

# A Longitudinal Study on Self-Service Technology: Understanding Customers' Post-Adoption Experience

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# **A Longitudinal Study on Self-Service Technology: Understanding Customers' Post-Adoption Experience**

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**A Thesis Submitted in Partial Fulfillment of the Requirements for the  
Degree of Doctor of Philosophy**

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Over the past decade, the proliferation of self-service technologies (SSTs) in service industries has attracted considerable scholarly attention. An abundance of research has investigated how customers evaluate a new SST and what drives the initial trial. However, little is known about how customers interact with and adapt to an SST following their first experience. It is argued that while the initial trial is a critical step in the adoption process, the long term viability of an SST and its eventual success depend on its regular use. Therefore, in order to fill the literature gap and shed light on the issue, this research is undertaken with an overall objective to investigate customers' post-adoption experience with an SST from a longitudinal perspective. To understand this complex, dynamic phenomenon, three specific research objectives are proposed and three empirical studies are conducted in Australia with recently installed supermarket self-checkout kiosks as the focal SST under examination.

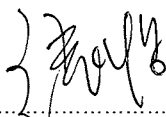
Study 1 explores situational influences on customers' choice between self-service and personal service. Through interview and observation, it is found that customers' choice is influenced by three major situational factors: perceived waiting time, perceived task complexity, and companion influence. Results also show that past experiences influence SST attitudes and behaviours in a more complex manner than SST characteristics and other individual difference variables. Study 2 uses a longitudinal design to examine in particular how habit, self-efficacy, and satisfaction impact on continued SST usage over time. The results show that, as experience accumulates and learning occurs, customers' decision to continue using an SST is initially rational driven (self-efficacy), then largely emotional driven (satisfaction), and finally becomes habitual (habit). Study 3 adopts an econometric modelling approach to focus on how a habit of SST usage is developed and what drives its formation. The results indicate a significant carryover effect, suggesting that habit is formed cumulatively. In addition to satisfaction and self-efficacy that have been examined in Study 2, past usage (frequency and recency) and need for interaction are also found to impact on habit development. Furthermore, the findings reveal some gender differences in habit development.

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Last but not least, my sincere gratitude to my wife and mother, for their understanding and support of me in the completion of this dissertation, for always being proud of me.

## **ABSTRACT**

Over the past decade, the proliferation of self-service technologies (SSTs) in service industries has attracted considerable scholarly attention. An abundance of research has investigated how customers evaluate a new SST and what drives the initial trial. However, little is known about how customers interact with and adapt to an SST following their first experience. It is argued that while the initial trial is a critical step in the adoption process, the long term viability of an SST and its eventual success depend on its regular use. Therefore, in order to fill the literature gap and shed light on the issue, this research is undertaken with an overall objective to investigate customers' post-adoption experience with an SST from a longitudinal perspective. To understand this complex, dynamic phenomenon, three specific research objectives are proposed and three empirical studies are conducted in Australia with recently installed supermarket self-checkout kiosks as the focal SST under examination.

Study 1 explores situational influences on customers' choice between self-service and personal service. Through interview and observation, it is found that customers' choice is influenced by three major situational factors: perceived waiting time, perceived task complexity, and companion influence. Results also show that past experiences influence SST attitudes and behaviours in a more complex manner than SST characteristics and other individual difference variables. Study 2 uses a longitudinal design to examine in particular how habit, self-efficacy, and satisfaction impact on continued SST usage over time. The results show that, as experience accumulates and learning occurs, customers' decision to continue using an SST is initially rational driven (self-efficacy), then largely emotional driven (satisfaction), and finally becomes habitual (habit). Study 3 adopts an econometric modelling approach to focus on how a habit of SST usage is developed and what drives its formation. The results indicate a significant carryover effect, suggesting that habit is formed cumulatively. In addition to satisfaction and self-efficacy that have been examined in Study 2, past usage (frequency and recency) and need for interaction are also found to impact on habit development. Furthermore, the findings reveal some

gender differences in habit development.



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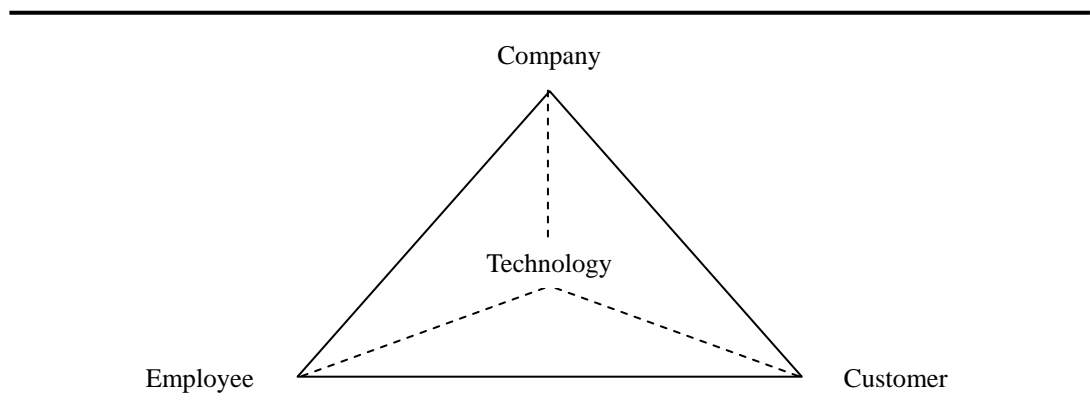
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## CHAPTER 1 INTRODUCTION

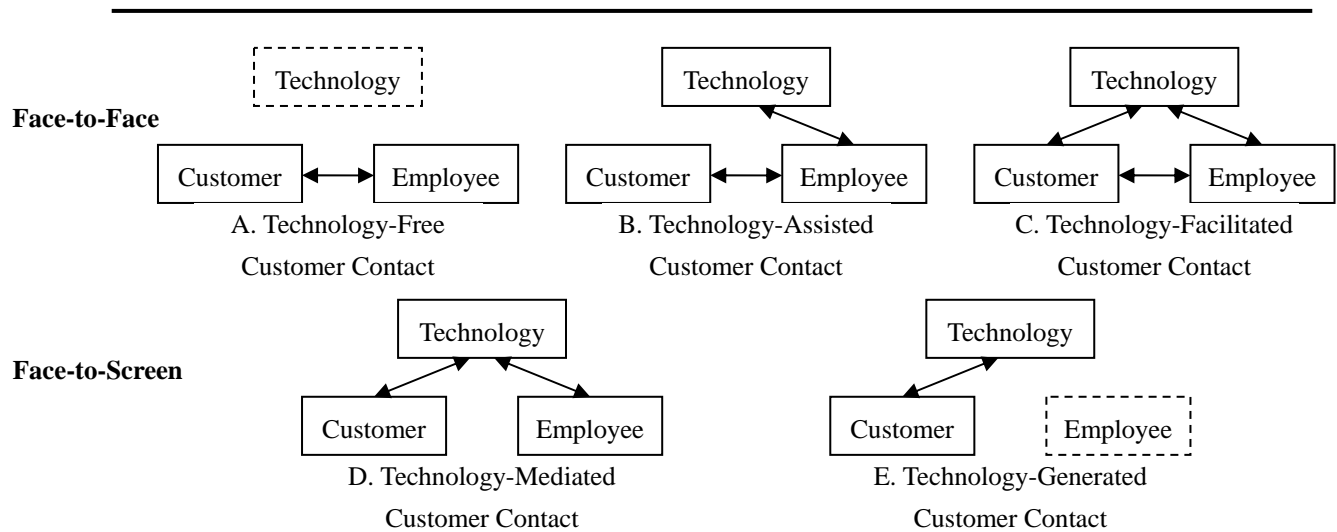
### 1.1 OVERVIEW OF THE RESEARCH AREA

Over the past decade, the infusion of technology has dramatically changed the nature of service products, and in particular the service delivery process (e.g., Bitner, Brown, and Meuter 2000; Salomann, Kolbe, and Brenner 2006). For many high to medium-contact services such as retail banking, travel/hotel booking and airline check-in, traditional “high-touch and low-tech” interpersonal service encounters have been supplemented, or even replaced, by “high-tech and low-touch” technological interfaces (e.g., self-service kiosks, Internet/telephone based services). In order to reflect this profound evolution in the services sector, Parasuraman (1996) modified the Services Marketing Triangle and proposed the Services Marketing Pyramid with “technology” being the very important fourth end point (Figure 1.1). Moreover, Froehle and Roth (2004) proposed five customer contact modes according to the different roles technology plays in a service encounter (Figure 1.2). In the business world, a noticeable manifestation of the above advancements is the introduction of self-service technologies (SSTs).

**Figure 1.1 The Services Marketing Pyramid**



Source: Parasuraman, A. (1996), "Understanding and Leveraging the Role of Customer Service in External, Interactive and Internal Marketing," in *Frontiers in Services Conference*, Nashville, TN.

**Figure 1.2 Modes of Customer Contact in Relation to Technology**

Source: Froehle, Craig M. and Aleda V. Roth (2004), "New Measurement Scales for Evaluating Perceptions of the Technology-Mediated Customer Service Experience," *Journal of Operations Management*, 22 (1), 1-21.

SSTs are defined as those "technological interfaces that enable customers to produce a service independent of direct service employee involvement" (Meuter et al. 2000, p.50). Examples include automated teller machines (ATMs), hotel self check-out systems, self check-in kiosks in airports, pay-at-the-pump terminals, just to name a few (see Figure 1.3). With the development of information technology (especially the Internet), recent years have witnessed the proliferation of SSTs across a variety of services industries, which has drastically changed the way services organizations interact with their customers (Bitner, Ostrom, and Meuter 2002). By using those technological interfaces instead of receiving services from frontline staff, the customer actively participates in the service production and delivery process and thus is, in effect, a co-producer of the service. This seems to reflect a fundamental shift from the traditional goods-centered dominant logic to the emerging services-centered dominant logic in marketing in recent years, which has significant impact on marketing research and practice (e.g., Vargo and Lusch 2004). According to this new perspective, the customer is always a co-producer of services and involved in the production of value. Although this view of the customer

as a co-producer is not new (see Bendapudi and Leone 2003 for a review), what is new is the recognition that encouraging customers to be "co-producers" in this sense is the next frontier in competitive effectiveness. Customer participation in the production and delivery of services nowadays appears to be growing and one evidence is the increased use of SSTs.

**Figure 1.3 Categories and Examples of SSTs**

Technology Purpose	Technology			
	Telephone/IVR	Internet	Interactive Kiosks	Video/CD
Customer Service	Telephone banking Telephone booking	Internet banking Online check-in Package tracking	ATMs Hotel check-out Airport check-in	
	Telephone banking Telephone booking	Internet banking Online shopping Brokerage service	ATMs Hotel check-out Pay-at-the-pump	Home video ordering
Self-Help/Education	Information hotline	Distance learning	Tourist information	Video/CD-based training

Source: Adapted from Meuter, Matthew L., Amy L. Ostrom, Robert I. Roundtree, and Mary Jo Bitner (2000), "Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters," *Journal of Marketing*, 64 (3), 50-64.

For service firms, although the initial investments in SSTs are often resource-intensive in terms of both time and money, the payoff of such technology-based self-services is quite obvious. By replacing the service personnel with technological interfaces, service companies are able to reduce labour costs, provide a consistent level of service quality and thus increase customer satisfaction and loyalty, and reach new customer segments (e.g., Bitner, Brown, and Meuter 2000; Dabholkar 1996; Salomann, Kolbe, and Brenner 2006). However, in reality, not all SSTs are successful and not all customers are willing adopters (e.g., Bitner, Ostrom, and Meuter 2002). Therefore, in order to benefit from the implementation of SSTs, managers are particularly interested in what drives the initial adoption of a new SST.

In the services domain, because of its theoretical significance and practical importance, SST has received considerable scholarly attention since Parasuraman's (1996) proposal of the Services Marketing Pyramid (e.g., Curran and Meuter 2005; Meuter et al. 2005; Oyedele and Simpson 2007; Reinders, Dabholkar, and Frambach 2008; van Beuningen et al. 2009). Extensive research has been done to investigate how customers evaluate a new SST and what drives the initial adoption decision. In these studies, the key variable of interest is SST adoption intention, and the primary research objective is to explore factors that impact on it. The major findings suggest two categories of determinants of SST adoption intention: SST characteristics (e.g., usefulness, ease of use, convenience, control) and individual differences (e.g., technology readiness, need for human interaction), with the former being better predictors than the latter in general (e.g., Dabholkar 1996; Meuter et al. 2005) (see Chapter 3 for a detailed review of previous SST studies).

While these studies have significantly contributed to our understanding of what drives the initial adoption of an SST, they nevertheless share limitations that call for further investigation. First and foremost, as noted above, the focus of prior SST studies has been primarily on the initial adoption. Little is known about customers' post-adoption experience and few studies have focused explicitly on customers' continued use of SSTs. It is still not clear how customers interact with and adapt to an SST after the initial adoption and how this dynamic process results in continued use. While the initial adoption is an important first step, it is argued that the long term viability of an SST and its eventual success depend on its regular use rather than first-time use (Bhattacharjee 2001; Eriksson and Nilsson 2007). This has prompted some scholars to suggest that future SST studies should shift the focus from initial adoption to repeated use (e.g., Curran and Meuter 2005; Meuter et al. 2005).

Secondly, with few exceptions (e.g., Dabholkar and Bagozzi 2002), most previous SST studies have focused on the direct effects of antecedent variables on SST adoption (i.e., SST characteristics and individual differences). However, scholars have suggested that

hypothesizing direct effects may be somewhat redundant and obvious (Dabholkar and Bagozzi 2002), and it is much more meaningful to investigate the moderating effects of external factors, such as situational influences. In an SST context today, SST is often just one of the multiple ways from which a customer may choose for delivery of a full service (e.g., Internet banking) or part of a service (e.g., supermarket self-service checkout). Hence, a customer's decision to use an SST is more likely to be based on a comparative situational evaluation of all available service delivery options rather than on an absolute evaluation of an SST. Thus, the investigation of situational factors that affect people's choice between self-service and personal service is worthwhile. Moreover, from the viewpoint of service firms, the purpose of introducing self-service is certainly not to entirely replace the traditional personal service, but rather to provide a choice and a sense of control, and thereby enhance the overall customer experience (e.g., Salomann, Kolbe, and Brenner 2006). Hence, instead of focusing on the direct drivers of SST adoption, it is more insightful to understand *under what conditions* customers would use self-service as opposed to personal service.

Finally, most previous studies have focused on behavioural intentions rather than actual behaviour (e.g., Curran, Meuter, and Surprenant 2003; Dabholkar 1996; Dabholkar and Bagozzi 2002). The risk is that intentions do not always lead to action (e.g., Ajzen 1991; e.g., Ajzen and Madden 1986). This is especially true when SST is studied in situations where multiple service delivery options are offered. For instance, a passenger who is not keen to use the self-checkin kiosk at the airport might actually use it if he or she was in a hurry to catch a flight and/or there was a long queue at the checkin counter. Furthermore, in the context of repeated behaviour, the use or nonuse of an SST may become a force of habit rather than an intentional action, and accordingly intentions may lose its power in predicting actual behaviour (Verplanken et al. 1994; Wittenbraker, Gibbs, and Kahle 1983). In the SST literature, a good exception is Meuter et al.'s (2005) work, which goes beyond the emphasis on behavioural intentions and focuses on actual behaviour.



## 1.2 THE CURRENT RESEARCH

To fill the literature gaps, the current research is conducted with the overall objective to study customers' post-adoption experience with an SST from a longitudinal perspective. This is achieved by addressing the following three more specific sub-objectives:

- a) To explore situational influences on customers' actual choice between SST service and personal service after the initial SST adoption.
- b) To develop and test a dynamic post-adoption SST model that focuses explicitly on customers' continued use of an SST.
- c) To investigate how a habit of SST usage is formed and what drives its formation.

To achieve the three research objectives, three empirical studies are carried out. Study 1 addresses the first objective by conducting a mixed qualitative study in a retail setting (i.e., supermarket self-checkout SST). It uses the Theory of Reasoned Action (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) and the Theory of Planned Behaviour (Ajzen 1991; Ajzen and Madden 1986) as foundational theories, but extends them by exploring potential moderating factors in an SST context. Results from 209 observations and 47 interviews show that the attitude-behaviour link is somewhat weak in situations when multiple service delivery options are offered, and customers' actual choice between SST service and personal service is strongly influenced by three situational factors, namely perceived waiting time, perceived task complexity, and companion influence. Moreover, Study 1 also examines the impact of customers' prior focal product and product-norm experience on their current SST attitudes and behaviour.

Study 2 addresses the second research objective by drawing on Triandis' (1977; 1980) theory of behaviour, satisfaction research, and Bandura's (1997; 2001) Social Cognitive Theory to develop a model that focuses on customers' continued SST use. The model incorporates *intention* and *habit* as two different mechanisms underlying the dynamic and complex post-adoption process. While the former captures the deliberate, conscious aspect, the latter captures the automatic, unconscious aspect. Moreover, *satisfaction* and

*self-efficacy* are incorporated as the affective and cognitive drivers of intention and habit. The central theme is that, as experience accumulates and learning occurs, a customer's actual continued use of an SST is initially rational (self-efficacy), then largely emotion driven (satisfaction), and finally becomes habitual (habit). In addition to continued use, word-of-mouth (WOM) is also incorporated as another outcome variable. The model is empirically tested using a three-wave longitudinal study tracking customers' experience with a new SST immediately following the initial trial.

Since the concept of "habit" is particularly relevant when studying repeated behaviour and it has been rarely investigated in the SST and general marketing literature, Study 3 focuses on how a habit of SST usage is formed and what drives its formation. It draws on previous habit research in the social psychology literature to identify key antecedents of habit and studies how these antecedents impact on habit formation in an SST context. An econometric modeling approach is adopted with the panel data collected in Study 2. Three panel regression models are estimated to establish a general relationship between habit and its antecedents across individuals and times. While habit is just one of the four key variables in Study 2 that capture the dynamic, complex post-adoption process, it is the focal dependent variable in Study 3 and a more complete set of antecedent variables are included. Furthermore, potential individual differences in habit development are also investigated.

All the three empirical studies in this research are conducted in a supermarket retailing setting with the self-checkout kiosk as the focal SST under investigation. This research context is selected based on the research objectives to be achieved. Firstly, since Study 1 focuses on customers' actual choice of self-service in situations where multiple delivery options are offered, the self-checkout SST is an ideal setting in that both the self-service option and the personal service option are present at the time of checkout and customers are free to choose either. Secondly, as it is a relatively new SST in Australia, it provides an opportunity to approach a sufficient number of new users and track their adaptation process from the beginning, which is the main focus of Study 2. Moreover, supermarket

shopping is a relatively high frequency household activity, and therefore the use of the self-checkout SST is likely to become a frequent and regular activity. This facilitates the empirical testing for the habitualization of SST behaviour in Study 3.

### **1.3 RESEARCH CONTRIBUTIONS**

In achieving the research objectives, this dissertation makes conceptual, methodological, and managerial contributions to the existing literature.

#### **a) Exploring the moderating effects of situational factors**

The majority of prior SST studies have focused on examining the direct effects of SST characteristics and individual differences on SST attitudes and intentions (e.g., Curran and Meuter 2007; Curran, Meuter, and Surprenant 2003; Walker and Johnson 2006). In general, results show that customers' intentions to use an SST are primarily determined by their attitudes toward the use, which are then determined by two sets of antecedents: SST characteristic and individual difference variables. While this relationship has been well established in the literature, it is argued in this research that when investigating the actual use of an SST in a multiple service delivery context, attitude and intention alone are not sufficient as situational factors may exert moderating effects. Thus, Study 1 goes beyond the direct effect and explores the moderating effect of situational factors. Hence, the focus shifts from a "why" question to a "when" (or under what conditions?) question. With two exceptions in the literature (Bateson 1985; Dabholkar and Bagozzi 2002), this area has not been studied. The findings reveal three situational factors that impact on customers' choice between SST service and personal service. While perceived waiting time is not new but, rather, consistent with previous research, it is the first time that perceived task complexity and companion influence have been identified as two situational factors in the SST context.

#### **b) Focusing on actual SST behaviour rather than intentions**

With few exceptions (McKechnie, Winkhofer, and Ennew 2006; Meuter et al. 2005;

Weijters et al. 2007), most prior empirical SST studies, implicitly or explicitly, use behavioural intentions as a proxy of the actual SST behaviour. While this is convenient in terms of measurement, it has conceptual flaws in that intentions do not always lead to action and actual behaviour is also determined by other factors in addition to intentions. Therefore, in order to go beyond the emphasis on behavioural intentions and focus on actual behaviour, Study 1 and Study 2 explicitly measure customers' actual choice/use of an SST as well as their choice/use intentions, which has both theoretical and practical appeals. Theoretically, the inclusion of actual behaviour provides an opportunity for the exploration of situational influences in the attitude – behaviour relationship in Study 1 and the investigation of additional drivers of continued use (i.e., habit) in Study 2. Practically, it is the actual use of the SST rather than the attitudes or intentions that matters to service companies.

#### c) Developing a dynamic post-adoption SST model

A key difference and contribution of the current research is its post-adoption perspective. In contrast to most previous SST studies that centre on the initial adoption (e.g., Meuter et al. 2005), this study focuses on the processes via which customers' prior experiences lead to subsequent continued use. However, it may be argued that continued use of an SST is similar to repurchase of a product or revisitation of a website. While this is true, most revisitation studies use pre-adoption models (e.g., TAM) to explain post-adoption behaviours (e.g., Gefen, Karahanna, and Straub 2003; Koufaris 2002), and repurchase studies focus primarily on the role of satisfaction (see Seiders et al. 2005; Szymanski and Henard 2001 for a review). However, research shows that the initial adoption and continued use are affected by different factors (e.g., Bhattacharjee and Premkumar 2004; Karahanna, Straub, and Chervany 1999) and that there may be other factors influencing continued use in addition to satisfaction (Eriksson and Nilsson 2007; Hsu, Ghiu, and Ju 2004). Therefore, Study 2 (longitudinal study) develops a dynamic post-adoption SST model that explicitly focuses on customers' continued use of an SST over time. The model includes intention and habit as two distinct mechanisms driving continued use. It

also incorporates satisfaction and self-efficacy as the affective and cognitive drivers of intention and habit. It is expected that the relative impact of intention and habit on continued use and that of satisfaction and self-efficacy on intention will change over time as customers gain experience with an SST. So far no study has simultaneously included habit, intention, satisfaction, and self-efficacy, and tested their changing influences. Therefore, this study provides a more complete and dynamic picture of customers' post-adoption continued use of SSTs.

d) Highlighting the role of habit in repeated behaviour

The concept of habit is not new in social psychology (e.g., Aarts and Dijksterhuis 2000; Aarts, Verplanken, and van Knippenberg 1998; Klockner, Matthies, and Hunecke 2003), but it has yet to be examined in marketing. This is likely due to the fact that the field is dominated by purely cognitive approaches where decisions and actions are deliberately made. Examples include the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), and the Technology Acceptance Model (TAM), in which behavioural intention is the key variable of interest. This has prompted Bargh (2002) to suggest that the next wave of consumer research should centre on “the assessment of how much of a role nonconscious influences play in real life in decisions and behavior that are of real consequence to the individual” (p.280). Research has shown that in predicting repeated behaviour, habit is more powerful than other variables such as intentions and attitudes (Verplanken et al. 1994; Wittenbraker, Gibbs, and Kahle 1983). Because of its relevance and importance, Study 2 models habit as another key driver of behaviour in addition to intentions and examines its changing influence on behaviour in the context of continued SST use. Moreover, to further understand how a habit of SST usage is formed, Study 3 models habit as the focal dependent variable and investigates its relationships with the antecedents. Both studies highlight the significant role of habit in repeated behaviour in an SST context.

e) Methodological contributions

A variety of advanced methods are adopted in this research to address different research objectives in a most appropriate way, which adds to the rigor and validity of the results. Since Study 1 is an exploratory one that has little previous research to draw on, a mixed qualitative design is used, which involves nonparticipant observations and one-on-one interviews. Although observation is not adopted as often as a survey or an experiment in marketing research, it proves to be useful in this study. The advantage is that it captures the actual phenomenon rather than relying on reconstructed or contrived versions of it (Tombs and McColl-Kennedy 2010). Therefore, there is little memory error or bias. Its combination with the interview data provides more reliable and valid results. Interview collects rich and detailed subjective opinions, whereas observation provides supporting objective evidence.

Study 2 uses a three-wave longitudinal design, which enables the tracking of customers' post-adoption experience and the examination of changing effects over time. With one exception (Weijters et al. 2007), all previous SST studies adopt a cross-sectional method. This may not be a problem given that these studies focus on the drivers of SST adoption and therefore only need a snapshot of a customer's perception and behaviour at a single point in time. However, for post-adoption experiences, a cross-sectional design fails to capture the dynamic, complex nature of the phenomenon and restricts the investigation to simply testing unidirectional relationships. Thus, a preferred method is a longitudinal study that is able to capture the temporal changes in the relationships between variables. By investigating the changing influences over time of satisfaction and self-efficacy on habit and intention, and ultimately on actual behaviour, the current research provides a better understanding of the complex, dynamic post-adoption phenomenon.

To examine the relationships between habit and its drivers, Study 3 uses an econometric modeling approach and estimates three panel regression models (the pooled OLS model, the fixed effect model, and the random effect model). While this approach is extensively used in brand choice modeling (e.g., Ailawadi, Gedenk, and Neslin 1999; Neelamegham and Jain 1999), it is not so popular in services research because panel data often are not

so readily available in services contexts (see Bolton, Kannan, and Bramlett 2000; Harris and Uncles 2007 for exceptions). Compared to multiple regressions with cross-sectional data, this approach has obvious advantages in that panel regression models can account for various unobserved heterogeneity (individual or time difference) in two ways (fixed or random effect) (Chintagunta 1993), which makes the results robust across individuals and/or times.

f) Managerial contribution

By focusing on customers' post-adoption SST experience, the three empirical studies of the current research can contribute to managers' knowledge and understanding of how to best manage and coordinate multiple service delivery options (with SST being one of them). Today, more and more service companies are providing the new SST service in addition to the traditional personal service to customers. For most of them, the purpose of introducing SSTs is certainly not to entirely replace the personal service, but rather to provide customers with a choice and a sense of control, and thereby enhance the overall customer experience, as well as increase service efficiency. Hence, it is a challenge for managers to get the balance between multiple service delivery options right and at the same time get customers to use the SST service regularly. The results of this dissertation should shed some light on this issue by showing managers the contingency factors that impact on customers' choice between multiple service delivery options and the driving forces that compel customers to increase SST usage over time.

## **1.4 STRUCTURE OF THESIS**

This chapter provides an overview of the research area, followed by the identification of major literature gaps. To fill these gaps, three research objectives are proposed and three empirical studies are introduced to address the respective objectives. Finally, the chapter concludes with a highlight of major conceptual and methodological contributions of the current research.

The balance of the thesis is organized as follows. Chapters 2, 3, and 4 present the three empirical studies: Study 1, Study 2, and Study 3, respectively. While these studies are interrelated in the sense that they share the same overall objective to study customers' post-adoption experience with an SST, they may be read separately as each study has its own specific research objective. Chapter 5 summarizes key findings of the three studies, discusses the managerial implications, and suggests the areas for further research.



## **CHAPTER 2 CUSTOMER CHOICE OF SELF-SERVICE TECHNOLOGY: THE ROLES OF SITUATIONAL INFLUENCES AND PAST EXPERIENCE**

### **2.1 INTRODUCTION**

With advances in information technology, there has been a proliferation of self-service technologies (SSTs) across the services sector in the past decade (Salomann, Kolbe, and Brenner 2006; Xinyuan, Mattila, and Tao 2008). SSTs are "technological interfaces that enable customers to produce a service independent of direct service employee involvement" (Meuter et al. 2000, p.50). Examples include ATMs, self-checkout machines in supermarkets, self-check-in kiosks at airports, ticket vending machines at railway stations, and various Internet/telephone-based self-services such as online hotel booking and telephone banking.

The introduction of SSTs has dramatically changed the way in which service companies interact with customers. The traditional "high-touch and low-tech" personal encounters have now been supplemented by the "high-tech and low-touch" technological interfaces (Bitner, Brown, and Meuter 2000; Froehle and Roth 2004). This means that, in many instances, customers now have a choice of the way in which they want to receive services (i.e., self-service, personal service, or a combination of the two). For example, a passenger travelling light sometimes may use the self-check-in kiosk to avoid a long queue at the check-in counter but may go back to the check-in counter when he or she has a lot of luggage to check in. While the flexibility is good for customers, it can be quite challenging for managers. In order to better allocate resources to achieve productivity gains and at the same time manage the customer experience, it is therefore important for a service company to understand under what circumstances customers would use the self-service option versus the personal service option. Unfortunately, despite extensive research on SST adoption, little has been done to shed light on this issue. Hence, the primary purpose of this study is to explore situational factors that might moderate a customer's actual choice between self-service and personal service.

Thus, this research is conducted in situations in which multiple service delivery options are available to customers and SST is just one of them.

In addition, as customers become increasingly exposed to a range of SSTs introduced by different service companies, their past SST experiences might be expected to exert some influence on their subsequent SST attitudes and behaviour. For example, it would not be unexpected that a bad first-time experience with an SST could lead to a customer never using it again. On the other hand, past positive experience with an SST (e.g., online flight check-in) might lead a customer to try a new one (e.g., online hotel reservation) as the technologies are similar. Although previous SST research has investigated the impact of various individual differences (i.e., customer demographics and psychographics) on SST adoption (e.g., Meuter et al. 2005; Nilsson 2007), focal product and product-norm experiences as important individual difference variables have yet to receive attention (e.g., McKechnie, Winkhofer, and Ennew 2006). It is still not clear if, and how, a customer's previous focal product and product-norm experiences have an impact on their current SST attitudes and behaviour. Therefore, a second purpose of this paper is to explore the impact of past experiences on current SST attitudes and behaviour.

The balance of the paper is organised as follows. First, prior SST research is reviewed and critiqued, from which our research objectives are proposed. Second, a detailed description of data collection and analysis methodology is provided. Empirical results are then presented with key findings highlighted. The paper concludes with a discussion of major findings, theoretical contributions, managerial implications, limitations, and future directions.

## **2.2 LITERATURE REVIEW**

Service encounters are the building blocks in service research. They have traditionally been defined as critical moments of interaction between a customer and a service firm (Shostack 1985). For many customers, their primary experiences with service firms are

interactions with frontline employees. Therefore, at the core of a service encounter is the interpersonal contact between a customer and a frontline employee. Research on service encounters has shown a critical role of this interpersonal aspect in determining customer experience. A positive interaction between a customer and a frontline employee has a positive impact on service quality (e.g., Dabholkar, Thorpe, and Rentz 1996), customer satisfaction (e.g., Bitner, Booms, and Tetreault 1990), customer loyalty (e.g., Vesel and Zabkar 2010), and positive word-of-mouth (e.g., Keaveney 1995).

Although service encounters have traditionally been conceptualized as “high-touch and low-tech”, the infusion of technology in recent years has dramatically changed its nature (Bitner, Brown, and Meuter 2000). In the service sector, many traditional interpersonal encounters have now been supplemented or even replaced by technological interfaces (i.e., SSTs) via which customers can service themselves without direct involvement of service employees. According to Meuter et al. (2000), there are four main types of SSTs: telephone-based (e.g., telephone banking), Internet-based (e.g., online shopping), kiosk-based (e.g., ATMs), and Video/CD-based (e.g., CD-based training). Companies provide SSTs for broadly three purposes: customer service (e.g., online flight check-in), direct transaction (e.g., online hotel booking), and self-help (e.g., information telephone line). While the introduction of SSTs can help companies reduce labour costs and reach new customer segments (Bitner, Ostrom, and Meuter 2002), research shows that the lack of interpersonal contact might result in reduced customer loyalty through weakened social bonds between the customer and the firm (Selnes and Hansen 2001).

In addition to changing the nature of service encounters, the widespread implementation of SSTs is also altering the service delivery structure. More and more service firms are becoming multi-channel service providers by having both the new SST channel and the traditional interpersonal channel. This is especially true in the retail sector, where many retailers now provide online shopping (a new SST channel) as well as in-store shopping (the traditional interpersonal channel) (e.g., Birgelen, Jong, and Ruyter 2006; Lee and Tan 2003). Moreover, even within the in-store shopping channel, in some stores for

example, customers now have a choice of checking out through a checkout counter (a personal service option) or a self-checkout machine (a self-service option). Here it is important to recognise the difference between “multi-channel” and “multiple-channel” marketing (Rangaswamy and Bruggen 2005). The former refers to the situation in which a firm provides a number of options from which a customer is free to choose and the same customer may choose different channels to interact with the firm at different times. “Multiple-channel” marketing, however, is where a firm interacts with different customer segments through different channels (e.g., using personal selling for large customers and retailers for small customers). We adopt the “multi-channel” concept as in most cases SST (e.g., online shopping) is just one of the service channels available to the same customer. It is also worth noting that not all SSTs can be viewed as a service channel. For example, in a retail setting, e-retailing is an SST and a service channel as well in that via e-retailing a customer can complete a core service (i.e., shopping). On the other hand, a self-checkout machine only provides part of a service (i.e., checkout) and therefore it is an SST but not a service channel from the viewpoint of a service firm. However, no matter whether an SST is a complete service channel or not, it offers a new and often convenient alternative service delivery option to customers.

