assumed to indirectly influence TBSS kiosk service quality through perceived usefulness and perceived enjoyment. The high standardized indirect effect of perceived ease of use on TBSS kiosk service quality verified that perceived ease of use is also a significant determinant of TBSS kiosk service quality. The findings suggest that there are multiple determinants of TBSS kiosk service quality that must be considered simultaneously when improving TBSS kiosk service quality.

The Role of TBSS Kiosks for Retail Patronage Behavior

Hypotheses 8 through 11 were constructed for investigating the role of TBSS kiosks in increasing retail store patronage. This study expected that TBSS kiosks contribute to retail store patronage in two ways. First, evaluation of TBSS kiosk service quality positively influences patronage intention toward a retail store through satisfaction with using TBSS kiosks. Second, evaluation of TBSS kiosk service quality positively influences patronage intention toward a retail store through store service quality. As hypothesized, TBSS kiosk service quality appears to positively influence satisfaction with using TBSS kiosks. It seems that the more positive consumers' evaluations of TBSS kiosk service quality, the greater their satisfaction with using TBSS kiosks. This finding supports previous research suggesting that satisfaction is derived from service quality (e.g., Sivadas & Baker-Prewitt, 2000; Spreng & Mackoy, 1996).

However, surprisingly, no empirical evidence for the existence of a positive causal link between satisfaction with using TBSS kiosks and patronage intention toward a retail store was found in both samples. It seems in this study that retail patronage intention is not explained by satisfaction with using TBSS kiosks. Even though a consumer is satisfied with using TBSS kiosks in a store, the consumer is not likely to patronage the store more frequently. This is not consistent with the finding from a previous study in which satisfaction with using TBSS kiosks positively influences the repatronage intention to the store (Marzocchi & Zammit, 2006). This finding would be daunting for retailers who have made an endeavor to increase customer satisfaction with TBSS kiosks for retail patronage and, ultimately, retail profitability. One possible explanation might be that satisfaction with using TBSS kiosks indirectly influences patronage intention toward a

retail store through other variables such as store service quality or opinions toward a store than directly influencing retail patronage intention. Another explanation might be that satisfaction with using TBSS kiosks is not the only crucial determinant in forming patronage intention toward a retail store.

TBSS kiosk service quality appears to positively influence store service quality for both samples. A retail store offering TBSS kiosks provides consumers added benefits, such as saving time via faster checkout process, allowing greater privacy and control, and providing more choice, which ultimately improve customer service (Dabholkar, 1996; Meuter et al., 2000; NCR, 2003). Thus, the more positive consumers' evaluation of TBSS kiosk service quality, the more positive their evaluation of store service quality. Next, favorable evaluation of store service quality also led to increased patronage intention toward a retail store. Accordingly, the results affirm that TBSS kiosk usage contributes considerably to retail store patronage through store service quality. This substantiates that retail store patronage is driven, in part, by TBSS kiosk usage, indicating the supportive role of TBSS kiosks in a retail store.

Structural Invariance across Two TBSS Kiosks

One of the research objectives was to investigate whether the hypothesized relationships in the model is similar or dissimilar across two TBSS kiosks. Specifically, two causal links between perceived usefulness and TBSS kiosk service quality, and perceived enjoyment and TBSS kiosk service quality were presumed as being variant, while the remaining links as being invariant across two TBSS kiosks. The result of the invariance test indicated that structural paths were not considerably different based on a

comparison of model fit indices, even though chi-square difference was significant. Further analysis of testing the invariance of each path revealed that only three of the 11 paths were dissimilar across two TBSS kiosks. Contrary to what was hypothesized, perceived usefulness had a greater explanatory power of TBSS kiosk service quality for the information kiosk sample than for the self-checkout sample. Likewise, perceived enjoyment had a greater explanatory power of TBSS kiosk service quality for the self-checkout sample than for the information kiosk sample.

It is also interesting to note that the effect of perceived enjoyment was greater than that of perceived usefulness for the self-checkout sample, whereas the effect of perceived usefulness was greater than that of perceived enjoyment for the information kiosk sample. In Davis et al.'s (1992) study which is the first study to examine effects of both extrinsic (i.e., perceived usefulness) and intrinsic (i.e., perceived enjoyment) motivation in determining people's intentions to use computers in workplace, perceived usefulness was a more influential factor than perceived enjoyment in determining intentions. However, for the self-checkout sample, perceived enjoyment appears to have the largest impact on TBSS kiosk service quality. It seems that consumers use a self-checkout primarily because it gives them a feeling of enjoyment and pleasure. Thus, evaluations of TBSS kiosk service quality might be driven by perceived enjoyment, to a greater extent. On the other hand, for the information kiosk sample, perceived usefulness appears to have the largest impact on TBSS kiosk service quality. By the same token, it seems that consumers use an information kiosk mainly due to its usefulness for their shopping performance. As a result, perceived usefulness might play a greater role in determining TBSS kiosk service quality. However, one should be cautious in generalizing

this finding because variations in design features of TBSS kiosks may cause this mixed result. If this is true, another research design such as an experimental design, rather than a survey design, should be employed so as not to lose control and thus to enhance interval validity.

CONTRIBUTIONS OF THE STUDY

This study made significant contributions by extending current theoretical and empirical knowledge on TBSS kiosks in retailing and providing managerial implications. In the following section, theoretical contributions and managerial implications are discussed.

Theoretical Contributions

This study contributes to theoretical understanding of TBSS kiosks in retail stores. Since TBSS kiosks are becoming more common in the retail marketplace, including not only grocery stores but also discount, do-it-yourself, big box specialty, and department stores (NCR, 2003), a more comprehensive understanding of TBSS kiosks in retail stores was needed. The proposed model in which TBSS kiosk service quality is the focal construct investigated a variety of factors relevant to TBSS kiosks such as individual characteristics that affect determinants of TBSS kiosk service quality, key determinants of TBSS kiosk service quality, and the consequences of TBSS kiosk service quality by integrating previous theoretical and empirical knowledge of TBSS kiosks in retailing. Since this study was designed to focus on TBSS kiosks in retail stores, the domain-specific individual characteristics including technology anxiety, need for interaction, and

knowledge of SSTs were examined, which yielded more meaningful, specific, and richer descriptions. The significant impacts of three cognitive beliefs – perceived usefulness, perceived ease of use, and perceived enjoyment – on TBSS kiosk service quality were identified, providing evidence supporting their roles as the key determinants of TBSS kiosk service quality. This finding was similar to previous studies which examined these beliefs as determinants of attitudes or intentions to use computers. Thus, this study provides additional support for importance of the three attributes (i.e., how useful, how easy to use, and how enjoyable it is to use TBSS kiosks) to consumers in using technology-based services.

Compared to previous studies that were limited to research on consumer acceptance or trial of such forms of service delivery, this study addressed formerly unexplored aspects of how TBSS kiosks contribute to patronage to a retail store. Given that most U.S. consumers have used a self-checkout system at least once, it is useful to explore how TBSS kiosk usage influences consumer experience and, ultimately, retail store patronage. The results from this study demonstrated the supportive role of TBSS kiosk service quality for retail stores by empirically proving that delivering quality service through TBSS kiosks increased store service quality, which eventually resulted in retail store patronage. Furthermore, research findings supported the entire model. Thus, validity of the proposed model was granted.

Compared to previous studies which were mostly conducted in a self-checkout context, this study tested the model related to two TBSS kiosks (i.e., self-checkouts and information kiosks) and investigated whether the proposed relationships are similar or dissimilar across two TBSS kiosks. Even though the overall pattern of the relationships

was found to be quite similar across two TBSS kiosk settings through the invariance test, one should pay attention to some differences with regard to the effects of need for interaction, perceived usefulness, and perceived enjoyment between the self-checkout and the information kiosk samples. A comparison of the results of the model provides a useful guideline on further conceptual work for a differentiated model related to each of the two TBSS kiosks.

Managerial Implications

This study also provides managerial implications for retailers. It would be risky for retailers to determine the installation of a TBSS kiosk in their stores because it needs the complex integration with a store's system and costs about 10% more than comparable cashier-manned checkout lanes, although it lowers operational costs (Porjes, 2006). The results from this study help retailers make sure it would work under certain circumstances before starting to deploy TBSS kiosks and implement successful strategies which facilitate TBSS kiosks to improve customer service.

Understanding individual differences that varied in technology anxiety, need for interaction, and knowledge of SSTs could help retailers to better assess their impact on consumers' evaluations of TBSS kiosks and build more efficient and tailored strategies. The negative relationship technology anxiety has with perceived ease of use for the information kiosk sample suggests that retailers should pay careful attention to its impact on perceived ease of use. If retailers target a consumer group who is likely to be high in technology anxiety, the retailers should ensure that a level of technology anxiety is reduced to the extent to which the negative effect of technology anxiety becomes invalid.

Retailers could educate and train, for example, those consumers with high technology anxiety through in-store and self-running demonstrations, which may encourage those consumers to approach the TBSS kiosk. More detailed and varied communication methods such as audio instructions and animations (NCR, 2003) could be also used for consumers who feel apprehensive about using technology.

The finding that need for interaction has a negative relationship with perceived ease of use for the self-checkout sample suggests that help or personal attention from a store employee is still important although TBSS kiosks minimize store employee involvement. If retailers' target consumers prefer interacting with a store employee, the retailers should emphasize the availability of personalized service and immediate help from a store employee for consumers with problems when using a TBSS kiosk. Interaction with a friendly and courteous store employee assigned to a TBSS kiosk may increase perceived ease of using TBSS kiosks.

Knowledge of SSTs was also found to be an important individual characteristic in technology-based self-service environments. Consumers who are very familiar with and highly knowledgeable about related SSTs may be an attractive target segment for retailers who have adopted TBSS kiosks. They may use a TBSS kiosk well without any support from a store employee, instructions, or demonstration. On the other hand, consumers who are low in knowledge of SSTs may need help from a store employee to use a TBSS kiosk. Depending upon a level of knowledge of SSTs, retailers could implement differentiated strategies in introducing, targeting, and positioning a TBSS kiosk, after understanding what would potentially be the most effective.

Perceived usefulness, perceived ease of use, and perceived enjoyment were

revealed as key determinants of TBSS kiosk service quality in this study. Retailers should focus on all these three aspects of TBSS kiosks concurrently as a means of increasing TBSS kiosk service quality. First, insufficient perceived ease of use can undermine both perceived usefulness and perceived enjoyment. Thus, a retailer should make progress toward understanding how to make TBSS kiosks easier to use. For example, retailers should design user-friendly TBSS kiosks by using a virtual assistant such as pseudo or photo-realistic 3D images that answer common questions about TBSS kiosks (Maguire, 1999; NCR, 2003). For self-checkouts, specifically, using photos for non-barcoded items such as produce may be useful to make self-checkouts easier to use. Providing help information which is accessible throughout TBSS kiosks can be another solution for boosting perceived ease of use.

Even though both perceived usefulness and perceived enjoyment were influential in determining TBSS kiosk service quality for the two TBSS kiosks, the results from this study offer new insights to retailers as to how a consumer's evaluation criteria differ by TBSS kiosk types. For the self-checkout, perceived enjoyment was found to be a more important determinant of TBSS kiosk service quality. Thus, grocery retailers or others who have used self-checkout systems should emphasize hedonic and fun aspects of using a self-checkout. Given the importance of perceived enjoyment to self-checkout consumers, self-checkout design could incorporate a more appealing look and feel, for example with colors, images and graphics for produce.

For the information kiosk, perceived usefulness appeared to be more influential than perceived enjoyment as a determinant of TBSS kiosk service quality. Thus, retailers who have used information kiosks, such as department stores and book stores, should

heavily promote the usefulness of using information kiosks by highlighting how information kiosks can improve shopping productivity. Since information kiosks are generally used as a tool of providing information, the information offered should help consumers make a more informed purchase decision, find products, and save time while shopping. For example, an information kiosk displaying a store layout can help consumers easily locate the product categories they are looking for and a recipe-based kiosk can provide meal ideas, recipes, and instructions and guide consumers around the store to appropriate ingredients (Porjes, 2006), which help consumers be more effective in shopping. Thus, retailers should stress how an information kiosk can be useful in improving shopping ability.