As SST is drastically changing the nature of service encounters and the structure of service delivery, it attracts considerable scholarly attention. To date extensive research has been undertaken to understand customer experience with SST service encounters in a range of contexts such as airlines (e.g., Harris, Mohr, and Bernhardt 2006; Liljander et al. 2006), retailing (e.g., Forbes, Kelley, and Hoffman 2005; Weijters et al. 2007), personal banking (e.g., Curran and Meuter 2007; Snellman and Vihtkari 2003), hotels (e.g., Beatson, Coote, and Rudd 2006; Oyedele and Simpson 2007), and libraries (e.g., Xinyuan, Mattila, and Tao 2008). In these studies, two key variables are behavioural intentions to use an SST and attitudes toward use, with the main objective being to examine the determinants of those attitudes and intentions. A meta-analysis of empirical results shows that a person’s intentions to use an SST are primarily determined by his or her attitudes toward use, which are then determined by two categories of antecedents:

SST characteristic and individual difference variables (Meuter et al. 2005). To date, the main SST characteristics include perceived usefulness (e.g., Lin, Shih, and Sher 2007; Walker and Johnson 2006), ease of use (e.g., Curran and Meuter 2005; Timmor and Rymon 2007), fun/enjoyment (e.g., Curran and Meuter 2007; Weijters et al. 2007), risk (e.g., Bobbitt and Dabholkar 2001; Curran and Meuter 2005), and control (e.g., Dabholkar 1996; Lee and Allaway 2002). While occasionally other SST characteristics such as money/time saving and reliability are suggested (e.g., Walker et al. 2002), it is argued that these attributes are no more than a subset of usefulness (e.g., Rogers 2003). It is found that a person is more likely to hold a favorable attitude toward an SST if it is perceived to be useful, easy to use, enjoyable, not risky, and controllable.

In terms of individual differences, it can be further classified into demographics and psychographics. Primary demographics that have been found to affect SST attitude and intention are age (e.g., Ding, Verma, and Iqbal 2007; Simon and Usunier 2007), gender (e.g., Elliott and Hall 2005; Meuter et al. 2005), education (e.g., Greco and Fields 1991; Meuter et al. 2003), and income (e.g., Lee, Lee, and Eastwood 2003; Nilsson 2007), whereas primary psychographics include technology anxiety (e.g., Meuter et al. 2003; Oyedele and Simpson 2007), technology readiness (e.g., Matthing et al. 2006; Parasuraman 2000), behavioural inertia (e.g., Meuter et al. 2005), and need for human interaction (e.g., Dabholkar 1996; Dabholkar and Bagozzi 2002). Results across a wide range of SSTs show that compared to nonusers, SST users are generally younger, better educated and better paid, less anxious and more ready to embrace new technology, and less in need for personal contact. In terms of the relative impact, a general conclusion is that SST characteristic variables are more powerful than individual difference variables in predicting SST adoption (e.g., Dabholkar 1996; Meuter et al. 2005).

While previous research has contributed greatly to our understanding of why people use an SST, three important issues have been largely ignored in the literature. First, with few exceptions (e.g., Dabholkar and Bagozzi 2002), most prior SST studies have focused on the direct effects of antecedent variables on SST adoption (i.e., SST characteristics and

individual differences). However, researchers have suggested that hypothesizing direct effects may be somewhat redundant and obvious (Dabholkar and Bagozzi 2002), and it is much more meaningful to investigate the moderating effects of external factors, such as situational influences. In an SST context today, SST is often just one of the multiple ways from which a customer may choose for delivery of a full service (e.g., Internet banking) or part of a service (e.g., supermarket self-service checkout). Hence, a customer's decision to use an SST is more likely to be based on a comparative situational evaluation of all available service delivery options rather than on an absolute evaluation of an SST. Thus, the investigation of situational factors that affect people's choice between self-service and personal service is worthwhile. Moreover, from the viewpoint of service companies, the purpose of introducing self-service is certainly not to entirely replace the traditional personal service, but rather to provide a choice and a sense of control, and thereby enhance the overall customer experience (Salomann, Kolbe, and Brenner 2006). Hence, it is important and insightful to understand *under what conditions* customers would use self-service as opposed to personal service.

Second, most prior studies have focused on behavioural intentions rather than actual behaviour (e.g., Curran, Meuter, and Surprenant 2003; Dabholkar 1996; Dabholkar and Bagozzi 2002). The results indicate that SST intentions are determined by SST attitudes, which are in turn determined by various SST characteristics and individual differences. Although this relationship, grounded in the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975), is well established in the literature, the risk of focusing on behavioural intentions instead of actual behaviour is that intentions do not always lead to action. According to the Theory of Planned Behaviour (TPB) (Ajzen 1991; Ajzen and Madden 1986), actual behaviour is not determined by behavioural intentions alone and the intention-behaviour link is expected to vary across situations, suggesting the existence of potential situational moderator factors. This is especially true when SST is studied in situations where multiple service delivery options are offered. For example, a passenger who is not keen to use the self-check-in kiosk at the airport might actually use it if he or she was in a hurry to catch a flight and there was

a long queue at the check-in counter. Therefore, Meuter and his colleagues (2005) have argued that SST research should go beyond the emphasis on attitudes and intentions and focus on actual behaviour, and they made a good example in their work.

A final issue is that the majority of prior studies do not include past experiences when modelling the drivers of SST attitudes and intentions. A few studies have taken this factor into account (e.g., McKechnie, Winkhofer, and Ennew 2006) but do not distinguish between focal product and product-norm experience (Woodruff, Cadotte, and Jenkins 1983). Experience may take two forms (Patterson 2000). One derives from experience with, and hence knowledge of, the focal product/service. The other form consists of experience that has been accumulated in the past from a number of similar products/services other than the focal one. According to Woodruff and his colleagues (1983), both focal product and product-norm experiences play a significant yet different role in shaping focal product attitudes. In the SST context, focal product experience can be defined as a customer's past experience using the SST under investigation, whereas product-norm experience refers to a customer's experience using a range of SSTs. It might be argued that SST characteristics have already captured a customer's focal product experience in that the evaluation of SST attributes is based primarily on their past experience. However, it fails to capture critical experience events such as first-time experience and SST failure and recovery experience.

The initial trial of a new SST is a critical step in the adoption process in that it helps shape a customer's future behaviour (e.g., Bhattacharjee and Premkumar 2004; Eriksson and Nilsson 2007). Service failure and recovery are other critical experiences that can change a customer's predisposition toward an SST (Holloway and Beatty 2003; Yen, Gwinner, and Su 2004). For example, it is not uncommon for a customer to experience difficulties and dissatisfaction with an SST, which then makes the customer decide not to use the SST again (e.g., Meuter et al. 2000). On the other hand, a positive recovery experience may restore confidence and customer satisfaction and prevent switching next time (e.g., Bitner, Brown, and Meuter 2000). In terms of product-norm experience, it is

argued that prior use of other related technologies will increase a customer's perception of his or her ability and confidence in trying a new, similar SST (Meuter et al. 2005).

To summarize, due to the fact that the multiple service delivery context and the actual SST behaviour have been largely ignored in the literature, the focus has been primarily on the direct effect of SST characteristics and individual differences, and the moderating impact of situational factors has not been well addressed (e.g., Dabholkar and Bagozzi 2002). It is argued in this research that when investigating the actual use of an SST in a multiple service delivery context, attitude and intention alone may not be sufficient as situational factors may moderate the attitude-behaviour relationship (e.g., Ajzen 1991). Therefore, this study provides three key contributions. First, it goes beyond the direct effect and explores the moderating effect of situational factors in a multiple service delivery context. Hence, the focus shifts from a "why" question to a "when" question. Second, this study goes beyond attitudes and intentions and focuses on actual SST behaviour. Finally, both focal product and product-norm experiences are included and their impact on SST attitudes and behaviour is investigated.

## **2.3 METHODOLOGY**

This exploratory study had little previous research to draw upon in understanding which situational factors might be relevant and how they affect the attitude-behaviour link in an SST context. Therefore, in order to shed light on this issue, a grounded theory approach was deemed appropriate in that a guiding theory is lacking and it allows new categories, schemes, or theories to emerge as the study progresses (Glaser and Strauss 1967; Strauss 1987). This methodology is commonly used in early SST and more broadly service research where the purpose is to provide insight into the nature of a new phenomenon under investigation (e.g., Bitner, Booms, and Tetreault 1990; Meuter et al. 2000). In this paper, both one-on-one interviews and nonparticipant observations were conducted to supplement and support each other. On one hand, interview data, while sufficient for idea generation, are often subjective and lacking in objectivity. On the other hand, observation data are objective in nature but often lack explanatory power.



By combining interviews (the main method) and observations, we were able to support subjective ideas with objective evidence and come to more reliable and valid findings.

### **2.3.1 Research Context**

Supermarket self-checkout machines were the focal SST for the current investigation. The reasons are as follows. First, as this study focuses on customers' actual choice of self-service in situations in which the customer has a choice among delivery modes, the supermarket self-checkout machine provides an ideal setting in that both the self-service option and the personal service option are present at the time of checkout and a customer is free to choose either. Second, these machines are only now being introduced in selected Australian supermarkets (Browne 2008), which means that most customers are either first-time users or still in the early stage of adoption. At this stage, first-time experience is still fresh and hence service failure and recovery experience are expected. Finally, considering the substantial investment in introducing self-checkout machines and the possibility that this SST will become the next competitive focus in offline retailing (Preston 2008), an investigation is worthwhile for both managers and scholars.

### **2.3.2 Interview Guideline and Observation Checklist**

Prior to field data collection, a guideline for interviews and a checklist for observations were developed (refer to Appendices 2.6.1 and 2.6.2 for details). Both self-checkout customers and regular checkout customers [1] were observed and interviewed. The focus of the observation was on observable situational factors such as shopping conditions (e.g., type of items purchased, time spent at the checkout) and store conditions (e.g., length of queue at both the regular checkout and the self-checkout). Based on the literature review and guided by our research objectives, the interview questions focused on the conditions under which a customer would use or not use the self-checkout when shopping at the supermarket and their prior experiences with the focal self-checkout as well as other SSTs. To avoid biased results, major SST characteristics and individual differences, and SST attitude and behaviour were also

captured in the interviews.

### **2.3.3 Data Collection Procedure**

With the support of a major national supermarket chain, five stores in different areas of an eastern Australian city were carefully chosen for observations and interviews in order to reach a range of sociodemographic customer segments (e.g., young, middle-aged, and older customers; lower, middle, and upper class customers). Moreover, in each store, observations and the accompanying interviews were conducted at various times of the day (i.e., morning, afternoon, and evening) and various days of the week (i.e., weekdays and weekends) to control for any potential timing bias. Two researchers conducted the fieldwork. One did the observation and the other did the interview. It was not possible to observe every customer because most of the time there were more than one customer checking out at the same time. To select subjects when busy, the observer only pick up the customers coming out from one preselected self-checkout SST or personal checkout counter. When a customer was selected, the observer filled out an observation checklist while the customer was checking out. When the customer finished the checkout, the observer would ask the interviewer to approach the observed customer and asked if they agreed to be interviewed. If declined, the observer would pick up the next subject for observation right away, and if agreed, the observer would wait until the interview was over. Eligible interviewees shopped at this particular supermarket regularly and had used the self-checkout prior to this occasion. This was to ensure interviewees had sufficient prior experiences so they could provide true thoughts on their choice between the self-service and the personal service. As our interview was based on the actual choice the customer just made at the checkout, memory error or bias was minimal. Each interview ran from five to ten minutes and all interviews were digitally recorded and then transcribed by the researchers.

In total, 209 observations were obtained across five stores, consisting of 110 self-checkout customers and 99 regular checkout customers on this occasion. In line with previous studies (e.g., Nilsson 2007; Simon and Usunier 2007), there was a

significant age difference between SST users and nonusers ( $p < 0.05$ ), with more seniors in the nonuser group (39.4% vs. 10.1%) and more young adults in the user group (53.2% vs. 17.2%). In terms of gender, no significant difference was found between SST users and nonusers ( $p = 0.61$ ). However, there were more females (57.4%) than males (42.6%) in the whole sample, probably due to the fact that in general women still shop more often than men. From the 209 observations, 57 customers agreed to be interviewed. Of the 57 interviewees, 29 were self-checkout users and 28 used the regular checkout on this occasion. However, 10 regular checkout customers had never used the self-checkout machine before and hence were not eligible, resulting in 47 completed interviews. The final interview sample came from five stores, with 9 to 11 interviewees from each store. 21 were males and 26 were females. It covered three age groups: 20 young adults, 15 middle-aged, and 12 senior customers.

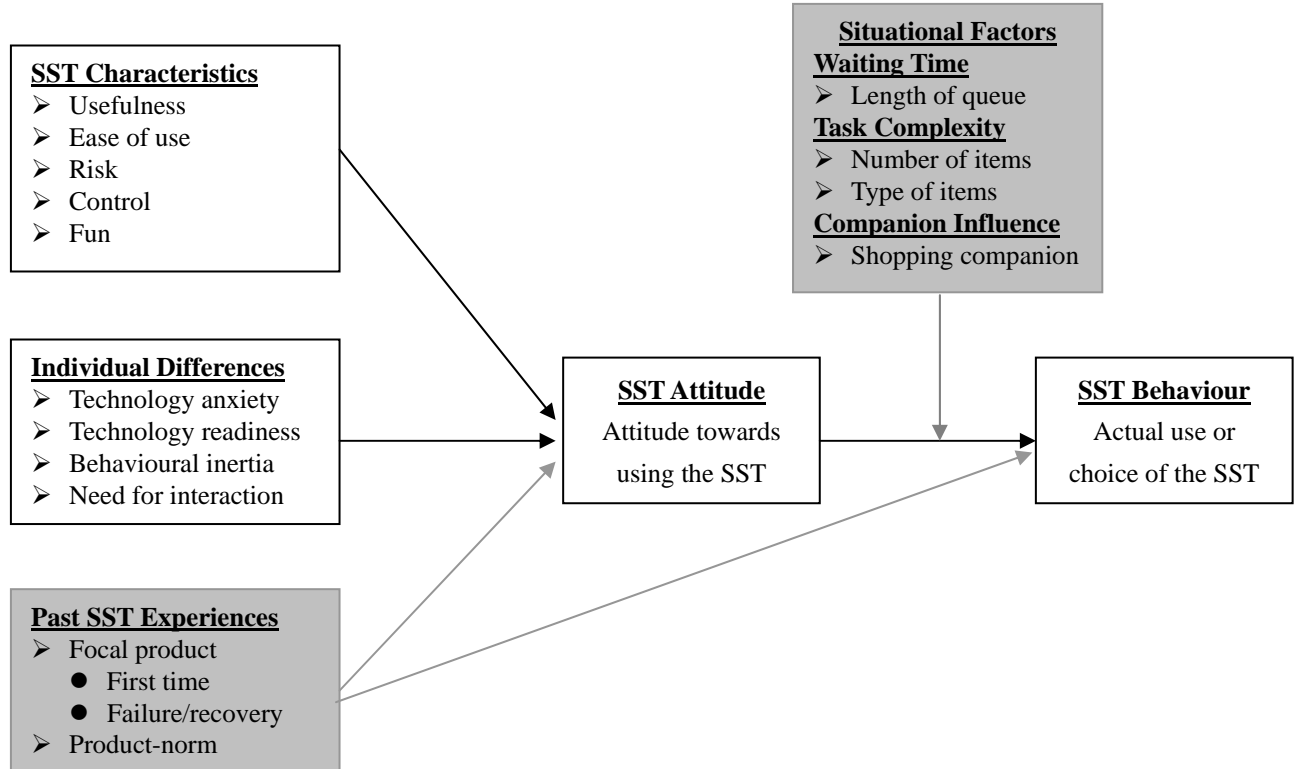
#### **2.3.4 Data Analysis Procedure**

Content analysis was used to analyse the interview data (Weber 1990). Initial categories for SST characteristics and individual differences were developed from the literature. SST attitude was classified as positive, neutral, or negative, and the frequency of SST usage was classified into always, often, sometimes, and seldom. Since the categorization of situational factors was the primary objective of this study, it could not be predetermined and it was an ongoing effort throughout the coding process. Past experiences were classified into focal product experience and product-norm experience, with the former being further categorized into first-time experience and failure/recovery experience. Two judges who were familiar with the SST topic independently classified information from each interview into the above categories and sorted situational factors into their own classification scheme developed in the coding process. All disagreements were resolved through discussions. The interjudge reliability, based on the percentage agreement statistic, was 85.6% overall, which was above the critical threshold of 80% (e.g., Kassirjian 1977).

### **2.4 RESULTS**

In order to better organise and present the findings, an indicative conceptual framework was utilized (Figure 2.1). The white areas (SST characteristics, individual differences, SST attitude, SST behaviour, and their relationships) were the basic SST model based on prior research, and they were not replicated here. They were put in the framework to show this research in relation to prior studies and our contributions to the literature. The gray areas (situational factors and their influences on the attitude–behaviour link, past SST experiences and their impact on attitude and behaviour) were the focus of this study, and they were based on our interviews and observations. The results suggested that two important components be added into the basic model, with one being situational factors and their moderating effect on the attitude–behaviour link, and the other being past SST experiences and their direct influence on SST attitudes and behaviour. After describing the observation results, the interview findings are presented in detail.

**Figure 2.1 A Contingency Model of SST Use in a Retail Context**



### 2.4.1 Observation Findings

An examination of the 209 observed customers revealed some interesting behavioural similarities and differences between 110 self-checkout (SST) customers and 99 regular checkout customers (refer to Table 2.1). More than 60% of SST customers did not use a basket or trolley/shopping cart and only 12.8% went through the self-checkout with a trolley. In comparison, 40% of regular checkout users used a trolley and less than 30% did not use a basket or trolley. Chi-square test indicated a significant difference ( $p < 0.01$ ), suggesting that customers tend to use the self-checkout with a smaller number of items and to use the regular checkout with a larger purchase. The observation revealed that a regular checkout customer purchased around 11 items, whereas a self-checkout customer purchased only 4 items ( $p < 0.01$ ). The two groups of customers also differed in the type of products they purchased. Chi-square test indicated a significant higher percentage of vegetable and fruit purchases among regular checkout customers than that among self-checkout customers (more than 40% vs. less than 20%,  $p < 0.01$ ). Finally, an examination of the in-store conditions showed that on average the length of the queue at regular checkouts was significantly longer than that at self-checkouts ( $t = 13.89$ ,  $p < 0.01$ ).

**Table 2.1 Summary of Key Observation Results**

	Self-checkout users	Regular checkout users
Shopping tool used		
Trolley	12.8%	39.5%
Basket	26.6%	31.4%
None	60.6%	29.1%
Number of items purchased	4.29	10.97
Type of items purchased		
Vegetables	16.8%	44.9%
Fruit	12.9%	42.7%
Scannables	98.0%	92.1%
Length of queue (people)	0.30	1.24

From the analysis of the observational data above, differences were found between self-checkout users and regular checkout users in some situational aspects (e.g., number and type of items purchased). However, since the data were purely observational, it could not be determined why and how these situational factors impacted on customers' choice between self-service and personal service. Analysis of the interview findings provided the main explanation of the “why” and “how” questions, with the observational results used as supporting evidence whenever appropriate.

### **2.4.2 Situational Influences**

Interviewees varied in SST attitudes and behaviours. About half of the interviewees held a positive attitude toward using the self-checkout, whereas a few held a negative view. It should be noted that the remaining one-third of the interviewees, when asked about their attitudes toward the self-checkout, did not have a clear positive or negative comment. This neutral attitude was noteworthy in that for these customers their preference for SST was highly likely to be influenced by factors other than their predispositions. Very few interviewees stated that they always used the self-checkout machine; the vast majority used a combination of the self-checkout and the regular checkout. This means that even those who had a favorable attitude toward the self-checkout sometimes did not use it (*“Just sometimes it’s a quicker line. There is no line there. But if there was no line in other registers, I will go there.”*). On the other hand, possessing a negative attitude did not imply that the self-checkout machine would never be used (*“For preference, no. But I would probably use it [the self-checkout machine] if I was really in a hurry and had only one or two items.”*).

Given the fact that quite a few interviewees held a neutral SST attitude and that positive (negative) attitudes did not always result in the actual use (nonuse) of the SST, it seems that in situations when multiple service delivery options are provided, the SST attitude–behaviour relationship is neither strong nor straightforward and that the choice of the SST is likely contingent upon situational influences. Initial analysis of the situational factors surrounding use or nonuse indicated a number of possible

context-specific categories, with four key ones emerging: length of queues, number of items, type of items, and shopping companion. Further analysis resulted in three generalized situational variables: perceived waiting time, perceived task complexity, and companion influence (refer to Appendix 2.6.3 for illustrative quotes). Each has the potential to enhance or decrease the probability of actual usage of the SST, in addition to the strength or direction of prior attitudes. They are now discussed in turn.

***Perceived waiting time*** This situational factor relates to the queue length at the time of checkout. When asked under what conditions they used the self-checkout, two-thirds of the interviewees said it would depend on the length of the queue. When choosing between the self-checkout and the regular checkout, they were simply looking for the shortest queue to minimize waiting time. To illustrate, one interviewee said, *“I will look for the quickest line. If you have looked at this queue now, it’s fairly long. So I wouldn’t be waiting there. So really what we are trying to do is to find the quickest, the easiest way out.”* This customer had a neutral attitude toward the self-checkout, and his choice was largely dependent on the length of queue. In another case, the interviewee preferred the regular checkout but still used the self-checkout frequently because usually there was a shorter queue. *“If there were no queues for the other (regular) checkouts, I would probably use them more. But because of less queues for the self-service ones, you see now, there is no one waiting at the self-service, you just go straight in.”* Observation results verified that the queue length at regular checkouts was significantly longer than that at self-checkouts across five stores (1.24 vs. 0.3 customer,  $p < 0.05$ ). This helps explain why quite a few interviewees who held a neutral or even negative attitude toward the self-checkout actually used it frequently.

It is interesting to note that it was the perceived rather than the actual waiting time that influenced a customer’s use of the self-checkout. Most interviewees simply compared the length of queues at both checkouts when estimating their waiting time. However, the actual waiting time is not determined by the length of the queue alone. Sometimes the waiting time could be a little longer even if the queue was shorter because of slow

processing by some customers. For example, one interviewee pointed out, *“As people are still learning, it can be a little bit slow sometimes.”* This was consistent with our observations, where it was found that although self-checkout customers purchased fewer items than regular checkout customers, they took a similar amount of time going through the checkout (1.87 vs. 1.58 minutes,  $p = 0.25$ ). On the other hand, sometimes the actual waiting time at self-checkouts could be much shorter even if the queue was the same or longer than that at regular checkouts. As only a few interviewees already observed, *“People at the self-checkout usually have only a couple of items and you’ve got one line but several machines.”*

**Perceived task complexity** This is related to the number and the type of items being purchased. The number of items was the most frequently mentioned situational factor in interviews, with around three-quarters of the interviewees saying their use of the self-checkout would depend on the number of items. Interviewees typically preferred the self-checkout with only a few items and used the regular checkout when they had a lot of items. *“I would not say it [self-checkout] is better because if I had a lot of things, I would never use it, I will always go to the traditional one. But if I just purchased a few things, it’s definitely better.”* This was evident in the observation. It was found that on average self-checkout customers purchased significantly fewer items than regular checkout customers (4.29 vs. 10.97,  $p < 0.05$ ). When interviewees were probed as to why the number of items mattered, they revealed that as the number increased, they worried that they had too many things to do at the machine by themselves and they could not control the whole situation. Thus, self-checkout is sometimes perceived as a complicated and risky task and the regular checkout became a preferred choice in this situation. To illustrate, one interviewee explained, *“If I’ve only got one or two things, I use the self-checkout. If you are carrying a lot of things, it’s really quite difficult for you because you gotta put them down and you gotta pack up. So there is problem with it.”*

The type of items purchased also had an impact on perceived task complexity in that nonscannable items had to be weighed and located on a list of products on the screen.



This could be difficult for customers if they were not familiar with the system. For example, one interviewee said, *“Usually when you have a plastic bag with a croissant in or a piece of fruit that you have to search for on the screen and weigh and go such and such. That’s the problem.”* Even young customers who were generally considered to be technologically savvy had the same problem initially. Hence, despite prior attitudes toward the self-checkout, interviewees were less likely to use it if they had nonscannable items such as vegetables and fruit. Observations also revealed the proportion of customers who purchased fruit or vegetables was significantly higher through regular checkouts than through self-checkouts ( $p < 0.05$ , Table 2.1). However, it may be expected that the perceived complexity caused by the type of item may decrease as customers become used to the system.

**Companion influence** This refers to the influence of others (e.g., family or friends) with whom a customer shops. Although the percentage of those shopping with others was low in the observation (20%) and only a couple of interviewees mentioned this, companion influence was particularly strong for older customers. Typically, older interviewees held a negative attitude toward the self-checkout because they thought they might make mistakes that they could not correct. Therefore, normally they did not use it when alone. However, many had used it when they were with their children, who could show them how to do it and help fix any problems they might have. *“I was with my daughter and she said she’s going to try it (self-checkout). I will try it and she is here because I might make mistakes.”* *“When my daughter is with me, we do [use the self-checkout], but other than that, I am a bit old-fashioned.”* Companion influence was also salient among young people, where it took the form of peer influence. They might use the technology with the intention of impressing their peer friends or being accepted. *“My boyfriend loved it. He just wanted to, I don’t know. I used it because he gets very excited about it, like a child.”*

### 2.4.3 SST Experiences

The second research objective was to explore if and how past SST experiences had an

impact on SST attitudes and behaviour. Overall, it was found that compared to SST characteristics and other individual differences, past experience influenced SST attitudes and behaviour in a more complex manner (see Appendix 2.6.4 for illustrative quotes).

***First-time experience***

It is intuitive that a good first-time experience will lead to a positive attitude and enhanced self-efficacy and thereby encourage future use, whereas a bad first-time experience may result in dislike and diminished self-efficacy and hinder further use. To illustrate, a positive case was a senior female customer who after a very good first-time experience started to use the self-checkout frequently (*“First time the girl from the store showed me how to do it, and after that it was easy. Now I can do it myself.”*). In this case, a positive first-time experience increased the interviewee’s self-confidence in using it on her own, which led to a positive perception (*“it was easy”*) and continued use. In a negative case example, a middle-aged male interviewee never used the self-checkout again after a terrible first-time experience (*“I’ve only used it once, but once and never again because of the false [price] discrepancies on some occasions and there was no one there to help you.”*). This was a typical case of a double-deviation scenario that involved core service failure (false price discrepancy) and unsuccessful or even no recovery initiative by the supermarket. In such a situation, the sense of helplessness and desperation felt by the customer might trigger strong negative emotions (e.g., anger, rage) and behaviour (i.e., *never again*) (Patterson et al. 2009). However, a not-so-good first-time experience did not necessarily have a negative influence as most customers expected it to not be smooth the first time they tried a new technology (*“Kinda confusing the first time. Wasn’t sure how to do it.”*). When asked if the problems they had in their first-time use somehow had an effect on the next time they came to the study supermarket and decided to use the self-checkout again, a typical response was, *“It kind of did, but then you thought because it is a new thing and they should have some feedback from customers and they probably would improve it.”* Thus, it seemed that as long as the first-time experience did not involve a severe service failure and poor (or nonexistent) recovery effort, customers would give the SST a

second chance.

***Service failure and recovery experience*** Here the focus was on customers' overall past failure and recovery experiences with the SST. It was found that although customers expected to encounter some problems initially, they would not tolerate the SST if these problems happened repeatedly. That is, the frequency of service failure plays a key role in shaping a customer's SST attitude. For example, one interviewee stated, *"Each time [using the self-checkout], some problems come up. We'd have to get help. That kinda affected my choice to use it again. Just felt that it was easier to watch someone else to do it I suppose."* In this case, because the problem occurred frequently, the customer might think the SST was very likely to malfunction again and hence preferred to use the alternative checkout. Unless recovery effort was efficient and effective, it would not compensate for the damage caused by the service failure (as was shown in the above case). An efficient and effective recovery is one that was speedy and successful in fixing problems. As one interviewee commented, *"The staff are really helpful. When you get stuck [with the self-checkout], they ride over straightaway ... Sometimes price doesn't match the reading, but we challenge that and you usually get the price."* As a result, this interviewee still held a favorable attitude toward the self-checkout.

***Product-norm experience*** It seems reasonable to suggest that the more positive experiences a customer has with other SSTs (i.e., product-norm experience), the more likely it is that the customer will have a positive attitude toward the focal SST (i.e., supermarket self-checkout) and actually use it. This is because a customer with other SST experience is confident (high self-efficacy) and hence skilful in using SSTs in general, which facilitates the use of the focal SST. However, the results suggested that again it was not that simple or straightforward. Not all previous product-norm experience could be directly translated into a favorable attitude and actual use of the focal SST. It depended on the similarity of other SSTs compared to the focal one. Only past experiences with similar SSTs had an impact on the focal SST attitude and

behaviour. To illustrate, when an interviewee was asked if having a good experience with ATMs affected her experience here with the self-checkout, she said, “*Can you compare an ATM to a self-checkout really? It’s a whole different thing. They are unrelated.*” The interviewee perceived the ATM and the self-checkout to be different technologies and therefore found it hard to transfer the learning experience from one to the other.

## **2.5 DISCUSSION**

### **2.5.1 Summary of Findings**

Our first research objective was to explore potential situational influences on customers’ actual choice between self-service and personal service. The results show that the SST attitude–behaviour link is somewhat weak in situations when multiple service delivery options are offered, and thus focusing on attitude alone does not effectively predict a customer’s actual choice. Through content analysis of interview data, three situational factors emerged: perceived waiting time, perceived task complexity, and companion influence. Perceived waiting time relates to the length of queue at the checkout. When choosing between the self-checkout and the regular checkout, in addition to prior attitudes, customers often compare queues and look for the shorter one to minimize waiting time. This finding is consistent with Bateson’s (1985) study, where perceived waiting time was found to be the most important situational factor when faced with the choice between self-service and personal service. It is also in line with Dabholkar and Bagozzi’s (2002) research, where a significant moderating effect of perceived waiting time on SST attitude – SST intention was established. However, one might argue that there may be some level of overlap between perceived waiting time (conceptualized as a moderator) and perceived usefulness (conceptualized as an antecedent) in that shorter waiting time means more convenient and efficient, which is an indicator of how useful an SST is. Thus, conceptually waiting time is no more than a subset or one dimension of usefulness. However, we argue that perceived usefulness as an SST characteristic is a person’s context-free, overall evaluation of how useful an SST is, whereas perceived

waiting time is a context-specific factor that may change every time a customer uses an SST. For example, a customer may find the self-checkout useful overall, but the waiting time could be shorter sometimes and longer at other times depending on the length of the queue. Hence, we distinguish between waiting time and usefulness and include them as two distinct components in the model.

Perceived task complexity relates to the number and the type of items being purchased. The findings indicate that customers tend to use the self-checkout for simple tasks only (e.g., a few scannable items to check out) and when the task becomes complicated (e.g., a lot of items including nonscannable items to check out) they prefer to use the regular checkout. Note the difference between SST complexity and task complexity. The former is an SST characteristic (i.e., ease of use), whereas the latter is a situational factor. That is, SST complexity refers to overall ease of use of an SST (e.g., self-checkout machine) in any situation (e.g., irrespective of what type of items and how many items being purchased), whereas task complexity means ease of use of an SST in different situations. Therefore, SST complexity is a context-free, absolute measure of ease of use, and task complexity is a situation-specific, relative measure. The theoretical argument for the influence of task complexity can be found in the Theory of Planned Behaviour (Ajzen 1991; Ajzen and Madden 1986), which suggests the actual behaviour is determined by both perceived behavioural control and behavioural intention. As a task gets more difficult (e.g., going through the self-checkout with many nonscannable items), a customer's perceived control over the task situation will be lower, and as a result the customer will not use the self-checkout in this situation regardless of prior attitude and intention.