Finally, TBSS kiosk service quality was found to indirectly influence retail store patronage through store service quality. For consumers, a service offered by TBSS kiosks seems to be viewed as a part of the total customer service from a retail store, not to be seen in isolation. Thus, retailers should not be satisfied with the mere introduction of TBSS kiosks. Rather, retailers should make an endeavor to increase TBSS kiosk service quality, which ultimately generates more retail store patronage.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

There are some limitations that must be taken into consideration. First, a possible concern is the various types of information kiosks available in the current retail market. Compared to information kiosks, self-checkouts are quite standardized in the range of functions. In a typical self-checkout, a consumer unloads the products, scans the

product's Universal Product Code (UPC), bags the scanned products, and pays. On the other hand, information kiosks are much more diverse in the range of functions that they support. Some information kiosks perform simple functions, such as information provision, whereas others carry out multiple functions, for example, transaction, web searching options, and personalized product design, together with information provision (Slack & Rowley, 2002). A wide variance in the functions of information kiosks might cause the diverse evaluations of information kiosks with regard to perceived usefulness, perceived ease of use, and perceived enjoyment. This might affect the final results. A review of the existing literature indicates the lack of a consensus classification of TBSS kiosks. Without a uniform classification of TBSS kiosks, researchers are not able to make an appropriate comparison across the different types of TBSS kiosks. Thus, developing a clear classification of TBSS kiosks would be an interesting avenue for future research.

Second, the proposed model attempted to draw a comprehensive picture of a retail patronage model of TBSS kiosk by investigating a variety of factors relevant to TBSS kiosks in retail settings. However, there may nevertheless be other factors that would have potential importance. This study only included three individual characteristics as antecedents that determine perceived ease of use. To provide a broader view and better prediction, future research could investigate other variables, for example, TBSS kiosk characteristics such as design and interface features that may impact consumers' evaluations of TBSS kiosks. Likewise, a limited number of factors were investigated as determinants of TBSS kiosk service quality in this study. Future research could extend the findings by examining additional determinants of TBSS kiosk service quality. To do so, future research may use qualitative interviews with consumers. Also, retailers'

acceptance of TBSS kiosks has become increasingly popular in the Europe and Asian markets (NCR, 2003). Thus, future research could investigate cultural differences in TBSS kiosk usage by conducting cross-cultural studies to compare U.S. consumers and other countries' consumers.

Third, an issue regarding the measurement items should be noted. In spite of the evidence of discriminant validity, a high correlation between TBSS kiosk service quality and satisfaction with using TBSS kiosks should deserve further investigation. Future research is recommended to develop a rival model in which the construct, satisfaction with using TBSS kiosks, is excluded and then compare the overall model fit and examine the extent to which discriminant validity is strengthened in the revised model. Also, this study failed to replicate the findings of Dabholkar et al.'s study (1996) in which the five dimensions of service quality for retail stores were validated. Thus, the dimensionality issue is not fully resolved in this study.

Finally, it was impossible to examine and test all potentially important paths in the structural model. For example, the effects of individual characteristics on other determinants of TBSS kiosk service quality (i.e., perceived usefulness and perceived enjoyment), beyond perceived ease of use, should be further researched. Also, investigation of any mediator of the relationship between TBSS kiosk service quality and retail patronage intention, for example, attitude or opinion toward a retail store, would be another avenue for further research.

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APPENDICES

APPENDIX A - Survey Questionnaire

Appendix A-1 - Type A: Self-Checkout

TECHNOLOGY-BASED SELF-SERVICE (TBSS) KIOSK SURVEY

Welcome to the survey! This survey is designed to better understand your thoughts and opinions on why you use technology-based self-service (TBSS) kiosks, such as a self-checkout and an information kiosk, in retail stores. This survey is being conducted by the Department of Retail, Hospitality, and Tourism Management at the University of Tennessee.

I greatly appreciate your willingness to take the time to complete this survey. Please read each question carefully and answer all of the questions. It will take approximately 10-15 minutes. The findings of this study will help in improving your shopping experience with TBSS kiosks. Your answers are completely confidential and will be released only as summaries in which no individual's answers can be identified.

If you have any questions or comments about this study, please contact me at hlee23@utk.edu and (865) 974-1848.

In this survey, a **"SELF-CHECKOUT"** refers to a computerized system that allows shoppers to purchase tangible products unassisted (including full payment) in a retail setting. In other words, it is an automated alternative to the traditional cashier-staffed checkout.

Have you ever used a self-checkout in a retail store in the past six months?

- ☐ No
 - ☐ Yes
-

Please think for a moment about the self-checkouts you have used in retail stores. I would like you to pick the **ONE RETAIL STORE** where you have used the most the self-checkout. Please specify the name of this retail store in the space below:

SECTION I. Please respond to all the questions from now on regarding the **"SELF-CHECKOUT"** from the retail store that you selected above. Please Indicate one response category.

1. How long have you been a customer of this store?

- ☐ Less than 1 year
- ☐ 1-2 years
- ☐ 3-4 years
- ☐ 5-10 years
- ☐ 11 or more years

2. How often do you visit this store?

- ☐ More than once a week
- ☐ Once a week
- ☐ Once every two weeks
- ☐ Once a month
- ☐ Rarely

3. On average, how much do you usually spend at this store, in one shopping trip?

- ☐ Less than \$25
- ☐ \$26 - \$50

- ☐ \$51 - \$100
- ☐ \$101 - \$150
- ☐ \$151 - \$200
- ☐ \$201 - \$300
- ☐ More than \$301

4. Thinking about the retail store you identified above, what percentage of the shopping trips did you use the self-checkout? Please enter a number a between 0 and 100.

SECTION II. Please read each statement carefully and indicate your level of agreement or disagreement with each statement that describes your characteristics.

	Strongly Disagree					Strongly Agree	
I have avoided technology because it is unfamiliar to me	1	2	3	4	5	6	7
I like interacting with the person who provides the service	1	2	3	4	5	6	7
I would have described myself as being very familiar with self-service technologies (e.g., automated airline ticketing, ATM, or Internet shopping)	1	2	3	4	5	6	7
It bothers me to use a machine when I could talk with a person instead	1	2	3	4	5	6	7
As compared to the average person, I would have said that I was highly knowledgeable about self-service technologies (e.g., automated airline ticketing, ATM, or Internet shopping)	1	2	3	4	5	6	7
I have difficulty understanding most technological matters	1	2	3	4	5	6	7
I am sure of my ability to interpret technological output	1	2	3	4	5	6	7
I am confident I can learn technology-related skills	1	2	3	4	5	6	7
Personal attention by the service employee is not very important to me	1	2	3	4	5	6	7
When given the opportunity to use technology, I fear I might damage it in some way	1	2	3	4	5	6	7
Human contact in providing services makes the process enjoyable for me	1	2	3	4	5	6	7
Technological terminology sounds like confusing jargon	1	2	3	4	5	6	7

to me

I hesitate to use technology for fear of making mistakes I cannot correct	1	2	3	4	5	6	7
I am able to keep up with important technological advances	1	2	3	4	5	6	7
I have a lot of experience with self-service technologies (e.g., automated airline ticketing, ATM, or Internet shopping)	1	2	3	4	5	6	7
I feel apprehensive about using technology	1	2	3	4	5	6	7

SECTION III. The following statements describe your opinions about the self-checkout. Based on your overall experience with the **SELF-CHECKOUT** at the retail store that you selected above, please indicate your level of agreement or disagreement with each statement.

	Strongly Disagree						Strongly Agree
The self-checkout improves my shopping productivity	1	2	3	4	5	6	7
I believe that the overall service quality at the self-checkout is excellent	1	2	3	4	5	6	7
Using the self-checkout is clear and understandable	1	2	3	4	5	6	7
I think the overall service I usually receive from the self-checkout is of a high quality	1	2	3	4	5	6	7
The self-checkout enhances my effectiveness in shopping	1	2	3	4	5	6	7
The overall quality of the service at the self-checkout is generally a high standard of service	1	2	3	4	5	6	7
Using the self-checkout does not require a lot of mental effort	1	2	3	4	5	6	7
Most of the time, I consider the overall service quality at the self-checkout to be superior	1	2	3	4	5	6	7
I am satisfied with the service provided at the self-checkout	1	2	3	4	5	6	7
Using the self-checkout is exciting	1	2	3	4	5	6	7
Using the self-checkout makes me feel good	1	2	3	4	5	6	7
I am pleased with the service provided at the self-checkout	1	2	3	4	5	6	7
Using the self-checkout is enjoyable	1	2	3	4	5	6	7

The self-checkout improves my shopping ability	1	2	3	4	5	6	7
I am delighted with the service provided at the self-checkout	1	2	3	4	5	6	7
The self-checkout is easy to use	1	2	3	4	5	6	7
Using the self-checkout is boring	1	2	3	4	5	6	7

SECTION IV. The following statements describe your opinions about the retail store where you have used the self-checkout. Based on your overall experience with the **RETAIL STORE** that you selected above, please indicate your level of agreement or disagreement with each statement.

	Strongly Disagree			Strongly Agree			
Materials associated with this store's service (such as shopping bags, catalogs, or statements) are visually appealing	1	2	3	4	5	6	7
Employees in this store have the knowledge to answer customers questions	1	2	3	4	5	6	7
This store provides its services at the time it promises to do so	1	2	3	4	5	6	7
This store willingly handles returns and exchanges	1	2	3	4	5	6	7
This store has modern-looking equipment and fixtures	1	2	3	4	5	6	7
This store offers its own credit card	1	2	3	4	5	6	7
The behavior of employees in this store instills confidence in customers	1	2	3	4	5	6	7
When this store promises to do something by a certain time, it will do so	1	2	3	4	5	6	7
This store offers high quality merchandise	1	2	3	4	5	6	7
Employees of this store are able to handle customer complaints directly and immediately	1	2	3	4	5	6	7
This store accepts most major credit cards	1	2	3	4	5	6	7
Employees in this store give prompt service to customers	1	2	3	4	5	6	7
This store has merchandise available when the customers want it	1	2	3	4	5	6	7
When a customer has a problem, this store shows a sincere interest in solving it	1	2	3	4	5	6	7

The store layout at this store makes it easy for customers to move around in the store	1	2	3	4	5	6	7
Employees in this store are never too busy to respond to customer's requests	1	2	3	4	5	6	7
The physical facilities at this store are visually appealing	1	2	3	4	5	6	7
Customers feel safe in their transactions with this store	1	2	3	4	5	6	7
Employees of this store treat customers courteously on the telephone	1	2	3	4	5	6	7
The store layout at this store makes it easy for customers to find what they need	1	2	3	4	5	6	7
This store performs the service right the first time	1	2	3	4	5	6	7
This store provides plenty of convenience to all its customers	1	2	3	4	5	6	7
Employees in this store tell customers exactly when services will be performed	1	2	3	4	5	6	7
This store has clean, attractive, and convenient public areas (restrooms, fitting rooms)	1	2	3	4	5	6	7
Employees in this store are consistently courteous with customers	1	2	3	4	5	6	7
This store gives customers individual attention	1	2	3	4	5	6	7
This store has operating hours convenient to all its customers	1	2	3	4	5	6	7
This store insists on error-free sales transactions and records	1	2	3	4	5	6	7

SECTION V. The following questions are about your willingness to shop at the **RETAIL STORE** that you selected above. Please indicate the likelihood of the following statements.

	Very Low						Very High
The probability that I will shop at this store again is	1	2	3	4	5	6	7
The likelihood that I would recommend this store to a friend is	1	2	3	4	5	6	7
If I had to do it again, I would still shop at this store	1	2	3	4	5	6	7

SECTION VI. The following questions will be used for description purposes only. As with the other responses, these will be completely confidential. Please indicate the appropriate response for each question.