Companion influence relates to the influence from others (family or friends) with whom a customer shops. This is particularly evident in two groups. For older customers, who are usually less likely to use an SST, they use it when they are with their children. In that situation, children influence the choice of an SST by showing them how to use it and fix any problem they may encounter, thus relieving the older customer's technology

anxiety and increasing their self-confidence. Younger customers sometimes use the technology with the intention of impressing their peer friends (because they think it is a “cool thing”) or being accepted (because everyone uses it).

Our second research objective was to explore the influence of past SST experiences (both focal product and product-norm experience) on current SST attitude and behaviour. It is found that most customers expect to encounter some problems the first time they try an SST, and therefore, unless they experience a double deviation scenario that involves core service failure and unsuccessful or possibly no recovery initiative, they will give the SST a second chance and try it again. In terms of the impact of failure and recovery experience in general, the results suggest that the frequency of failure after the first time negatively affects a customer’s attitude toward using an SST, whereas an effective and speedy recovery effort can restore customer satisfaction, which seems to be consistent with the concept of the service recovery paradox (de Matos, Henrique, and Alberto Vargas Rossi 2007). In the context of SST failure, the speed of recovery is critical because the recovery is mostly initiated by the customer – in other words, a call for help. Typically, the customer required an immediate response. The findings also indicate that not all previous SST experiences can be translated directly into a positive attitude and an actual use of the focal SST. It depends on the similarity between different technologies. Only past experiences with similar SSTs will have an impact on the focal SST attitude and behaviour.

### **2.5.2 Theoretical Contributions**

This research contributes to the literature in several ways. Conceptually (refer to Figure 2.1), we study people’s actual SST behaviour instead of SST intention, which makes our model more relevant to the real world. We also shift our focus from the antecedents of SST attitude and intention to the situational influences that moderate the SST attitude–behaviour link. To the best of our knowledge, with two exceptions in the literature (Bateson 1985; Dabholkar and Bagozzi 2002), this area has not been researched. The findings indicate that in situations where multiple service delivery

options are provided, the SST attitude–behaviour relationship is strongly influenced by three situational factors: perceived waiting time, perceived task complexity, and companion influence. While the first factor is not new but, rather, consistent with prior research, it is the first time that perceived task complexity and companion influence have been identified as two situational factors in the SST context. Furthermore, we include past SST experiences as another important individual difference variable and distinguish between focal product experience and product-norm experience (Woodruff, Cadotte, and Jenkins 1983). The results show that both types of past experiences have an impact on SST attitude and behaviour but in different ways. Last, but not least, from a methodological perspective, our qualitative research method involves using both interviews and observations. Although observation is not used as often as a survey or an experiment as a data collection method in marketing research, it proves to be useful in our study. The advantage of this technique is that it captures the actual phenomenon rather than relying on reconstructed or contrived versions of it (Tombs and McColl-Kennedy 2010). Hence, there is no memory error or bias. Its combination with the interview data provides more reliable and valid results. More specifically, while the interview as the main method collects rich and detailed subjective opinions, the observation on the other hand provides supporting objective evidence.

### **2.5.3 Managerial Implications**

This study also provides implications for managers. By understanding what situational factors impact on customer's choice, better strategies can be developed to manage and coordinate the multiple service delivery options. The results regarding waiting time suggest that in order to keep a balance between the self-checkout and regular checkout, managers can change the queue by opening or closing more self-checkout machines or checkout counters. For example, to promote the initial trial of the self-checkout machine, managers can deliberately close a few checkout counters. A long queue at the checkout counter will sometimes lead customers to use the self-checkout machine even if they do not like it. However, this measure should be taken with caution, as research has shown

that forcing customers to use SSTs may cause negative consequences (e.g., Reinders, Dabholkar, and Frambach 2008). An alternative could be to reduce the waiting time by increasing the number of self-checkout machines in retail stores. However, this must be weighed against possible idle capacity. Findings on task complexity suggest that the self-checkout may be a good alternative for the express checkout but not for the regular checkout because most customers only use the self-checkout when purchasing a small number of items. Moreover, as many customers have difficulties using the self-checkout when purchasing nonscannable goods (i.e., fruit and vegetables), to increase the rate and frequency of use, the current technology needs to be further improved so that it is more user-friendly. For example, showing product names in larger font and providing product pictures on the screen may make it easier for customers to find the item themselves. Having an assistant around to help with finding the item on the screen can also make the self-checkout easier for customers purchasing nonscannable goods. Finally, the results regarding companion influence suggest that young customers' usage of an SST is often influenced by their peers' opinion. The implication is that managers can highlight the "cool" and "fun" aspect when promoting an SST to this customer segment. When they find the use of an SST is enjoyable, they may be even willing to wait for the service as using the technology may be seen as worth waiting for.

Our findings regarding past SST experiences suggest that although managers can be a little relieved by customers' tolerance of a not-so-good first-time experience, a positive first-time experience is still important in that if a customer still feels confused about using an SST after the first time, it is likely that the problem will come up repeatedly later. Therefore, in order to prevent frequent failures, service staff should let customers know what causes the problem and how it can be prevented rather than just fixing it for the customers. It is also found that past experiences with similar SSTs had an impact on the focal SST attitude and behaviour. This suggests that when introducing a new SST, managers can emphasize its similarity to an existing one so that customers will be more ready to accept and adopt it.



#### **2.5.4 Limitations and Future Research Directions**

As with any research, there are some limitations associated with our study. First, the interviews could have been more in-depth. This may potentially prevent us from identifying more situational influences. However, because we use a shopping mall intercept method, it is difficult to get a customer to agree to be interviewed for longer than ten minutes. Second, there is limited generalizability of our findings. Although we are confident that the three situational factors will be relevant in other kiosk-based SST contexts (e.g., the airport self-check-in kiosk), they might not all be generalizable to Internet- or telephone-based SST contexts, where there might be some other more relevant and influential factors. For example, availability may be a compelling reason why sometimes people use Internet- or telephone-based SSTs; they can use the service during off-hour times when the personal service is not available. Therefore, an opportunity for future research is to explore other situational factors in Internet- or telephone-based SST contexts. Future studies could also empirically test the moderating effects of the three situational factors identified in our research, specifically, varying moderating effects (direction vs. strength) under different conditions (positive vs. negative attitude). Finally, since customers have a choice among alternative service delivery options every time they use a service, the decision to use an SST becomes a continuous behaviour. Thus, there could be a feedback loop from SST behaviour to SST characteristics and SST experiences (refer to Figure 2.1). Therefore, a longitudinal study can be done to understand how prior SST usage influences current evaluation of SST characteristics and SST experiences, which then impacts on subsequent SST behaviour.

#### **Note**

1. Self-checkout customers are those who checkout through a self-checkout machine (SST), and regular checkout customers are those who checkout through a personal checkout counter.

## 2.6 APPENDICES

### 2.6.1 Interview Guideline

#### **Interview Guideline (*For Self-Checkout Users*)**

This is a semi-structured interview, the purpose of which is to gain some insight into customers' experience using self-service technologies (SSTs). The focus is on when customers would use the SST (the self-checkout machine at the supermarket). The interview will take 10-15 minutes and it will be digital recorded.

#### Pre-interview (2 minutes)

- ☐ Screening: eligible participants are those who shop regularly at the supermarket (at least once a week) and who were using the self-checkout machine at the time of interview.
- ☐ Consent: present the Participant Information Statement (highlight it is a university research) and get the participant sign the Consent Form (including consent for audio recording).

#### Interview Questions (10 minutes)

- ☐ Do you always use the SST when shopping at the supermarket?
  - ☐ If YES, then why is that (e.g., customer characteristics such as technology savvy and avoidance of personal confrontation, SST characteristics such as ease of use and fun)?
  - ☐ If NO, then when to use it and when not to use it (e.g., situational factors such as who you shop with, type & No. of products purchased, queue length at checkout counters)?
- ☐ Please recall the first time you used the SST at the supermarket. What were the drivers of your initial trial? Was it a good or bad experience? Did it have impact on your subsequent usage?
- ☐ Which aspect(s) of the SST do you like most (e.g., time saving, sense of control, etc.) and which aspect(s) do you dislike most (e.g., risk, complexity, etc.)?
- ☐ Have you ever encountered any problems when using the SST? And how did it get solved?
- ☐ How do you compare the SST with the traditional checkout counter?
- ☐ Do you have any other SST experiences (e.g., ATMs, Internet banking, telephone banking, self check-in kiosks in the airport, online hotel booking)?

#### Post-interview (1 minute)

- ☐ Thank the participant for the time and give the participant a \$5 voucher.

**Interview Guideline (*For Regular Checkout Users*)**

This is a semi-structured interview, the purpose of which is to gain some insight into customers' experience using self-service technologies (SSTs). The focus is on when customers would use the SST (the self-checkout machine at the supermarket). The interview will take 10-15 minutes and it will be digital recorded.

**Pre-interview (2 minutes)**

- ☐ Screening: eligible participants are those who shop regularly at the supermarket (at least once a week) and who were not using the self-checkout machine at the time of interview.
- ☐ Consent: present the Participant Information Statement (highlight it is a university research) and get the participant sign the Consent Form (including consent for audio recording).

**Interview Questions (10 minutes)**

- ☐ Have you tried the SST at the supermarket before?
  - ☐ If YES, then why not use it this time (e.g., stop using it due to prior bad experience or use it only in some situations)? Please elaborate.
  - ☐ Please recall the first time you used the SST at the supermarket. What were the drivers of your initial trial? Was it a good or bad experience? Did it have impact on your subsequent usage?
  - ☐ Which aspect(s) of the SST do you like most (e.g., time saving, sense of control, etc.) and which aspect(s) do you dislike most (e.g., risk, complexity, etc.)?
  - ☐ How do you compare the SST with the traditional checkout counter?
- ☐ If NO, then why not try it (e.g., customer characteristics such as technology anxiety, need for human interaction)?
  - ☐ Under what conditions would you intend to try the SST (e.g., SST characteristics such as ease of use and security, situational factors such as who you shop with, type & No. of products purchased, queue length at checkout counters)?
- ☐ Do you have any other SST experiences (e.g., ATMs, Internet banking, telephone banking, self check-in kiosks in the airport, online hotel booking)?

**Post-interview (1 minute)**

- ☐ Thank the participant for the time and give the participant a \$5 voucher.

### 2.6.2 Observation Checklist

Observation Checklist <i>(For Self-Checkout Users)</i>			
Time_____	Date_____	Venue_____	Observer_____
<b>Shopper Characteristics</b>			
Age: <input type="checkbox"/> Child <input type="checkbox"/> Young adult <input type="checkbox"/> Middle-aged <input type="checkbox"/> Senior			
Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female			
<b>Shopping Conditions</b>			
Shopper Companion(s): <input type="checkbox"/> Alone <input type="checkbox"/> With others (adult No._____, child No._____)			
If with others, Scanning by <input type="checkbox"/> Self <input type="checkbox"/> Others      Payment by <input type="checkbox"/> Self <input type="checkbox"/> Others			
Shopping Tool used: <input type="checkbox"/> No <input type="checkbox"/> Basket <input type="checkbox"/> Cart			
Category of Items Purchased: <input type="checkbox"/> Vegetables <input type="checkbox"/> Fruit <input type="checkbox"/> Other scannable goods			
Number of Items Purchased:_____item(s)			
Payment Method: <input type="checkbox"/> Cash <input type="checkbox"/> EFTPOS ( <input type="checkbox"/> Credit card <input type="checkbox"/> Debit card)			
Personal Assistance: <input type="checkbox"/> No <input type="checkbox"/> Yes (Number of assistance_____)			
Type of Assistance: <input type="checkbox"/> Scanning <input type="checkbox"/> Payment <input type="checkbox"/> Others (Specify_____)			
Total Time Used at the Checkout:_____minute(s)			
<b>In-Store Conditions</b>			
Queue Length at Checkout Counters (Average):_____people			
Queue Length at SST Terminals (Average):_____people			
Observation Checklist <i>(For Regular Checkout Users)</i>			
Time_____	Date_____	Venue_____	Observer_____
<b>Shopper Characteristics</b>			
Age: <input type="checkbox"/> Child <input type="checkbox"/> Young adult <input type="checkbox"/> Middle-aged <input type="checkbox"/> Senior			
Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female			
<b>Shopping Conditions</b>			
Shopper Companion(s): <input type="checkbox"/> Alone <input type="checkbox"/> With others (adult No._____, child No._____)			
Shopping Tool used: <input type="checkbox"/> No <input type="checkbox"/> Basket <input type="checkbox"/> Cart			
Category of Items Purchased: <input type="checkbox"/> Vegetables <input type="checkbox"/> Fruit <input type="checkbox"/> Other scannable goods			
Number of Items Purchased:_____item(s)			
Payment Method: <input type="checkbox"/> Cash <input type="checkbox"/> EFTPOS ( <input type="checkbox"/> Credit card <input type="checkbox"/> Debit card)			
Total Time Used at the Checkout:_____minute(s)			
<b>In-Store Conditions</b>			
Queue Length at Checkout Counters (Average):_____people			
Queue Length at SST Terminals (Average):_____people			

### 2.6.3 Interviewees' Illustrative Quotes Regarding Situational Influences – Frequency of Mention

Category Name	Illustrative Quotes	Interviewee Demographics	Percentage of Total*
Perceived waiting time (length of queue)	"I will look for the quickest line. If you have looked at this queue now, it's fairly long. So I wouldn't be waiting there. So really what we are trying to do is to find the quickest, the easiest way out."	Middle-aged male	63.8%**
	"If there were no queues for the other [regular] checkouts, I probably use them more. But because of less queues for the self-service ones, you see now, there is no one waiting at the self-service, you just go straight in."	Young adult male	
Perceived task complexity (number of items)	"If I've only got 1 or 2 things, I use the self-checkout. If you are carrying a lot of things, it's really quite difficult for you because you gotta put them down and you gotta pack up. So there is problem with it."	Middle-aged female	76.6%
	"When I buy small quantity of stuff, I will use the self-service. I guess it's like easier, you kinda have control of what you are doing... When I buy like weekly shopping, there's a lot to do and it's more convenient to use the regular checkout."	Middle-aged female	
Perceived task complexity (type of items)	"Just the speed with which I can find the item. For instance, if I am doing a weighed item, finding it on the database that you have to select from."	Young adult male	19.1%
	"Usually when you have a plastic bag with a croissant in or a piece of fruit that you have to search for on the screen and weigh and go such and such. That's the problem."	Middle-aged female	
Companion influence (shopping companion)	"I was with my daughter and she said she's going to try it [self-checkout]. I will try it and she is here because I might make mistakes."	Senior female	17.0%
	"My boyfriend loved it. He just wanted to, I don't know. I used it because he gets very excited about it like a child."	Young adult female	

### 2.6.4 Interviewees' Illustrative Quotes Regarding Past SST Experiences – Frequency of Mention

Category Name	Illustrative Quotes	Interviewee Demographics	Percentage of Total*
Focal product experience (first time)	"I've only used it once, but once and never again because of false [price] discrepancies on some occasions and there was no one there to help you."	Middle-aged male	17.0%
	"First time the girl from the store showed me how to do it, and after that it was easy. Now I can do it myself."	Senior female	
Focal product experience (failure/recovery)	"The staff is really helpful. When you get stuck [with the self-checkout], they ride over straightaway ... Sometimes price doesn't match the reading, but we challenge that and you usually get the price."	Young adult male	19.1%
	"Each time [using the self-checkout], some problems come up. We'd have to get help. That kinda affected my choice to use it again. Just felt that it was easier to watch someone else to do it I suppose."	Young adult female	
Product-norm experience	"She [the interviewee's daughter] never had the problem here because in the store X [another retailer with the similar self-checkout], she always uses the self-service. She always goes in there and she is very happy doing that."	Senior female	21.3%
	Q: Do you think that having a positive experience with ATMs impacts on your experience here with the self-checkout? A: Can you compare an ATM to a self-checkout really? It's a whole different thing. They are unrelated.	Middle-aged female	

\* Percentages may sum to more than 100%, due to multiple responses being allowed.

\*\* The number was calculated based on how many interviewees mentioned this factor influencing their choice between the SST service and the personal service

## **CHAPTER 3 THE ROLES OF HABIT, SELF-EFFICACY, AND SATISFACTION IN DRIVING CONTINUED USE OF SELF-SERVICE TECHNOLOGY (SST): A LONGITUDINAL STUDY**

### **3.1 INTRODUCTION**

In recent years, the infusion of technology has dramatically changed the nature of service industries and in particular the service delivery process (e.g., Froehle and Roth 2004; Salomann, Kolbe, and Brenner 2006). For many high to medium-contact services such as retail banking, share trading, and airline check-in, traditional “high-touch and low-tech” interpersonal service encounters have been gradually supplemented, or even replaced, by “high-tech and low-touch” technological interfaces. These are self-service technologies (SSTs) "that enable customers to produce a service independent of direct service employee involvement" (Meuter et al. 2000, p.50).

With its proliferation in the services sector, SST has received considerable scholarly attention in recent years (e.g., Dabholkar and Bagozzi 2002; Reinders, Dabholkar, and Frambach 2008; Weijters et al. 2007). In particular, research has studied how customers evaluate a new SST and what drives the initial adoption. However, little is known about how customers interact with and adapt to it after their first experience. It is still not clear how customers’ prior experiences with an SST, good or bad, evolve over time to impact their subsequent use. It is argued that although the initial trial is a critical step in the adoption process, the ultimate goal and eventual success is to keep customers using an SST regularly (e.g., Bhattacharjee 2001; Eriksson and Nilsson 2007). This has prompted some scholars to suggest that future research should shift the focus from pre-adoption evaluations to post-adoption experiences (e.g., Curran and Meuter 2005; Meuter et al. 2005). Furthermore, considering its dynamic nature, it is suggested that post-adoption research should use a longitudinal design rather than a cross-sectional one that has been used in the majority of SST studies to date (McKechnie, Winkhofer, and Ennew 2006).

Thus, in response to such calls to study customers' post-adoption SST experiences, the current research focuses on the dynamic, complex process through which consumers adapt to an SST after the initial adoption. Adaptation is the psychological mechanism whereby customers gradually move from initial adoption to continued use after repeated interactions with an SST. Accordingly, this research is process-oriented, with the focus on identifying key variables that explain this adaptation *process*. The research question driving this investigation is how customers' initial experiences with an SST influence their subsequent behaviour. To address the question, this research develops a conceptual model (refer to Appendix 3.9.2) that focuses on *continued use* and *positive WOM* as the outcome variables. It then incorporates *intention* and *habit* as two different mechanisms underlying the adaptation process. While the former captures the deliberate, conscious aspect, the latter captures the automatic, unconscious aspect. The concept of "habit" is not new in social psychology (e.g., Aarts and Dijksterhuis 2000; Aarts, Verplanken, and van Knippenberg 1998; Klockner, Matthies, and Hunecke 2003). However, it has been rarely investigated in the SST and general marketing contexts. In addition, *satisfaction* and *self-efficacy* are included as the affective and cognitive determinants of intention and habit. The central theme is that, as experience accumulates and learning occurs, a customer's decision to continue using an SST is initially rational (self-efficacy), then is largely emotion driven (satisfaction), and finally becomes habitual (habit). A three-wave longitudinal study is undertaken to empirically test the model in a retailing context. The model is estimated with the same set of respondents at two time periods, one using T<sub>1</sub> data for process variables (i.e., satisfaction, self-efficacy, intention, and habit) and T<sub>2</sub> data for consequence variables (i.e., continued use and WOM), and the other one using T<sub>2</sub> data for process variables and T<sub>3</sub> data for consequence variables.

The contribution of this study is three-fold. First, we shift the focus from the initial SST adoption to continued SST use. While most prior SST studies centre on the factors driving the initial trial (i.e., SST characteristic and individual difference variables), this study focuses on the *processes* through which customers' prior experiences lead to their subsequent continued use. While we highlight the role of habit as a key determinant of



behaviour, we also include satisfaction and self-efficacy as the affective and cognitive antecedents of intention and habit, and investigate their changing influence, which to the best of our knowledge has not been studied. We adopt a think (self-efficacy) – feel (satisfaction) – do (behaviour) framework. Secondly, in line with Meuter et al.'s (2005) work, we go beyond the emphasis on attitudes and behavioural intentions and focus on actual behaviour by explicitly incorporating actual use as the outcome variable in our model. Last but not least, from a methodological perspective, the current research uses a three-wave longitudinal design, which enables us to track a customer's post-adoption experience and examine changing effects over time. With one exception (Weijters et al. 2007), all prior SST studies use a cross-sectional method. This may not be a problem given that these studies focus on the drivers of SST adoption and hence only need a snapshot of a customer's perception and behaviour at a single point in time. However, in terms of post-adoption experiences, a cross-sectional design fails to capture the dynamic and complex nature of the phenomenon and restricts the investigation to simply testing unidirectional relationships. A preferred methodology is a longitudinal study that is able to capture the temporal changes in the relationships between variables. By investigating the changing effects over time of satisfaction and self-efficacy on habit and intention, and ultimately on actual behaviour, the current research provides a better understanding of the complex, dynamic post-adoption phenomenon.

In the following sections, the theoretical foundations of SST research are outlined, followed by a synthesis of prior SST studies and research gaps identified and research questions proposed. A conceptual model and a series of hypotheses are then developed, followed by a description of the methodology. Finally, the results are presented, and the managerial implications, limitations and future directions are discussed.

### **3.2 THEORETICAL FOUNDATION**

Two important streams of research have exerted significant influence in guiding SST studies: Davis's (1985) Technology Acceptance Model (TAM) and Rogers's (1995) Innovation Diffusion Theory (IDT).

Based on Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975), Davis (1985) developed a specific, yet parsimonious, model to predict and explain technology adoption behaviour, namely the Technology Acceptance Model (TAM) which has been widely accepted in the literature (e.g., King and He 2006; Legris, Ingham, and Colletette 2003; Ma and Liu 2004; Schepers and Wetzels 2007). Similar to TRA, TAM also posits that people's actual behaviour is determined by their behavioural intentions, which in turn are determined by attitudes towards the behaviour and various behavioural beliefs. However, the original TAM differs from TRA in noticeable aspects. First, while TRA is interested in general human behaviour, TAM identifies two specific beliefs particularly relevant to the technology acceptance behaviour, namely perceived usefulness and perceived ease of use, which have been widely used in later SST studies (e.g., Lin, Shih, and Sher 2007; McKechnie, Winkhofer, and Ennew 2006). In addition, TRA posits that attitudes completely mediate the belief – intention relationship, whereas TAM suggests that beliefs (e.g., perceived usefulness) have a direct impact on intentions in addition to the indirect influence through attitudes. This direct belief – intention link has already been found in many empirical studies (e.g., Davis, Bagozzi, and Warshaw 1989; Mathieson 1991; Szajna 1996), suggesting that attitudes may partially mediate the influence of beliefs on intentions. Finally, while behavioural intentions are determined jointly by attitudes and subjective norms in TRA, TAM does not incorporate subjective norms as the determinant of behavioural intentions “because of its uncertain theoretical and psychometric status” (Davis, Bagozzi, and Warshaw 1989, p.986). Empirical results are inconsistent and conflicting, with some studies reporting a significant influence of subjective norms on behavioural intentions (e.g., Lu et al. 2008; Venkatesh and Davis 2000; Venkatesh and Morris 2000) while others finding an insignificant link (e.g., Davis, Bagozzi, and Warshaw 1989; Fu, Farn, and Chao 2006), suggesting that the relationship may be moderated by other situational factors (Venkatesh et al. 2003).

In addition to TAM, the other influential research is Rogers's (1995) Innovation Diffusion Theory (IDT). Grounded in sociology, IDT has been used since the mid-1960s to study a variety of innovations, ranging from agricultural tools to information systems

(Rogers 1976; Tornatzky and Klein 1982). Although IDT focused on the diffusion of innovations in society initially (at the aggregate level), it has been widely applied later to studying the adoption of innovations by individuals/organisations (at the disaggregate level). One example is SST research (e.g., Lee, Lee, and Eastwood 2003; Meuter et al. 2005; Walker et al. 2002; Wu and Wang 2005). In his book “Diffusion of Innovations”, Rogers (1995) identifies five innovation characteristics affecting the adoption/rejection decision that have been widely used as five SST characteristics in later SST studies (e.g., Meuter et al. 2005). They are relative advantage, compatibility, complexity, trialability, and observability. After reviewing previous diffusion research, Rogers (1995) concludes that from 49 to 87 percent of the variance in the rate of adoption can be explained by these five attributes jointly. Empirical results indicate that although all five innovation characteristics have some effect on people’s adoption decision, their relative importance varies. For example, in a meta-analysis of diffusion studies, Tornatzky and Klein (1982) find that only relative advantage, compatibility, and complexity are consistently related to the innovation adoption behaviour and the impact of trialability and observability is less powerful. Furthermore, some studies report that relative advantage is the single best predictor of innovation adoption, outperforming all the other four variables (Karahanna, Straub, and Chervany 1999; Ostlund 1974). It is perhaps for this reason that complexity and relative advantage are more frequently used in SST research than the other three characteristics.

### **3.3 RESEARCH IN THE SELF-SERVICE TECHNOLOGY DOMAIN**

While TAM and IDT have focused on limited determinants of technology adoption, research in the services domain explores additional factors that are particularly relevant to SST. A summary of major empirical SST studies is provided in Appendix 3.9.1.

In the services literature, SST has received extensive interest in the last decade. It has been studied in a wide range of service settings such as airlines (e.g., Liljander et al. 2006), hotels (e.g., Oyedele and Simpson 2007), banks (e.g., Nilsson 2007; Snellman and Vihtkari 2003), retailing (e.g., Holloway and Beatty 2003; Weijters et al. 2007) and

so on (see Column 2, Appendix 3.9.1). Furthermore, within each services industry, various SSTs have been studied, especially in a retail banking context (e.g., ATMs, telephone banking, Internet banking).

A review of the existing SST literature shows that, with only a few exceptions (e.g., Meuter et al. 2000; Selnes and Hansen 2001), the majority of prior SST studies focus on pre-adoption evaluations and adoption decisions. This is not surprising, considering the importance of the issue in the business world (Salomann, Kolbe, and Brenner 2006). In these studies, the key variable of interest is SST adoption intention, the central question is what drives the SST adoption, with the main objective to explore possible factors that may impact customers' SST adoption and how these factors exert influence in relation to others. In terms of the methodology (see Column 3, Appendix 3.9.1), with only one exception (Weijters et al. 2007), a cross-sectional experiment/survey is commonly used to test the relationships between antecedent variables and SST adoption intention. However, given the nature of the research question, such a cross-sectional design is justifiable.

Although different studies focus on different variables with varying results (see Column 4, Appendix 3.9.1), the key determinants of SST adoption intention can be generally classified into two categories: SST characteristics and individual differences (Meuter et al. 2005). Major SST characteristics that have been studied include perceived usefulness/relative advantage (e.g., Lin, Shih, and Sher 2007; Walker and Johnson 2006), perceived ease of use/complexity (e.g., Dabholkar and Bagozzi 2002; Xinyuan, Mattila, and Tao 2008), fun/enjoyment (e.g., Curran and Meuter 2007; Weijters et al. 2007), perceived risk (e.g., Curran and Meuter 2005; Meuter et al. 2005), and perceived control (e.g., Dabholkar 1996; Lee and Allaway 2002). While occasionally other SST attributes such as financial savings and reliability have been proposed (e.g., Ding, Verma, and Iqbal 2007; Walker et al. 2002), it is argued that these characteristics are no more than a subset of perceived usefulness/relative advantage (Rogers 1995), and therefore they are not listed separately as major SST characteristics. In terms of

individual differences variables, they can be further classified into demographics and psychographics. Demographic variables found to impact SST adoption are age (e.g., Simon and Usunier 2007), gender (e.g., Meuter et al. 2005), education (e.g., Meuter et al. 2003) and income (e.g., Nilsson 2007), whereas primary customer psychographic variables include technology readiness (e.g., Matthing et al. 2006), technology anxiety (e.g., Oyedele and Simpson 2007), and need for human interaction (e.g., Dabholkar and Bagozzi 2002).

Another important issue is how the two sets of variables exert effects on customers' intention to adopt SSTs. There are two different conceptualizations regarding the impact of SST characteristics. Some researchers incorporate attitude (or other similar constructs such as satisfaction) as a mediator and hypothesize that SST characteristics only have an indirect effect on SST adoption intention through attitude (e.g., Curran and Meuter 2005; Weijters et al. 2007), which is consistent with TRA and early versions of TAM. Others do not include attitude and propose a direct relationship between SST attributes and SST adoption intention (e.g., Lee and Allaway 2002; Walker et al. 2002), which follows the conceptualization of IDT and later versions of TAM. There are also two different views of the influence of individual differences variables on SST adoption intention. One view is that individual demographic and psychographic variables are directly related to SST adoption behaviour. For example, it has been found that compared to non-adopters, SST adopters are younger, more likely to be male than female, better educated with high income, and less anxious about technology (e.g., Meuter et al. 2005; Nilsson 2007). The other view is that individual differences are not directly related to the adoption behaviour, but rather moderate the influence of SST characteristics (e.g., Dabholkar and Bagozzi 2002; Zhu et al. 2007). Despite the different conceptualizations, a general conclusion is that SST characteristics are better predictors of SST adoption intention than individual difference variables (Dabholkar 1996; Meuter et al. 2005).

In sum, the past decade has seen an abundance of research on SSTs in the services literature. Although these studies have significantly contributed to our understanding of

what drives the initial SST adoption (i.e., SST characteristics and individual differences), two important issues have been largely ignored in the literature. First and foremost, little is known about a customer's post-adoption experiences and few studies have explicitly focused on the continued use of an SST. It has been argued that while the initial trial is a critical step in the adoption process, the ultimate goal is to keep customers continuing using an SST on a regular basis. Hence, the research opportunity here is to examine how customers interact with/adapt to an SST after the initial adoption and how this dynamic process results in their continued non/use. It should be noted, however, there are several studies in the information system (IS) literature that deal with people's continued use of technologies (e.g., Eriksson and Nilsson 2007; Hsu, Ghiu, and Ju 2004). Nevertheless, these studies all adopt a cross-sectional design and either use pre-adoption models (e.g., TAM) to explain post-adoption behaviours or focus solely on the impact of satisfaction.

There is evidence suggesting that initial adoption and continued use behaviours are influenced by different factors (Bhattacharjee and Premkumar 2004; Karahanna, Straub, and Chervany 1999). Hence, pre-adoption models might not be completely applicable to studying post-adoption behaviour. Moreover, considering the complex, dynamic nature of post-adoption experiences, a cross-sectional design may not be appropriate to capture the process of how customers interact with and adapt to SSTs over time (Bhattacharjee 2001; Hsu, Ghiu, and Ju 2004). Furthermore, prior studies focus on the intention to use an SST rather than the actual use (e.g., Curran, Meuter, and Surprenant 2003; Dabholkar and Bagozzi 2002). As noted earlier, the risk of focusing on behavioural intention is that intention does not always lead to action (e.g., Ajzen 1991). This might be especially true when the use or nonuse of an SST has become a force of habit rather than an intentional action. Therefore, it is argued that research on continued SST use should go beyond the emphasis on attitudes and intentions and focus on actual behaviour. Motivated by these two unanswered questions, the current study develops a conceptual model that focuses explicitly on the actual continued use of an SST over time.

### **3.4 CONCEPTUAL MODEL**

As shown in Appendix 3.9.2, our model has four distinctive features. Firstly, compared to pre-adoption models in previous SST studies (e.g., Meuter et al. 2005), our model shifts its focus from the initial adoption to the continued use of an SST. Secondly, our model includes satisfaction, self-efficacy, intention, and habit as four key variables that capture the SST adaptation process. This distinguishes it from other post-adoption models that focus exclusively on satisfaction and intention. Thirdly, this is a dynamic model, the central theme being that there are two different mechanisms underlying the process of customers' interaction with and adaptation to an SST. Intention captures the deliberate, conscious aspect of the process, while habit captures the automatic, unconscious part. It is expected that the relative impact of intention and habit on continued use will change over time as customers gain experience with an SST. In addition, in terms of the drivers of intention and habit, the model incorporates satisfaction as the affective component (Oliver 2010), and self-efficacy as the cognitive component (Bandura 1997, 2001). It is expected that the importance of satisfaction and self-efficacy in determining intention and habit will also change as experience accumulates and learning occurs. Finally, the model goes beyond the emphasis on attitude and intention and captures actual behaviour.

Since the *antecedents* component of the model has been established in the literature (performance – satisfaction and performance – self-efficacy) and in order to highlight the contribution of this research, the following section will focus on the *processes* and *consequences* components of the model and develop hypotheses for empirical testing.

### **3.5 DEVELOPMENT OF HYPOTHESES**

#### **3.5.1 Determinants of SST Behavioural Intention**

Our model (Appendix 3.9.2) posits that customers' intention to use an SST is determined by both satisfaction and self-efficacy. While the former is an affective driver, the latter is a cognitive driver. Rooted in TRA (e.g., Ajzen and Fishbein 1980; Fishbein and Ajzen 1975), the satisfaction – behavioural intention relationship has been

extensively examined and well supported in the satisfaction literature. Satisfied consumers are more likely to stay with their current product/service provider and purchase from it again in the future (e.g., Anderson and Sullivan 1993; Mittal, Ross, and Baldasare 1998; Seiders et al. 2005; Szymanski and Henard 2001). In situations of SST adoption, it is argued that customers' decision to continue using an SST is similar to consumers' product repurchase decision in that "both decisions (1) follow an initial (acceptance or purchase) decision, (2) are affected by the initial use (of IS or product), and (3) can potentially lead to ex post reversal of the initial decision" (Bhattacharjee 2001, p. 355). In the information system literature, the positive impact of satisfaction on continuance intention has already been reported in several studies that focus on customers' continued use of technologies (e.g., Eriksson and Nilsson 2007; Hsu, Ghiu, and Ju 2004). Therefore, in line with previous research, it is hypothesized that customers' satisfaction with an SST will have a positive impact on intention to continue. Hence,

H<sub>1a</sub>: Satisfaction has a positive impact on behavioural intention at T<sub>1</sub> and T<sub>2</sub>.

Moreover, prior research shows that customer satisfaction is not static in nature and it should be viewed from a dynamic perspective (Bolton 1998; Homburg, Koschate, and Hoyer 2006). This is especially true in the context of SST adoption because innovation adoption is a dynamic, continuous process and satisfaction judgments may change after repeated use. Thus, it is critical to consider the potential changing effect of satisfaction. Satisfaction is typically modelled on the disconfirmation of expectations paradigm. This paradigm posits that satisfaction judgments occur following a comparison of perceived performance with expectation (i.e., confirmation or positive/negative disconfirmation of prior expectations) (Oliver 1980). And, as noted by service researchers, expectations in particular are dynamic and shift over time (see for example Wood and Moreau (2006)). Furthermore, for inexperienced users of complex, innovative services (e.g., professional services, SSTs), expectations are unstable and vague – and hence satisfaction judgments are similarly flexible (e.g., Patterson 2000). Therefore, in the context of SST adoption,



customers can experience strong emotions (e.g., delight, disappointment) following the initial trial because they may have been surprised by the difficulty or ease of their first usage experiences (Wood and Moreau 2006). However, one initial extreme satisfaction judgment will not necessarily result in continued use or nonuse in the future, because at this stage customers are inexperienced, their expectations are vague, and thus the recent satisfaction judgments are unstable and held with less certainty and therefore not an ideal predictor of future intentions (Homburg, Koschate, and Hoyer 2006). Over time, as experience accumulates, we predict customers' expectations will be more accurate and stable, and hence their satisfaction judgments will be formed with more certainty, leading to satisfaction being more powerful in predicting future intentions. Hence,

H<sub>1b</sub>: The impact of satisfaction on behavioural intention strengthens over time as customers' experience with an SST accumulates.

Studies in social psychology suggest that behavioural intentions are not determined by emotional drivers alone such as satisfaction, but also by cognitive drivers (e.g., Ajzen 1991; Bandura 1986). Therefore, in addition to satisfaction, self-efficacy, as a cognitive determinant, is also hypothesized to impact on a customer's intention to continue using an SST. Self-efficacy is defined as "beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura 1997, p.3). In his book "Self-Efficacy: The Exercise of Control", Bandura (1997) points out that, "Can is a judgment of capability; will is a statement of intention. Perceived self-efficacy is a major determinant of intention, but the two constructs are conceptually and empirically separable." (p.43) The positive influence of self-efficacy on intention is based upon the notion that people are more likely to perform a task that they think they are capable of accomplishing. Research on technology adoption shows that people's efficacy beliefs about their capabilities of using technologies significantly impact on their subsequent decision to adopt or reject a technology (e.g., computers, softwares). More specifically, consumers are more willing to try a new technology if they believe that they can use it properly and achieve desired outcomes (e.g., Compeau and Higgins 1995; Hill, Smith,

and Mann 1986, 1987; Igbaria and Iivari 1995). Moreover, recent SST studies also find that self-efficacy increases a customer's intention to use an SST (van Beuningen et al. 2009; Xinyuan, Mattila, and Tao 2008). Following this line of thinking, we hypothesize that customers' efficacy beliefs about using an SST will have a positive impact on their intentions to continue using an SST. Hence,

H<sub>2a</sub>: Self-efficacy has a positive impact on behavioural intention at T<sub>1</sub> and T<sub>2</sub>.

Furthermore, as self-efficacy is a dynamic construct that changes as learning occurs and experience accumulates, it is important to examine its changing effect as customers move from the initial trial to the continued use of an SST. During the early stage of SST adoption, customers are required to develop a new skill set as they become a coproducer by using an SST (Kelley, Donnelly, and Skinner 1990). As novice users, they are likely to experience usage difficulties and service failures, and the resulting low or negative confidence can stop them from future use. On the other hand, research shows that high levels of confidence can stimulate the trial of a new SST and convert novice customers into regular users (e.g., Meuter et al. 2005; van Beuningen et al. 2009). However, after repeated interactions, customers become experienced with the SST and their confidence level increases accordingly. That is, their ability to use the SST is no longer a problem. Accordingly, self-efficacy should not play as big a role as it does earlier and customers' intention to continue using an SST will be largely determined by their appreciation of the benefits of the SST (i.e., satisfaction). Hence,

H<sub>2b</sub>: The impact of self-efficacy on behavioural intention weakens over time as customers' experience with an SST accumulates.

### **3.5.2 Determinants of SST Habit**

So far, the focus has been on the deliberate, conscious aspect of the SST adaptation process (intention), be it affective (satisfaction) or cognitive (self-efficacy). However, recent research in human automaticity suggests that a great deal of human functioning is

rooted in nonconscious processes that do not require conscious control (e.g., Bargh and Chartrand 1999; Bargh and Ferguson 2000). This prompts Bargh (2002) to suggest that the next wave of consumer research should centre on “the assessment of how much of a role nonconscious influences play in real life in decisions and behavior that are of real consequence to the individual” (p. 280). In response to this call, this research includes *habit* as a key variable that captures the automatic, nonconscious process through which a customer interacts with and adapts to an SST over time. In contemporary psychology, habit is defined as learned sequences of acts that have become automatic responses to specific situations, which may be functional in obtaining certain goals or end-states (e.g., Triandis 1977; 1980; Verplanken, Aarts, and Van Knippenberg 1997). Simply put, it is a form of goal-directed automatic behavioural tendency.

A review of the literature revealed two antecedents to habit development: history of past behaviour and satisfaction with past experiences. History of past behaviour can be partitioned into three aspects: length effect, frequency effect, and recency effect, and their roles have been examined in prior habit research (e.g., Bagozzi and Warshaw 1990; Bolton, Lemon, and Verhoef 2004; Mittal 1988; Prins and Verhoef 2007; Verplanken 2006). Since the current research tracks a customer’s use of an SST from the beginning, history of past behaviour for most respondents would be close to zero and therefore this antecedent is not included in our conceptual model. However, considering the specific nature of SST adoption (Limayem, Hirt, and Cheung 2007), self-efficacy is included as an antecedent of habit as the use of an SST requires some level of skill and confidence.

Prior satisfactory experiences are a key condition for habit formation because they increase one’s tendency to repeat the same course of action again and again (e.g., Aarts, Paulussen, and Schaalma 1997). Thorngate (1976) summarizes the relationship between satisfaction and habit as follows: “If a response generated in an interaction is judged to be satisfactory, it will tend to be reproduced under subsequent, equivalent circumstances from habit rather than thought” (p.32). This positive impact of satisfaction on habit has been empirically supported in the IS literature (e.g., Limayem, Hirt, and Cheung 2007).

Thus, in an SST context, it is proposed that past satisfying experiences with an SST will contribute to the formation of the habit. Hence,

H<sub>3a</sub>: Satisfaction has a positive impact on habit at T<sub>1</sub> and T<sub>2</sub>.

From a dynamic perspective, and in line with H<sub>1b</sub>, we also propose that as customers gain experience with an SST over time, satisfaction will exert a stronger influence on habit formation. This is because, on the one hand, the initial affective emotions elicited during use of an SST are often unstable because of vague expectations, which leads to a weak impact of satisfaction on habit vulnerable. The impact becomes stronger as customers gain more experience and form satisfaction judgments with more certainty. On the other hand, as satisfaction becomes more effective in eliciting future usage, this repeat customer–SST interaction accelerates the formation of habit. Thus:

H<sub>3b</sub>: The impact of satisfaction on habit strengthens over time as customers' experience with an SST accumulates.

As the adoption of an SST requires new skills from a customer (Kelley, Donnelly, and Skinner 1990), self-efficacy also contributes to habit formation. By definition, habit is an automatic behavioural tendency that the behaviour is performed without deliberate thinking (Verplanken, Aarts, and Van Knippenberg 1997). In order to do that, a person must be highly confident and have no difficulty in performing a specific task. Thus, the more confidence a person has in performing a task, the more likely that he or she can do it without having to think. Usually, as people repeatedly try to carry out an action, they tend to perform better. Associated feelings of increasing competence may contribute to an intensification of the level of confidence experienced as the behaviour is performed frequently. Eventually, the self-efficacy cue response links might take on an automatic (habitual) nature. Therefore, we propose a positive influence of self-efficacy on habit. Hence,

H<sub>4a</sub>: Self-efficacy has a positive impact on habit at T<sub>1</sub> and T<sub>2</sub>.

In line with H<sub>2b</sub>, we also expect that the impact of self-efficacy on habit will diminish over time. As discussed previously, customers' efficacy beliefs are particularly salient in the initial stage of SST adoption when they experiment with the technology and build confidence. As customers become accustomed to the SST, their confidence level stabilizes, making self-efficacy no longer an active or relevant contributor to habit development. Thus:

H<sub>4b</sub>: The impact of self-efficacy on habit weakens over time as customers' experience with an SST accumulates.

Although intention and habit are modelled as two distinct mechanisms underlying the complex and dynamic process of customer adaptation to an SST, we hypothesize a positive path from intention to habit. This is because behavioural intentions increase the likelihood of actual behaviour (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) and the frequency of past actual behaviour is a necessary condition for habit formation (e.g., Limayem, Hirt, and Cheung 2007; Verplanken 2006). That is, if customers are willing to use an SST, they are more likely to actually use it, and the more frequently they use it, the more likely the use of the SST will become habitual. Hence,

H<sub>5</sub>: Behavioural intention has a positive impact on habit at T<sub>1</sub> and T<sub>2</sub>.

### **3.5.3 Determinants of SST Behaviour**

This study relies on Triandis' (1977; 1980) model to examine the drivers of actual behaviour from a dynamic perspective. Although the intention – behaviour link has been established and supported (e.g., TRA and TAM), these information-processing models fail to consider the role of habit in the context of repeated behaviours such as continued use of an SST. Triandis (1977; 1980) explicitly includes habit in his model and suggests that actual behaviour is predicted by both intention and habit. These relationships are expressed as:

$$P_a = (w_1H + w_2I) F$$

where the probability of an act ( $P_a$ ) is a weighted function of habit (H) and intention (I) multiplied by facilitating conditions (F) (e.g., a person's ability to perform the act). In addition, Triandis (1977; 1980) further considers the changing influence of habit and intention on behaviour over time in the model. It is suggested, "when a behavior is new, untried, and unlearned, the behavior-intention component will be solely responsible for the behavior, while, when the behavior is old, well learned, or over learned and has occurred many times before in the organism's life span, it is very likely to be under control of the habit component" (Triandis 1977, p.205). That is to say, as experience accumulates and learning occurs due to repetition, the performance of the behaviour is largely a matter of habit rather than the result of intentional reasoning. This argument fits well into the current context in that this study focuses on the process through which customers pass from the initial adoption (new, untried, and unlearned behaviour) to the continued use of an SST (old, repeated, and well learned behaviour). Thus, based upon the above reasoning, the following hypotheses are proposed,

H<sub>6a</sub>: Habit has a positive impact on continued use at T<sub>2</sub> and T<sub>3</sub>.

H<sub>6b</sub>: The impact of habit on continued use strengthens over time as customers' experience with an SST accumulates.

H<sub>7a</sub>: Behavioural intention has a positive impact on continued use at T<sub>2</sub> and T<sub>3</sub>.

H<sub>7b</sub>: The impact of behavioural intention on continued use weakens over time as customers' experience with an SST accumulates.

### **3.5.4 Determinants of Positive Word-of-Mouth (WOM)**

In addition to continued use, word-of-mouth (WOM) is another important outcome, and it is proposed that satisfaction, self-efficacy, intention, habit, and continued use all have a positive effect on it. WOM is generally referred to as informal, person-to-person communications between private parties concerning evaluations of goods and services (e.g., Anderson 1998). In relationship marketing and services marketing, both scholars

and practitioners consider WOM as a most important post-consumption response (e.g., Brown et al. 2005; de Matos and Rossi 2008). While WOM can be positive or negative, marketers are naturally interested in positive WOM, such as recommendations to others (Reichheld 2003), and that is the focus of this research.

The relationship between satisfaction and WOM has already been well established. Dissatisfied customers are likely to engage in various complaining behaviours such as negative WOM (e.g., Singh 1988; Singh and Wilkes 1996). Satisfied customers, on the other hand, are found to exhibit loyalty behaviours such as positive WOM (e.g., Brown et al. 2005). As customers become a coproducer of services when using an SST, their efficacy beliefs also impact on WOM behaviours. Services research has indicated that customers who believe that they are more efficacious in the use of a particular service are more likely to value that service, and the perceived service value then provides the customer with an incentive to exhibit loyalty behaviours such as positive WOM (McKee, Simmers, and Licata 2006). On the other hand, a customer would not recommend an SST to a friend, colleague or family until he or she knows how to use it because the less confidence in using the SST, the more perceived risk in recommending it to others. In terms of the impact of intention on positive WOM, the rationale is that if a customer is more willing to use an SST again, that means he or she sees the benefits and advantages in doing so and therefore is more likely to talk positively about the experience. Also, the more a customer actually uses an SST, the more it becomes a habit, the easier and more likely the customer is to recommend it with a degree of confidence. Hence,

H<sub>8a</sub>: Satisfaction has a positive impact on positive WOM at T<sub>2</sub> and T<sub>3</sub>.

H<sub>8b</sub>: Self-efficacy has a positive impact on positive WOM at T<sub>2</sub> and T<sub>3</sub>.

H<sub>8c</sub>: Behavioural intention has a positive impact on positive WOM at T<sub>2</sub> and T<sub>3</sub>.

H<sub>8d</sub>: Habit has a positive impact on positive WOM at T<sub>2</sub> and T<sub>3</sub>.

H<sub>8e</sub>: Continued use has a positive impact on positive WOM at T<sub>2</sub> and T<sub>3</sub>.

## **3.6 METHODOLOGY**

### **3.6.1 Research Setting**

Recently installed supermarket self-checkout kiosks were selected as the SST for the current investigation. It is an ideal research context for this study as it is a new SST in Australia. It provided an opportunity to approach a sufficient number of new users and track their adaptation process from the beginning. Moreover, supermarket shopping is a relatively high frequency household activity, and hence the use of the self-checkout SST is likely to become a frequent and regular task for a customer. This facilitates the empirical testing for the habitualization of SST behaviour. The self-checkout SST was introduced in supermarkets as an alternative checkout to traditional checkout counters and customers are free to choose either. This is important in that the testing of the model would be meaningless if the customer had no choice of service delivery options. Finally, although retailing has been the research context in prior SST studies, the focus has been on online retailing (e.g., Forbes, Kelley, and Hoffman 2005; Holloway and Beatty 2003) and few have investigated the SST used in offline retailing (e.g., Weijters et al. 2007). Thus, an investigation is worthwhile for both managers and marketing scholars.

### **3.6.2 Research Design**

A longitudinal panel was used as this study involved an examination of dynamic changes in the relationship between variables over time. A three-wave panel survey was designed for data collection. A consumer panel was firstly established by the researchers via in-store recruitment. Seven stores in an eastern Australian city that had recently been equipped with the self-checkout SST were used for panel recruitment. Two researchers conducted the fieldwork. It was not possible to approach every self-checkout customer because most of the time there were more than one customer checking out at the same time. Hence, in order to select the subjects when busy, each researcher only picked up those customers coming out from one preselected self-checkout SST. Customers were approached after they completed the checkout through the self-checkout SST and were



asked if they would assist with a research study on SSTs. Once they agreed, they were screened for eligibility. Eligible respondents were those who shopped regularly in this store and were still in the early stage of using the self-checkout SST. This was possible due to the careful selection of stores. However, to avoid the situation that a customer might use the SST in other stores, we also required that respondents should not have used it more than five times in other stores. Immediately after screening, respondents were asked to complete a questionnaire ( $T_1$ ) where all the variables in the model were measured except the actual continued use and positive WOM. On completion, they were asked to leave their preferred contact information for the remaining two waves (via mail, email, or phone). Six weeks later, the same respondents were contacted ( $T_2$ ) when all variables including positive WOM and actual use between  $T_1$  and  $T_2$  were measured. A further six weeks later, each respondent was contacted for the last time ( $T_3$ ) when they were asked to only provide information regarding WOM and actual use between  $T_2$  and  $T_3$ . All control variables (customer demographics and psychographics) were captured at  $T_1$ . Six weeks was the time interval between waves of surveys as it was long enough for a customer to have a chance to use the self-checkout SST at least several more times before the next contact. Yet it was relatively short for a longitudinal study and therefore manageable in terms of time and cost. As with all panel studies, respondent attrition could not be avoided. To help reduce attrition, panel members received a \$5 voucher after each questionnaire and then entered a draw to win one of four \$250 vouchers after completing all the three waves (Sudman and Wansink 2002; Taris 2000). In addition to the store panel, an online panel was also used as a supplement in order to reach potential eligible respondents in other locations. However, eligible respondents via the online panel were limited since many stores across Australia did not have the self-checkout SST installed at the time of the survey.

### **3.6.3 Measurement**

Satisfaction was measured with a three-item scale adapted from Spreng, MacKenzie, and Olshavsky (1996), with “dissatisfied / satisfied”, “unhappy / happy”, and “terrible /

delighted” as anchors. This scale has been successfully used by technology studies (e.g., Bhattacharjee 2001; Bhattacharjee and Premkumar 2004) and thus it was relevant to the SST context. Self-efficacy was measured by asking the respondents how confident they were that they could successfully complete the checkout process using the self-checkout SST without any help, with a seven-point scale anchored at “not at all confident / totally confident”. In line with TRA, TPB and TAM, intention was measured by a single-item, seven-point Likert scale, asking the respondents to what extent they agreed or disagreed with the statement “Next time I shop at this store, I will use the self-checkout SST no matter what” (1 = strongly disagree and 7 = strongly agree). Habit was measured by a three-item, seven-point, Likert-type scale that was originally developed by Limayem and Hirt (2003) and then refined by Limayem, Hirt, and Cheung (2007). Respondents were asked to what extent they agreed or disagreed with the three statements “Using the self-checkout SST is part of my shopping routine at this store”, “When checking out at this store, the self-checkout SST is an obvious choice for me”, and “Using self-checkout SSTs has become automatic/natural to me”. This scale was used because of its relevance (information system usage context), parsimony (three items), and recency (year 2007). Actual continued use was obtained by asking respondents to report the percentage of times they used the self-checkout SST during the past six weeks when they shopped at this store. Positive WOM was measured by an 11-point, semantic differential scale (0 = not at all likely and 10 = extremely likely) asking respondents how likely it was that they would recommend self-checkout SST to a friend, colleague, or family (Reichheld 2003). To provide a more robust test of our hypotheses, customer demographic and psychographic variables are also included as control variables.

#### **3.6.4 Sample Description**

In total, 268 eligible respondents were obtained at T<sub>1</sub>, 210 from the store panel and 58 from the online panel. After T<sub>1</sub>, 126 respondents dropped out, resulting in 142 panel members at T<sub>2</sub> (106 in the store panel and 36 in the online panel). The attrition rate was 49.5% and 37.9% for the store panel and the online panel respectively. This was slightly

better than the average attrition rate between wave one and wave two in a longitudinal panel study, which is around 50% (Sudman and Wansink 2002; Taris 2000). At the end of T<sub>3</sub>, 85 respondents from the store panel and 30 respondents from the online panel remained, resulting in the final sample size of 115. The attrition rate from wave two to wave three was much lower (19.8% for the store panel and 16.7% for the online panel). A series of tests showed no significant difference ( $p > 0.05$ ) between the store panel and the online panel in terms of the key constructs as well as control variables in the model, and hence the combination of two panels was justified. Additional tests were performed to check non-response bias. Since the three groups of respondents (those who dropped out after T<sub>1</sub>, those who dropped out after T<sub>2</sub>, and those who did not dropped out) were not significantly different ( $p > 0.05$ ) in terms of their demographics and SST attitudes and behaviours, dropping out was considered random not systematic, and therefore the non-response bias was not considered an issue. The final sample covered a wide range of age groups, with 13.9% being 15-24 years old, 33.9% being 25-44 years old, 44.3% being 45-64 years old, and 7.8% being 65 years old or above. Females accounted for 72.2% of the sample. More than half of respondents held a university degree or above (57%), which is followed by 23.7% with a TAFE qualification or equivalent, and 16.7% with a high school education. Only 2.6% had a below high school education. The following measurement validation and hypotheses testing were based on the final 115 respondents across three waves.

## **3.7 RESULTS**

### **3.7.1 Data Analysis**

Since all measures were adapted from existing scales, confirmatory factor analysis was used to assess the measurement properties. An overall measurement model with all multi-item scales was estimated, and reliability, convergent and discriminant validity of each construct were assessed. To test the hypotheses, the same structural equation model was estimated with the same set of respondents at two time periods, one using T<sub>1</sub> data for process variables (i.e., satisfaction, self-efficacy, intention, and habit) and T<sub>2</sub> data for

consequence variables (i.e., actual use and WOM), and the other one using T<sub>2</sub> data for process variables and T<sub>3</sub> data for consequence variables.

### 3.7.2 Measurement Validation

**Table 3.1 Summary of CFA Results**

		T <sub>1</sub> Measurement Model		T <sub>2</sub> Measurement Model	
Overall	CMIN/df	1.183		1.968	
Model Fit	p value	0.305		0.046	
	CFI	0.986		0.965	
	RMSEA	0.040		0.092	
	SRMR	0.030		0.030	
	GFI	0.965		0.956	
	AGFI	0.909		0.883	
Factor		SAT	HAB	SAT	HAB
Loadings	SAT1	0.957		0.987	
	SAT2	0.992		0.988	
	SAT3	0.941		0.905	
	HAB1		0.950		0.973
	HAB2		0.954		0.982
	HAB3		0.930		0.969
Construct	AVE	0.928	0.892	0.923	0.949
Statistics	CR	0.975	0.961	0.973	0.983
	Correlation	0.748		0.840	

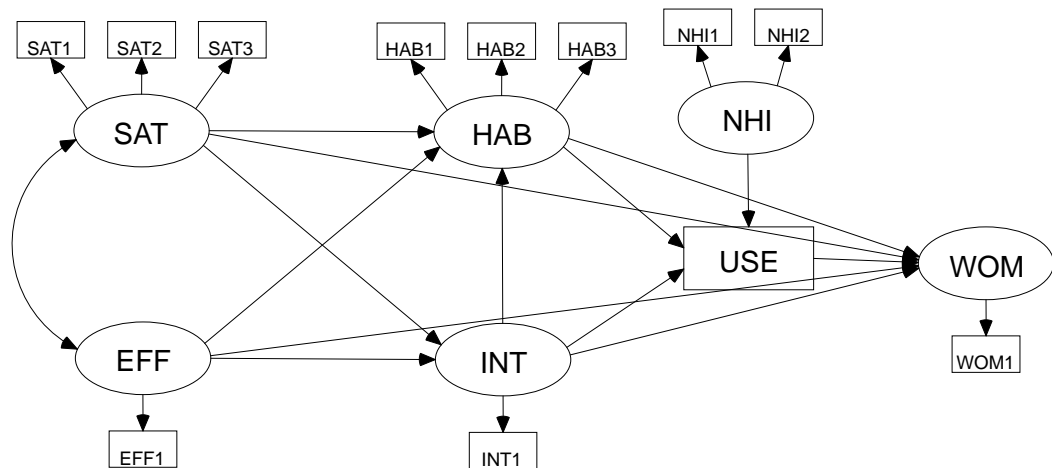
Since only two of the six key constructs (i.e., satisfaction and habit) were measured with a multi-item scale, an overall measurement model with satisfaction and habit items was estimated to assess construct validity. The same measurement model was estimated at T<sub>1</sub> and T<sub>2</sub>, with the results of the confirmatory factor analysis shown in Table 3.1.

Overall,  $T_1$  measurement model fitted the data very well with its CMIN/df less than 2 (1.183),  $p$  value greater than 0.05 (0.305), GFI, AGFI and CFI all above the cut-off value of 0.9 (0.965, 0.909 and 0.986 respectively), SRMR less than the critical threshold of 0.05 (0.030), and RMSEA below the 0.08 guideline (0.040).  $T_2$  measurement model, however, did not fit the data as well, with some indices (CMIN/df, CFI, SRMR, GFI) suggesting a good overall fit and others ( $p$  value, RMSEA, AGFI) indicating otherwise. However, since  $p$  value, RMSEA, and AGFI were all very close to the critical points, the overall fit of  $T_2$  measurement model was deemed acceptable.

Factor loadings, composite reliability (CR), and average variance extracted (AVE) were used to examine convergent validity (Hair et al. 2006). At the item level, all factor loadings were above 0.9, which was greater than the threshold of 0.7. At the construct level, CR was well above the cut-off point of 0.7 for both satisfaction and habit at both  $T_1$  and  $T_2$ , and AVE estimates were also higher than the threshold of 0.5. Therefore, all three statistics provided strong and consistent evidence of convergent validity. To assess discriminant validity, AVE estimates for both constructs were compared to the square of the correlation between the two constructs (Hair et al. 2006). As shown in Table 3.1, the AVE values for satisfaction and habit were greater than the squared correlation between satisfaction and habit in both measurement models (0.928/0.892 compared to  $0.748^2$  at  $T_1$ , 0.923/0.949 compared to  $0.840^2$  at  $T_2$ ), providing sound evidence of discriminant validity.

### **3.7.3 Hypotheses Testing**

The final structural model was shown in Figure 3.1, and need for human interaction was the control variable. Given the sample size, only one control variable was allowed in order for the model to have sufficient degree of freedom. For latent constructs measured by a single-item scale, a figure of 10% of the item variance was assigned to the error of that item in order for the measurement to be identified (Hair et al. 2006). The results of the structural model at two time periods ( $T_1$ - $T_2$  and  $T_2$ - $T_3$ ) were summarized in Table 3.2. Construct correlation matrices were also provided in Appendix 3.9.3.

**Figure 3.1 Full Structural Model in SEM**

SAT: satisfaction, EFF: self-efficacy, INT: behavioural intention, HAB: habit, USE: continued use, WOM: positive WOM, NHI: need for human interaction

**Table 3.2 Summary of SEM Results**

		T <sub>1</sub> -T <sub>2</sub> Structural	T <sub>2</sub> -T <sub>3</sub> Structural	$\Delta \chi^2(df)$
		Model	Model	
Overall Model Fit	CMIN/df	1.594	1.907	
	p value	0.010	0.000	
	CFI	0.955	0.933	
	RMSEA	0.072	0.089	N/A
	SRMR	0.080	0.072	
	GFI	0.969	0.968	
	AGFI	0.940	0.937	
Path Coefficients	SAT → INT	0.337*	0.612*	13.839 (1)*
	EFF → INT	0.513*	0.257*	4.145 (1)**
	SAT → HAB	0.227*	0.576*	9.487 (1)*
	EFF → HAB	0.461*	0.174*	16.006 (1)*
	INT → HAB	0.176 (n.s.)	0.254*	/

INT → USE	0.289**	0.111 (n.s.)	3.468 (1)***
HAB → USE	0.798*	0.598*	4.378 (1)**
SAT → WOM	0.392*	0.386*	/
EFF → WOM	0.442*	0.030 (n.s.)	/
INT → WOM	0.002 (n.s.)	0.049 (n.s.)	/
HAB → WOM	0.061 (n.s.)	0.336*	/
USE → WOM	0.332*	0.162**	/

\* significant at 0.01 level    \*\* significant at 0.05 level    \*\*\* significant at 0.1 level    n.s. not significant

Overall, the structural model fit the data reasonably well at both time periods, with CMIN/df less than the threshold of 2, and CFI, GFI and AGFI all above the cut-off point of 0.9. Although not a perfect fit as indicated by a less than 0.05 p value, a greater than 0.05 SRMR, and an around 0.08 RMSEA, overall the fit was deemed acceptable.

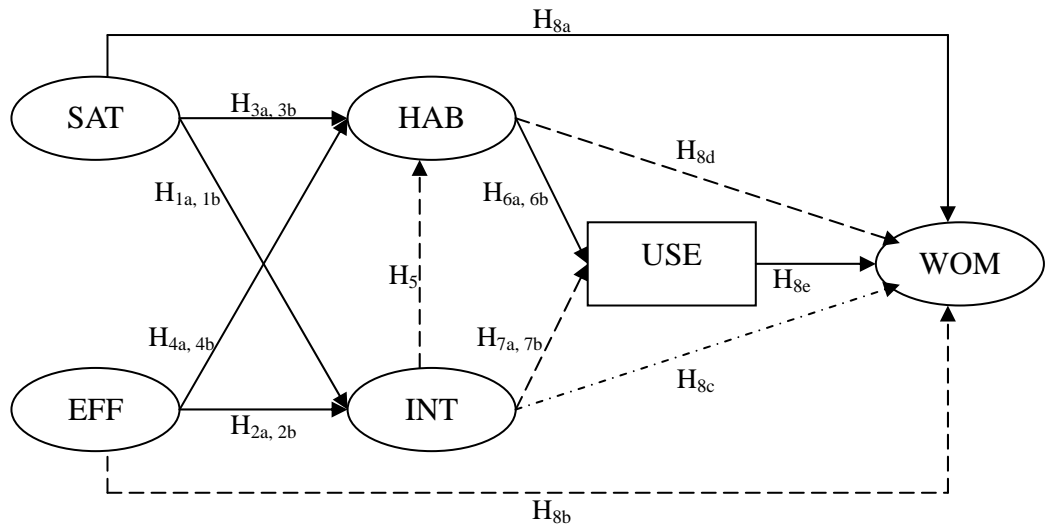
To test our hypotheses, the significance of path coefficients was assessed across two time periods. In addition, Chi-square difference test<sup>1</sup> was also used to test the difference between path coefficients in two models. H<sub>1a</sub> was fully supported as the path coefficient between satisfaction and intention was significant and positive in both models (0.337 and 0.612). The result also supported H<sub>1b</sub>, showing a significantly stronger influence of satisfaction on intention over time ( $p < 0.01$ ). H<sub>2a</sub> hypothesized that self-efficacy had a positive effect on intention. As the path coefficient from self-efficacy to intention was significant and positive in both models (0.513 and 0.257), H<sub>2a</sub> was fully supported. H<sub>2b</sub> was also fully supported as the positive impact of self-efficacy on intention significantly weakened over time ( $p < 0.05$ ). H<sub>3a</sub> posited a positive influence of satisfaction on habit. This was supported as the path coefficient was significant and positive in both models (0.227 and 0.576). H<sub>3b</sub> was also fully supported as Chi-square difference test indicated a significant increase in the path coefficient between satisfaction and habit ( $p < 0.01$ ). H<sub>4a</sub> proposed that self-efficacy had a positive effect on habit. This was fully supported with a significant and positive path coefficient from self-efficacy to habit at both time periods (0.461 and 0.174). As hypothesized in H<sub>4b</sub>, the positive impact of self-efficacy on habit

weakened over time ( $p < 0.01$ ). Thus,  $H_{4b}$  was supported.

In terms of the relationships between intention, habit, and continued use,  $H_5$  posited a positive effect of intention on habit and it was partially supported due to mixed results. While the path coefficient was positive in both models (0.176 and 0.254), it was only significant in the second model.  $H_{6a}$  hypothesized that habit had a positive impact on continued use. This was confirmed as the path coefficient between habit and continued use was significant and positive in both models (0.798 and 0.598). However, contrary to  $H_{6b}$ , the positive effect of habit on continued use weakened over time ( $p < 0.05$ ). Hence,  $H_{6b}$  was rejected.  $H_{7a}$  suggested a positive influence of intention on continued use and this was partially supported as this positive influence was significant in the first model ( $\beta = 0.289$ ) but insignificant in the second model ( $\beta = 0.111$ ). This change in the path coefficient was consistent with  $H_{7b}$ , where it was hypothesized that the positive impact of intention on continued use weakens over time ( $p < 0.1$ ). Hence,  $H_{7b}$  was supported.