1. What is the year you were born?

2. What is your gender?

- ☐ Male
- ☐ Female

3. How many people including yourself live in your household?

4. Please indicate your current marital status.

- ☐ Single
- ☐ Married
- ☐ Separated or Divorced
- ☐ Widowed

5. Which of the following best describes your racial or ethnic identification?

- ☐ Caucasian/White
- ☐ African-American
- ☐ Native American
- ☐ Asian/Pacific Islander
- ☐ Hispanic
- ☐ Multiracial
- ☐ Other (specify: _____)

6. Please indicate the highest level of education completed.

- ☐ High School or less
- ☐ Associate Degree (community college, technical school, two-year college)

- ☐ Bachelor's Degree
- ☐ Master's Degree
- ☐ Doctoral Degree
- ☐ Professional Degree (MD, JD, etc.)
- ☐ Other (specify: _____)

7. Please indicate your current household income in U.S. dollars.

- ☐ Less than \$10,000
- ☐ \$10,000-\$19,999
- ☐ \$20,000-\$29,999
- ☐ \$30,000-\$39,999
- ☐ \$40,000-\$49,999
- ☐ \$50,000-\$74,999
- ☐ \$75,000-\$99,999
- ☐ \$100,000 and above

8. On average, how many hours do you spend per day using the Internet?

- ☐ Less than an hour
- ☐ 1-2 hours
- ☐ 3-4 hours
- ☐ 5-6 hours
- ☐ 7 or more hours

9. Over the past 12 months, how many times have you bought products using the Internet?

- ☐ 0 times
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ 11-15 times
- ☐ 16-20 times
- ☐ 21 or more times

10. Below is a list of technology-based self-service options. Which service options have you been aware or used?

	Unaware	Aware, but Not Used	Aware and Used
ATMs (automated teller machines)	☐	☐	☐
Automated hotel checkout	☐	☐	☐
Automated airport check-in	☐	☐	☐
Internet banking	☐	☐	☐
Price checkers (price look up points)	☐	☐	☐
Shopping on the Internet	☐	☐	☐
Shopping via mobile phone	☐	☐	☐

Appendix A-2 - Type B: Information Kiosk

TECHNOLOGY-BASED SELF-SERVICE (TBSS) KIOSK SURVEY

Welcome to the survey! This survey is designed to better understand your thoughts and opinions on why you use technology-based self-service (TBSS) kiosks, such as a self-checkout and an information kiosk, in retail stores. This survey is being conducted by the Department of Retail, Hospitality, and Tourism Management at the University of Tennessee.

I greatly appreciate your willingness to take the time to complete this survey. Please read each question carefully and answer all of the questions. It will take approximately 10-15 minutes. The findings of this study will help in improving your shopping experience with TBSS kiosks. Your answers are completely confidential and will be released only as summaries in which no individual's answers can be identified.

If you have any questions or comments about this study, please contact me at hlee23@utk.edu and (865) 974-1848.

In this survey, an “**INFORMATION KIOSK**” refers to a computerized system that is designed to provide digital information or e-transactions to customers at retail stores. For example, customers can use information kiosks to:

view images of the products;
compare items;
find detailed product information;
determine whether a product is in stock;
order a product.

Have you ever used an information kiosk in a retail store in the past six months?

- ☐ No
☐ Yes
-

Please think for a moment about the information kiosks you have used in retail stores. I would like you to pick the **ONE RETAIL STORE** where you have used the most the information kiosk. Please specify the name of this retail store in the space below:

SECTION I. Please respond to all the questions from now on regarding the **INFORMATION KIOSK** from the retail store that you selected above. Please Indicate one response category.

1. How long have you been a customer of this store?

- ☐ Less than 1 year
☐ 1-2 years
☐ 3-4 years
☐ 5-10 years
☐ 11 or more years

2. How often do you visit this store?

- ☐ More than once a week
☐ Once a week
☐ Once every two weeks
☐ Once a month
☐ Rarely

3. On average, how much do you usually spend at this store, in one shopping trip?

- ☐ Less than \$25
- ☐ \$26 - \$50
- ☐ \$51 - \$100
- ☐ \$101 - \$150
- ☐ \$151 - \$200
- ☐ \$201 - \$300
- ☐ More than \$301

4. Thinking about the retail store you identified above, what percentage of the shopping trips did you use the information kiosk? Please enter a number a between 0 and 100.

SECTION II. Please read each statement carefully and indicate your level of agreement or disagreement with each statement that describes your characteristics.

	Strongly Disagree					Strongly Agree	
I have avoided technology because it is unfamiliar to me	1	2	3	4	5	6	7
I like interacting with the person who provides the service	1	2	3	4	5	6	7
I would have described myself as being very familiar with self-service technologies (e.g., automated airline ticketing, ATM, or Internet shopping)	1	2	3	4	5	6	7
It bothers me to use a machine when I could talk with a person instead	1	2	3	4	5	6	7
As compared to the average person, I would have said that I was highly knowledgeable about self-service technologies (e.g., automated airline ticketing, ATM, or Internet shopping)	1	2	3	4	5	6	7
I have difficulty understanding most technological matters	1	2	3	4	5	6	7
I am sure of my ability to interpret technological output	1	2	3	4	5	6	7
I am confident I can learn technology-related skills	1	2	3	4	5	6	7
Personal attention by the service employee is not very important to me	1	2	3	4	5	6	7
When given the opportunity to use technology, I fear I	1	2	3	4	5	6	7

might damage it in some way

Human contact in providing services makes the process enjoyable for me	1	2	3	4	5	6	7
Technological terminology sounds like confusing jargon to me	1	2	3	4	5	6	7
I hesitate to use technology for fear of making mistakes I cannot correct	1	2	3	4	5	6	7
I am able to keep up with important technological advances	1	2	3	4	5	6	7
I have a lot of experience with self-service technologies (e.g., automated airline ticketing, ATM, or Internet shopping)	1	2	3	4	5	6	7
I feel apprehensive about using technology	1	2	3	4	5	6	7

SECTION III. The following statements describe your opinions about the information kiosk. Based on your overall experience with the **INFORMATION KIOSK** at the retail store that you selected above, please indicate your level of agreement or disagreement with each statement.

	Strongly Disagree					Strongly Agree	
The information kiosk improves my shopping productivity	1	2	3	4	5	6	7
I believe that the overall service quality at the information kiosk is excellent	1	2	3	4	5	6	7
Using the information kiosk is clear and understandable	1	2	3	4	5	6	7
I think the overall service I usually receive from the information kiosk is of a high quality	1	2	3	4	5	6	7
The information kiosk enhances my effectiveness in shopping	1	2	3	4	5	6	7
The overall quality of the service at the information kiosk is generally a high standard of service	1	2	3	4	5	6	7
Using the information kiosk does not require a lot of mental effort	1	2	3	4	5	6	7
Most of the time, I consider the overall service quality at the information kiosk to be superior	1	2	3	4	5	6	7
I am satisfied with the service provided at the information kiosk	1	2	3	4	5	6	7
Using the information kiosk is exciting	1	2	3	4	5	6	7

Using the information kiosk makes me feel good	1	2	3	4	5	6	7
I am pleased with the service provided at the information kiosk	1	2	3	4	5	6	7
Using the information kiosk is enjoyable	1	2	3	4	5	6	7
The information kiosk improves my shopping ability	1	2	3	4	5	6	7
I am delighted with the service provided at the information kiosk	1	2	3	4	5	6	7
The information kiosk is easy to use	1	2	3	4	5	6	7
Using the information kiosk is boring	1	2	3	4	5	6	7

SECTION IV. The following statements describe your opinions about the retail store where you have used the information kiosk. Based on your overall experience with the **RETAIL STORE** that you selected above, please indicate your level of agreement or disagreement with each statement.

	Strongly Disagree				Strongly Agree			
Materials associated with this store’s service (such as shopping bags, catalogs, or statements) are visually appealing	1	2	3	4	5	6	7	
Employees in this store have the knowledge to answer customers questions	1	2	3	4	5	6	7	
This store provides its services at the time it promises to do so	1	2	3	4	5	6	7	
This store willingly handles returns and exchanges	1	2	3	4	5	6	7	
This store has modern-looking equipment and fixtures	1	2	3	4	5	6	7	
This store offers its own credit card	1	2	3	4	5	6	7	
The behavior of employees in this store instills confidence in customers	1	2	3	4	5	6	7	
When this store promises to do something by a certain time, it will do so	1	2	3	4	5	6	7	
This store offers high quality merchandise	1	2	3	4	5	6	7	
Employees of this store are able to handle customer complaints directly and immediately	1	2	3	4	5	6	7	
This store accepts most major credit cards	1	2	3	4	5	6	7	

Employees in this store give prompt service to customers	1	2	3	4	5	6	7
This store has merchandise available when the customers want it	1	2	3	4	5	6	7
When a customer has a problem, this store shows a sincere interest in solving it	1	2	3	4	5	6	7
The store layout at this store makes it easy for customers to move around in the store	1	2	3	4	5	6	7
Employees in this store are never too busy to respond to customer's requests	1	2	3	4	5	6	7
The physical facilities at this store are visually appealing	1	2	3	4	5	6	7
Customers feel safe in their transactions with this store	1	2	3	4	5	6	7
Employees of this store treat customers courteously on the telephone	1	2	3	4	5	6	7
The store layout at this store makes it easy for customers to find what they need	1	2	3	4	5	6	7
This store performs the service right the first time	1	2	3	4	5	6	7
This store provides plenty of convenience to all its customers	1	2	3	4	5	6	7
Employees in this store tell customers exactly when services will be performed	1	2	3	4	5	6	7
This store has clean, attractive, and convenient public areas (restrooms, fitting rooms)	1	2	3	4	5	6	7
Employees in this store are consistently courteous with customers	1	2	3	4	5	6	7
This store gives customers individual attention	1	2	3	4	5	6	7
This store has operating hours convenient to all its customers	1	2	3	4	5	6	7
This store insists on error-free sales transactions and records	1	2	3	4	5	6	7

SECTION V. The following questions are about your willingness to shop at the **RETAIL STORE** that you selected above. Please indicate the likelihood of the following statements.

	Very Low						Very High
The probability that I will shop at this store again is	1	2	3	4	5	6	7
The likelihood that I would recommend this store to a friend is	1	2	3	4	5	6	7
If I had to do it again, I would still shop at this store	1	2	3	4	5	6	7

SECTION VI. The following questions will be used for description purposes only. As with the other responses, these will be completely confidential. Please indicate the appropriate response for each question.

1. What is the year you were born?

2. What is your gender?

- ☐ Male
- ☐ Female

3. How many people including yourself live in your household?

4. Please indicate your current marital status.

- ☐ Single
- ☐ Married
- ☐ Separated or Divorced
- ☐ Widowed

5. Which of the following best describes your racial or ethnic identification?

- ☐ Caucasian/White
- ☐ African-American
- ☐ Native American
- ☐ Asian/Pacific Islander
- ☐ Hispanic
- ☐ Multiracial
- ☐ Other (specify: _____)

6. Please indicate the highest level of education completed.

- ☐ High School or less
- ☐ Associate Degree (community college, technical school, two-year college)
- ☐ Bachelor's Degree
- ☐ Master's Degree
- ☐ Doctoral Degree
- ☐ Professional Degree (MD, JD, etc.)
- ☐ Other (specify: _____)

7. Please indicate your current household income in U.S. dollars.

- ☐ Less than \$10,000
- ☐ \$10,000-\$19,999
- ☐ \$20,000-\$29,999
- ☐ \$30,000-\$39,999
- ☐ \$40,000-\$49,999
- ☐ \$50,000-\$74,999
- ☐ \$75,000-\$99,999
- ☐ \$100,000 and above

8. On average, how many hours do you spend per day using the Internet?

- ☐ Less than an hour
- ☐ 1-2 hours
- ☐ 3-4 hours
- ☐ 5-6 hours
- ☐ 7 or more hours

9. Over the past 12 months, how many times have you bought products using the Internet?

- ☐ 0 times
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ 11-15 times
- ☐ 16-20 times
- ☐ 21 or more times

10. Below is a list of technology-based self-service options. Which service options have you been aware or used?

	Unaware	Aware, but Not Used	Aware and Used
ATMs (automated teller machines)	☐	☐	☐
Automated hotel checkout	☐	☐	☐
Automated airport check-in	☐	☐	☐
Internet banking	☐	☐	☐
Price checkers (price look up points)	☐	☐	☐
Shopping on the Internet	☐	☐	☐
Shopping via mobile phone	☐	☐	☐