In terms of the drivers of positive WOM, satisfaction and continued use were found to have a significant positive impact on positive WOM in both models ( $\beta = 0.392$  and  $0.386$  for satisfaction,  $\beta = 0.332$  and  $0.162$  for continued use), and therefore  $H_{8a}$  and  $H_{8e}$  were fully supported. Self-efficacy and habit both had a positive impact on positive WOM. However, this impact was only significant in one of the two models. The impact of self-efficacy was significant in the first model ( $\beta = 0.442$ ) but not in the second ( $\beta = 0.030$ ), whereas the effect of habit was significant in the second model ( $\beta = 0.336$ ) but not in the first one ( $\beta = 0.061$ ). Therefore,  $H_{8b}$  and  $H_{8d}$  were partly supported. Since the impact of intention on positive WOM was insignificant in both models ( $\beta = 0.002$  and  $0.049$ ),  $H_{8c}$  was rejected. Figure 3.2 and Table 3.3 summarized hypotheses testing results.



**Figure 3.2 Hypotheses in the Model**

\_\_\_\_\_ : path significant in both models (T<sub>1</sub>-T<sub>2</sub> model & T<sub>2</sub>-T<sub>3</sub> model)

----- : path significant in one model but insignificant in the other (INT-HAB: path significant in T<sub>2</sub>-T<sub>3</sub> model only; INT-USE: path significant in T<sub>1</sub>-T<sub>2</sub> model only; EFF-WOM: path significant in T<sub>1</sub>-T<sub>2</sub> model only; HAB-WOM: path significant in T<sub>2</sub>-T<sub>3</sub> model only)

..... : path insignificant in both models

**Table 3.3 Summary of Hypothesis Testing**

Hypothesis	Result
H <sub>1a</sub> : Satisfaction has a positive impact on behavioural intention at T <sub>1</sub> and T <sub>2</sub> .	Fully supported
H <sub>1b</sub> : The impact of satisfaction on behavioural intention strengthens over time as customers' experience with an SST accumulates.	Fully supported
H <sub>2a</sub> : Self-efficacy has a positive impact on behavioural intention at T <sub>1</sub> and T <sub>2</sub> .	Fully supported
H <sub>2b</sub> : The impact of self-efficacy on behavioural intention weakens over time as customers' experience with an SST accumulates.	Fully supported
H <sub>3a</sub> : Satisfaction has a positive impact on habit at T <sub>1</sub> and T <sub>2</sub> .	Fully supported
H <sub>3b</sub> : The impact of satisfaction on habit strengthens over time as customers' experience with an SST accumulates.	Fully supported

<b>Hypothesis</b>	<b>Result</b>
H <sub>4a</sub> : Self-efficacy has a positive impact on habit at T <sub>1</sub> and T <sub>2</sub> .	Fully supported
H <sub>4b</sub> : The impact of self-efficacy on habit weakens over time as customers' experience with an SST accumulates.	Fully supported
H <sub>5</sub> : Behavioural intention has a positive impact on habit at T <sub>1</sub> and T <sub>2</sub> .	Partially supported
H <sub>6a</sub> : Habit has a positive impact on continued use at T <sub>2</sub> and T <sub>3</sub> .	Fully supported
H <sub>6b</sub> : The impact of habit on continued use strengthens over time as customers' experience with an SST accumulates.	Rejected
H <sub>7a</sub> : Behavioural intention has a positive impact on continued use at T <sub>2</sub> and T <sub>3</sub> .	Partially supported
H <sub>7b</sub> : The impact of behavioural intention on continued use weakens over time as customers' experience with an SST accumulates.	Fully supported
H <sub>8a</sub> : Satisfaction has a positive impact on positive WOM at T <sub>2</sub> and T <sub>3</sub> .	Fully supported
H <sub>8b</sub> : Self-efficacy has a positive impact on positive WOM at T <sub>2</sub> and T <sub>3</sub> .	Partially supported
H <sub>8c</sub> : Behavioural intention has a positive impact on positive WOM at T <sub>2</sub> and T <sub>3</sub> .	Rejected
H <sub>8d</sub> : Habit has a positive impact on positive WOM at T <sub>2</sub> and T <sub>3</sub> .	Partially supported
H <sub>8e</sub> : Continued use has a positive impact on positive WOM at T <sub>2</sub> and T <sub>3</sub> .	Fully supported

### 3.8 DISCUSSION

The main objective of the current study is to understand customers' post-adoption experience with an SST, and the key research question is: what drives the continued use of an SST after the initial adoption? The central theme of the model is that, as learning occurs and experience accumulates, a customer's decision to continue using an SST is initially rational (self-efficacy), then emotional (satisfaction) driven, and finally habitual (habit).

#### 3.8.1 Summary of Findings

In terms of the roles of satisfaction and self-efficacy, it is found that both have a positive impact on intention. That is, if a customer is happy with an SST experience and confident in using it, he or she is more likely to use it again. This is consistent with the

satisfaction literature where a positive relationship between satisfaction and repurchase intention is established (see Szymanski and Henard 2001 for a review). It is also in line with Theory of Planned Behaviour (Ajzen 1991) and Social Cognitive Theory (Bandura 1986). In terms of the changing influence of satisfaction and self-efficacy on intention, the results show that initially self-efficacy has a stronger impact than satisfaction, but over time its impact weakens and the impact of satisfaction strengthens, resulting in a much stronger influence of satisfaction than self-efficacy on intention. This means that in the early stage of SST adoption, a customer's confidence in using an SST is critical in determining whether they are willing to use it again. In order to avoid future frustration and embarrassment, a customer would probably not use the technology again if it is still confusing after a couple of initial trials. As experience accumulates and learning occurs, self-confidence in use is no longer a major issue and the customer can then start to appreciate the advantages and benefits of using the SST. That is when satisfaction starts to play a more prominent role in driving customers' intention of continued use. Thus, in the context of SST continuation, consumer behaviour follows the think (self-efficacy) – feel (satisfaction) – do (intention) framework as suggested in our hypotheses.

The impact of satisfaction and self-efficacy on habit is similar to their impact on intention. The results show that both have a positive effect on habit, with self-efficacy having a stronger influence at first but with satisfaction playing a more influential role over time. Self-confidence plays a critical role in habit formation in the early stage of SST adoption. For the use of an SST to become an automatic and habitual behaviour, a customer needs to be able to use it without any difficulty and deliberate thinking, which requires a high level of self-confidence. As the customer gets used to the SST, in line with previous arguments, confidence is no longer a major issue and satisfaction feelings start to contribute to habit formation. Eventually, the satisfaction cue response links take on an automatic (habitual) character.

Results also show that intention has a direct positive effect on behaviour initially, but over time this direct effect weakens, and intention impacts behaviour indirectly through

habit. This supports Triandis' (1977; 1980) theory that intention has a weaker impact on behaviour as a behaviour becomes well learned. As for habit, it is found that it consistently has a direct impact on behaviour across time and this impact is consistently stronger than intention. This seems to suggest that habit is a better predictor of behaviour than intention in repeated behaviour such as SST continuation. Contrary to our hypothesis, the effect of habit slightly weakens over time. This may be due to a strong effect of habit on behaviour to begin with. This is not expected as a customer does not have the chance to form a habit of using an SST after just a couple of trials. One explanation could be that overall respondents in our sample may have a lot of experience with other SSTs or technology in general and this product norm experience can contribute to the formation of the habit of using the focal SST. Our data indicate that most respondents use a variety of SSTs in their daily lives, with ATMs, Internet banking and online booking for travel/hotels being the most frequently used ones. In sum, our findings partially support the idea that as a behaviour is repeated over time, it will turn into an automatic, unconscious routine (habit) without deliberate, conscious thinking (intention).

Finally, in terms of the determinants of positive WOM, satisfaction is found to have a positive effect across time, consistent with the satisfaction literature. Self-efficacy is the most powerful driver of positive WOM initially, however its effect extinguishes over time. This is similar to its effect on intention and habit, where the effect of self-efficacy decays as a customer becomes familiar with an SST. The logic here is that a customer would probably not recommend an SST to a friend, colleague, or family until he or she is confident about ease of use and benefits. This reconfirms the importance of building customer confidence at the initial stage of SST adoption. Surprisingly, intention has no influence on positive WOM at all. This is likely due to the inclusion of actual behaviour (continued use) in the model that has a significant positive impact on WOM across time and it swamps the direct effect of intention on WOM. Therefore, intention only has an indirect effect via behaviour. Finally, habit is found to have no impact on WOM initially, but a positive impact over time, suggesting that a customer is more likely to recommend

an SST to others if the usage of it has become automatic and habitual.

### **3.8.2 Managerial Implications**

The findings of this research provide several implications for service organisations offering the SST service delivery option. From the managerial perspective, a key insight is that the continued use of an SST is a more complex and dynamic process compared with the initial adoption and hence satisfaction and behavioural intention alone cannot capture the whole picture. In order to keep customers using an SST regularly, managers should pay specially attention to increasing customer confidence and facilitating habit formation.

Specifically, managers should understand that from customers' point of view, use of an SST depends on the SST's ability to provide convenience and a speedier transaction, thereby empowering customers (Farquhar and Rowley 2009). However, these benefits will not manifest unless customers are confident in using the technology with minimum anxiety. Producing both confidence and a satisfying service experience clearly affects customers' willingness to use the SST again. Our results suggest that a dissatisfactory experience, combined with a lack of confidence in using the technology, is sufficient for customers to avoid the hassle and use the service from a frontline service employee. This is especially true in the early stage of use when customers are likely to encounter difficulties, which can potentially lower their confidence. Hence, managers should try to increase perceived skills and abilities, thus enhancing customer confidence. For instance, some banks use "greeters" in branches to assist customers in migrating to in-branch technologies. This not only helps customers overcome any technology anxiety but also builds confidence in their ability to use the SST again. Such personal assistance should increase customers' confidence in handling a similar situation in the future. Another example is that some airlines have an assistant around to help with the checkin through the self-checkin kiosks at the airport. When customers believe that SST encounters are easy and convenient, they feel empowered and thus are more likely to opt for it again. In addition to personal assistance, providing clear instructions or built-in simulations can

be effective in enhancing confidence levels in Internet- or kiosk-based SST contexts (e.g., a step-by-step demonstration of online banking). For more complicated SSTs such as tax return online, a comprehensive online tutorial or training is needed to equip users with necessary skills and abilities.

Habit is found to be a powerful predictor of continued use of an SST, and compared to intention, its impact is stronger. Hence, in order to keep a customer using an SST on a regular base, it is important to help foster a habit of using it. Our results suggest that satisfaction and self-efficacy play varying roles in habit formation. More specifically, self-efficacy has a strong impact on habit at the initial stage of SST adoption and its impact weakens over time, whereas the influence of satisfaction is weak initially and it strengthens over time. This implies that managers should pay special attention to ‘ease of use’ when designing and implementing an SST. This can be done through sufficient and appropriate pretesting among target customers. If customers find it easy to use, their confidence in using it will increase, which will help the formation of the habit of using it. On the other hand, if an SST is found difficult to use, customers will probably avoid using it again, which will prevent the formation of habitual behaviour. Over time, as customers’ experience with an SST accumulates, ease of use is no longer an issue, and managers can then focus on communicating the benefits of using the SST (e.g., sense of control, time saving) to customers. At this stage, the appreciation of the benefits will be the main contributor to the formation of the habit of continuing using an SST.

### **3.8.3 Future Research Directions**

In this research, an effort has been made to track customers’ adaptation to an SST after the initial trial using a 12-week, three-wave longitudinal/panel study. The results reveal some interesting changing impacts of key variables over time.

One limitation of this study is its small sample size. This is partially due to the fact that this is a panel study and attrition cannot be avoided. However, effective measures have been taken to keep the panel members throughout the research such as a shopping

voucher and a draw to win prizes. As a result, our attrition rate is slightly better than the average. The other reason might be the strict screening criteria for panel recruitment. An eligible respondent should shop regularly at a supermarket store and have just started to use the self-checkout kiosk in that store and have not used it more than five times in other stores at the time of contact. This restricted the number of potential respondents in the first wave. However, effort has been made to recruit as many eligible respondents as possible (i.e., both in-store and online recruitment). Although a small sample size may affect the reliability of our results, the strict selection of respondents, on the other hand, may increase the validity of our findings. Further research could test the model with a larger sample in a different SST context (e.g., Internet or telephone based SSTs) to see if the results are generalizable across different types of SSTs.

Moreover, our results from 12 weeks uncovered changing effects of satisfaction and self-efficacy and the importance of habit. However, it may be argued that a three-wave, 12-week longitudinal panel study may not be long enough to fully capture the changing pattern or the habit formation process. For example, there is evidence suggesting that the impact of satisfaction on innovation adoption may follow a reversed U shape (Wood and Moreau 2006), and our study only captures the first half. Therefore, a longitudinal study with a longer time period can be conducted to capture a more complete picture of a customer's post adoption experience (e.g., a 12-month panel study with one contact per month).

Finally, although our model indicates that habit and behavioural intentions mediate the influence of satisfaction and self-efficacy on continued SST usage, SST characteristics (e.g., ease of use, sense of control) may be relevant. For example, as the model depicts, we consider these factors initial antecedents that influence continued SST use indirectly through satisfaction and self-efficacy. Although prior research has examined some of the links between SST characteristics and satisfaction and self-efficacy (e.g., Limayem, Hirt, and Cheung 2007; Xinyuan, Mattila, and Tao 2008), further study could take a dynamic perspective and examine how the impact of various SST characteristics may strengthen

or weaken over time. Doing so would provide additional insight into effective SST management.

### **Notes**

1. In this study, a single sample provided data at different time periods. This contrasts to the usual case in SEM where two or more independent samples provide data at the same time period. Therefore, multi-group analysis is not appropriate for Chi-square difference test, and an alternative analysis procedure is used to test pairs of corresponding paths in the  $T_1$ - $T_2$  and  $T_2$ - $T_3$  models. Firstly, a path in the  $T_2$ - $T_3$  model to be tested is selected (e.g., satisfaction – habit) and its coefficient is fixed to the unstandardized value of the corresponding path in the  $T_1$ - $T_2$  model. Secondly, the  $T_2$ - $T_3$  model is re-estimated and a Chi-square statistic is obtained. Finally, the Chi-square statistics from the initial  $T_2$ - $T_3$  model and the re-estimated  $T_2$ - $T_3$  model are compared. The difference between the two is itself a Chi-square statistic with one degree of freedom and checked for significance. A significant value means that the path coefficient in the  $T_2$ - $T_3$  model is different from the corresponding path in the  $T_1$ - $T_2$  model.



### 3.9 APPENDICES

#### 3.9.1 A Chronological Review of Major SST Studies\*

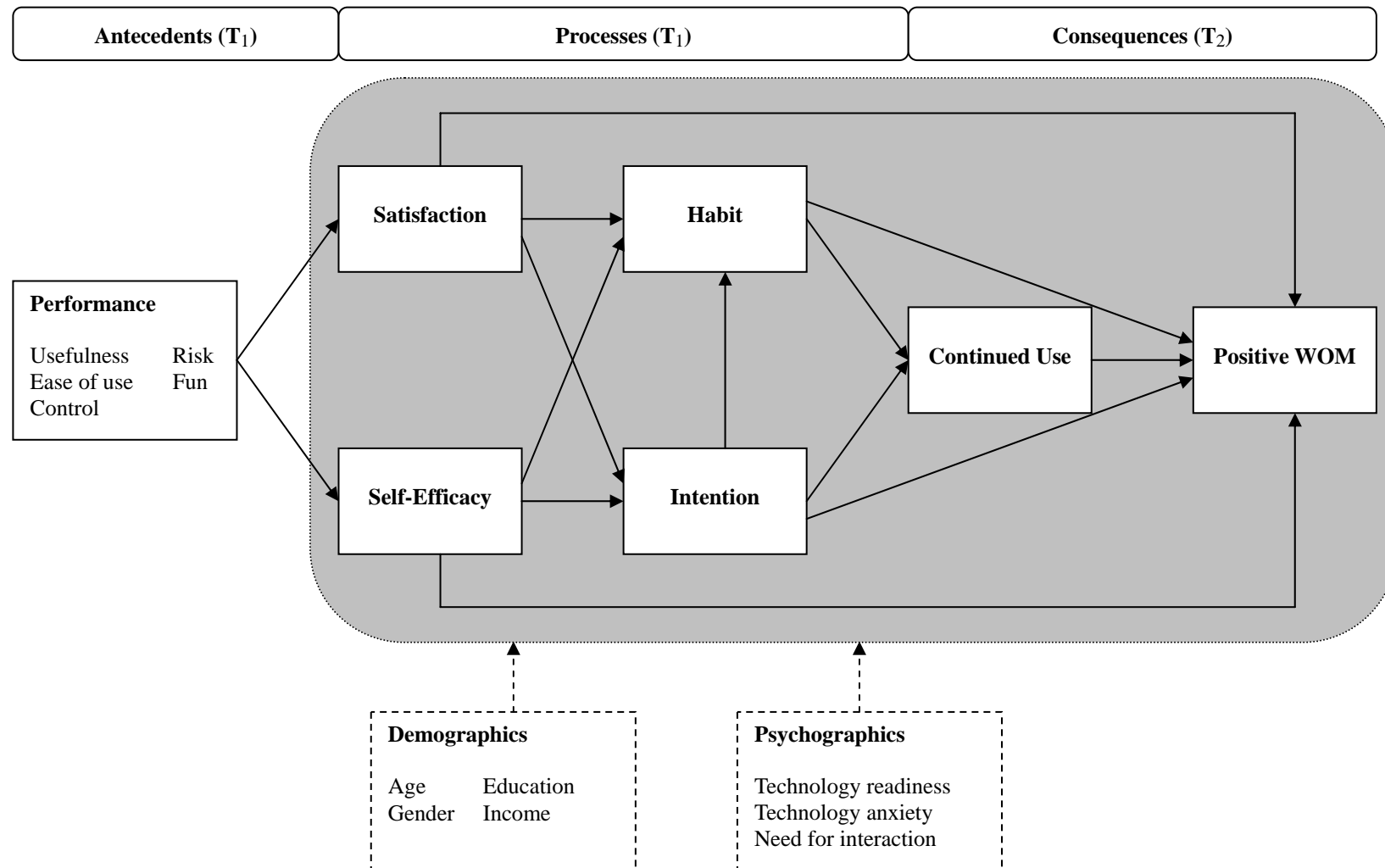
Study	Technology	Methodology	Finding
Bateson (1985)	Pay-at-the-pump ATMs	Cross-sectional survey	Time and control influence consumers' choice between SST & personnel service.
Greco and Fields (1991)	Interactive home video shopping services	Cross-sectional survey	Earlier triers of service innovations are younger, better educated and paid, less dogmatic and more extroverted.
Dabholkar (1996)	Touch screen ordering in a fast-food restaurant	Cross-sectional experiment	The cognitive model is better than the affective model. Ease of use, enjoyment, control, attitude, and need for interaction are important determinants.
Meuter et al. (2000)	Various due to the nature of the study	Critical incident technique	There are three categories of satisfying SST incidents and four categories of dissatisfying SST incidents.
Selnes and Hansen (2001)	ATMs Telephone banking Internet banking	Cross-sectional survey	The use of technology-based self-service has a negative impact on social bonding and customer loyalty.
Dabholkar and Bagozzi (2002)	Touch screen ordering in a fast-food restaurant	Cross-sectional experiment	Ease of use, performance, and fun have a positive effect on attitude, which in turn has a positive effect on intention. Consumer traits and situational factors moderate the above relationships.
Lee and Allaway (2002)	Online shopping	Cross-sectional experiment	More perceived control leads to lower perceived risk, higher perceived value, and higher adoption intention.
Walker et al. (2002)	General, not specific	Cross-sectional survey	Relative advantage, complexity, control, risk, reliability, & need for interaction are important determinants of SST adoption.

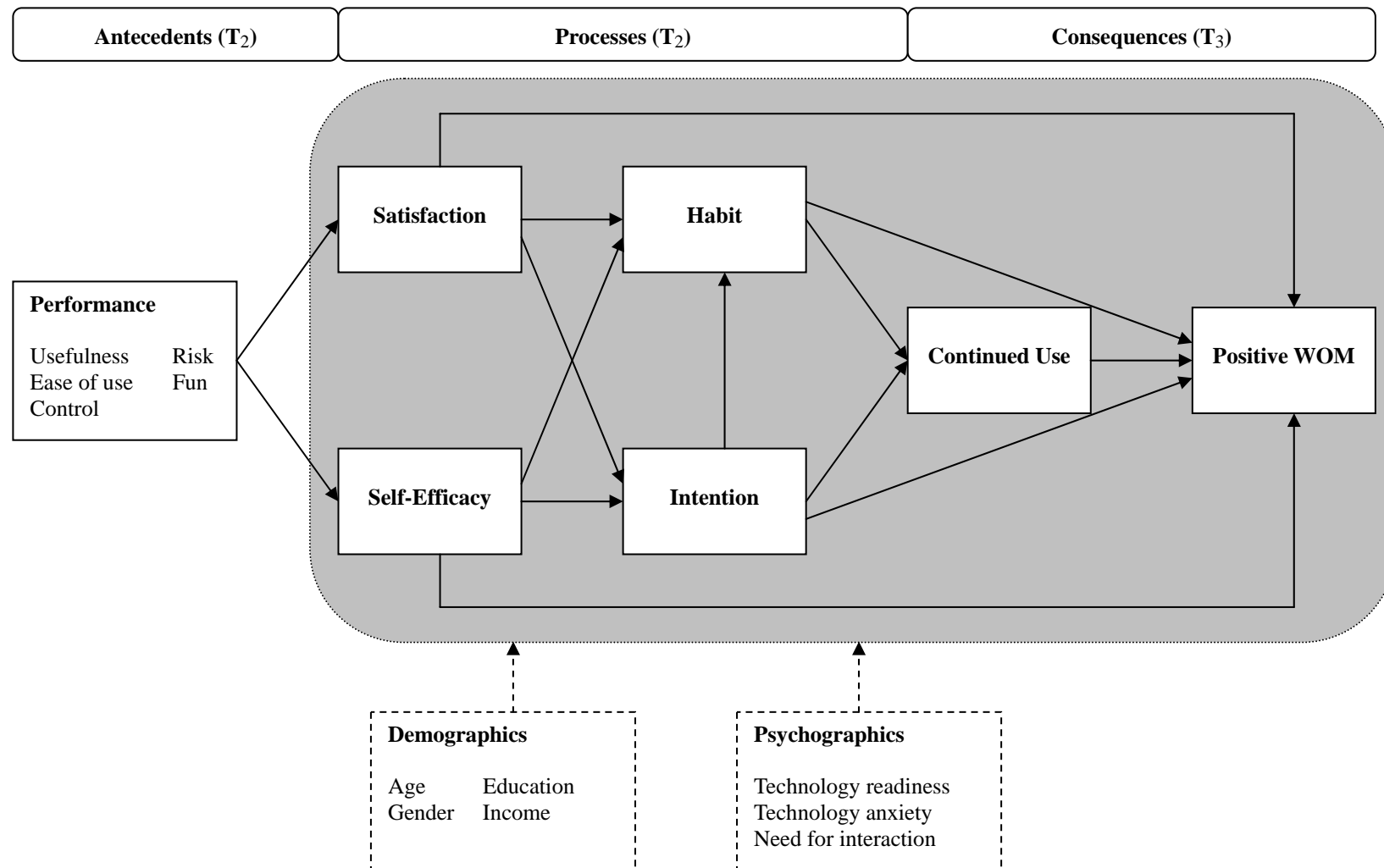
<b>Study</b>	<b>Technology</b>	<b>Methodology</b>	<b>Finding</b>
Curran, Meuter, and Surprenant (2003)	ATMs Telephone banking Internet banking	Cross-sectional survey	Intentions to use SSTs are driven by multiple, hierarchical attitudes (company, employee, SST, general technology).
Holloway and Beatty (2003)	Online retailing	In-depth interview Critical incident technique	There are 6 failure types and 5 recovery problems in online retailing.
Meuter et al. (2003)	14 SSTs	Cross-sectional survey	Technology anxiety is a better predictor of SST usage than demographics (age, gender, education).
Yen, Gwinner, and Su (2004)	Distance learning	Cross-sectional experiment	Self-service customers are more likely to attribute service failure to service firms and employees.
Meuter et al (2005)	IVR/Internet prescription refill ordering	Cross-sectional survey	Consumer readiness variables mediate the impact of innovation characteristics and individual differences on SST trial.
Curran and Meuter (2005)	ATMs Telephone banking Internet banking	Cross-sectional survey	Different factors (ease of use, usefulness, risk) influence attitude toward different SSTs, which then influence use intention.
Forbes, Kelley, and Hoffman (2005)	Online retailing	Critical incident technique	There are 10 failure types & 11 recovery strategies in online retailing.
Matthing et al. (2006)	Various	Cross-sectional survey	Technology readiness is positively correlated with SST adoption.
Harris, Mohr, and Bernhardt (2006)	Online booking Internet banking	Cross-sectional experiment	Self-service customers blame themselves more for service failure.
Chris Lin and Pei-ling (2006)	Various	Cross-sectional survey	SST use intention is determined by SST service quality, satisfaction, technology readiness.

Study	Technology	Methodology	Finding
Walker and Johnson (2006)	Internet banking Telephone bill-paying Online shopping	Cross-sectional survey	SST adoption intention is determined by capacity, risk, relative advantage, and need for interaction.
Nilsson (2007)	Internet banking	Cross-sectional survey	Consumer demographics (age, gender, education, income) influence SST use.
Simon and Usunier (2007)	Various	Cross-sectional survey	Cognitive style, age, and waiting time influence consumers' preference for SST.
Weijters et al. (2007)	grocery self-scanner	Longitudinal survey (2 waves, before and after one shopping experience)	Usefulness, ease of use, reliability and fun drive SST attitude, which drives SST usage.
Lin, Shih, and Sher (2007)	Online stock trading	Cross-sectional survey	Intention is determined by usefulness and ease of use, which are then influenced by technology readiness.
Ding, Verma, and Iqbal (2007)	Online financial services	Cross-sectional experiment	Cost, time, control, age, and gender are key determinants of SST preference.
Xinyuan, Mattila, and Tao (2008)	Library self-checkout machine	Cross-sectional experiment	Self-efficacy has a positive impact on customer satisfaction and ease of use. Ease of use, in turn, increased customer intention to reuse SSTs while decreasing technology anxiety.
Reinders, Dabholkar, and Frambach (2008)	Ticket vending machine at railway stations	Cross-sectional experiment	Forced use leads to negative attitudes toward using the SST and toward the service provider, and it indirectly leads to adverse effects on behavioural intentions.
van Beuningen et al. (2009)	Online stock investment	Cross-sectional experiment	Self-efficacy increases novice customers' financial performance perceptions, service value evaluations, and future usage intentions.

\* Academic paper only, empirical study only, B2C context only

### 3.9.2 Conceptual Model: The Process of SST Adaptation





### 3.9.3 Correlation Matrices Implied by the Model

<b>T<sub>1</sub>-T<sub>2</sub> Model</b>	SAT	EFF	INT	HAB	USE	WOM	NFI
SAT	1						
EFF	0.688	1					
INT	0.690	0.745	1				
HAB	0.666	0.748	0.676	1			
USE	0.344	0.414	0.494	0.663	1		
WOM	0.771	0.805	0.725	0.752	0.610	1	
NHI	-0.389	-0.579	-0.428	-0.431	-0.197	-0.448	1

<b>T<sub>2</sub>-T<sub>3</sub> Model</b>	SAT	EFF	INT	HAB	USE	WOM	NFI
SAT	1						
EFF	0.528	1					
INT	0.747	0.580	1				
HAB	0.858	0.625	0.786	1			
USE	0.580	0.449	0.574	0.676	1		
WOM	0.748	0.488	0.614	0.757	0.598	1	
NHI	-0.403	-0.104	-0.273	-0.319	-0.164	-0.279	1

SAT: satisfaction, EFF: self-efficacy, INT: behavioural intention, HAB: habit, USE: continued use, WOM: positive WOM, NHI: need for human interaction

## **CHAPTER 4 MODELLING HABIT FORMATION IN A SELF-SERVICE TECHNOLOGY (SST) USAGE CONTEXT**

### **4.1 INTRODUCTION**

Over the past decade, there has been a steadily increasing use of self-service technologies (SSTs) across the services sector (Froehle and Roth 2004; Salomann, Kolbe, and Brenner 2006). SSTs are defined as those “technological interfaces that enable customers to produce a service independent of direct service employee involvement” (Meuter et al. 2000, p.50). Examples include ATMs, Internet/telephone banking, self check-in systems in airports, self check-out kiosks in supermarkets, just to name a few. The proliferation of SSTs has drastically changed the service delivery process as traditional “high-touch and low-tech” interpersonal service encounters have been gradually supplemented, or even completely replaced, by “high-tech and low-touch” technological interfaces (Bitner, Brown, and Meuter 2000).

For service firms, although the initial introduction of an SST is often resource-intensive in terms of both time and money, the most prominent motivation behind this initiative is reduction in labour cost (e.g., Bitner, Ostrom, and Meuter 2002) as well as increased convenience for customers. By making customers a co-producer and having them produce a service themselves, service firms can hire less frontline employees and thus deal with the increasing growth in labour costs. However, in order for this investment to pay off, it is critical that service firms should be able to keep customers using the SST on a regular basis (i.e., using an SST becomes somewhat habitual to a customer). Hence, it is important for managers to understand how a habit of SST usage is formed and what factors facilitate its development.

However, in the services literature, despite extensive research on SSTs in recent years, the focus has been limited to understanding the initial adoption process (e.g., Curran, Meuter, and Surprenant 2003; Dabholkar and Bagozzi 2002; Meuter et al. 2005). It has

been found that a customer's intention to adopt an SST is determined by two categories of antecedents: SST characteristic variables (e.g., usefulness, ease of use) and individual difference variables (e.g., demographics, psychographics). While the initial adoption of an SST is an important first step, it is argued that the long term viability of an SST and its eventual success depend on its regular use rather than first-time use (Bhattacharjee 2001; Eriksson and Nilsson 2007). This has prompted some researchers to suggest that future SST studies should shift the focus from the initial adoption to repeated use (e.g., Curran and Meuter 2005; Meuter et al. 2005).

Therefore, to understand post-adoption repeat behaviour in an SST context, this study draws on habit research in the social psychology literature to investigate how a habit of SST usage is formed and what factors drive its formation. The concept of "habit" is not new (e.g., Aarts and Dijksterhuis 2000b; Aarts, Verplanken, and van Knippenberg 1998; Klockner, Matthies, and Hunecke 2003), but it has been rarely examined in the SST and general marketing literature. Previous research has indicated that in predicting repeated behaviour, habit is more powerful than other variables such as intentions and attitudes (Verplanken et al. 1994; Wittenbraker, Gibbs, and Kahle 1983). Because of its relevance and importance, habit is modelled as the focal dependent variable in the current study. To investigate the relationships between habit and its antecedents, we use an econometric modelling approach and estimate three panel regression models (the pooled OLS model, the fixed effect model, and the random effect model). While this approach is extensively used in brand choice modelling (e.g., Ailawadi, Gedenk, and Neslin 1999; Neelamegham and Jain 1999), it is not so popular in services research because panel data often are not so readily available in services contexts (see Bolton, Kannan, and Bramlett 2000; Harris and Uncles 2007 for exceptions). Compared to multiple regression analysis using cross-sectional data, this approach has obvious advantages in that panel regression models can account for various unobserved heterogeneity (individual or time difference) in two ways (fixed or random effect) (Chintagunta 1993), which makes our results robust across individuals and/or times.



The balance of the paper is organised as follows. Firstly, we discuss the focal dependent variable (i.e., habit) and identify the key independent variables (i.e., the antecedents of habit). Secondly, we detail the model development process, which is then followed by the reporting of empirical results. Finally, we discuss our findings and suggest directions for future research.

## **4.2 LITERATURE REVIEW**

Studies on human automaticity suggests that a great deal of human functioning is rooted in nonconscious processes that do not require conscious control, such as goal activation (e.g., Bargh and Chartrand 1999; Bargh and Ferguson 2000). According to this research stream, the consideration of nonconscious as well as conscious processes when studying human behaviour should be the norm rather than the exception (e.g., Bargh et al. 2001). Nevertheless, in consumer behaviour research, despite the growing evidence that a lot of social judgments and behaviours actually occur without conscious awareness, the field is still dominated by purely cognitive approaches where decisions and actions are made deliberately. This is evident in some of the widely adopted models such as the Theory of Reasoned Action, the Theory of Planned Behaviour, and Technology Acceptance Model, in which behavioural intention is the key variable of interest. This prompted Bargh (2002) to suggest the next wave of consumer research should centre on “the assessment of how much of a role nonconscious influences play in real life decisions and behavior” (p.280). In contrast to intention capturing the deliberate, conscious influences of behaviour, habit captures the automatic, unconscious influences.

### **4.2.1 Habit: Past Behaviour or State of Mind?**

The concept of “habit” can be traced back to James (1890), who was probably the first researcher to point out the importance of habit in managing our daily lives: “There is no more miserable human being than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day, and the beginning of every bit of work, are subjects of express

volitional deliberation... We must make automatic and habitual, as early as possible, as many useful actions as we can” (p.122). In contemporary psychology, habit is defined as learned sequences of acts that have become automatic responses to specific situations, which may be functional in obtaining certain goals or end-states (Triandis 1977; 1980; Verplanken, Aarts, and Van Knippenberg 1997). That is, habit is a form of goal-directed automatic behavioural tendency.

Two important features of habit are worth mentioning. First, habitual behaviours happen without a person’s awareness/consciousness, which differs from intentional behaviours (Mittal 1988). For example, by force of habit, a driver may put on the seat belt without even being aware of it. Secondly, habit is a goal-directed type of human automaticity, which distinguishes itself from other types of automatic behaviours such as body reflex (e.g., Aarts and Dijksterhuis 2000b; Aarts, Verplanken, and van Knippenberg 1998). For example, people do not automatically go to the ATM without having the goal of getting cashing out.

A review of previous habit research (see Appendix 4.6.1) shows that a fundamental problem in many early habit studies is that the construct was viewed as equivalent to frequency of past behaviour (e.g., Bentler and Speckart 1979; Landis, Triandis, and Adamopoulos 1978; Wittenbraker, Gibbs, and Kahle 1983). Ajzen (2002) pointed out, “In the absence of an independent measure of the habit construct, using habit to explain the relation between prior and later behavior involves circular reasoning” (p.110). Later psychology scholars acknowledged this problem and suggested that repeated occurrence is a prerequisite to the formation of habit but it is not habit per se, and that habit should be considered as a mental construct and not be confused with past behaviour (e.g., Limayem and Hirt 2003; Verplanken and Orbell 2003). In line with the argument above, this research also views habit as a person’s state of mind that is independent of past behaviour. That is, habit is a separate, independent construct.

The relevance and importance of habit in repeat behaviour is highlighted in Triandis’ (1977; 1980) model, in which habit is explicitly incorporated as a predictor of behaviour.

The relationship is expressed as follows:

$$P_a = (w_1H + w_2I) F$$

where the probability of an act ( $P_a$ ) is a weighted function of habit ( $H$ ) and intention ( $I$ ) multiplied by facilitating conditions ( $F$ ) (e.g., a person's ability to perform the act). It is suggested that, "when a behavior is new, untried, and unlearned, the behavior-intention component will be solely responsible for the behavior, while, when the behavior is old, well learned, or overlearned and has occurred many times before in the organism's life span, it is very likely to be under control of the habit component" (Triandis 1977, p.205). That is, as experience accumulates and learning occurs after repetition, the performance of a behaviour is largely a matter of habit rather than the result of intentional reasoning. Empirical support can be found in many later psychology studies showing that habit is a most powerful, if not the only, determinant of repeated behaviour (e.g., Verplanken 2006; Wittenbraker, Gibbs, and Kahle 1983). Because of its important role in predicting repeated behaviour, habit is modelled as the focal dependent variable in this study and we are particularly interested in what factors impact on the formation of a habit.

#### **4.2.2 Antecedents of Habit**

A review of the literature revealed two major antecedents to habit development: history of past behaviour and satisfaction with past experience. Furthermore, given the specific nature of SST adoption (Limayem, Hirt, and Cheung 2007), self-efficacy is included as another antecedent of habit since the use of an SST usually requires some level of skill and confidence (van Beuningen et al. 2009; Xinyuan, Mattila, and Tao 2008).

History of past behaviour can be partitioned into three aspects: frequency effect, length effect, and recency effect. The role of frequency of past behaviour in the formation of habit has already been addressed in previous habit studies (e.g., Mittal 1988; Verplanken 2006). The main point of view is that repetition is a necessary but insufficient condition for habit formation and it is not habit per se. Therefore, frequency of past behaviour is

expected to have a positive impact on habit strength. In addition to the frequency effect, Bagozzi and Warshaw (1990) proposed recency of past behaviour as another factor that directly influences future behaviour. In this study, however, it is argued that the recency of past behaviour should influence future behaviour via habit. Like frequency, recency can be seen as another necessary but insufficient condition for habit formation in that recently performed behaviours are salient and relevant to the current life and are more likely to become routinized than behaviours performed long time ago. Hence, a positive impact of recency on habit is proposed. Finally, the third component – length of usage history comes from relationship marketing literature (e.g., Bolton, Lemon, and Verhoef 2004; Dwyer, Schurr, and Oh 1987; Prins and Verhoef 2007). The need for separating length and recency effects can be illustrated by the following example. A customer who has recently migrated from telephone banking to Internet banking is said to have a long, remote history of using telephone banking and a short, recent history of using Internet banking. It is argued that a long history of performing a behaviour is usually associated with accurate expectation, abundant experience, and adequate repetition of the action, which will lead to behavioural inertia and facilitate the habitualization of the behaviour. Therefore, the longer a customer has used an SST, the more likely the use of the SST becomes habitual to the customer.

Prior satisfying experiences are also a key condition for habit formation because they increase one's tendency to repeat the same course of action again and again (e.g., Aarts, Paulussen, and Schaalma 1997). Thorngate (1976) summarizes the relationship between satisfaction and habit as follows: "If a response generated in an interaction is judged to be satisfactory, it will tend to be reproduced under subsequent, equivalent circumstances from habit rather than thought" (p.32). This positive influence of satisfaction on habit has been empirically supported in the information system literature (e.g., Limayem, Hirt, and Cheung 2007). Thus, in an SST context, we propose that past satisfying experiences with an SST will contribute to the formation of habitual usage.

As the adoption of an SST often requires new skills from a customer (van Beuningen et

al. 2009; Xinyuan, Mattila, and Tao 2008), self-efficacy beliefs also contributes to habit formation. By definition, habit is an automatic behavioural tendency that the behaviour is performed without deliberate thinking (e.g., Verplanken, Aarts, and Van Knippenberg 1997). In order to do that, a person must be highly confident and have no difficulty in performing a specific task. Therefore, the more confidence a person has in performing a task, the more likely that he or she can do it without having to think. Usually, as people repeatedly try to carry out an action, they tend to perform better (e.g., Ronis, Yates, and Kirscht 1989). Associated feelings of increasing competence may then contribute to an intensification of the level of self-confidence experienced as the behaviour is performed frequently. Eventually, the self-efficacy cue response links might take on an automatic (habitual) nature. Therefore, a positive effect of self-efficacy on habit is proposed.

### **4.3 MODEL DEVELOPMENT**

#### **4.3.1 Description of the Sampling Panel Data**

Drawing on prior habit research, this study models habit as a function of past behaviour (frequency, recency, and length), satisfaction, and self-efficacy in an SST context. The data we use are from a consumer panel comprising 626 Australian customers who shop regularly at a supermarket chain (at least once a week) and have used the self-checkout SST within the supermarket before (at least once). The self-checkout SST is a checkout machine via which customers can scan products, pack them, pay the money, and check themselves out without a cashier. It is a relatively new SST being introduced in selected Australian supermarkets as an alternative checkout to the traditional checkout counters and customers are free to choose either one.

Panel consumers were tracked over a 12-week period, during which they were contacted three times to report their SST perceptions and behaviours (at the beginning, middle and end of the 12 weeks) with six weeks being the time interval between two contacts. One problem with any panel study is attrition (Sudman and Wansink 2002; Taris 2000). With an attrition rate of 44.41% between the first and second waves and 19.54% between the

second and third waves, our panel data set consists of 626, 348, and 280 consumers at wave 1, 2, and 3, respectively. To formally express the panel data and to facilitate the specification of variables and models later, we define our data set as follows:

$$y_{it}, x_{1it}, x_{2it}, \dots, x_{Kit}, i = 1, \dots, N, t = 1, \dots, T_i$$

$y_{it}$  = dependent variable,       $x_{it}$  = set of independent variables,

$K$  = number of regressors,       $N$  = number of groups (individuals),

$T_i$  = number of observations in group “ $i$ ”.

Since our data set has many respondents (large  $N$ ) and few time periods (small  $T_i$ ), it is a short panel data set. This may have implications for the specification and estimation of panel models (especially for a fixed effect model) (Greene 2007). Moreover, as  $T_i$  varies with  $i$  due to attrition ( $T_i = 1, 2$ , or  $3$ ), it results in an unbalanced panel for modelling, which may also entail some estimation issues depending on the analysis software used (Park 2009).

### **4.3.2 Variable Specification**

As discussed earlier, habit should be viewed as a mental construct and not be confused with past behaviour. Therefore, as the focal dependent variable ( $y_{it}$ ), it is measured using a three-item, seven-point, Likert-type scale that was originally developed by Limayem and Hirt (2003) and then refined by Limayem, Hirt, and Cheung (2007) (see Appendix 4.6.2 for scale items). This scale was used because of its parsimony (three items), relevance (IS usage context), and recency (year 2007). To obtain a composite measure for  $y_{it}$ , three options are available: selecting a surrogate variable, creating a summated scale, or using factor scores (Hair et al. 2006). A confirmatory factor analysis is conducted to decide which option to choose.

Satisfaction ( $x_{1it}$ ) is captured with a three-item, semantic differential scale adapted from Spreng, MacKenzie, and Olshavsky (1996). This measure has been successfully used in

technology studies (e.g., Bhattacharjee 2001; Bhattacharjee and Premkumar 2004) and therefore it is relevant to the SST context. Like habit, a confirmatory factor analysis is performed to obtain a composite measure for  $x_{1it}$ . Self-efficacy ( $x_{2it}$ ) is captured using a single-item, semantic-differential scale based upon guidelines from Bandura (1997) and adapted from Dabholkar and Bagozzi's (2002) study. Respondents are asked about their confidence in using the self-checkout SST, measured by a seven-point scale with "not at all confident / totally confident" as anchors.

As for past behaviour, we use  $x_{3it}$ ,  $x_{4it}$ , and  $x_{5it}$  to denote length, recency, and frequency of SST usage, respectively.  $x_{3i1}$  (length) is obtained by asking respondents when was the first time they used the self-checkout SST in the supermarket. As this SST is relatively new to the market, the respondent may find it relatively easy to recall the time of their first use. For comparison and compatibility purpose, all initial responses are transformed into weeks. For instance, if the response from consumer  $i$  is two months ago, then  $x_{3i1}$  is 8.57 weeks ago (2 times 30 divided by 7). Thus, the larger the number, the longer the length. As the time interval between two contacts is six weeks,  $x_{3i2}$  and  $x_{3i3}$  are automatically obtained by adding 6 and 12 to  $x_{3i1}$ , respectively, hence are not measured in the second and third waves.

$x_{4it}$  (recency) is measured by asking respondents when was the last time they used the self-checkout SST in the supermarket. Like  $x_{3it}$ , all initial responses are transformed into weeks. For example, if the response from consumer  $i$  at  $t=1$  is four days ago, then  $x_{4i1}$  is 0.57 weeks ago. Note that  $x_{4it}$  is a reverse-scaled variable. That is, the smaller  $x_{4it}$  is, the more recent a consumer has used the SST.

$x_{5it}$  (frequency) is captured by asking consumers two questions, with the first being how many times in the past six weeks they have shopped at a particular supermarket and the second being what percentage of times they used the self-checkout SST when shopping at the supermarket in the past six weeks.  $x_{5it}$  is obtained by multiplying the responses from these two questions. For instance, if the responses from consumer  $i$  at  $t=1$  are nine times and 80%, then  $x_{5i1}$  is 7.2 times.

In addition to the focal dependent variable and five key antecedent variables, customer demographics and psychographics are also captured and incorporated in our data set as measures of observed individual heterogeneity. More specifically, previous research has identified five major individual difference variables that are particularly relevant to the use of SSTs and technology in general (e.g., Dabholkar 1996; Meuter et al. 2005). They are technology anxiety ( $x_{6i}$ ), need for human interaction ( $x_{7i}$ ), behavioural inertia ( $x_{8i}$ ), technology experience ( $x_{9i}$ ), and personal innovativeness ( $x_{10i}$ ). The first three serve as inhibitors (i.e., negative influence in SST usage), whereas the last two are accelerators. They are all measured using a multi-item scale adapted from the existing literature (see Appendix 4.6.2). As personal traits are relatively stable and usually do not change across time, these five individual difference variables are measured only once at the first wave.

### 4.3.3 Model Estimation

*a) Establishing Baseline Models* As a starting point, three linear regression models are specified and estimated using LIMDEP 9.0, in which habit is modelled as a function of five antecedents. It should be noted that LIMDEP does not require the panel data to be balanced and missing data are handled automatically by this estimator (Greene 2007).

The first model is a pooled regression model based on ordinary least square estimation (OLS). Its functional form can be expressed as:

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \varepsilon_{it} \quad (1)$$

where  $\varepsilon_{it}$  is the error term with  $E[\varepsilon_{it}] = 0$  and  $\text{Var}[\varepsilon_{it}] = \sigma_e^2$

As  $\alpha$  and  $\beta_i$  are invariant across individuals ( $i$ ) and times ( $t$ ), model (1) assumes that the same regression model holds for all individuals and time periods. It does not incorporate individual and/or time heterogeneity. For the purpose of the current study, this model is a reasonable starting point or base because we are particularly interested in a general relationship between habit and its antecedents.



However, to take full advantage of panel data, a fixed effect model and a random effect model are also specified and estimated in order to account for unobserved heterogeneity (Chintagunta 1993). It should be noted that there are other approaches to incorporating heterogeneity (Ailawadi, Gedenk, and Neslin 1999). This study looks at the fixed effects specification and the random effects specification as two illustrations because they are two basic approaches. In determining the form and estimation method of the fixed effect model, the structure of the data set needs to be considered. As our data set is a short one with many respondents (large N) and few time periods (small T<sub>i</sub>), it is more appropriate to estimate a one-way fixed time effect model rather than a one-way fixed group effect model. In addition, to avoid dummy variables, a within effect estimation is used (Park 2009). Thus, the one-way fixed time effect model is specified as:

$$y_{it} - \bar{y}_t = \beta_1(x_{1it} - \bar{x}_{1t}) + \beta_2(x_{2it} - \bar{x}_{2t}) + \beta_3(x_{3it} - \bar{x}_{3t}) + \beta_4(x_{4it} - \bar{x}_{4t}) + \beta_5(x_{5it} - \bar{x}_{5t}) + (\varepsilon_{it} - \bar{\varepsilon}_t),$$

$$t = 1, 2, 3 \quad (2)$$

where  $\bar{y}_t$  is the mean of habit at time t,  $\bar{x}_{1t}$  is the mean of satisfaction at time t,  $\bar{x}_{2t}$  is the mean of self-efficacy at time t,  $\bar{x}_{3t}$  is the mean of length at time t,  $\bar{x}_{4t}$  is the mean of recency at time t, and  $\bar{x}_{5t}$  is the mean of frequency at time t

Finally, for comparison and compatibility purpose, a one-way random time effect model as opposed to a one-way random group effect model is estimated, which is written as:

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + (\varepsilon_{it} + u_t), \quad t = 1, 2, 3 \quad (3)$$

where  $u_t$  is a random time effect with  $E[u_t] = 0$ ,  $\text{Var}[u_t] = \sigma_u^2$ ,  $\text{Cov}[\varepsilon_{it}, u_t] = 0$

*b) Incorporating Lagged Variables* So far, all the three regression models above are static in nature, with no carry-over effect incorporated in the equation. However, prior habit studies have shown that habitual behaviours are often difficult to suppress unless interventions occur to disrupt the formation of deep and non-reflective mental scripts (e.g., Aarts and Dijksterhuis 2000a; Jasperson, Carter, and Zmud 2005). Put simply,

habitual behaviours are characterized by mental inertia and enduring effect. Thus, it is reasonable to include previous habit ( $y_{i(t-1)}$ ) in the model as an additional antecedent of current habit ( $y_{it}$ ), resulting in a respecification of equations (1) to (3) into three dynamic panel models:

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 y_{i(t-1)} + \varepsilon_{it}, t = 2, 3^* \quad (4)$$

$$y_{it} - \bar{y}_t = \beta_1(x_{1it} - \bar{x}_{1t}) + \beta_2(x_{2it} - \bar{x}_{2t}) + \beta_3(x_{3it} - \bar{x}_{3t}) + \beta_4(x_{4it} - \bar{x}_{4t}) + \beta_5(x_{5it} - \bar{x}_{5t}) + \beta_6(y_{i(t-1)} - \bar{y}_{(t-1)}) + (\varepsilon_{it} - \bar{\varepsilon}_t), t = 2, 3^* \quad (5)$$

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 y_{i(t-1)} + (\varepsilon_{it} + u_i), t = 2, 3^* \quad (6)$$

\* Due to the inclusion of  $y_{i(t-1)}$ , the estimation of the model starts from  $t = 2$ .

*c) Accounting for Heterogeneity* Although the fixed effect model (5) and the random effect model (6) have accounted for time heterogeneity, individual heterogeneity has yet to be incorporated in any way. In the current research, the effects of observed individual heterogeneity are examined in two ways. In terms of customer psychographics, the five major individual difference variables (technology anxiety, need for human interaction, behavioural inertia, technology experience, and personal innovativeness) are included in the model as additional independent variables. However, like satisfaction and habit, a confirmatory factor analysis of the five variables needs to be conducted first to obtain a composite measure for each variable. The final complete regression models are written as:

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 y_{i(t-1)} + \beta_7 x_{6i} + \beta_8 x_{7i} + \beta_9 x_{8i} + \beta_{10} x_{9i} + \beta_{11} x_{10i} + \varepsilon_{it}, t = 2, 3 \quad (7)$$

$$y_{it} - \bar{y}_t = \beta_1(x_{1it} - \bar{x}_{1t}) + \beta_2(x_{2it} - \bar{x}_{2t}) + \beta_3(x_{3it} - \bar{x}_{3t}) + \beta_4(x_{4it} - \bar{x}_{4t}) + \beta_5(x_{5it} - \bar{x}_{5t}) + \beta_6(y_{i(t-1)} - \bar{y}_{(t-1)}) + \beta_7(x_{6i} - \bar{x}_6) + \beta_8(x_{7i} - \bar{x}_7) + \beta_9(x_{8i} - \bar{x}_8) + \beta_{10}(x_{9i} - \bar{x}_9) + \beta_{11}(x_{10i} - \bar{x}_{10}) + (\varepsilon_{it} - \bar{\varepsilon}_t), t = 2, 3 \quad (8)$$

$$y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 y_{i(t-1)} + \beta_7 X_{6i} + \beta_8 X_{7i} + \beta_9 X_{8i} + \beta_{10} X_{9i} + \beta_{11} X_{10i} + (\varepsilon_{it} + u_i), t = 2, 3 \quad (9)$$

In terms of customer demographics, subgroup analysis is performed to investigate potential differences between demographic segments. In this study, we are particularly interested in gender differences as prior research has suggested that males and females are different in terms of their SST perceptions and behaviours (e.g., Ding, Verma, and Iqbal 2007; Nilsson 2007). Specifically, Venkatesh and Morris (2000) found that men's technology usage decisions are more strongly influenced by their perceptions of usefulness, whereas women are more strongly influenced by their perceptions of ease of use and subjective norm. Moreover, Elliott and Hall (2005) suggested that males have a stronger desire to experiment with new SSTs, while females exhibit less confidence in making new SSTs work. Hence, after the estimation of an overall model, models (7), (8), and (9) are estimated separately for males and females in order to investigate potential gender differences in the formation of SST habit.

*d) Model Fit and Comparison* After specifying and estimating a series of models, a final issue is to assess model fit and examine whether there is an unobserved time effect. F-value and adjusted  $R^2$  are calculated to examine the overall model fit. To investigate the time effect, two statistical tests are conducted to compare the pooled OLS model (7) with the one-way fixed time effect model (8) and the one-way random time effect model (9) (Greene 2008). More specifically, the F-test is used to compare model (7) and model (8), and the Lagrange multiplier (LM) test is used to compare model (7) and model (9). A time effect is present if model (8) and model (9) are favoured over model (7).

#### 4.4 EMPIRICAL RESULTS

The initial 626 panel consumers consist of 66.4% females and 33.6% males. This is reasonable in that our research setting is the self-checkout SST in supermarkets and in general women still do more supermarket shopping than men. The panel covers a wide range of age groups, with 19.9% being 15-24 years old, 50.7% being 25-44 years old,

25.9% being 45-64 years old, and only 3.4% being 65 years old or above. This demographic split is consistent with prior SST research suggesting that SST users are generally younger (e.g., Nilsson 2007; Simon and Usunier 2007). Panel consumers also vary in education level. More than half of them hold a university degree or above (53.4%), followed by 24.9% with a TAFE degree and 20.2% with only a high school education, and the remaining 2.6% not completing high school. This is in line with previous results that SST users have a generally higher education level (e.g., Greco and Fields 1991; Meuter et al. 2003).

All consumers in our panel shop at least once a week in the selected supermarket with an average of approximately 1.5 times a week. The majority (around 70%) are loyal customers in that more than 60% of their monthly supermarket spending has been in this particular supermarket. As required, all consumers have used the self-checkout SST at least once before, with an average of 9 times. This suggests that the SST is relatively new to the market and most customers are still in the early stage of adoption – earliest first use being two years ago, with the average being approximately 10 weeks earlier. However, they have a variety of product-norm experience with the consumers using a variety of SSTs in their daily lives – ATMs, online banking, online booking for travel/hotels, and ticket machines at railway stations being most frequently used.

#### **4.4.1 Confirmatory Factor Analysis**

Before the estimation of regression models, a composite measure was obtained for satisfaction and habit. Confirmatory factor analysis was conducted using AMOS 7.0 to assess measurement validity. Since both satisfaction and habit were measured at  $t = 1, 2$ , and  $3$ , three measurement models were estimated and the results are summarized in Table 4.1.

**Table 4.1 CFA Results for Satisfaction and Habit**

		Measurement Model at t = 1		Measurement Model at t = 2		Measurement Model at t = 3	
Overall	CMIN/df	1.216		1.658		1.212	
Model Fit	p value	0.284		0.103		0.287	
	SRMR	0.011		0.014		0.026	
	GFI	0.990		0.981		0.979	
	AGFI	0.974		0.951		0.944	
	CFI	0.996		0.986		0.993	
	RMSEA	0.019		0.044		0.028	
Factor		SAT	HAB	SAT	HAB	SAT	HAB
Loadings	SAT1	0.946		0.960		0.965	
	SAT2	0.973		0.971		0.981	
	SAT3	0.902		0.917		0.928	
	HAB1		0.922		0.947		0.972
	HAB2		0.930		0.957		0.976
	HAB3		0.921		0.950		0.934
Construct	AVE	0.886	0.855	0.902	0.906	0.918	0.923
Statistics	CR	0.959	0.946	0.965	0.966	0.971	0.973
	Correlation	0.726		0.827		0.823	

SAT: satisfaction, HAB: habit

Overall, all three measurement models fit the data very well, with CMIN/df less than 2, p value greater than 0.05, GFI, AGFI and CFI all above the cut-off point of 0.9, SRMR less than the threshold of 0.05, and RMSEA below the 0.05 guideline (Byrne 2001).

To assess convergent validity, factor loadings, composite reliability (CR), and average variance extracted (AVE) are used (Hair et al. 2006). At the item level, factor loadings are all above 0.9, which is much greater than the threshold of 0.7. At the construct level,

CR is well above the cut-off point of 0.7 for both satisfaction and habit across the three models, and AVE estimates are much higher than the threshold of 0.5. These statistics provide strong, consistent evidence of convergent validity. To test discriminant validity, AVE estimates for both constructs are compared to the square of the correlation between the two constructs (Hair et al. 2006). As shown in Table 4.1, the AVEs for satisfaction and habit are much greater than the squared correlation between satisfaction and habit across three measurement models ( $0.886/0.855$  vs.  $0.73^2$  at  $t = 1$ ,  $0.902/0.906$  vs.  $0.83^2$  at  $t = 2$ , and  $0.918/0.923$  vs.  $0.82^2$  at  $t = 3$ ), providing evidence of discriminant validity.

Since all indicators load equally high on its own construct, and for ease of interpretation, an unweighted summated scale is created for satisfaction and habit.

Similarly, a CFA is conducted for the five individual difference variables, and the results are summarized in Table 4.2.

**Table 4.2 CFA Results for Individual Difference Variables**

Overall	CMIN/df	p value	SRMR	GFI	AGFI	CFI	RMSEA
Model Fit	1.842	0.000	0.035	0.944	0.908	0.955	0.037
		TA	NHI	BI	TE	PI	
	TA1	0.832					
	TA2	0.928					
	TA3	0.901					
	NHI1		0.923				
	NHI2		0.958				
	NHI3		0.919				
Factor	BI1			0.888			
Loadings	BI2			0.909			
	BI3			0.916			
	TE1				0.955		
	TE2				0.946		

	PI1					0.789
	PI2					0.915
Construct	AVE	0.788	0.872	0.818	0.903	0.730
Statistics	CR	0.918	0.953	0.931	0.949	0.843

TA: technology anxiety, NHI: need for human interaction, BI: behavioural inertia, TE: technology experience, PI: personal innovativeness

Overall, all the statistics except p-value indicate a good fit of the measurement model. The measures of the five constructs exhibit good reliability and validity, as indicated by all factor loadings greater than the threshold of 0.7, and AVEs and CRs above the cut-off point of 0.5 and 0.7, respectively.

#### 4.4.2 Panel Regression Models

After measurement validation, three panel regression models (models (7), (8), and (9)) are firstly estimated using the whole sample, and the results are summarized in Table 4.3. They are then re-estimated separately for male and female respondents, and the results are presented in Table 4.4. As can be seen from the correlation matrix in Appendix 4.6.3, the five individual difference variables are not highly correlated with each other (the highest correlation coefficient being 0.664), suggesting that incorporating all the five variables in the regression models does not bring about the problem of multicollinearity (Hair et al. 2006).

In comparing the three overall models (Table 4.3), we find that accounting for the effects of unobserved time heterogeneity (in either a fixed or random way) does improve the overall model fit. This is indicated by a significant F-test ( $F = 8.367$ ,  $p < 0.05$ ) and LM test ( $LM = 8.98$ ,  $p < 0.05$ ), which are in favour of the fixed/random effect model over the pooled OLS model. However, this does not mean that the pooled OLS model has a poor fit. It also fits the data well as indicated by a significant F value ( $F = 191.63$ ,  $p < 0.05$ ) and a high adjusted  $R^2$  ( $Adj R^2 = 0.803$ ). We now focus on the relationships between habit and its antecedents across the three models, which is the

primary purpose of this study.

**Table 4.3 Summary of Three Regression Results**

	Pooled OLS		Fixed Effect		Random Effect	
	Model (7)		Model (8)		Model (9)	
	DV: Habit (y <sub>it</sub> )		DV: Habit (y <sub>it</sub> )		DV: Habit (y <sub>it</sub> )	
<i>IVs</i>	b	b/SE	b	b/SE	b	b/SE
Satisfaction (x <sub>1it</sub> )	0.470	12.929	0.466	12.902	0.467	12.928
Self-efficacy (x <sub>2it</sub> )	0.122	4.653	0.122	4.675	0.122	4.678
Length (x <sub>3it</sub> )	n.s.		n.s.		n.s.	
Recency (x <sub>4it</sub> )	-0.034	-3.790	-0.034	-3.821	-0.034	-3.821
Frequency (x <sub>5it</sub> )	0.033	5.576	0.032	5.522	0.032	5.543
Habit <sub>(t-1)</sub> (y <sub>i(t-1)</sub> )	0.421	13.324	0.425	13.539	0.424	13.514
Technology anxiety (x <sub>6i</sub> )	n.s.		n.s.		n.s.	
Need for human interaction (x <sub>7i</sub> )	-0.061	-2.187	-0.060	-2.150	-0.060	-2.162
Behavioural inertia (x <sub>8i</sub> )	n.s.		n.s.		n.s.	
Technology experience (x <sub>9i</sub> )	n.s.		n.s.		n.s.	
Personal innovativeness (x <sub>10i</sub> )	n.s.		n.s.		n.s.	
<i>Model Comparison</i>						
F-test	Model (7) vs. Model (8): F = 8.367 (p = 0.004)					
LM test	Model (7) vs. Model (9): LM = 8.98 (p = 0.003)					

n.s.: not significant (for simplicity, insignificant values are omitted in the table)

Overall, the results regarding the effects of six antecedent variables and five individual difference variables on the dependent variable (i.e., habit) are highly consistent across the three models. It is found that previous habit ( $y_{i(t-1)}$ ) is the most powerful predictor of current habit (as indicated by b/SE of above 13, the largest among all variables). The second most influential driver of habit is satisfaction ( $x_{1it}$ ), with its b/SE of around 12.9 across the three models, followed by frequency ( $x_{5it}$ ), self-efficacy ( $x_{2it}$ ), and recency ( $x_{4it}$ ), which all have a significant positive impact on habit ( $p < 0.05$ ). That is, positive



satisfaction, a feeling of confidence, frequently use of an SST and the more recent the use of the SST (due to the reverse coding), all help to increase habit formation. Out of the six antecedent variables, length ( $x_{3it}$ ) is the only one that has no influence on habit ( $p < 0.05$  in all the three models). Thus, the models highlight the carryover effect of habit and provide robust support for the effects of key antecedents on habit except for the effect of length. Of the five individual difference variables, need for human interaction ( $x_{7i}$ ) is found to negatively impact on habit ( $p < 0.05$ ). That is, the more a customer enjoys interacting with service staff during the service encounter, the less likely that the use of the SST would become habitual. The other four variables have no direct impact on habit across the three models ( $p > 0.05$ ). This means that individual heterogeneity is significant only through the effect of need for human interaction in our models.

**Table 4.4 Summary of Three Regression Results by Gender**

	Pooled OLS		Fixed Effect		Random Effect	
	Model (7)		Model (8)		Model (9)	
	DV: Habit ( $y_{it}$ )		DV: Habit ( $y_{it}$ )		DV: Habit ( $y_{it}$ )	
	Males	Females	Males	Females	Males	Female
<i>IVs</i>	(b/SE)	(b/SE)	(b/SE)	(b/SE)	(b/SE)	s (b/SE)
Satisfaction ( $x_{1it}$ )	9.064	9.405	9.039	9.367	9.445	9.397
Self-efficacy ( $x_{2it}$ )	2.140	4.499	2.077	4.622	2.212	4.609
Length ( $x_{3it}$ )	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Recency ( $x_{4it}$ )	-3.894	n.s.	-3.943	n.s.	-4.077	n.s.
Frequency ( $x_{5it}$ )	3.954	3.938	3.891	3.909	4.104	3.924
Habit <sub>(t-1)</sub> ( $y_{i(t-1)}$ )	4.171	13.572	4.205	13.863	4.360	13.840
Technology anxiety ( $x_{6i}$ )	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Need for human interaction ( $x_{7i}$ )	-2.734	n.s.	-2.726	n.s.	-2.849	n.s.
Behavioural inertia ( $x_{8i}$ )	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Technology experience ( $x_{9i}$ )	2.029	n.s.	2.024	n.s.	2.114	n.s.
Personal innovativeness ( $x_{10i}$ )	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

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*Model Comparison*

F-test	Model (7) vs. Model (8) for males: $F = 0.856$ ( $p = 0.356$ )
	Model (7) vs. Model (8) for females: $F = 9.503$ ( $p = 0.002$ )
LM test	Model (7) vs. Model (9) for males: $LM = 0.32$ ( $p = 0.569$ )
	Model (7) vs. Model (9) for females: $LM = 12.71$ ( $p = 0.000$ )

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n.s.: not significant (for simplicity, insignificant values are omitted in the table)

Prior to the subgroup analysis by gender, a series of Chi-square tests are conducted to check if males and females differ by other demographics such as age and education. The results indicate that age distribution is similar for males and females in our sample ( $p = 0.068$ ), thus ruling out the influence of age in the following analysis. Males and females are found to differ by education ( $p = 0.002$ ), with males having a higher education level than females in general. This suggests that education could be a confounding factor and any gender differences found in the following subgroup analysis should be interpreted with caution.