APPENDIX B – Descriptions of the Measurement Items

Construct	Items	Item Label	Error Label	Note
Technology Anxiety	I have avoided technology because it is unfamiliar to me	TA01	eta1	
	I have difficulty understanding most technological matters	TA02	eta2	
	I am sure of my ability to interpret technological output	TA03	eta3	
	I am confident I can learn technology-related skills	TA04	eta4	Dropped
	When given the opportunity to use technology, I fear I might damage it in some way	TA05	eta5	
	Technological terminology sounds like confusing jargon to me	TA06	eta6	
	I hesitate to use technology for fear of making mistakes I cannot correct	TA07	eta7	
	I am able to keep up with important technological advances	TA08	eta8	
	I feel apprehensive about using technology	TA09	eta9	
Need for Interaction	I like interacting with the person who provides the service	NI01	eni1	
	It bothers me to use a machine when I could talk with a person instead	NI02	eni2	Dropped
	Personal attention by the service employee is not very important to me	NI03	eni3	Dropped
	Human contact in providing services makes the process enjoyable for me	NI04	eni4	
Knowledge of Self-Service Technologies	I would have described myself as being very familiar with self-service technologies (such as automated airline ticketing, ATM, or Internet shopping)	KN01	ekn1	
	As compared to the average person, I would have said that I was highly knowledgeable about self-service technologies (such as automated airline ticketing, ATM, or Internet shopping)	KN02	ekn2	
	I have a lot of experience with self-service technologies (such as automated airline ticketing, ATM, or Internet shopping)	KN03	ekn3	
Perceived Usefulness	The self-checkout (information kiosk) improves my shopping productivity	PU01	epu1	
	The self-checkout (information kiosk) enhances my effectiveness in shopping	PU02	epu2	
	The self-checkout (information kiosk) improves my shopping ability	PU03	epu3	
Perceived Ease of Use	Using the self-checkout (information kiosk) is clear and understandable	PEU01	epe1	
	Using the self-checkout (information kiosk) does not require a lot of mental effort	PEU02	epe2	
	The self-checkout (information kiosk) is easy to use	PEU03	epe3	

APPENDIX B – Descriptions of the Measurement Items (Continued)

Construct		Items	Item Label	Error Label	Note
Perceived Enjoyment		Using the self-checkout (information kiosk) makes me feel good	PEJ01	epj1	
		Using the self-checkout (information kiosk) is boring	PEJ02	epj2	Dropped
		Using the self-checkout (information kiosk) is exciting	PEJ03	epj3	
		Using the self-checkout (information kiosk) is enjoyable	PEJ04	epj4	
TBSS Kiosk Service Quality		I believe that the overall service quality at the self-checkout (information kiosk) is excellent	K_SQ01	esq1	
		I think the overall service I usually receive from the self-checkout (information kiosk) is of a high quality	K_SQ02	esq2	
		The overall quality of the service at the self-checkout (information kiosk) is generally a high standard of service	K_SQ03	esq3	
		Most of time, I consider the overall service quality at the self-checkout (information kiosk) to be superior	K_SQ04	esq4	
Satisfaction with Using TBSS Kiosks		I am satisfied with the service provided at the self-checkout (information kiosk)	K_SAT01	esat1	
		I am pleased with the service provided at the self-checkout (information kiosk)	K_SAT02	esat2	
		I am delighted with the service provided at the self-checkout (information kiosk)	K_SAT03	esat3	
Store Service Quality	Physical Aspects	Materials associated with this store's service (such as shopping bags, catalogs, or statements) are visually appealing	PA01/SSQ1	e1	
		This store has modern-looking equipment and fixtures	PA02/SSQ1	e1	
		The store layout at this store makes it easy for customers to move around in the store	PA03/SSQ2	e2	
		The physical facilities at this store are visually appealing	PA04/SSQ2	e2	
		The store layout at this store makes it easy for customers to find what they need	PA05/SSQ1	e1	
		This store has clean, attractive, and convenient public areas (restrooms, fitting rooms)	PA06/SSQ2	e2	
	Reliability	This store provides its services at the time it promises to do so	RE01/SSQ3	e3	
		When this store promises to do something by a certain time, it will do so	RE02/SSQ4	e4	
		This store has merchandise available when the customers want it	RE03/SSQ3	e3	
		This store performs the service right the first time	RE04/SSQ4	e4	
		This store insists on error-free sales transactions and records	RE05/SSQ3	e3	

APPENDIX B – Descriptions of the Measurement Items (Continued)

Construct		Items	Item Label	Error Label	Note
Store Service Quality	Personal Interaction	Employees in this store have the knowledge to answer customers questions	PI01/SSQ5	e5	
		The behavior of employees in this store instills confidence in customers	PI02SSQ6	e6	
		Employees in this store give prompt service to customers	PI03/SSQ7	e7	
		Employees in this store are never too busy to respond to customer’s requests	PI04/SSQ5	e5	
		Customers feel safe in their transactions with this store	PI05/SSQ6	e6	
		Employees of this store treat customers courteously on the telephone	PI06/SSQ7	e7	
		Employees in this store tell customers exactly when services will be performed	PI07/SSQ5	e5	
		Employees in this store are consistently courteous with customers	PI08/SSQ6	e6	
		This store gives customers individual attention	PI09/SSQ7	e7	
	Problem Solving	This store willingly handles returns and exchanges	PS01/SSQ8	e8	
		Employees of this store are able to handle customer complaints directly and immediately	PS02/SSQ8	e8	
		When a customer has a problem, this store shows a sincere interest in solving it	PS03/SSQ9	e9	
	Policy	This store offers its own credit card	PO01		Dropped
		This store offers high quality merchandise	PO02/SSQ10	e10	
		This store accepts most major credit cards	PO03/SSQ11	e11	
		This store provides plenty of convenience to all their customers	PO04/SSQ11	e11	
		This store has operating hours convenient to all their customers	PO05/SSQ10	e10	
Patronage Intention		The probability that I will shop at this store again is	S_BI01	ebi1	
		The likelihood that I would recommend this store to a friend is	S_BI02	ebi2	
		If I had to do it again, I would still shop at this store	S_BI03	ebi3	

APPENDIX C - Descriptive Statistics

Appendix C-1: Self-Checkout

Items	Mean	S.D.	Skewness	Kurtosis
TA01	2.25	1.454	1.279	.972
TA02	2.35	1.367	1.106	.662
TA03	2.63	1.376	1.152	1.226
TA04	1.95	1.035	1.704	4.455
TA05	2.15	1.267	1.412	1.913
TA06	2.76	1.474	.862	-.097
TA07	2.39	1.433	1.202	.745
TA08	2.73	1.322	.990	.736
TA09	2.41	1.379	1.267	1.288
NI01	4.58	1.389	-.355	-.126
NI02	3.25	1.656	.525	-.592
NI03	4.52	1.557	-.301	-.629
NI04	4.49	1.357	-.341	-.231
KN01	5.90	1.244	-1.518	2.307
KN02	5.50	1.276	-.960	.891
KN03	5.80	1.218	-1.386	1.785
PU01	4.96	1.493	-.768	.008
PU02	5.07	1.572	-.766	-.121
PU03	4.89	1.498	-.556	-.249
PEU01	5.47	1.335	-1.238	1.264
PEU02	5.48	1.342	-1.184	1.110
PEU03	5.65	1.347	-1.542	2.283
PEJ01	4.32	1.453	-.399	.179
PEJ02	4.90	1.300	-.402	-.087
PEJ03	4.28	1.574	-.325	-.309
PEJ04	4.85	1.396	-.674	.185
K_SQ01	4.90	1.545	-.730	-.261
K_SQ02	5.09	1.425	-1.003	.592
K_SQ03	5.04	1.432	-.737	-.052
K_SQ04	4.66	1.489	-.345	-.605
K_SAT01	5.37	1.348	-1.177	.901
K_SAT02	5.18	1.397	-.970	.415
K_SAT03	4.91	1.465	-.654	-.157
PA01	4.47	1.244	-.196	-.039
PA02	5.26	1.157	-.958	.827
PA03	5.34	1.141	-1.069	1.561
PA04	4.87	1.322	-.653	.165
PA05	5.19	1.244	-1.012	.920
PA06	4.87	1.368	-.520	-.331
RE01	5.09	1.199	-.672	.445
RE02	4.75	1.134	.095	-.293
RE03	5.21	1.164	-1.024	1.099
RE04	4.94	1.232	-.485	.114
RE05	4.85	1.174	-.142	-.104

Appendix C-1: Self-Checkout (Continued)

Items	Mean	S.D.	Skewness	Kurtosis
PI01	5.02	1.375	-.769	.174
PI02	4.67	1.431	-.460	-.243
PI03	4.99	1.354	-.871	.393
PI04	4.65	1.464	-.569	-.320
PI05	5.46	1.042	-.795	1.065
PI06	4.71	1.171	.165	-.077
PI07	4.67	1.131	-.028	.288
PI08	5.05	1.264	-.779	.305
PI09	4.76	1.352	-.463	-.202
PS01	5.43	1.094	-.670	.228
PS02	4.86	1.292	-.436	.003
PS03	4.90	1.325	-.666	.211
PO01	4.54	1.758	-.446	-.648
PO02	5.19	1.174	-.624	.089
PO03	6.19	.825	-1.222	1.825
PO04	5.25	1.076	-.949	1.177
PO05	5.95	1.071	-1.241	1.761
S BI01	6.34	.994	-1.923	4.596
S BI02	5.74	1.302	-1.005	.608
S BI03	6.23	1.030	-1.638	3.341

Appendix C-2: Information Kiosk

Items	Mean	S.D.	Skewness	Kurtosis
TA01	2.20	1.413	1.278	1.061
TA02	2.19	1.265	1.326	1.623
TA03	2.55	1.306	1.077	.849
TA04	1.92	1.049	1.885	5.215
TA05	2.10	1.301	1.470	1.956
TA06	2.65	1.445	.803	-.152
TA07	2.21	1.306	1.139	.545
TA08	2.68	1.355	1.110	1.113
TA09	2.31	1.429	1.230	.841
NI01	4.63	1.477	-.441	-.140
NI02	3.47	1.689	.334	-.767
NI03	4.49	1.599	-.260	-.704
NI04	4.58	1.432	-.506	-.086
KN01	5.88	1.305	-1.538	2.522
KN02	5.60	1.243	-.993	.938
KN03	5.82	1.172	-1.294	1.963
PU01	5.29	1.196	-.628	.525
PU02	5.38	1.239	-.846	.701
PU03	5.29	1.290	-.883	.899
PEU01	5.46	1.064	-.708	.312
PEU02	5.47	1.183	-.793	.167
PEU03	5.67	1.055	-1.142	1.748
PEJ01	4.34	1.333	-.393	.327
PEJ02	5.08	1.310	-.466	-.232
PEJ03	4.32	1.368	-.427	.199
PEJ04	4.85	1.217	-.476	.295
K SQ01	5.22	1.212	-.747	.649
K SQ02	5.33	1.165	-.763	.647
K SQ03	5.29	1.211	-.852	.889
K SQ04	4.83	1.321	-.330	-.133
K SAT01	5.46	1.143	-1.141	1.695
K SAT02	5.36	1.164	-1.099	1.654
K SAT03	5.09	1.277	-.842	.787
PA01	5.00	1.217	-.623	.258
PA02	5.49	1.252	-1.173	1.532
PA03	5.48	1.260	-1.153	.979
PA04	5.35	1.174	-1.108	1.233
PA05	5.29	1.290	-.924	.272
PA06	5.37	1.270	-1.055	1.102
RE01	5.35	1.124	-1.056	1.709
RE02	5.20	1.167	-.605	.382
RE03	5.35	1.246	-1.102	1.347
RE04	5.26	1.216	-.865	.726
RE05	4.97	1.290	-.279	-.390
PI01	5.20	1.280	-1.159	1.348
PI02	5.20	1.267	-.838	.737
PI03	5.39	1.226	-1.269	1.806

Appendix C-2: Information Kiosk (Continued)

Items	Mean	S.D.	Skewness	Kurtosis
PI04	4.89	1.370	-.625	-.182
PI05	5.62	1.029	-.928	.494
PI06	5.07	1.214	-.241	-.453
PI07	5.06	1.102	-.331	-.187
PI08	5.33	1.165	-1.069	1.528
PI09	5.13	1.255	-.847	.697
PS01	5.61	1.198	-1.039	1.451
PS02	5.20	1.270	-.805	.548
PS03	5.20	1.283	-.733	.444
PO01	5.16	1.727	-.911	-.086
PO02	5.51	1.195	-1.062	.891
PO03	6.13	1.027	-1.843	4.861
PO04	5.43	1.112	-1.109	1.372
PO05	5.82	1.013	-1.180	1.982
S BI01	6.32	1.084	-1.965	4.293
S BI02	6.10	1.189	-1.407	1.631
S BI03	6.29	1.081	-1.774	3.576