Subgroup analysis reveals some gender differences in the formation of SST habit (Table 4.4). Overall, as indicated by the F-test and LM test, the pooled OLS model is favoured in the male group, whereas the fixed/random effect model is preferred in the female group. That is, the unobserved time heterogeneity is significant in the female group but not in the male group. Results also indicate strong differences between males and females in terms of the number of antecedents impacting on habit and the strength of these antecedents. For male respondents, five antecedent variables (satisfaction, self-efficacy, recency, frequency, prior habit) and two individual difference variables (need for human interaction, technology experience) are found to have a significant impact on habit development, with satisfaction being the most powerful determinant. However, for female respondents, habit is determined by four antecedent variables only (satisfaction, self-efficacy, frequency, prior habit) with prior habit being the most powerful predictor, and none of the five individual difference variables exerts a

significant impact. A discussion of these gender differences follows.

## **4.5 DISCUSSION**

The purpose of this study was to understand how a habitual SST usage is formed and what factors facilitate its formation. Using a consumer panel data set that tracks the use of the supermarket self-checkout SST over a 12-week time period, an econometric modelling approach was adopted to investigate the relationships between habit and its key antecedents. The results from three panel regression models are highly consistent.

### **4.5.1 Summary of Findings**

It is found that five out of the six antecedents (i.e., prior habit, satisfaction, self-efficacy, recency, and frequency) have a significant positive effect on habit, with  $\text{habit}_{(t-1)}$  being the most powerful predictor. The carryover effect of habit has not been previously examined, since prior habit research has used cross-sectional data, which makes the investigation unfeasible. Since habitual behaviours are characterized by mental inertia and difficult to suppress once formed (Aarts and Dijksterhuis 2000a; Jasperson, Carter, and Zmud 2005), it is reasonable to suggest a positive carryover effect of habit. With the use of panel data, we are able to demonstrate that prior habit level significantly impacts on the level of current habit and its impact is stronger than any other factor. This means that habit is formed in a cumulative manner, and the quicker a habit forms the quicker it becomes a major influence. In line with previous research (e.g., Limayem, Hirt, and Cheung 2007), satisfaction is also found to play an important role in habit formation. The use of an SST is more likely to become habitual to customers if their experience with the SST is satisfactory. While prior studies do not typically view self-efficacy as a determinant of habit, given our research context, we incorporated it in the model. The results show that higher self-efficacy beliefs lead to higher confidence in using SSTs, which promotes habit formation (e.g., van Beuningen et al. 2009; Xinyuan, Mattila, and Tao 2008). Past behaviour, in terms of both frequency effect and recency effect, are significant, whereas length effect is not. Specifically, the more frequently and recently a

customer has used an SST, the more likely that the use of the SST has become habitual to the customer, which is consistent with previous research findings (Bagozzi and Warshaw 1990; Verplanken 2006). One explanation for the insignificant length effect is that in our research setting, the SST is just one of the multiple service delivery options from which customers are free choose. It is not uncommon for a customer to have tried the self-checkout SST a while ago and then stopped using it, returning to use the traditional checkout counter. In that case, the customer is said to have a long length but no habit of using the SST. However, a length effect might be expected if the research was undertaken in the situation where the SST is the only service delivery method.

For the purpose of the current study, five individual difference variables are included in the models as additional independent variables to account for the observed individual heterogeneity. Results show that only need for human interaction has a negative effect on habit. This means the more a customer values the interpersonal aspect of the service encounter, the more they prefer to use a non SST service if there is a choice, and hence the less likely they will develop a habit of using the SST service. The insignificance of the other four individual difference variables is not unexpected as previous research, as well as Study 2 of this research (Chapter 3), usually treats these personal characteristics as control variables or moderators (e.g., Dabholkar and Bagozzi 2002; Reinders, Dabholkar, and Frambach 2008) and the results indicate that their influences are implicit and indirect.

Investigation of the models by gender demonstrated that the process of habit formation is more complicated for males than for females. Overall, previous habit, satisfaction, self-efficacy, and frequency all impact on habit for both genders. That is, prior habit level, a satisfying experience, a feeling of confidence, and frequent use of an SST, all contribute to habit formation. However, the strength of their impact varies dramatically. In particular, previous habit has a much greater impact for females. This suggests that female's habit is formed in a more cumulative manner, whereas male's habit is formed in a more usage-specific manner (similar to the difference between transaction-specific

and cumulative satisfaction). It may also partly explain why the time effect is significant in females but not in males. Since female's habit is more dependent on prior habit level, it is time dependent and changes over time. However, male's habit is less cumulative, and therefore it is relatively invariant across time. Results also show that self-efficacy has a greater impact for females, implying that females usually exhibit a lower confidence in using technologies and their habit is more influenced by their perception of how easy they can handle the situation (Elliott and Hall 2005; Venkatesh and Morris 2000). Another difference between males and females is that recency effect applies to males but not to females. A possible explanation could be that females do supermarket shopping more frequently and have more chance of using the SST. Consequently, there is less variation in female's recency, which results in a smaller recency effect. This is verified by our data (i.e., during the 12-week period, women do use the SST more frequently and their variance for recency is smaller). Furthermore, the personal dispositions of males also play a big role in that general technology experience positively impacts on habit, whereas need for human interaction negatively impacts on habit. The positive impact of technology experience implies that for males past experiences with similar technologies may be translated into a favourable attitude towards the focal SST and thus facilitate the development of a habit of using it (Wang, Harris, and Patterson 2012). None of the five individual difference variables exerts significant effect for females. This means that females rely primarily on their experience with the focal SST to develop a habit of using, and product-norm experience or personal dispositions do not contribute to habit development.

#### **4.5.2 Managerial Implications**

Our results provide some implications for managers. The good news is that once a habit starts to develop, it will strengthen itself through an carryover effect and is difficult to break. Hence, various measures should be taken to help facilitate the initial formation of a habit. For example, to increase customers' confidence in using an SST and provide a satisfying experience, current technology should be further improved so that it is more

user-friendly and fun to use. In that case, customers may find the use of an SST is easy and enjoyable, and thus feel more confident and satisfied with it, which will then help increase the likelihood of habit formation. Moreover, in-store promotion of the SST is an efficient and effective measure in that it could strengthen the frequency and recency effect by promoting instant actual use every time a customer comes to the supermarket. This may be especially useful during the launching period encouraging the initial trial. It can be done by offering a small gift (e.g., a green grocery bag) upon the completion of checking out via the self-checkout SST. Finally, an extreme measure could be taken to force customers to use the SST. This can be done by only offering SST service or a price differentiation between the SST and non-SST service options. As customers are forced to use the SST, a habit is likely to develop. However, this measure should be taken with caution, as research has shown that forcing customers to use SSTs may cause negative consequences (e.g., Reinders, Dabholkar, and Frambach 2008).

While a strong carryover effect of habit suggests that habit is developed in a cumulative manner and difficult to suppress, which is good news for managers, it also implies that a habit will collapse once radical changes occur because prior habit is no longer relevant. This has implications for those service providers planning to upgrade their technologies. Today, many SSTs are still new to the market, occasional technological improvement is normal and necessary to enhance customer experience. However, our findings suggest that a radical change to an SST is risky in that it will break a customer's already formed usage habit. In this situation, customers will see the upgraded SST as a new technology and their prior experience may not directly facilitate the usage of the current technology. Consequently, they will need extra time and effort to get used to it. Thus, it seems that a gradual improvement is a better and safer strategy for managers. Managers should see to it that the improved technology is not radically different to the old one from customers' point of view so that customers' already formed usage habit will not be broken.

#### **4.5.3 Further Research**

Accounting for unobserved heterogeneity has been an important component in many

choice modelling studies (e.g., Ailawadi, Gedenk, and Neslin 1999; Harris and Uncles 2007). This study also incorporates heterogeneity by estimating a fixed effect model and a random effect model. However, due to the structure of our panel data and in order to investigate the carryover effect of habit, we estimate a time effect model as opposed to a group (individual) effect model. Therefore, unobserved individual heterogeneity is not accounted for in this study. However, various measures have been taken to incorporate observed individual heterogeneity in our model (e.g., subgroup analysis by gender, the inclusion of five individual difference variables). Future study could have a longer panel data set with more cross-sections which would then allow a fixed and/or random group effect model to be estimated to account for any unobserved individual heterogeneity.

Another possible extension of the current study is the estimation of the model with alternative specifications of the dependent and independent variables. In this study, we are interested primarily in the drivers of habit in its absolute term across time. However, rather than using magnitude of habit, we may investigate changes in habit across time. Therefore the focus would be shifted to what drives changes in habit. Specifically, instead of using  $habit_t$  as the dependent variable and  $satisfaction_t$ ,  $self-efficacy_t$ , etc. as the independent variables, a future study can specify the dependent variable as  $(habit_t - habit_{t-1})$  (change in habit), and the independent variables as  $(satisfaction_t - satisfaction_{t-1})$ ,  $(self-efficacy_t - self-efficacy_{t-1})$ , etc. However, in this situation, the relationships between variables may be more complex than linear, and an alternative model specification may be required.

## 4.6 APPENDICES

### 4.6.1 A Chronological Review of Habit Studies

Study	Area	Conceptualization	Operationalization	Finding
Landis et al. (1978)	Classroom teacher behaviour	The frequency of the act in the behavioural history of the organism	Observed frequency of past behaviour	Habit is a more potent predictor of classroom teacher behaviour than intentions.
Bentler & Speckart (1979)	Drug and alcohol use	N/A	Self-report frequency of past behaviour	Past behaviour has a direct effect on behavioural intention. Both past behaviour and attitude have a direct effect on future behaviour.
Wittenbraker et al. (1983)	Seat belt usage	Well learned behaviours that were at one time under the control of the person's intentions	Self-report frequency of past behaviour	TRA is supported. Habit predicts behaviour better than intention.
Mittal (1988)	Seat belt usage	Automatic behaviour which recurs without awareness	Latent construct, reflective scale (Mittal 1988)	Use habit has a main effect on the actual behaviour and nonuse habit interacts with attitude/intention.
Verplanken et al. (1994)	Travel mode choice	N/A	The response-frequency measure (Verplanken et al. 1994)	Habit is an important determinant of the actual travel mode choice behaviour in addition to attitude.
Aarts et al. (1997)	Travel mode choice	The learning of sequences of acts that have become automatic responses to certain situations	The response-frequency measure (Verplanken et al. 1994)	Habit reduces the elaborateness of information use in judgments of travel mode use.
Verplanken et al. (1997)	Travel mode choice	The learning of sequences of acts that have become automatic responses to certain situations	The response-frequency measure (Verplanken et al. 1994)	Habit reduces the elaborateness of information use in judgments of travel mode use.
Aarts et al. (1997)	Physical exercise	The learning of sequences of acts that have become automatic responses to certain situations	N/A	A model of the formation of physical exercise habit



Study	Area	Conceptualization	Operationalization	Finding
Ouellette & Wood (1998)	Meta-analysis	Behavioural tendencies to repeat responses given a stable supporting context	Self-report frequency of past behaviour	Past behaviour influences future behaviour directly in stable contexts and indirectly via intention in unstable contexts.
Aarts et al. (1998)	Travel mode choice	A form of goal-directed automatic behaviour	The response-frequency measure (Verplanken et al. 1994)	Habit reduces the elaborateness of information use in judgments of travel mode use.
Trafimow (2000)	Condom use	N/A	Latent construct, reflective scale (Trafimow 2000)	Habit has a direct influence on intention. Habit moderates the attitude/subjective norm-intention link.
Aarts & Dijksterhuis (2000b)	Travel mode choice	A form of goal-directed automatic behaviour	The response-frequency measure (Verplanken et al. 1994)	The automaticity in habits is conditional on the presence of an active goal.
Aarts & Dijksterhuis (2000a)	Travel mode choice	A form of goal-directed automatic behaviour	Experiment condition (bike – habitual, train – nonhabitual)	Habitual responses are especially difficult to suppress under mentally demanding conditions.
Oh and Hsu (2001)	Gambling behaviour	N/A	Self-report frequency of past behaviour	Both attitude and past behaviour have a direct effect on behavioural intention. While past behaviour has a direct effect on future behaviour, attitude doesn't.
Wood et al. (2002)	Everyday life	Behaviours that are repeated in stable contexts	Self-report frequency of past behaviour Stability of the context	Habitual behaviours are associated with less behaviour-related thoughts & less intense emotions than nonhabitual behaviours.
Klockner et al. (2003)	Travel mode choice	N/A	The response-frequency measure (Verplanken et al. 1994)	Habit adds to the explanatory power of normative decision making models.
Limayem & Hirt (2003)	IS usage	Automatic behaviour tendencies (Triandis 1980)	Latent construct, reflective scale (Limayem & Hirt 2003)	Both habit and intention have a significant direct effect on actual IS usage.
Verplanken & Orbell (2003)	N/A	Learned sequences of acts that become automatic responses to specific cues, are functional in obtaining certain goals or end-states	Latent construct, reflective scale Self-report habit index (SRHI) (Verplanken & Orbell 2003)	Development and validation of the SRHI The SRHI is a reliable and valid instrument.

Study	Area	Conceptualization	Operationalization	Finding
Gefen (2003)	Online shopping	N/A	Latent construct, reflective scale (Gefen 2003)	Habit alone explains a large proportion of the variance of continuation intentions, and it is a major predictor of perceived usefulness and ease of use.
Bamberg et al. (2003)	Travel mode choice	N/A	The response-frequency measure (Verplanken et al. 1994)	Habit does not have a significant direct effect on future behaviour.
Jaspersen et al. (2005)	IS Usage	Situational-behaviour sequences with respect to an IT application and its features that have become automatic (Triandis 1980)	N/A	Post-adoptive behaviours become habitualized over time, unless interventions occur to disrupt the formation of deep, non-reflective mental scripts.
Lin & Wang (2006)	Mobile commerce	N/A	Latent construct, reflective scale (Gefen 2003)	Habit has a significant direct effect on loyalty.
Verplanken (2006)	Eating snack food	Learned sequences of acts that become automatic responses to specific cues, are functional in obtaining certain goals or end-states	Latent construct, reflective scale Self-report habit index (SRHI) (Verplanken & Orbell 2003)	Habit fully mediates the effect of past behaviour on later behaviour. Frequency of past behaviour should not be equated with habit.
Jolley et al. (2006)	Online gambling	N/A	Self-report frequency of past behaviour	Habit moderates the satisfaction – retention link.
Khalifa & Liu (2007)	Online shopping	Situation-behaviour sequences that are or have become automatic ... the individual is usually not conscious of the sequences (Triandis, 1980, p.204)	Latent construct, reflective scale (Limayem & Hirt 2003)	Habit moderates the satisfaction – retention link.
Limayem et al. (2007)	IS usage	The extent to which people tend to perform behaviours (use IS) automatically because of learning	Latent construct, reflective scale (Limayem & Hirt 2003)	Habit moderates the intention – behaviour relation. Satisfaction, comprehensiveness of usage, and frequency of past behaviour are key to habit formation.

### 4.6.2 Construct Measures

Scale Items	Adapted from
<p><i>Habit (HAB)</i></p> <p>HAB1: Using self-checkout machines is part of my shopping routine at the supermarket.</p> <p>HAB2: When checking out at the supermarket, the self-checkout machine is an obvious choice for me.</p> <p>HAB3: Using self-checkout machines has become automatic/natural to me.</p>	<p><i>Limayem, Hirt, and Cheung (2007)</i></p>
<p><i>Satisfaction (SAT)</i></p> <p>SAT1: Dissatisfied / Satisfied</p> <p>SAT2: Unhappy / Happy</p> <p>SAT3: Terrible / Delighted</p>	<p><i>Spreng, MacKenzie, and Olshavsky (1996)</i></p>
<p><i>Self-efficacy (SE)</i></p> <p>SE1: Not at all confident / Totally confident</p>	<p><i>Dabholkar and Bagozzi (2002)</i></p>
<p><i>Technology anxiety (TA)</i></p> <p>TA1: I feel apprehensive about using technology that is new to me.</p> <p>TA2: I have typically avoided technology that is unfamiliar to me.</p> <p>TA3: I hesitate to use most forms of technology for fear of making mistakes I cannot correct.</p>	<p><i>Meuter et al. (2005)</i></p>
<p><i>Need for human interaction (NHI)</i></p> <p>NHI1: Human contact in providing services makes the process enjoyable for me.</p> <p>NHI2: I like interacting with the person who provides the service.</p> <p>NHI3: Personal attention by the service employee is very important to me.</p>	<p><i>Dabholkar (1996)</i></p>
<p><i>Behavioural inertia (BI)</i></p> <p>BI1: Changing checkout methods is a bother.</p> <p>BI2: For me, the cost in time, effort, and grief to switch checkout methods is high.</p> <p>BI3: It is a hassle for me to switch checkout methods.</p>	<p><i>Meuter et al. (2005)</i></p>

Scale Items	Adapted from
<i>Technology experience (TE)</i>	
TE1: I feel very knowledgeable about using technology in general.	
TE2: I have a lot of experience using technology in general.	
<i>Personal innovativeness (PI)</i>	<i>Agarwal and Prasad</i>
PI1: If I heard about a new technology, I would look for ways to experiment with it.	(1998)
PI2: Among my peers, I am usually the first to try out new technologies.	

### 4.6.3 Construct Correlations

	Satisfaction ( $x_{1i1}$ )	Self-efficacy ( $x_{2i1}$ )	Habit ( $y_{i1}$ )	Length ( $x_{3i1}$ )	Recency ( $x_{4i1}$ )	Frequency ( $x_{5i1}$ )
Satisfaction ( $x_{1i1}$ )	5.27 (1.50)					
Self-efficacy ( $x_{2i1}$ )	0.504**	5.17 (1.84)				
Habit ( $y_{i1}$ )	0.708**	0.559**	4.50 (1.74)			
Length ( $x_{3i1}$ )	-0.053	0.088*	0.035	9.69 (13.80)		
Recency ( $x_{4i1}$ )	-0.283**	-0.179**	-0.340**	0.265**	1.10 (2.94)	
Frequency ( $x_{5i1}$ )	0.140**	0.226**	0.281**	0.522**	-0.071	8.89 (15.99)
** $p < 0.01$ , * $p < 0.05$ , mean (standard deviation) displayed on the diagonal						

	Satisfaction ( $x_{1i2}$ )	Self-efficacy ( $x_{2i2}$ )	Habit ( $y_{i2}$ )	Length ( $x_{3i2}$ )	Recency ( $x_{4i2}$ )	Frequency ( $x_{5i2}$ )
Satisfaction ( $x_{1i2}$ )	5.25 (1.39)					
Self-efficacy ( $x_{2i2}$ )	0.470**	5.28 (1.74)				
Habit ( $y_{i2}$ )	0.779**	0.536**	4.55 (1.83)			
Length ( $x_{3i2}$ )	-0.021	0.142*	0.017	16.40 (14.88)		
Recency ( $x_{4i2}$ )	-0.290**	-0.180**	-0.401**	0.129*	2.34 (4.25)	
Frequency ( $x_{5i2}$ )	0.329**	0.218**	0.458**	-0.086	-0.358**	5.45 (6.62)
** $p < 0.01$ , * $p < 0.05$ , mean (standard deviation) displayed on the diagonal						

	Satisfaction ( $x_{1i3}$ )	Self-efficacy ( $x_{2i3}$ )	Habit ( $y_{i3}$ )	Length ( $x_{3i3}$ )	Recency ( $x_{4i3}$ )	Frequency ( $x_{5i3}$ )
Satisfaction ( $x_{1i3}$ )	5.26 (1.43)					
Self-efficacy ( $x_{2i3}$ )	0.562**	5.36 (1.74)				
Habit ( $y_{i3}$ )	0.794**	0.563**	4.78 (1.85)			
Length ( $x_{3i3}$ )	-0.013	0.167*	0.008	21.61 (13.57)		
Recency ( $x_{4i3}$ )	-0.297**	-0.241**	-0.439**	0.169**	2.42 (4.92)	
Frequency ( $x_{5i3}$ )	0.309**	0.184**	0.439**	-0.110	-0.334**	5.56 (7.02)

\*\*  $p < 0.01$ , \*  $p < 0.05$ , mean (standard deviation) displayed on the diagonal

	Technology anxiety ( $x_{6i}$ )	Need for human interaction ( $x_{7i}$ )	Behavioural inertia ( $x_{8i}$ )	Technology experience ( $x_{9i}$ )	Personal innovativeness ( $x_{10i}$ )
Technology anxiety ( $x_{6i}$ )	2.74 (1.54)				
Need for human interaction ( $x_{7i}$ )	0.236**	4.76 (1.46)			
Behavioural inertia ( $x_{8i}$ )	0.411**	0.410**	3.16 (1.71)		
Technology experience ( $x_{9i}$ )	-0.396**	-0.027	-0.115**	5.19 (1.41)	
Personal innovativeness ( $x_{10i}$ )	-0.297**	0.002	-0.048	0.664**	4.68 (1.43)

\*\*  $p < 0.01$ , mean (standard deviation) displayed on the diagonal

## **CHAPTER 5 CONCLUSIONS**

The overall objective of this research is to investigate customers' post-adoption experience with SSTs. To understand this complex, dynamic phenomenon, three specific research objectives are proposed and three empirical studies conducted to shed some light on the issue. Since specific findings, implications, limitations and future directions of each study have been discussed separately in Chapters 2, 3, and 4, this chapter will provide a more general discussion on these issues that is related to the research area and the three research objectives stated in Chapter 1.

### **5.1 SUMMARY OF KEY FINDINGS**

The first research objective is to explore potential situational influences on customers' choice between self-service and personal service. It is relevant and worth investigating as most service providers today offer both self-service and personal service options from which customers are free to choose. Hence, a customer's decision to use an SST is more likely to be based on a comparative situational evaluation of all available service delivery options than on an absolute evaluation of the SST alone. Situational influences may be particularly salient and strong during the early stage of post-adoption repeat use because, at this stage, the use/nonuse of an SST has not become habitual and customers' choice is contingent upon situations.

Results from an exploratory qualitative study (Study 1) reveals three situational factors: perceived waiting time, perceived task complexity, and companion influence. Perceived waiting time relates to the length of queue. When choosing between the self-service and personal service options, customers tend to compare queues and look for the shorter one to minimize their waiting time. This is consistent with Bateson's (1985) research, where perceived waiting time was found to be the most important situational factor when faced with a choice between self-service and personal service. It is also in line with Dabholkar and Bagozzi's (2002) study, where a significant moderating effect of perceived waiting time on SST attitude – SST intention was established. The findings regarding perceived

task complexity show that customers tend to use self-service for simple tasks and when the task gets complicated they prefer to use personal service. The theoretical argument for this influence can be found in the Theory of Planned Behaviour (Ajzen 1991; Ajzen and Madden 1986), which suggests that behaviour is determined by behavioural control and behavioural intention. As a task gets more difficult, a customer's perceived control over the task situation will be lower, and as a result the customer will tend not to use the self-service option and turn to frontline service staff (i.e., personal service). Finally, companion influence relates to the influence from others (family or friends). The results find that this is particularly evident in two groups. For older customers, who are usually less likely to use an SST, they use it when they are with their children. This is because their children can show them how to use it and fix any problem they may encounter, and thus relieve their technology anxiety and increase self-confidence. Younger customers sometimes use the technology with the intention of impressing their peers (because they think it is a "cool thing") or being accepted (because everyone uses it).

The second research objective is to develop a dynamic post-adoption SST model that focuses explicitly on continued use of an SST over time. This then fills the literature gap that most prior research has focused on how customers evaluate a new SST and what drives the initial adoption, and little is known about customers' post-adoption experience and in particular what drives continued use of an SST. It is argued that while the initial trial is a critical first step in the adoption process, the long term viability of an SST and its eventual success depend on continued use rather than first-time use (e.g., Bhattacharjee 2001; Eriksson and Nilsson 2007).

Through a longitudinal study that empirically tests the post-adoption SST model (Study 2), it is found that customers' continued use of an SST is a dynamic, complex process. As experience accumulates and learning occurs, customers' decision to continue using an SST is initially rational (self-efficacy), then largely emotional driven (satisfaction), and finally becomes habitual (habit). More specifically, results show that continued use is determined by both intention (the deliberate, conscious part of the process) and habit

(the automatic, unconscious part of the process). Intention has a direct positive effect on continued use initially, but over time this direct effect weakens, and it impacts continued use indirectly through habit. This supports Triandis' (1977; 1980) theory that intention has a weaker impact on behaviour as a behaviour becomes well learned. As for habit, it is found that it consistently has a positive impact on continued use across time and this impact is consistently stronger than intention. This seems to suggest that habit is a better predictor of behaviour than intention in repeated behaviour such as SST continuation. In terms of the drivers of intention and habit, it is found that both satisfaction (the affective driver) and self-efficacy (the cognitive driver) have a positive impact on intention and habit, with self-efficacy having a stronger impact at first and satisfaction playing a more influential role over time. In the early stage of SST adoption, self-confidence is critical in determining future intention and habit development. A low level of self-confidence in using an SST will probably inhibit a customer from using it again, let alone forming a habitual behaviour. As experience accumulates and learning occurs, self-confidence in use is no longer a major issue and customers can then start to appreciate the advantages and benefits of using the SST. That is when satisfaction starts to play a more prominent role in driving intention and habit.

The third research objective is to investigate how a habit of SST usage is developed and what drives its formation. Study 2 highlights the relevance and usefulness of the concept of 'habit' in determining post-adoption behaviours (i.e., continued SST use). Since habit has been rarely examined in the SST and general marketing literature, there is a need to identify key drivers of habit and understand how they contribute to habit development in an SST context.

Results from a longitudinal analysis of a panel data set (Study 3) show that in addition to satisfaction and self-efficacy that have already been investigated in Study 2, previous habit and past behaviour also impact habit development, with previous habit being the most powerful determinant. The carryover effect of habit has not been studied, because prior habit research uses cross-sectional data, which makes the investigation unfeasible.



Since habitual behaviours are characterized by mental inertia and difficult to suppress once formed (e.g., Aarts and Dijksterhuis 2000; Jasperson, Carter, and Zmud 2005), it is reasonable to suggest a positive carryover effect of habit. With the use of panel data, it is demonstrated that prior habit level significantly impacts on the level of current habit and its impact is stronger than any other factor. In terms of the impact of past behaviour, both frequency effect and recency effect are salient, whereas length effect is not. That is, the more frequently and recently a customer has used an SST, the more likely that the use of the SST has become habitual to the customer, which is consistent with previous research findings (Bagozzi and Warshaw 1990; Verplanken 2006). Furthermore, results also reveal individual differences in habit development. It is found that a need for human interaction (a customer psychographic factor) exerts a negative effect on habit. That is, the more a customer values the interpersonal aspect of the service encounter, the more they prefer to use a non SST service if there is a choice, and hence the less likely they will develop a habit of using the SST service. Genders differ in their habit development. While prior habit, satisfaction, self-efficacy, and frequency all impact on habit for both genders, the strength of their impact varies. In particular, the carryover effect of habit is much stronger for females and self-efficacy also exerts a greater impact for females. In addition, females rely primarily on their experience with a focal SST to develop a habit of using, and personal dispositions or product-norm experience does not impact on habit development. For males, however, their personal dispositions also play a big role in that technology experience positively impacts on habit, whereas need for human interaction negatively impacts on habit.

## **5.2 MANAGERIAL IMPLICATIONS**

With the widespread implementation of various SSTs in the services industry in recent years, more and more service companies are becoming multi-channel service providers by having both the new SST service and the traditional interpersonal service. While this may be good for customers in the sense that customers now have a choice of the way in which they want to receive services, it can be quite challenging for managers. On one

hand, the initial investments in SSTs are often resource-intensive in terms of both time and money, and in order for this investment to pay off, it is critical that managers should be able to keep customers using the SST on a regular basis. On the other hand, for most service companies, the purpose of introducing the self-service is certainly not to entirely replace the traditional interpersonal service, but rather to provide a choice and a sense of control, and thereby enhance the overall customer experience. In order to better allocate resources to achieve productivity gains and manage customer experience, it is therefore important for service companies to coordinate and keep a balance between the new SST service and the traditional personal service.

By focusing on understanding customers' post-adoption experience with SSTs, the three empirical studies of the current research all offer insight and shed light on the above two managerial challenges. In general, two key implications are provided for managers.

One is that, by realising under what conditions customers use self-service as opposed to personal service (Study 1), better strategies can be developed to manage and coordinate the multiple service delivery options. More specifically, customers' perceived waiting time and task complexity can be manipulated in order to influence their choice between self-service and personal service. In the context of this research, for example, to relieve service employees' work load during peak hours, managers can encourage the use of the self-service by opening more self-checkout machines available to customers. This will result in a shorter queue at the self-checkout area. Since customers always look for ways to minimize their waiting time, this will then lead some customers to use the self-service even if they do not like it. Furthermore, banks and airlines can promote the use of online services (e.g., Internet banking, online check-in) by highlighting 'instant service and no queuing up'. The results regarding perceived task complexity show that the self-service is suitable for simple tasks (e.g., money withdrawal from ATMs), whereas the personal service is a better choice for more complicated tasks (e.g., financial investment through a personal consultant). This is another way to balance the use between self-service and personal service. For instance, the self-checkout may be an alternative for the express

line but not for the regular checkout because most customers only use the self-checkout when purchasing a small number of items. Banks can gradually migrate simple business such as balance check and money transfer to online service and the branch staff can put focus on more advanced services such as personal financing.

The other key insight and perhaps a more important implication of this research is that the post-adoption continued use is a complex and dynamic process, and in order to keep customers using an SST regularly, managers should pay specially attention to increasing customer confidence, ensuring customer satisfaction and facilitating habit development. The results from the three empirical studies suggest various measures that can be taken to achieve this.

It is found from Study 1 that although customers may tolerate a not-so-good first-time experience and encounter difficulties in the early stage of using an SST, frequent service failures can lower their self-confidence and prevent them from using it again. Therefore, it is imperative to increase perceived skills and abilities, thus enhancing their confidence. Study 2 finds a dominant influence of self-efficacy in driving continued SST use in the early stage of adoption and offers a range of measures to increase customer confidence. For example, providing clear instructions or using a simulation can be effective. What's more, having a customer service representative around to help with the use of an SST can also be useful. When customers feel that SST encounters are easy and convenient, they are more likely to opt for it in their next encounter. To aid habit formation, Study 3 suggests that current technology be further improved so that it is more user-friendly and fun to use. That is, SSTs need to be designed for customers, not for technicians. It can be achieved by bringing customers in from the very beginning of the design process and listen to their feedback. When customers find the use of an SST is easy and enjoyable, and thus feel confident and satisfied, this will then help increase the likelihood of habit formation.

All in all, customers have not changed. In this high-tech and low-touch world, they still want good quality service even when dealing with technology (Bitner 2001a, 2001b). It

is that simple, and that difficult. In order to implement successful SSTs and at the same time enhance customer experience, managers should see to it that the SST offers a level of service that satisfies or even delights customers. This can be achieved by simplifying customer tasks, designing user-friendly technologies, providing personal assistance, and preventing and recovering failures, etc., as discussed earlier. Moreover, offering choices can also enhance overall customer experience. Even if an SST offers a quality service, not all customers want to use it all the time. Customers want and expect a choice of the way in which they interact with a service company. They do not like to be forced to use only one way. Therefore, providing customers with a variety of service delivery options can give them a sense of control and thus enhance their overall experience. However, managers can still promote the use of SSTs by giving reasons (e.g., incentives, added benefits).

### **5.3 LIMITATIONS AND FUTURE RESEARCH DIRECTIONS**

As with any study, this research is constrained by limitations that suggest directions for further study.

One limitation associated with the three empirical studies is that they are all conducted in the same single SST context (i.e., supermarket self-checkout machines). The selection of this research setting has been discussed and justified earlier in each study, and it will not be repeated here. However, the use of a single SST may limit the generalizability of the findings. According to Meuter and his colleagues' (2000) classification (Figure 1.3 in Chapter 1), there are three major types of SSTs depending on the types of technology interfaces involved: telephone-based, Internet-based, and interactive kiosk-based SSTs. Since the SST under the current investigation is interactive kiosk-based, the results may not be generalizable to Internet or telephone-based SST contexts. In particular, the three situational influences identified in Study 1 may not be all relevant to the other two SST contexts, where there might be other relevant factors. For example, availability may be a compelling reason why people use Internet and/or telephone-based SSTs; they can use the service during off-hour times when personal service is not available. A more recent

classification scheme divides a range of SSTs into two types according to the location where customers access the SST: provider-based SSTs (e.g., ATMs) and customer-based SSTs (e.g., online banking) (Schumann, Wunderlich, and Wangenheim 2012). Since the current research is conducted in a provider-based SST setting, the findings may not be generalizable to customer-based SST setting as illustrated by the example above. Hence, an opportunity for further research is to replicate Studies 1, 2, and 3 in a different SST context to see if the results are generalizable across different types of SSTs.