APPENDIX D - Second-Order CFA Model Results

Appendix D-1a: Unstandardized Regression Weights for Self-Checkout Sample

			Estimate	S.E.	C.R.	P	Label
Physical Aspects	<---	Store Service Quality	2.238	.135	16.578	***	par_3
Personnel Service	<---	Store Service Quality	2.767	.167	16.609	***	par_6
Policy	<---	Store Service Quality	1.362	.094	14.566	***	par_7
SSQ2	<---	Physical Aspects	1.153	.058	19.904	***	par_1
SSQ1	<---	Physical Aspects	1.000				
SSQ11	<---	Policy	.849	.057	14.913	***	par_2
SSQ10	<---	Policy	1.000				
SSQ5	<---	Personnel Service	.978	.034	29.080	***	par_4
SSQ6	<---	Personnel Service	.934	.031	30.064	***	par_5
SSQ7	<---	Personnel Service	1.000				
SSQ4	<---	Personnel Service	.622	.021	29.679	***	par_8
SSQ3	<---	Personnel Service	.824	.031	26.930	***	par_9
SSQ8	<---	Personnel Service	.534	.024	21.822	***	par_10
SSQ9	<---	Personnel Service	.352	.015	22.942	***	par_11

Appendix D-1b: Standardized Regression Weights for Self-Checkout Sample

			Estimate
Physical Aspects	<---	Store Service Quality	.930
Personnel Service	<---	Store Service Quality	.872
Policy	<---	Store Service Quality	.915
SSQ2	<---	Physical Aspects	.881
SSQ1	<---	Physical Aspects	.893
SSQ11	<---	Policy	.818
SSQ10	<---	Policy	.825
SSQ5	<---	Personnel Service	.915
SSQ6	<---	Personnel Service	.924
SSQ7	<---	Personnel Service	.935
SSQ4	<---	Personnel Service	.921
SSQ3	<---	Personnel Service	.894
SSQ8	<---	Personnel Service	.828
SSQ9	<---	Personnel Service	.844

Appendix D-2a: Unstandardized Regression Weights for Information Kiosk Sample

			Estimate	S.E.	C.R.	P	Label
Physical Aspects	<---	Store Service Quality	2.545	.147	17.324	***	par_3
Personnel Service	<---	Store Service Quality	2.752	.148	18.545	***	par_6
Policy	<---	Store Service Quality	1.612	.092	17.568	***	par_7
SSQ2	<---	Physical Aspects	1.042	.045	23.192	***	par_1
SSQ1	<---	Physical Aspects	1.000				
SSQ11	<---	Policy	.907	.054	16.758	***	par_2
SSQ10	<---	Policy	1.000				
SSQ5	<---	Personnel Service	.973	.036	26.831	***	par_4
SSQ6	<---	Personnel Service	.959	.033	29.156	***	par_5
SSQ7	<---	Personnel Service	1.000				
SSQ4	<---	Personnel Service	.650	.025	25.848	***	par_8
SSQ3	<---	Personnel Service	.894	.035	25.249	***	par_9
SSQ8	<---	Personnel Service	.610	.030	20.211	***	par_10
SSQ9	<---	Personnel Service	.366	.017	21.963	***	par_11

Appendix D-2b: Standardized Regression Weights for Information Kiosk Sample

			Estimate
Physical Aspects	<---	Store Service Quality	.926
Personnel Service	<---	Store Service Quality	.937
Policy	<---	Store Service Quality	.997
SSQ2	<---	Physical Aspects	.914
SSQ1	<---	Physical Aspects	.900
SSQ11	<---	Policy	.803
SSQ10	<---	Policy	.845
SSQ5	<---	Personnel Service	.906
SSQ6	<---	Personnel Service	.930
SSQ7	<---	Personnel Service	.921
SSQ4	<---	Personnel Service	.894
SSQ3	<---	Personnel Service	.887
SSQ8	<---	Personnel Service	.809
SSQ9	<---	Personnel Service	.840

APPENDIX E - Measurement Model Results

Appendix E-1a: Unstandardized Regression Weights for Self-Checkout Sample

			Estimate	S.E.	C.R.	P	Label
TA09	<---	Technology Anxiety	1.103	.068	16.253	***	par_1
TA08	<---	Technology Anxiety	.734	.073	10.027	***	par_2
TA07	<---	Technology Anxiety	1.180	.070	16.976	***	par_3
TA06	<---	Technology Anxiety	1.181	.072	16.290	***	par_4
TA05	<---	Technology Anxiety	.868	.067	12.963	***	par_5
TA03	<---	Technology Anxiety	.839	.075	11.245	***	par_6
TA02	<---	Technology Anxiety	1.015	.070	14.589	***	par_7
TA01	<---	Technology Anxiety	1.121	.073	15.394	***	par_8
NI04	<---	Need for Interaction	1.190	.097	12.229	***	par_9
NI01	<---	Need for Interaction	.989	.093	10.587	***	par_10
KN03	<---	Knowledge	1.023	.060	17.182	***	par_11
KN02	<---	Knowledge	1.101	.062	17.874	***	par_12
KN01	<---	Knowledge	.994	.062	15.964	***	par_13
PEJ01	<---	Perceived Enjoyment	1.095	.074	14.853	***	par_14
PEJ03	<---	Perceived Enjoyment	1.237	.078	15.805	***	par_15
PEJ04	<---	Perceived Enjoyment	1.293	.064	20.166	***	par_16
K_SQ04	<---	TBSS QUALITY	1.209	.071	17.033	***	par_17
K_SQ03	<---	TBSS QUALITY	1.343	.062	21.595	***	par_18
K_SQ02	<---	TBSS QUALITY	1.318	.063	21.063	***	par_19
K_SQ01	<---	TBSS QUALITY	1.385	.069	19.951	***	par_20
K_SAT03	<---	TBSS SAT	1.324	.065	20.230	***	par_21
K_SAT02	<---	TBSS SAT	1.307	.061	21.491	***	par_22
K_SAT01	<---	TBSS SAT	1.234	.060	20.674	***	par_23
S_BI01	<---	Store BI	.872	.046	18.924	***	par_24
S_BI02	<---	Store BI	1.024	.064	16.042	***	par_25
S_BI03	<---	Store BI	.987	.045	21.922	***	par_26
SPO	<---	Store SQ	2.642	.146	18.067	***	par_27
SPES	<---	Store SQ	14.274	.815	17.516	***	par_28
PU01	<---	Perceived Usefulness	1.310	.069	19.084	***	par_30
PU02	<---	Perceived Usefulness	1.474	.069	21.351	***	par_31
PU03	<---	Perceived Usefulness	1.315	.069	19.094	***	par_32
PEU01	<---	Perceived Ease of Use	1.105	.064	17.144	***	par_33
PEU02	<---	Perceived Ease of Use	.983	.069	14.342	***	par_34
PEU03	<---	Perceived Ease of Use	1.211	.062	19.498	***	par_35

Appendix E-1b: Standardized Regression Weights for Self-Checkout Sample

			Estimate
TA09	<---	Technology Anxiety	.801
TA08	<---	Technology Anxiety	.556
TA07	<---	Technology Anxiety	.825
TA06	<---	Technology Anxiety	.803
TA05	<---	Technology Anxiety	.686
TA03	<---	Technology Anxiety	.611
TA02	<---	Technology Anxiety	.744
TA01	<---	Technology Anxiety	.772
NI04	<---	Need for Interaction	.878
NI01	<---	Need for Interaction	.713
KN03	<---	Knowledge	.841
KN02	<---	Knowledge	.864
KN01	<---	Knowledge	.800
PEJ01	<---	Perceived Enjoyment	.755
PEJ03	<---	Perceived Enjoyment	.787
PEJ04	<---	Perceived Enjoyment	.928
K_SQ04	<---	TBSS QUALITY	.813
K_SQ03	<---	TBSS QUALITY	.939
K_SQ02	<---	TBSS QUALITY	.926
K_SQ01	<---	TBSS QUALITY	.898
K_SAT03	<---	TBSS SAT	.905
K_SAT02	<---	TBSS SAT	.937
K_SAT01	<---	TBSS SAT	.917
S_BI01	<---	Store BI	.879
S_BI02	<---	Store BI	.788
S_BI03	<---	Store BI	.960
SPO	<---	Store SQ	.861
SPES	<---	Store SQ	.844
SPA	<---	Store SQ	.847
PU01	<---	Perceived Usefulness	.879
PU02	<---	Perceived Usefulness	.939
PU03	<---	Perceived Usefulness	.879
PEU01	<---	Perceived Ease of Use	.829
PEU02	<---	Perceived Ease of Use	.733
PEU03	<---	Perceived Ease of Use	.900

Appendix E-1c: Covariances for Self-Checkout Sample

			Estimate	S.E.	C.R.	P	Label
Technology Anxiety	<-->	Need for Interaction	.263	.064	4.112	***	par_36
Technology Anxiety	<-->	Knowledge	-.652	.041	-16.028	***	par_37
Technology Anxiety	<-->	Perceived Enjoyment	-.151	.063	-2.397	.017	par_38
Technology Anxiety	<-->	TBSS QUALITY	-.163	.061	-2.676	.007	par_39
Technology Anxiety	<-->	TBSS SAT	-.183	.061	-3.012	.003	par_40
Technology Anxiety	<-->	Store BI	-.214	.060	-3.569	***	par_41
Technology Anxiety	<-->	Store SQ	-.123	.064	-1.927	.054	par_42
Technology Anxiety	<-->	Perceived Usefulness	-.181	.061	-2.970	.003	par_43
Technology Anxiety	<-->	Perceived Ease of Use	-.361	.057	-6.303	***	par_44
Need for Interaction	<-->	Knowledge	-.087	.068	-1.275	.202	par_45
Need for Interaction	<-->	Perceived Enjoyment	-.216	.066	-3.282	.001	par_46
Need for Interaction	<-->	TBSS QUALITY	-.263	.062	-4.221	***	par_47
Need for Interaction	<-->	TBSS SAT	-.232	.063	-3.662	***	par_48
Need for Interaction	<-->	Store BI	.063	.066	.964	.335	par_49
Need for Interaction	<-->	Store SQ	.119	.067	1.761	.078	par_50
Need for Interaction	<-->	Perceived Usefulness	-.274	.063	-4.361	***	par_51
Need for Interaction	<-->	Perceived Ease of Use	-.231	.066	-3.518	***	par_52
Knowledge	<-->	Perceived Enjoyment	.301	.060	4.985	***	par_53
Knowledge	<-->	TBSS QUALITY	.315	.058	5.473	***	par_54
Knowledge	<-->	TBSS SAT	.294	.059	5.024	***	par_55
Knowledge	<-->	Store BI	.243	.060	4.040	***	par_56
Knowledge	<-->	Store SQ	.221	.063	3.520	***	par_57
Knowledge	<-->	Perceived Usefulness	.356	.057	6.294	***	par_58
Knowledge	<-->	Perceived Ease of Use	.502	.051	9.785	***	par_59
Perceived Enjoyment	<-->	TBSS QUALITY	.823	.025	32.476	***	par_60
Perceived Enjoyment	<-->	TBSS SAT	.846	.024	35.889	***	par_61
Perceived Enjoyment	<-->	Store BI	.303	.058	5.226	***	par_62
Perceived Enjoyment	<-->	Store SQ	.469	.053	8.914	***	par_63
Perceived Enjoyment	<-->	Perceived Usefulness	.813	.027	30.282	***	par_64

Appendix E-1c: Covariances for Self-Checkout Sample (Continued)

			Estimate	S.E.	C.R.	P	Label
Perceived Enjoyment	<-->	Perceived Ease of Use	.743	.035	21.426	***	par_65
TBSS QUALITY	<-->	TBSS SAT	.962	.008	114.971	***	par_66
TBSS QUALITY	<-->	Store BI	.409	.051	7.959	***	par_67
TBSS QUALITY	<-->	Store SQ	.550	.046	12.052	***	par_68
TBSS QUALITY	<-->	Perceived Usefulness	.825	.022	37.019	***	par_69
TBSS QUALITY	<-->	Perceived Ease of Use	.815	.025	32.073	***	par_70
TBSS SAT	<-->	Store BI	.454	.049	9.184	***	par_71
TBSS SAT	<-->	Store SQ	.558	.045	12.300	***	par_72
TBSS SAT	<-->	Perceived Usefulness	.790	.026	30.649	***	par_73
TBSS SAT	<-->	Perceived Ease of Use	.841	.023	36.068	***	par_74
Store BI	<-->	Store SQ	.720	.034	21.350	***	par_75
Store BI	<-->	Perceived Usefulness	.327	.055	5.895	***	par_76
Store BI	<-->	Perceived Ease of Use	.483	.050	9.670	***	par_77
Store SQ	<-->	Perceived Usefulness	.340	.057	5.973	***	par_78
Store SQ	<-->	Perceived Ease of Use	.496	.051	9.671	***	par_79
Perceived Usefulness	<-->	Perceived Ease of Use	.746	.032	23.321	***	par_80
eta8	<-->	eta3	.494	.080	6.204	***	par_81
epj1	<-->	epj3	.487	.074	6.593	***	par_82
eta7	<-->	eta5	.243	.056	4.365	***	par_83

Appendix E-1d: Correlations for Self-Checkout Sample

			Estimate
Technology Anxiety	<-->	Need for Interaction	.263
Technology Anxiety	<-->	Knowledge	-.652
Technology Anxiety	<-->	Perceived Enjoyment	-.151
Technology Anxiety	<-->	TBSS QUALITY	-.163
Technology Anxiety	<-->	TBSS SAT	-.183
Technology Anxiety	<-->	Store BI	-.214
Technology Anxiety	<-->	Store SQ	-.123
Technology Anxiety	<-->	Perceived Usefulness	-.181
Technology Anxiety	<-->	Perceived Ease of Use	-.361
Need for Interaction	<-->	Knowledge	-.087
Need for Interaction	<-->	Perceived Enjoyment	-.216
Need for Interaction	<-->	TBSS QUALITY	-.263
Need for Interaction	<-->	TBSS SAT	-.232
Need for Interaction	<-->	Store BI	.063
Need for Interaction	<-->	Store SQ	.119
Need for Interaction	<-->	Perceived Usefulness	-.274
Need for Interaction	<-->	Perceived Ease of Use	-.231
Knowledge	<-->	Perceived Enjoyment	.301
Knowledge	<-->	TBSS QUALITY	.315
Knowledge	<-->	TBSS SAT	.294
Knowledge	<-->	Store BI	.243
Knowledge	<-->	Store SQ	.221
Knowledge	<-->	Perceived Usefulness	.356
Knowledge	<-->	Perceived Ease of Use	.502
Perceived Enjoyment	<-->	TBSS QUALITY	.823
Perceived Enjoyment	<-->	TBSS SAT	.846
Perceived Enjoyment	<-->	Store BI	.303
Perceived Enjoyment	<-->	Store SQ	.469
Perceived Enjoyment	<-->	Perceived Usefulness	.813
Perceived Enjoyment	<-->	Perceived Ease of Use	.743
TBSS QUALITY	<-->	TBSS SAT	.962
TBSS QUALITY	<-->	Store BI	.409
TBSS QUALITY	<-->	Store SQ	.550
TBSS QUALITY	<-->	Perceived Usefulness	.825
TBSS QUALITY	<-->	Perceived Ease of Use	.815
TBSS SAT	<-->	Store BI	.454
TBSS SAT	<-->	Store SQ	.558

Appendix E-1d: Correlations for Self-Checkout Sample (Continued)

			Estimate
TBSS SAT	<-->	Perceived Usefulness	.790
TBSS SAT	<-->	Perceived Ease of Use	.841
Store BI	<-->	Store SQ	.720
Store BI	<-->	Perceived Usefulness	.327
Store BI	<-->	Perceived Ease of Use	.483
Store SQ	<-->	Perceived Usefulness	.340
Store SQ	<-->	Perceived Ease of Use	.496
Perceived Usefulness	<-->	Perceived Ease of Use	.746
eta8	<-->	eta3	.414
epj1	<-->	epj3	.528
eta7	<-->	eta5	.327

Appendix E-1e: Confidence Intervals for Self-Checkout Sample

			Estimate	S.E.	Confidence Intervals	
Technology Anxiety	<-->	Need for Interaction	.263	0.064	0.135	0.391
Technology Anxiety	<-->	Knowledge	-.652	0.041	-0.734	-0.570
Technology Anxiety	<-->	Perceived Enjoyment	-.151	0.061	-0.273	-0.029
Technology Anxiety	<-->	TBSS QUALITY	-.163	0.063	-0.289	-0.037
Technology Anxiety	<-->	TBSS SAT	-.183	0.061	-0.305	-0.061
Technology Anxiety	<-->	Store BI	-.214	0.060	-0.334	-0.094
Technology Anxiety	<-->	Store SQ	-.123	0.061	-0.245	-0.001
Technology Anxiety	<-->	Perceived Usefulness	-.181	0.061	-0.303	-0.059
Technology Anxiety	<-->	Perceived Ease of Use	-.361	0.057	-0.475	-0.247
Need for Interaction	<-->	Knowledge	-.087	0.068	-0.223	0.049
Need for Interaction	<-->	Perceived Enjoyment	-.216	0.066	-0.348	-0.084
Need for Interaction	<-->	TBSS QUALITY	-.263	0.062	-0.387	-0.139
Need for Interaction	<-->	TBSS SAT	-.232	0.063	-0.358	-0.106
Need for Interaction	<-->	Store BI	.063	0.066	-0.069	0.195
Need for Interaction	<-->	Store SQ	.119	0.067	-0.015	0.253
Need for Interaction	<-->	Perceived Usefulness	-.274	0.063	-0.400	-0.148
Need for Interaction	<-->	Perceived Ease of Use	-.231	0.066	-0.363	-0.099
Knowledge	<-->	Perceived Enjoyment	.301	0.060	0.181	0.421
Knowledge	<-->	TBSS QUALITY	.315	0.058	0.199	0.431
Knowledge	<-->	TBSS SAT	.294	0.059	0.176	0.412
Knowledge	<-->	Store BI	.243	0.060	0.123	0.363
Knowledge	<-->	Store SQ	.221	0.063	0.095	0.347
Knowledge	<-->	Perceived Usefulness	.356	0.057	0.242	0.470
Knowledge	<-->	Perceived Ease of Use	.502	0.051	0.400	0.604
Perceived Enjoyment	<-->	TBSS QUALITY	.823	0.025	0.773	0.873
Perceived Enjoyment	<-->	TBSS SAT	.846	0.024	0.798	0.894
Perceived Enjoyment	<-->	Store BI	.303	0.058	0.187	0.419
Perceived Enjoyment	<-->	Store SQ	.469	0.053	0.363	0.575
Perceived Enjoyment	<-->	Perceived Usefulness	.813	0.027	0.759	0.867
Perceived Enjoyment	<-->	Perceived Ease of Use	.743	0.035	0.673	0.813
TBSS QUALITY	<-->	TBSS SAT	.962	0.008	0.946	0.978
TBSS QUALITY	<-->	Store BI	.409	0.051	0.307	0.511

Appendix E-1e: Confidence Intervals for Self-Checkout Sample (Continued)

			Estimate	S.E.	Confidence Intervals	
TBSS QUALITY	<-->	Store SQ	.550	0.046	0.458	0.642
TBSS QUALITY	<-->	Perceived Usefulness	.825	0.022	0.781	0.869
TBSS QUALITY	<-->	Perceived Ease of Use	.815	0.025	0.765	0.865
TBSS SAT	<-->	Store BI	.454	0.049	0.356	0.552
TBSS SAT	<-->	Store SQ	.558	0.045	0.468	0.648
TBSS SAT	<-->	Perceived Usefulness	.790	0.026	0.738	0.842
TBSS SAT	<-->	Perceived Ease of Use	.841	0.023	0.795	0.887
Store BI	<-->	Store SQ	.720	0.034	0.652	0.788
Store BI	<-->	Perceived Usefulness	.327	0.055	0.217	0.437
Store BI	<-->	Perceived Ease of Use	.483	0.050	0.383	0.583
Store SQ	<-->	Perceived Usefulness	.340	0.057	0.226	0.454
Store SQ	<-->	Perceived Ease of Use	.496	0.051	0.394	0.598
Perceived Usefulness	<-->	Perceived Ease of Use	.746	0.032	0.682	0.810

Appendix E-2a: Unstandardized Regression Weights for Information Kiosk Sample

			Estimate	S.E.	C.R.	P	Label
TA09	<---	Technology Anxiety	1.130	.071	15.973	***	par_1
TA08	<---	Technology Anxiety	.795	.074	10.693	***	par_2
TA07	<---	Technology Anxiety	1.063	.064	16.620	***	par_3
TA06	<---	Technology Anxiety	1.142	.072	15.945	***	par_4
TA05	<---	Technology Anxiety	.935	.068	13.846	***	par_5
TA03	<---	Technology Anxiety	.841	.070	12.023	***	par_6
TA02	<---	Technology Anxiety	.995	.063	15.851	***	par_7
TA01	<---	Technology Anxiety	.874	.076	11.440	***	par_8
NI04	<---	Need for Interaction	.918	.109	8.456	***	par_9
NI01	<---	Need for Interaction	1.229	.127	9.669	***	par_10
KN03	<---	Knowledge	.971	.058	16.688	***	par_11
KN02	<---	Knowledge	1.038	.061	16.883	***	par_12
KN01	<---	Knowledge	1.013	.067	15.230	***	par_13
PEJ01	<---	Perceived Enjoyment	.968	.069	14.020	***	par_14
PEJ03	<---	Perceived Enjoyment	.941	.072	13.108	***	par_15
PEJ04	<---	Perceived Enjoyment	1.207	.056	21.576	***	par_16
K SQ04	<---	TBSS QUALITY	1.062	.064	16.688	***	par_17
K SQ03	<---	TBSS QUALITY	1.097	.054	20.225	***	par_18
K SQ02	<---	TBSS QUALITY	1.074	.052	20.854	***	par_19
K SQ01	<---	TBSS QUALITY	1.019	.057	17.864	***	par_20
K SAT03	<---	TBSS SAT	1.069	.060	17.785	***	par_21
K SAT02	<---	TBSS SAT	1.081	.051	21.144	***	par_22
K SAT01	<---	TBSS SAT	1.034	.051	20.207	***	par_23
S BI01	<---	Store BI	.999	.048	20.919	***	par_24
S BI02	<---	Store BI	1.092	.053	20.776	***	par_25
S BI03	<---	Store BI	1.056	.045	23.245	***	par_26
SPO	<---	Store SQ	3.140	.154	20.399	***	par_27
SPES	<---	Store SQ	14.801	.737	20.070	***	par_28
SPA	<---	Store SQ	5.154	.274	18.785	***	par_29
PU01	<---	Perceived Usefulness	1.056	.055	19.290	***	par_30
PU02	<---	Perceived Usefulness	1.128	.056	20.306	***	par_31
PU03	<---	Perceived Usefulness	1.153	.059	19.667	***	par_32
PEU01	<---	Perceived Ease of Use	.833	.053	15.672	***	par_33
PEU02	<---	Perceived Ease of Use	.845	.061	13.764	***	par_34
PEU03	<---	Perceived Ease of Use	.891	.051	17.490	***	par_35

Appendix E-2b: Standardized Regression Weights for Information Kiosk Sample

			Estimate
TA09	<---	Technology Anxiety	.792
TA08	<---	Technology Anxiety	.587
TA07	<---	Technology Anxiety	.815
TA06	<---	Technology Anxiety	.791
TA05	<---	Technology Anxiety	.720
TA03	<---	Technology Anxiety	.645
TA02	<---	Technology Anxiety	.788
TA01	<---	Technology Anxiety	.619
NI04	<---	Need for Interaction	.643
NI01	<---	Need for Interaction	.834
KN03	<---	Knowledge	.830
KN02	<---	Knowledge	.836
KN01	<---	Knowledge	.778
PEJ01	<---	Perceived Enjoyment	.727
PEJ03	<---	Perceived Enjoyment	.689
PEJ04	<---	Perceived Enjoyment	.994
K SQ04	<---	TBSS QUALITY	.805
K SQ03	<---	TBSS QUALITY	.907
K SQ02	<---	TBSS QUALITY	.924
K SQ01	<---	TBSS QUALITY	.842
K SAT03	<---	TBSS SAT	.838
K SAT02	<---	TBSS SAT	.930
K SAT01	<---	TBSS SAT	.906
S BI01	<---	Store BI	.923
S BI02	<---	Store BI	.919
S BI03	<---	Store BI	.979
SPO	<---	Store SQ	.917
SPES	<---	Store SQ	.908
SPA	<---	Store SQ	.872
PU01	<---	Perceived Usefulness	.884
PU02	<---	Perceived Usefulness	.912
PU03	<---	Perceived Usefulness	.895
PEU01	<---	Perceived Ease of Use	.785
PEU02	<---	Perceived Ease of Use	.715
PEU03	<---	Perceived Ease of Use	.846

Appendix E-2c: Covariances for Information Kiosk Sample

			Estimate	S.E.	C.R.	P	Label
Technology Anxiety	<-->	Need for Interaction	.080	.070	1.135	.257	par_36
Technology Anxiety	<-->	Knowledge	-.717	.037	-19.512	***	par_37
Technology Anxiety	<-->	Perceived Enjoyment	-.189	.059	-3.187	.001	par_38
Technology Anxiety	<-->	TBSS QUALITY	-.367	.055	-6.646	***	par_39
Technology Anxiety	<-->	TBSS SAT	-.382	.055	-6.961	***	par_40
Technology Anxiety	<-->	Store BI	-.246	.058	-4.210	***	par_41
Technology Anxiety	<-->	Store SQ	-.244	.060	-4.075	***	par_42
Technology Anxiety	<-->	Perceived Usefulness	-.401	.054	-7.419	***	par_43
Technology Anxiety	<-->	Perceived Ease of Use	-.530	.051	-10.464	***	par_44
Need for Interaction	<-->	Knowledge	.014	.072	.198	.843	par_45
Need for Interaction	<-->	Perceived Enjoyment	.055	.067	.820	.412	par_46
Need for Interaction	<-->	TBSS QUALITY	.006	.069	.080	.936	par_47
Need for Interaction	<-->	TBSS SAT	.083	.069	1.208	.227	par_48
Need for Interaction	<-->	Store BI	.222	.066	3.377	***	par_49
Need for Interaction	<-->	Store SQ	.357	.064	5.533	***	par_50
Need for Interaction	<-->	Perceived Usefulness	-.028	.069	-.409	.683	par_51
Need for Interaction	<-->	Perceived Ease of Use	.091	.073	1.254	.210	par_52
Knowledge	<-->	Perceived Enjoyment	.305	.058	5.267	***	par_53
Knowledge	<-->	TBSS QUALITY	.394	.056	7.072	***	par_54
Knowledge	<-->	TBSS SAT	.423	.054	7.763	***	par_55
Knowledge	<-->	Store BI	.364	.056	6.522	***	par_56
Knowledge	<-->	Store SQ	.288	.060	4.790	***	par_57
Knowledge	<-->	Perceived Usefulness	.460	.053	8.703	***	par_58
Knowledge	<-->	Perceived Ease of Use	.571	.050	11.438	***	par_59
Perceived Enjoyment	<-->	TBSS QUALITY	.649	.038	17.027	***	par_60
Perceived Enjoyment	<-->	TBSS SAT	.780	.030	26.225	***	par_61
Perceived Enjoyment	<-->	Store BI	.251	.056	4.504	***	par_62
Perceived Enjoyment	<-->	Store SQ	.292	.056	5.234	***	par_63
Perceived Enjoyment	<-->	Perceived Usefulness	.678	.037	18.515	***	par_64
Perceived Enjoyment	<-->	Perceived Ease of Use	.644	.042	15.331	***	par_65
TBSS QUALITY	<-->	TBSS SAT	.927	.013	70.289	***	par_66
TBSS QUALITY	<-->	Store BI	.362	.053	6.819	***	par_67
TBSS QUALITY	<-->	Store SQ	.430	.051	8.366	***	par_68
TBSS QUALITY	<-->	Perceived Usefulness	.877	.018	48.290	***	par_69
TBSS QUALITY	<-->	Perceived Ease of Use	.825	.027	30.255	***	par_70
TBSS SAT	<-->	Store BI	.406	.051	7.918	***	par_71
TBSS SAT	<-->	Store SQ	.433	.051	8.433	***	par_72
TBSS SAT	<-->	Perceived Usefulness	.887	.018	50.462	***	par_73
TBSS SAT	<-->	Perceived Ease of Use	.864	.024	35.800	***	par_74
Store BI	<-->	Store SQ	.762	.028	27.639	***	par_75
Store BI	<-->	Perceived Usefulness	.346	.054	6.398	***	par_76

Appendix E-2c: Covariances for Information Kiosk Sample (Continued)

			Estimate	S.E.	C.R.	P	Label
Store BI	<-->	Perceived Ease of Use	.459	.052	8.814	***	par_77
Store SQ	<-->	Perceived Usefulness	.349	.055	6.306	***	par_78
Store SQ	<-->	Perceived Ease of Use	.512	.051	10.112	***	par_79
Perceived Usefulness	<-->	Perceived Ease of Use	.845	.026	32.561	***	par_80
eta8	<-->	eta3	.229	.070	3.290	.001	par_81
epj1	<-->	epj3	.429	.069	6.201	***	par_82
eta7	<-->	eta5	.195	.051	3.825	***	par_83

Appendix E-2d: Correlations for Information Kiosk Sample

			Estimate
Technology Anxiety	<-->	Need for Interaction	.080
Technology Anxiety	<-->	Knowledge	-.717
Technology Anxiety	<-->	Perceived Enjoyment	-.189
Technology Anxiety	<-->	TBSS QUALITY	-.367
Technology Anxiety	<-->	TBSS SAT	-.382
Technology Anxiety	<-->	Store BI	-.246
Technology Anxiety	<-->	Store SQ	-.244
Technology Anxiety	<-->	Perceived Usefulness	-.401
Technology Anxiety	<-->	Perceived Ease of Use	-.530
Need for Interaction	<-->	Knowledge	.014
Need for Interaction	<-->	Perceived Enjoyment	.055
Need for Interaction	<-->	TBSS QUALITY	.006
Need for Interaction	<-->	TBSS SAT	.083
Need for Interaction	<-->	Store BI	.222
Need for Interaction	<-->	Store SQ	.357
Need for Interaction	<-->	Perceived Usefulness	-.028
Need for Interaction	<-->	Perceived Ease of Use	.091
Knowledge	<-->	Perceived Enjoyment	.305
Knowledge	<-->	TBSS QUALITY	.394
Knowledge	<-->	TBSS SAT	.423
Knowledge	<-->	Store BI	.364
Knowledge	<-->	Store SQ	.288
Knowledge	<-->	Perceived Usefulness	.460
Knowledge	<-->	Perceived Ease of Use	.571
Perceived Enjoyment	<-->	TBSS QUALITY	.649
Perceived Enjoyment	<-->	TBSS SAT	.780
Perceived Enjoyment	<-->	Store BI	.251
Perceived Enjoyment	<-->	Store SQ	.292
Perceived Enjoyment	<-->	Perceived Usefulness	.678
Perceived Enjoyment	<-->	Perceived Ease of Use	.644
TBSS QUALITY	<-->	TBSS SAT	.927
TBSS QUALITY	<-->	Store BI	.362
TBSS QUALITY	<-->	Store SQ	.430
TBSS QUALITY	<-->	Perceived Usefulness	.877
TBSS QUALITY	<-->	Perceived Ease of Use	.825
TBSS SAT	<-->	Store BI	.406
TBSS SAT	<-->	Store SQ	.433
TBSS SAT	<-->	Perceived Usefulness	.887
TBSS SAT	<-->	Perceived Ease of Use	.864
Store BI	<-->	Store SQ	.762
Store BI	<-->	Perceived Usefulness	.346

Appendix E-2d: Correlations for Information Kiosk Sample (Continued)

			Estimate
Store BI	<-->	Perceived Ease of Use	.459
Store SQ	<-->	Perceived Usefulness	.349
Store SQ	<-->	Perceived Ease of Use	.512
Perceived Usefulness	<-->	Perceived Ease of Use	.845
eta8	<-->	eta3	.210
epj1	<-->	epj3	.475
eta7	<-->	eta5	.286

Appendix E-2e: Confidence Intervals for Information Kiosk Sample

			Estimate	S.E.	Confidence Intervals	
Technology Anxiety	<-->	Need for Interaction	.080	0.070	-0.060	0.220
Technology Anxiety	<-->	Knowledge	-.717	0.037	-0.791	-0.643
Technology Anxiety	<-->	Perceived Enjoyment	-.189	0.051	-0.632	-0.428
Technology Anxiety	<-->	TBSS QUALITY	-.367	0.059	-0.307	-0.071
Technology Anxiety	<-->	TBSS SAT	-.382	0.055	-0.477	-0.257
Technology Anxiety	<-->	Store BI	-.246	0.058	-0.362	-0.130
Technology Anxiety	<-->	Store SQ	-.244	0.060	-0.364	-0.124
Technology Anxiety	<-->	Perceived Usefulness	-.401	0.054	-0.509	-0.293
Technology Anxiety	<-->	Perceived Ease of Use	-.530	0.051	-0.632	-0.428
Need for Interaction	<-->	Knowledge	.014	0.072	-0.130	0.158
Need for Interaction	<-->	Perceived Enjoyment	.055	0.067	-0.079	0.189
Need for Interaction	<-->	TBSS QUALITY	.006	0.069	-0.132	0.144
Need for Interaction	<-->	TBSS SAT	.083	0.069	-0.055	0.221
Need for Interaction	<-->	Store BI	.222	0.066	0.090	0.354
Need for Interaction	<-->	Store SQ	.357	0.064	0.229	0.485
Need for Interaction	<-->	Perceived Usefulness	-.028	0.069	-0.166	0.110
Need for Interaction	<-->	Perceived Ease of Use	.091	0.073	-0.055	0.237
Knowledge	<-->	Perceived Enjoyment	.305	0.058	0.189	0.421
Knowledge	<-->	TBSS QUALITY	.394	0.056	0.282	0.506
Knowledge	<-->	TBSS SAT	.423	0.054	0.315	0.531
Knowledge	<-->	Store BI	.364	0.056	0.252	0.476
Knowledge	<-->	Store SQ	.288	0.060	0.168	0.408
Knowledge	<-->	Perceived Usefulness	.460	0.053	0.354	0.566
Knowledge	<-->	Perceived Ease of Use	.571	0.050	0.471	0.671
Perceived Enjoyment	<-->	TBSS QUALITY	.649	0.038	0.573	0.725
Perceived Enjoyment	<-->	TBSS SAT	.780	0.030	0.720	0.840
Perceived Enjoyment	<-->	Store BI	.251	0.056	0.139	0.363
Perceived Enjoyment	<-->	Store SQ	.292	0.056	0.180	0.404
Perceived Enjoyment	<-->	Perceived Usefulness	.678	0.037	0.604	0.752
Perceived Enjoyment	<-->	Perceived Ease of Use	.644	0.042	0.560	0.728
TBSS QUALITY	<-->	TBSS SAT	.927	0.013	0.901	0.953
TBSS QUALITY	<-->	Store BI	.362	0.053	0.256	0.468

Appendix E-2e: Confidence Intervals for Information Kiosk Sample (Continued)

			Estimate	S.E.	Confidence Intervals	
TBSS QUALITY	<-->	Store SQ	.430	0.051	0.328	0.532
TBSS QUALITY	<-->	Perceived Usefulness	.877	0.018	0.841	0.913
TBSS QUALITY	<-->	Perceived Ease of Use	.825	0.027	0.771	0.879
TBSS SAT	<-->	Store BI	.406	0.051	0.304	0.508
TBSS SAT	<-->	Store SQ	.433	0.051	0.331	0.535
TBSS SAT	<-->	Perceived Usefulness	.887	0.018	0.851	0.923
TBSS SAT	<-->	Perceived Ease of Use	.864	0.024	0.816	0.912
Store BI	<-->	Store SQ	.762	0.028	0.706	0.818
Store BI	<-->	Perceived Usefulness	.346	0.054	0.238	0.454
Store BI	<-->	Perceived Ease of Use	.459	0.052	0.355	0.563
Store SQ	<-->	Perceived Usefulness	.349	0.055	0.239	0.459
Store SQ	<-->	Perceived Ease of Use	.512	0.051	0.410	0.614
Perceived Usefulness	<-->	Perceived Ease of Use	.845	0.026	0.793	0.897

APPENDIX F - Structural Model (SEM) Results

Appendix F-1a: Unstandardized Regression Weights for Self-Checkout Sample

			Estimate	S.E.	C.R.	P	Label
Perceived Ease of Use	<---	Knowledge	.596	.100	5.940	***	par_28
Perceived Ease of Use	<---	Need for Interaction	-.266	.067	-3.967	***	par_29
Perceived Ease of Use	<---	Technology Anxiety	.091	.099	.927	.354	par_30
Perceived Usefulness	<---	Perceived Ease of Use	.910	.062	14.707	***	par_31
Perceived Enjoyment	<---	Perceived Ease of Use	.916	.058	15.772	***	par_32
TBSS QUALITY	<---	Perceived Usefulness	.396	.049	8.060	***	par_42
TBSS QUALITY	<---	Perceived Enjoyment	.479	.053	9.069	***	par_43
TBSS SAT	<---	TBSS QUALITY	1.068	.059	18.238	***	par_35
Store SQ	<---	TBSS QUALITY	2.153	.244	8.830	***	par_36
Store BI	<---	TBSS SAT	.042	.037	1.132	.258	par_33
Store BI	<---	Store SQ	.125	.012	10.175	***	par_34
TA07	<---	Technology Anxiety	1.175	.070	16.848	***	par_1
TA06	<---	Technology Anxiety	1.183	.072	16.330	***	par_2
TA05	<---	Technology Anxiety	.866	.067	12.931	***	par_3
TA03	<---	Technology Anxiety	.843	.075	11.302	***	par_4
TA02	<---	Technology Anxiety	1.019	.069	14.662	***	par_5
TA01	<---	Technology Anxiety	1.125	.073	15.463	***	par_6
NI04	<---	Need for Interaction	1.353	.055	24.387	***	par_7
NI01	<---	Need for Interaction	.870	.072	12.086	***	par_8
KN03	<---	Knowledge	1.032	.059	17.399	***	par_9
KN02	<---	Knowledge	1.094	.062	17.702	***	par_10
KN01	<---	Knowledge	.989	.062	15.852	***	par_11
PEJ04	<---	Perceived Enjoyment	1.000				
PEJ03	<---	Perceived Enjoyment	.919	.057	16.081	***	par_12
PEJ01	<---	Perceived Enjoyment	.816	.054	15.105	***	par_13
K_SQ02	<---	TBSS QUALITY	1.099	.055	19.884	***	par_15
K_SQ03	<---	TBSS QUALITY	1.116	.055	20.202	***	par_16
K_SQ04	<---	TBSS QUALITY	1.000				
K_SAT01	<---	TBSS SAT	.929	.036	25.508	***	par_17
K_SAT02	<---	TBSS SAT	.990	.036	27.676	***	par_18
K_SAT03	<---	TBSS SAT	1.000				
S_BI01	<---	Store BI	1.000				
S_BI02	<---	Store BI	1.185	.068	17.391	***	par_19
S_BI03	<---	Store BI	1.144	.049	23.595	***	par_20

**Appendix F-1a: Unstandardized Regression Weights for Self-Checkout Sample
(Continued)**

			Estimate	S.E.	C.R.	P	Label
SPO	<---	Store SQ	.562	.032	17.823	***	par_21
SPES	<---	Store SQ	3.029	.175	17.309	***	par_22
SPA	<---	Store SQ	1.000				
PU01	<---	Perceived Usefulness	1.000				
PU02	<---	Perceived Usefulness	1.131	.047	24.028	***	par_23
PU03	<---	Perceived Usefulness	1.008	.048	21.169	***	par_24
PEU03	<---	Perceived Ease of Use	1.000				
PEU02	<---	Perceived Ease of Use	.849	.057	14.900	***	par_25
PEU01	<---	Perceived Ease of Use	.940	.053	17.565	***	par_26
TA09	<---	Technology Anxiety	1.098	.068	16.124	***	par_41
TA08	<---	Technology Anxiety	.735	.073	10.039	***	par_44

Appendix F-1b: Standardized Regression Weights for Self-Checkout Sample

			Estimate
Perceived Ease of Use	<---	Knowledge	.510
Perceived Ease of Use	<---	Need for Interaction	-.228
Perceived Ease of Use	<---	Technology Anxiety	.078
Perceived Usefulness	<---	Perceived Ease of Use	.816
Perceived Enjoyment	<---	Perceived Ease of Use	.821
TBSS QUALITY	<---	Perceived Usefulness	.438
TBSS QUALITY	<---	Perceived Enjoyment	.530
TBSS SAT	<---	TBSS QUALITY	.967
Store SQ	<---	TBSS QUALITY	.542
Store BI	<---	TBSS SAT	.063
Store BI	<---	Store SQ	.679
TA07	<---	Technology Anxiety	.822
TA06	<---	Technology Anxiety	.804
TA05	<---	Technology Anxiety	.685
TA03	<---	Technology Anxiety	.613
TA02	<---	Technology Anxiety	.747
TA01	<---	Technology Anxiety	.775
NI04	<---	Need for Interaction	.999
NI01	<---	Need for Interaction	.627
KN03	<---	Knowledge	.849
KN02	<---	Knowledge	.859
KN01	<---	Knowledge	.796
PEJ04	<---	Perceived Enjoyment	.934
PEJ03	<---	Perceived Enjoyment	.761
PEJ01	<---	Perceived Enjoyment	.732
K_SQ01	<---	TBSS QUALITY	.893
K_SQ02	<---	TBSS QUALITY	.925
K_SQ03	<---	TBSS QUALITY	.934
K_SQ04	<---	TBSS QUALITY	.802
K_SAT01	<---	TBSS SAT	.911
K_SAT02	<---	TBSS SAT	.938
K_SAT03	<---	TBSS SAT	.903
S_BI01	<---	Store BI	.872
S_BI02	<---	Store BI	.788
S_BI03	<---	Store BI	.964
SPO	<---	Store SQ	.860
SPES	<---	Store SQ	.841
SPA	<---	Store SQ	.849
PU01	<---	Perceived Usefulness	.874
PU02	<---	Perceived Usefulness	.939
PU03	<---	Perceived Usefulness	.879

**Appendix F-1b: Standardized Regression Weights for Self-Checkout Sample
(Continued)**

			Estimate
PEU03	<---	Perceived Ease of Use	.868
PEU02	<---	Perceived Ease of Use	.739
PEU01	<---	Perceived Ease of Use	.823
TA09	<---	Technology Anxiety	.797
TA08	<---	Technology Anxiety	.557

Appendix F-2a: Unstandardized Regression Weights for Information Kiosk Sample

			Estimate	S.E.	C.R.	P	Label
Perceived Ease of Use	<---	Knowledge	.347	.081	4.288	***	par_28
Perceived Ease of Use	<---	Need for Interaction	-.064	.047	-1.381	.167	par_29
Perceived Ease of Use	<---	Technology Anxiety	-.157	.079	-1.997	.046	par_30
Perceived Usefulness	<---	Perceived Ease of Use	1.090	.071	15.372	***	par_31
Perceived Enjoyment	<---	Perceived Ease of Use	.951	.077	12.430	***	par_32
TBSS QUALITY	<---	Perceived Usefulness	.779	.057	13.595	***	par_42
TBSS QUALITY	<---	Perceived Enjoyment	.163	.037	4.435	***	par_43
TBSS SAT	<---	TBSS QUALITY	.958	.062	15.423	***	par_35
Store SQ	<---	TBSS QUALITY	2.140	.299	7.150	***	par_36
Store BI	<---	TBSS SAT	.079	.044	1.784	.074	par_33
Store BI	<---	Store SQ	.141	.011	13.412	***	par_34
TA07	<---	Technology Anxiety	1.065	.064	16.665	***	par_1
TA06	<---	Technology Anxiety	1.140	.072	15.909	***	par_2
TA05	<---	Technology Anxiety	.936	.068	13.846	***	par_3
TA03	<---	Technology Anxiety	.838	.070	11.969	***	par_4
TA02	<---	Technology Anxiety	.995	.063	15.844	***	par_5
TA01	<---	Technology Anxiety	.874	.076	11.432	***	par_6
NI04	<---	Need for Interaction	1.428	.059	24.394	***	par_7
NI01	<---	Need for Interaction	.791	.079	10.016	***	par_8
KN03	<---	Knowledge	.979	.058	16.846	***	par_9
KN02	<---	Knowledge	1.029	.062	16.633	***	par_10
KN01	<---	Knowledge	1.014	.067	15.212	***	par_11
PEJ04	<---	Perceived Enjoyment	1.000				
PEJ03	<---	Perceived Enjoyment	.783	.063	12.415	***	par_12
PEJ01	<---	Perceived Enjoyment	.807	.061	13.207	***	par_13
K_SQ01	<---	TBSS QUALITY	.967	.058	16.581	***	par_14
K_SQ02	<---	TBSS QUALITY	1.021	.054	18.983	***	par_15
K_SQ03	<---	TBSS QUALITY	1.030	.057	18.198	***	par_16
K_SQ04	<---	TBSS QUALITY	1.000				
K_SAT01	<---	TBSS SAT	1.001	.049	20.367	***	par_17
K_SAT02	<---	TBSS SAT	1.026	.050	20.584	***	par_18
K_SAT03	<---	TBSS SAT	1.000				
S_BI01	<---	Store BI	1.000				
S_BI02	<---	Store BI	1.095	.039	28.362	***	par_19
S_BI03	<---	Store BI	1.057	.031	34.485	***	par_20
SPO	<---	Store SQ	.615	.027	22.685	***	par_21
SPES	<---	Store SQ	2.863	.131	21.846	***	par_22
SPA	<---	Store SQ	1.000				
PU01	<---	Perceived Usefulness	1.000				
PU02	<---	Perceived Usefulness	1.070	.046	23.493	***	par_23
PU03	<---	Perceived Usefulness	1.083	.049	22.055	***	par_24

**Appendix F-2a: Unstandardized Regression Weights for Information Kiosk Sample
(Continued)**

			Estimate	S.E.	C.R.	P	Label
PEU03	<---	Perceived Ease of Use	1.000				
PEU02	<---	Perceived Ease of Use	.961	.074	13.050	***	par_25
PEU01	<---	Perceived Ease of Use	.982	.064	15.439	***	par_26
TA09	<---	Technology Anxiety	1.131	.071	15.979	***	par_41
TA08	<---	Technology Anxiety	.794	.074	10.682	***	par_44

Appendix F-2b: Standardized Regression Weights for Information Kiosk Sample

			Estimate
Perceived Ease of Use	<---	Knowledge	.401
Perceived Ease of Use	<---	Need for Interaction	-.074
Perceived Ease of Use	<---	Technology Anxiety	-.182
Perceived Usefulness	<---	Perceived Ease of Use	.894
Perceived Enjoyment	<---	Perceived Ease of Use	.683
TBSS QUALITY	<---	Perceived Usefulness	.789
TBSS QUALITY	<---	Perceived Enjoyment	.189
TBSS SAT	<---	TBSS QUALITY	.956
Store SQ	<---	TBSS QUALITY	.433
Store BI	<---	TBSS SAT	.082
Store BI	<---	Store SQ	.729
TA07	<---	Technology Anxiety	.817
TA06	<---	Technology Anxiety	.791
TA05	<---	Technology Anxiety	.721
TA03	<---	Technology Anxiety	.643
TA02	<---	Technology Anxiety	.788
TA01	<---	Technology Anxiety	.619
NI04	<---	Need for Interaction	.999
NI01	<---	Need for Interaction	.536
KN03	<---	Knowledge	.836
KN02	<---	Knowledge	.829
KN01	<---	Knowledge	.778
PEJ04	<---	Perceived Enjoyment	.991
PEJ03	<---	Perceived Enjoyment	.690
PEJ01	<---	Perceived Enjoyment	.730
K_SQ01	<---	TBSS QUALITY	.834
K_SQ02	<---	TBSS QUALITY	.917
K_SQ03	<---	TBSS QUALITY	.891
K_SQ04	<---	TBSS QUALITY	.792
K_SAT01	<---	TBSS SAT	.919
K_SAT02	<---	TBSS SAT	.925
K_SAT03	<---	TBSS SAT	.821
S_BI01	<---	Store BI	.922
S_BI02	<---	Store BI	.920
S_BI03	<---	Store BI	.978
SPO	<---	Store SQ	.923
SPES	<---	Store SQ	.903
SPA	<---	Store SQ	.870
PU01	<---	Perceived Usefulness	.883
PU02	<---	Perceived Usefulness	.912
PU03	<---	Perceived Usefulness	.885

**Appendix F-2b: Standardized Regression Weights for Information Kiosk Sample
(Continued)**

			Estimate
PEU03	<---	Perceived Ease of Use	.820
PEU02	<---	Perceived Ease of Use	.702
PEU01	<---	Perceived Ease of Use	.799
TA09	<---	Technology Anxiety	.793
TA08	<---	Technology Anxiety	.587

VITA

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