In this research, an effort has been made to study customers' post-adoption experience with an SST from a longitudinal perspective. While Study 2 and Study 3 both adopt a longitudinal design, the time period is relatively short. It is questionable whether a 12 week, three-wave longitudinal analysis is long enough to fully capture the phenomenon under investigation. For example, Study 2 uncovers the decreasing role of self-efficacy and the increasing role of satisfaction in driving continued SST use. However, there is evidence suggesting that the impact of satisfaction on innovation adoption may follow a reversed U shape (Wood and Moreau 2006), and Study 2 only captures the first half of the process. Moreover, the small number of cross-sections may also have implications for Study 3 in that the carryover effect of habit and the time effect on habit development may not be fully revealed. To obtain a more complete understanding of the dynamic and complex post-adoption experience, it is encouraged that further research uses a longer panel data set with more cross-sections and a longer time period (e.g., a 12-month panel study with one contact per month).

In addition to replicating the current research in a different context or with a better data set as suggested above, there are areas in the SST literature that have yet to be examined, which can be opportunities for future research. For example, according to Rogers (1995), there are six steps in the adoption process: awareness – investigation – evaluation – trial – repeated use – commitment. While most prior research focuses on evaluation and trial, this research shifts the focus to repeated use. However, the last step (i.e., commitment) has attracted very limited attention (Beatson, Coote, and Rudd 2006). Further research

could investigate whether previous SST models that explain trial or repeated use apply to explaining commitment. If not, critical factors that influence customer commitment to SSTs need to be identified and tested.

Finally, the current research, as well as most of the prior SST studies, focuses primarily on customers' SST experience. However, since many service companies offer multiple service delivery options and SST is just one of them, a critical question is, how does SST experience influence customer attitude, satisfaction, and/or loyalty to the service company? With few exceptions (e.g., Reinders, Dabholkar, and Frambach 2008; Selnes and Hansen 2001), little has been done to shed light on this question. Therefore, it is worthwhile investigating how the frequency and extent of SST usage impacts on organisational outcome variables (e.g., loyalty, brand commitment, etc.).

## REFERENCES

- Aarts, Henk and Ap Dijksterhuis (2000a), "The Automatic Activation of Goal-Directed Behavior: The Case of Travel Habit," *Journal of Environmental Psychology*, 20 (1), 75-82.
- (2000b), "Habits as Knowledge Structures: Automaticity in Goal-Directed Behavior," *Journal of Personality & Social Psychology*, 78 (1), 53-63.
- Aarts, Henk, Theo Paulussen, and Herman Schaalma (1997), "Physical Exercise Habit: On the Conceptualization and Formation of Habitual Health Behaviours," *Health Education Research*, 12 (3), 363-74.
- Aarts, Henk, Bas Verplanken, and Ad van Knippenberg (1997), "Habit and Information Use in Travel Mode Choices," *Acta Psychologica*, 96 (1-2), 1-14.
- (1998), "Predicting Behavior From Actions in the Past: Repeated Decision Making or a Matter of Habit?," *Journal of Applied Social Psychology*, 28 (15), 1355-74.
- Agarwal, Ritu and Jayesh Prasad (1998), "A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology," *Information Systems Research*, 9 (2), 204-15.
- Ailawadi, Kusum L., Karen Gedenk, and Scott A. Neslin (1999), "Heterogeneity and Purchase Event Feedback in Choice Models: An Empirical Analysis with Implications for Model Building," *International Journal of Research in Marketing*, 16 (3), 177-98.
- Ajzen, Icek (2002), "Residual Effects of Past on Later Behavior: Habituation and Reasoned Action Perspectives," *Personality & Social Psychology Review*, 6 (2), 107-22.
- (1991), "The Theory of Planned Behavior," *Organizational Behavior and Human Decision Processes*, 50 (2), 179-211.
- Ajzen, Icek and M. Fishbein (1980), *Understanding Attitudes and Predicting Social Behavior*: Prentice-Hall.
- Ajzen, Icek and Thomas J. Madden (1986), "Prediction of Goal-Directed Behavior: Attitudes, Intentions, and Perceived Behavioral Control," *Journal of Experimental Social Psychology*, 22 (5), 453-74.
- Anderson, Eugene W. (1998), "Customer Satisfaction and Word of Mouth," *Journal of Service Research*, 1 (1), 5-17.
- Anderson, Eugene W. and M. W. Sullivan (1993), "The Antecedents and Consequences of Customer Satisfaction for Firms," *Marketing Science*, 12 (2), 125-43.
- Bagozzi, Richard P. and Paul R. Warshaw (1990), "Trying to Consume," *Journal of Consumer Research*, 17 (2), 127-40.

- Bamberg, Sebastian, Icek Ajzen, and Peter Schmidt (2003), "Choice of Travel Mode in the Theory of Planned Behavior: The Roles of Past Behavior, Habit, and Reasoned Action," *Basic & Applied Social Psychology*, 25 (3), 175-87.
- Bandura, Albert (1997), *Self-Efficacy: The Exercise of Control*: W. H. Freeman and Company.
- (2001), "Social Cognitive Theory: An Agentic Perspective," *Annual Review of Psychology*, 52 (1), 1-26.
- (1986), *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bargh, John A. (2002), "Losing Consciousness: Automatic Influences on Consumer Judgment, Behavior, and Motivation," *Journal of Consumer Research*, 29 (2), 280-85.
- Bargh, John A. and Tanya L. Chartrand (1999), "The Unbearable Automaticity of Being," *American Psychologist*, 54 (7), 462-79.
- Bargh, John A. and Melissa J. Ferguson (2000), "Beyond Behaviorism: On the Automaticity of Higher Mental Processes," *Psychological Bulletin*, 126 (6), 925-45.
- Bargh, John A., Annette Lee-Chai, Kimberly Barndollar, Peter M. Gollwitzer, and Roman Trotschel (2001), "The Automated Will: Nonconscious Activation and Pursuit of Behavioral Goals," *Journal of Personality & Social Psychology*, 81 (6), 1014-27.
- Bateson, J. E. G. (1985), "Self-Service Consumer: An Exploratory Study," *Journal of Retailing*, 61 (3), 49-76.
- Beatson, Amanda, Leonard V. Coote, and John M. Rudd (2006), "Determining Consumer Satisfaction and Commitment Through Self-Service Technology and Personal Service Usage," *Journal of Marketing Management*, 22 (7/8), 853-82.
- Bendapudi, Neeli and Robert P. Leone (2003), "Psychological Implications of Customer Participation in Co-Production," *Journal of Marketing*, 67 (1), 14-28.
- Bentler, P. M. and George Speckart (1979), "Models of Attitude-Behavior Relations," *Psychological Review*, 86 (5), 452-64.
- Bhattacharjee, Anol (2001), "Understanding Information Systems Continuance: An Expectation-Confirmation Model," *MIS Quarterly*, 25 (3), 351-70.
- Bhattacharjee, Anol and G. Premkumar (2004), "Understanding Changes in Belief and Attitude Toward Information Technology Usage: A Theoretical Model and Longitudinal Test," *MIS Quarterly*, 28 (2), 229-54.
- Birgelen, Marcel van, Ad de Jong, and Ko de Ruyter (2006), "Multi-Channel Service Retailing: The Effects of Channel Performance Satisfaction on Behavioral Intentions," *Journal of Retailing*, 82 (4), 367-77.



- Bitner, Mary Jo (2001a), "Self-Service Technologies: What Do Customers Expect?," *Marketing Management*, 10 (1), 10-11.
- (2001b), "Service and Technology: Opportunities and Paradoxes," *Managing Service Quality*, 11 (6), 375-79.
- Bitner, Mary Jo, Bernard H. Booms, and Mary Stanfield Tetreault (1990), "The Service Encounter: Diagnosing Favorable and Unfavorable Incidents," *Journal of Marketing*, 54 (1), 71-84.
- Bitner, Mary Jo, Stephen W. Brown, and Matthew L. Meuter (2000), "Technology Infusion in Service Encounters," *Journal of the Academy of Marketing Science*, 28 (1), 138-49.
- Bitner, Mary Jo, Amy L. Ostrom, and Matthew L. Meuter (2002), "Implementing Successful Self-Service Technologies," *Academy of Management Executive*, 16 (4), 96-108.
- Bobbitt, L. Michelle and Pratibha A. Dabholkar (2001), "Integrating Attitudinal Theories to Understand and Predict Use of Technology-Based Self-Service: The Internet as an Illustration," *International Journal of Service Industry Management*, 12 (5), 423-50.
- Bolton, Ruth N. (1998), "A Dynamic Model of the Duration of the Customer's Relationship with a Continuous Service Provider: The Role of Satisfaction," *Marketing Science*, 17 (1), 45-65.
- Bolton, Ruth N., R. K. Kannan, and Matthew D. Bramlett (2000), "Implications of Loyalty Program Membership and Service Experiences for Customer Retention and Value," *Journal of the Academy of Marketing Science*, 28 (1), 95.
- Bolton, Ruth N., Katherine N. Lemon, and Peter C. Verhoef (2004), "The Theoretical Underpinnings of Customer Asset Management: A Framework and Propositions for Future Research," *Journal of the Academy of Marketing Science*, 32 (3), 1-20.
- Brown, Tom J., Thomas E. Barry, Peter A. Dacin, and Richard F. Gunst (2005), "Spreading the Word: Investigating Antecedents of Consumers' Positive Word-of-Mouth Intentions and Behaviors in a Retailing Context," *Journal of the Academy of Marketing Science*, 33 (2), 123-38.
- Browne, Marcus (2008), "Woolies Lets Shoppers Check Themselves Out," ZDNet.com.au.
- Byrne, Barbara M. (2001), *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.
- Chintagunta, Pradeep K. (1993), "Investigating Purchase Incidence, Brand Choice and Purchase Quantity Decisions of Households," *Marketing Science*, 12 (2), 184-208.
- Chris Lin, Jiun-Sheng and Hsieh Pei-ling (2006), "The Role of Technology Readiness in Customers' Perception and Adoption of Self-Service Technologies," *International Journal of Service Industry Management*, 17 (5), 497-517.
- Compeau, Deborah R. and Christopher A. Higgins (1995), "Computer Self-Efficacy: Development of a Measure and Initial Test," *MIS Quarterly*, 19 (2), 189-211.

- Curran, James M. and Matthew L. Meuter (2007), "Encouraging Existing Customers to Switch to Self-Service Technologies: Put a Little Fun in Their Lives," *Journal of Marketing Theory & Practice*, 15 (4), 283-98.
- (2005), "Self-Service Technology Adoption: Comparing Three Technologies," *Journal of Services Marketing*, 19 (2), 103-13.
- Curran, James M., Matthew L. Meuter, and Carol F. Surprenant (2003), "Intentions to Use Self-Service Technologies: A Confluence of Multiple Attitudes," *Journal of Service Research*, 5 (3), 209-24.
- Dabholkar, Pratibha A. (1996), "Consumer Evaluations of New Technology-Based Self-Service Options: An Investigation of Alternative Models of Service Quality," *International Journal of Research in Marketing*, 13 (1), 29-51.
- Dabholkar, Pratibha A. and Richard P. Bagozzi (2002), "An Attitudinal Model of Technology-Based Self-Service: Moderating Effects of Consumer Traits and Situational Factors," *Journal of the Academy of Marketing Science*, 30 (3), 184-201.
- Dabholkar, Pratibha A., Dayle I. Thorpe, and Joseph O. Rentz (1996), "A Measure of Service Quality for Retail Stores: Scale Development and Validation," *Journal of the Academy of Marketing Science*, 24 (1), 3-16.
- Davis, Fred D. (1985), "A Technology Acceptance Model for Empirically Testing New End-user Information Systems: Theory and Results," Massachusetts Institute of Technology, Sloan School of Management.
- Davis, Fred D., Richard P. Bagozzi, and Paul R. Warshaw (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science*, 35 (8), 982-1003.
- de Matos, Celso Augusto, Jorge Luiz Henrique, and Carlos Alberto Vargas Rossi (2007), "Service Recovery Paradox: A Meta-Analysis," *Journal of Service Research*, 10 (1), 60-77.
- de Matos, Celso Augusto and Carlos Alberto Vargas Rossi (2008), "Word-of-mouth Communications in Marketing: A Meta-analytic Review of the Antecedents and Moderators," *Journal of the Academy of Marketing Science*, 36 (4), 578-96.
- Ding, Xin, Rohit Verma, and Zafar Iqbal (2007), "Self-Service Technology and Online Financial Service Choice," *International Journal of Service Industry Management*, 18 (3), 246-68.
- Dwyer, F. Robert, Paul H. Schurr, and Sejo Oh (1987), "Developing Buyer-Seller Relationships," *Journal of Marketing*, 51 (2), 11-27.
- Elliott, Kevin M. and Mark C. Hall (2005), "Assessing Consumers' Propensity to Embrace Self-Service Technologies: Are There Gender Differences?," *Marketing Management Journal*, 15 (2), 98-107.
- Eriksson, Kent and Daniel Nilsson (2007), "Determinants of the Continued Use of Self-Service Technology: The Case of Internet Banking," *Technovation*, 27 (4), 159-67.

- Fishbein, M. and I. Ajzen (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*: Addison-Wesley.
- Forbes, Lukas P., Scott W. Kelley, and K. Douglas Hoffman (2005), "Typologies of E-Commerce Retail Failures and Recovery Strategies," *Journal of Services Marketing*, 19 (5), 280-92.
- Froehle, Craig M. and Aleda V. Roth (2004), "New Measurement Scales for Evaluating Perceptions of the Technology-Mediated Customer Service Experience," *Journal of Operations Management*, 22 (1), 1-21.
- Fu, Jen-Ruei, Cheng-Kiang Farn, and Wen-Pin Chao (2006), "Acceptance of Electronic Tax Filing: A Study of Taxpayer Intentions," *Information & Management*, 43 (1), 109-26.
- Gefen, David (2003), "TAM or Just Plain Habit: A Look at Experienced Online Shoppers," *Journal of End User Computing*, 15 (3), 1-13.
- Gefen, David, Elena Karahanna, and Detmar W. Straub (2003), "Trust and TAM in Online Shopping: An Integrated Model," *MIS Quarterly*, 27 (1), 51-90.
- Glaser, B and A. Strauss (1967), *The Discovery of Grounded Theory: Strategies of Qualitative Research*. London: Wiedenfeld and Nicholson.
- Greco, Alan J. and D. Michael Fields (1991), "Profiling Early Triers of Service Innovations: A Look at Interactive Home Video Ordering Services," *Journal of Services Marketing*, 5 (3), 19-26.
- Greene, W. H. (2007), *LIMDEP 9.0 Econometric Modeling Guide*: Econometric Software.
- Greene, William H. (2008), *Econometric Analysis* (7 ed.): Prentice Hall.
- Hair, Joseph F., William C. Black, Barry J. Babin, Rolph E. Anderson, and Ronald L. Tatham (2006), *Multivariate Data Analysis* (Sixth ed.): Pearson Education.
- Harris, Jennifer and Mark Uncles (2007), "Modeling the Repatronage Behavior of Business Airline Travelers," *Journal of Service Research*, 9 (4), 297-311.
- Harris, Katherine E., Lois A. Mohr, and Kenneth L. Bernhardt (2006), "Online Service Failure, Consumer Attributions and Expectations," *Journal of Services Marketing*, 20 (7), 453-58.
- Hill, Thomas, Nancy D. Smith, and Millard F. Mann (1986), "Communicating Innovations: Convincing Computer Phobics to Adopt Innovative Technologies," *Advances in Consumer Research*, 13 (1), 419-22.
- (1987), "Role of Efficacy Expectations in Predicting the Decision to Use Advanced Technologies: The Case of Computers," *Journal of Applied Psychology*, 72 (2), 307-13.
- Holloway, Betsy B. and Sharon E. Beatty (2003), "Service Failure in Online Retailing: A Recovery Opportunity," *Journal of Service Research*, 6 (1), 92-105.
- Homburg, Christian, Nicole Koschate, and Wayne D. Hoyer (2006), "The Role of Cognition and Affect in the Formation of Customer Satisfaction: A Dynamic Perspective," *Journal of Marketing*, 70 (3), 21-31.

- Hsu, Meng H., Ghao M. Ghiu, and Teresa L. Ju (2004), "Determinants of Continued Use of the WWW: An Integration of Two Theoretical Models," *Industrial Management & Data Systems*, 104 (9), 766-75.
- Igbaria, M. and J. Iivari (1995), "The Effects of Self-Efficacy on Computer Usage," *Omega*, 23 (6), 587-605.
- James, W. (1890), *The Principles of Psychology*. New York: Henry Holt & Co.
- Jasperson, Jon, Pamela E. Carter, and Robert W. Zmud (2005), "A Comprehensive Conceptualization of Post-Adoptive Behaviors Associated with Information Technology Enabled Work Systems," *MIS Quarterly*, 29 (3), 525-57.
- Jolley, Bill, Richard Mizerski, and Doina Olaru (2006), "How Habit and Satisfaction Affects Player Retention for Online Gambling," *Journal of Business Research*, 59 (6), 770-77.
- Karahanna, Elena, Detmar W. Straub, and Norman L. Chervany (1999), "Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs," *MIS Quarterly*, 23 (2), 183-213.
- Kassarjian, Harold H. (1977), "Content Analysis in Consumer Research," *Journal of Consumer Research*, 4 (June), 8-18.
- Keaveney, Susan M. (1995), "Customer Switching Behavior in Service Industries: An Exploratory Study," *Journal of Marketing*, 59 (April), 71-82.
- Kelley, Scott W., James H. Donnelly, and Steven J. Skinner (1990), "Customer Participation in Service Production and Delivery," *Journal of Retailing*, 66 (3), 315-35.
- Khalifa, Mohamed and Vanessa Liu (2007), "Online Consumer Retention: Contingent Effects of Online Shopping Habit and Online Shopping Experience," *European Journal of Information Systems*, 16 (6), 780-92.
- King, William R. and Jun He (2006), "A Meta-Analysis of the Technology Acceptance Model," *Information & Management*, 43 (6), 740-55.
- Klockner, Christian A., Ellen Matthies, and Marcel Hunecke (2003), "Problems of Operationalizing Habits and Integrating Habits in Normative Decision-Making Models," *Journal of Applied Social Psychology*, 33 (2), 396-417.
- Koufaris, Marios (2002), "Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior," *Information Systems Research*, 13 (2), 205-23.
- Landis, Dan, Harry C. Triandis, and John Adamopoulos (1978), "Habit and Behavioral Intentions as Predictors of Social Behavior," *Journal of Social Psychology*, 106 (2), 227-37.
- Lee, Eun-Ju, Jinkook Lee, and David Eastwood (2003), "A Two-Step Estimation of Consumer Adoption of Technology-Based Service Innovations," *Journal of Consumer Affairs*, 37 (2), 256-82.

- Lee, Jungki and Arthur Allaway (2002), "Effects of Personal Control on Adoption of Self-Service Technology Innovations," *Journal of Services Marketing*, 16 (6), 553-72.
- Lee, Khai Sheang and Soo Juuan Tan (2003), "E-Retailing versus Physical Retailing: A Theoretical Model and Empirical Test of Consumer Choice," *Journal of Business Research*, 56, 877-85.
- Legrís, Paul, John Ingham, and Pierre Colletrette (2003), "Why Do People Use Information Technology? A Critical Review of the Technology Acceptance Model," *Information & Management*, 40 (3), 191-204.
- Liljander, Veronica, Filippa Gillberg, Johanna Gummerus, and Allard van Riel (2006), "Technology Readiness and the Evaluation and Adoption of Self-Service Technologies," *Journal of Retailing and Consumer Services*, 13 (3), 177-91.
- Limayem, Moez and Sabine Gabriele Hirt (2003), "Force of Habit and Information Systems Usage: Theory and Initial Validation," *Journal of the Association for Information Systems*, 4, 65-95.
- Limayem, Moez, Sabine Gabriele Hirt, and Christy M. K. Cheung (2007), "How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance," *MIS Quarterly*, 31 (4), 705-37.
- Lin, Chien-Hsin, Hsin-Yu Shih, and Peter J. Sher (2007), "Integrating Technology Readiness into Technology Acceptance: The TRAM Model," *Psychology and Marketing*, 24 (7), 641-57.
- Lin, Hsin-Hui and Yi-Shun Wang (2006), "An Examination of the Determinants of Customer Loyalty in Mobile Commerce Contexts," *Information & Management*, 43 (3), 271-82.
- Lu, June, Chang Liu, Chun-Sheng Yu, and Kanliang Wang (2008), "Determinants of Accepting Wireless Mobile Data Services in China," *Information & Management*, 45 (1), 52-64.
- Ma, Qingxiong and Liping Liu (2004), "The Technology Acceptance Model: A Meta-Analysis of Empirical Findings," *Journal of Organizational and End User Computing*, 16 (1), 59-72.
- Mathieson, Kieren (1991), "Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior," *Information Systems Research*, 2 (3), 173-91.
- Matthing, Jonas, Per Kristensson, Anders Gustafsson, and A. Parasuraman (2006), "Developing Successful Technology-Based Services: The Issue of Identifying and Involving Innovative Users," *Journal of Services Marketing*, 20 (5), 288-97.
- McKechnie, Sally, Heidi Winkhofer, and Christine Ennew (2006), "Applying the Technology Acceptance Model to the Online Retailing of Financial Services," *International Journal of Retail & Distribution Management*, 34 (4/5), 388-410.
- McKee, Daryl, Christina S. Simmers, and Jane Licata (2006), "Customer Self-Efficacy and Response to Service," *Journal of Service Research*, 8 (3), 207-20.

- Meuter, Matthew L., Mary Jo Bitner, Amy L. Ostrom, and Stephen W. Brown (2005), "Choosing Among Alternative Service Delivery Modes: An Investigation of Customer Trial of Self-Service Technologies," *Journal of Marketing*, 69 (2), 61-83.
- Meuter, Matthew L., Amy L. Ostrom, Mary Jo Bitner, and Robert Roundtree (2003), "The Influence of Technology Anxiety on Consumer Use and Experiences with Self-Service Technologies," *Journal of Business Research*, 56 (11), 899-906.
- Meuter, Matthew L., Amy L. Ostrom, Robert I. Roundtree, and Mary Jo Bitner (2000), "Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters," *Journal of Marketing*, 64 (3), 50-64.
- Mittal, Banwari (1988), "Achieving Higher Seat Belt Usage: The Role of Habit in Bridging the Attitude-Behavior Gap," *Journal of Applied Social Psychology*, 18 (12), 993-1016.
- Mittal, Vikas, William T. Ross, and Patrick M. Baldasare (1998), "The Asymmetric Impact of Negative and Positive Attribute-Level Performance on Overall Satisfaction and Repurchase Intentions," *Journal of Marketing*, 62 (1), 33-47.
- Montoya-Weiss, Mitzi M., Glenn B. Voss, and Dhruv Grewal (2003), "Determinants of Online Channel Use and Overall Satisfaction With a Relational, Multichannel Service Provider," *Journal of the Academy of Marketing Science*, 31 (4), 448-58.
- Neelamegham, Ramya and Dipak Jain (1999), "Consumer Choice Process for Experience Goods: An Econometric Model and Analysis," *Journal of Marketing Research*, 36 (3), 373-86.
- Nilsson, Daniel (2007), "A Cross-Cultural Comparison of Self-Service Technology Use," *European Journal of Marketing*, 41 (3/4), 367-81.
- Oh, Haemoon and Cathy H. C. Hsu (2001), "Volitional Degrees of Gambling Behaviors," *Annals of Tourism Research*, 28 (3), 618-37.
- Oliver, Richard L. (1980), "A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions," *Journal of Marketing Research*, 17 (4), 460-69.
- (2010), "Customer Satisfaction," in *Wiley International Encyclopedia of Marketing*: John Wiley & Sons, Ltd.
- Ostlund, Lyman E. (1974), "Perceived Innovation Attributes as Predictors of Innovativeness," *Journal of Consumer Research*, 1 (2), 23-29.
- Ouellette, Judith A. and Wendy Wood (1998), "Habit and Intention in Everyday Life: The Multiple Processes by Which Past Behavior Predicts Future Behavior," *Psychological Bulletin*, 124 (1), 54-74.
- Oyedele, Adesegun and Penny M. Simpson (2007), "An Empirical Investigation of Consumer Control Factors on Intention to Use Selected Self-Service Technologies," *International Journal of Service Industry Management*, 18 (3), 287-306.

- Parasuraman, A. (2000), "Technology Readiness Index (TRI): A Multiple-Item Scale to Measure Readiness to Embrace New Technologies," *Journal of Service Research*, 2 (4), 307-20.
- (1996), "Understanding and Leveraging the Role of Customer Service in External, Interactive and Internal Marketing," in *Frontiers in Services Conference*, Nashville, TN.
- Park, Hun Myoung (2009), "Linear Regression Models for Panel Data Using SAS, Stata, LIMDEP, and SPSS," Working Paper, The University Information Technology Services (UITs) Center for Statistical and Mathematical Computing, Indiana University.
- Patterson, Paul G. (2000), "A Contingency Approach to Modeling Satisfaction with Management Consulting Services," *Journal of Service Research*, 3 (2), 138-53.
- Patterson, Paul G., Janet R. McColl-Kennedy, Amy K. Smith, and Zhi Lu (2009), "Customer Rage: Triggers, Tipping Points, and Take-Outs," *California Management Review*, 52 (1), 6-28.
- Preston, Mike (2008), "Check Yourself Out at Woolworths," [smartcompany.com.au](http://smartcompany.com.au).
- Prins, Remco and Peter C. Verhoef (2007), "Marketing Communication Drivers of Adoption Timing of a New E-Service Among Existing Customers," *Journal of Marketing*, 71 (2), 169-83.
- Rangaswamy, Arvind and Gerrit H. Van Bruggen (2005), "Opportunities and Challenges in Multichannel Marketing: An Introduction to the Special Issue," *Journal of Interactive Marketing*, 19 (2), 5-11.
- Reichheld, Frederick F. (2003), "The One Number You Need to Grow," *Harvard Business Review*, December, 1-11.
- Reinders, Machiel J., Pratibha A. Dabholkar, and Ruud T. Frambach (2008), "Consequences of Forcing Consumers to Use Technology-Based Self-Service," *Journal of Service Research*, 11 (2), 107-23.
- Rogers, Everett M. (2003), *Diffusion of Innovations*: Simon and Schuster.
- (1995), *Diffusion of Innovations* (4th ed.). New York: The Free Press.
- (1976), "New Product Adoption and Diffusion," *Journal of Consumer Research*, 2 (4), 290-301.
- Ronis, D. L., J. F. Yates, and J. P. Kirscht (1989), "Attitudes, Decisions, and Habits As Determinants of Repeated Behavior," in *Attitude, Structure and Function*, A. R. Pratkanis and S. J. Breckler and A. G. Greenwald, Eds.: Lawrence Erlbaum Associates, Hillsdale, NJ.
- Salomann, Harald, Lutz Kolbe, and Walter Brenner (2006), "Self-Services in Customer Relationships: Balancing High-Tech and High-Touch Today and Tomorrow," *e-Service Journal*, 4 (2), 65-84.
- Schepers, Jeroen and Martin Wetzels (2007), "A Meta-Analysis of the Technology Acceptance Model: Investigating Subjective Norm and Moderation Effects," *Information & Management*, 44 (1), 90-103.

- Schumann, Jan H., Nancy V. Wunderlich, and Florian Wangenheim (2012), "Technology Mediation in Service Delivery: A New Typology and an Agenda for Managers and Academics," *Technovation*, 32 (2), 133-43.
- Seiders, Kathleen, Glenn B. Voss, Dhruv Grewal, and Andrea L. Godfrey (2005), "Do Satisfied Customers Buy More? Examining Moderating Influences in a Retailing Context," *Journal of Marketing*, 69 (4), 26-43.
- Selnes, Fred and Havard Hansen (2001), "The Potential Hazard of Self-Service in Developing Customer Loyalty," *Journal of Service Research*, 4 (2), 79-90.
- Shostack, G. Lynn. (1985), "Planning the Service Encounter," in *The Service Encounter*, John A. Czepiel and Michael R. Solomon and Carol F. Surprenant, Eds. Lexington, MA.
- Simon, Françoise and Jean-Claude Usunier (2007), "Cognitive, Demographic, and Situational Determinants of Service Customer Preference for Personnel-in-Contact over Self-Service Technology," *International Journal of Research in Marketing*, 24 (2), 163-73.
- Singh, Jagdip (1988), "Consumer Complaint Intentions and Behavior: Definitional and Taxonomical Issues," *Journal of Marketing*, 52 (1), 93-107.
- Singh, Jagdip and Robert E. Wilkes (1996), "When Consumers Complain: A Path Analysis of the Key Antecedents of Consumer Complaint Response Estimates," *Journal of the Academy of Marketing Science*, 24 (4), 350-65.
- Snellman, Kaisa and Tiina Vihtkari (2003), "Customer Complaining Behaviour in Technology-Based Service Encounters," *International Journal of Service Industry Management*, 14 (2), 217-31.
- Spreng, Richard A., Scott B. MacKenzie, and Richard W. Olshavsky (1996), "A Reexamination of the Determinants of Consumer Satisfaction," *Journal of Marketing*, 60 (3), 15-32.
- Strauss, A. (1987), *Qualitative Analysis for Social Scientists*. Cambridge, England: Cambridge University Press.
- Sudman, Seymour and Brian Wansink (2002), *Consumer Panels*. Chicago, Illinois: American Marketing Association.
- Szajna, Bernadette (1996), "Empirical Evaluation of the Revised Technology Acceptance Model," *Management Science*, 42 (1), 85-92.
- Szymanski, David M. and David H. Henard (2001), "Customer Satisfaction: A Meta-Analysis of the Empirical Evidence," *Journal of the Academy of Marketing Science*, 29 (1), 16-35.
- Taris, Toon (2000), *A Primer in Longitudinal Data Analysis*: SAGE Publications.
- Thorngate, W. (1976), "Must We Always Think Before We Act?," *Personality of Social Psychology Bulletin*, 2 (1), 31-35.



- Timmor, Yaron and Talia Rymon (2007), "To Do or Not to Do: The Dilemma of Technology-Based Service Improvement," *Journal of Services Marketing*, 21 (2), 99-111.
- Tombs, A. G. and J. R. McColl-Kennedy (2010), "Social and Spatial Influence of Customers on Other Customers in the Social-Servicescape," *Australasian Marketing Journal*, 18 (3), 120-31.
- Tornatzky, L. G. and K. J. Klein (1982), "Innovation Characteristics and Innovation Adoption-Implementation: A Meta-Analysis of Findings," *IEEE Transactions on Engineering Management*, 29 (1), 28-45.
- Trafimow, David (2000), "Habit as Both a Direct Cause of Intention to Use a Condom and as a Moderator of the Attitude-Intention and Subjective Norm-Intention Relations," *Psychology & Health*, 15 (3), 383 - 93.
- Triandis, H. C. (1977), *Interpersonal Behavior*. Monterey, CA: Brooks/Cole Pub. Co.
- (1980), "Values, Attitudes, and Interpersonal Behavior," in Nebraska Symposium Motivation. Lincoln, NE: University of Nebraska Press.
- van Beuningen, Jacqueline, Ko de Ruyter, Martin Wetzels, and Sandra Streukens (2009), "Customer Self-Efficacy in Technology-Based Self-Service: Assessing Between- and Within-Person Difference," *Journal of Service Research*, 11 (4), 407-28.
- Vargo, Stephen L. and Robert F. Lusch (2004), "Evolving to a New Dominant Logic for Marketing," *Journal of Marketing*, 68 (January), 1-17.
- Venkatesh, V., M. G. Morris, G. B. Davis, and Fred D. Davis (2003), "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, 27 (3), 425-78.
- Venkatesh, Viswanath and Fred D. Davis (2000), "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," *Management Science*, 46 (2), 186-204.
- Venkatesh, Viswanath and Michael G. Morris (2000), "Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior," *MIS Quarterly*, 24 (1), 115-39.
- Verplanken, Bas (2006), "Beyond Frequency: Habit as Mental Construct," *British Journal of Social Psychology*, 45 (3), 639-56.
- Verplanken, Bas, Henk Aarts, and Ad Van Knippenberg (1997), "Habit, Information Acquisition, and the Process of Making Travel Mode Choices," *European Journal of Social Psychology*, 27, 539-60.
- Verplanken, Bas, Henk Aarts, Ad van Knippenberg, and Carina van Knippenberg (1994), "Attitude Versus General Habit: Antecedents of Travel Mode Choice," *Journal of Applied Social Psychology*, 24 (4), 285-300.
- Verplanken, Bas and Sheina Orbell (2003), "Reflections on Past Behavior: A Self-Report Index of Habit Strength," *Journal of Applied Social Psychology*, 33 (6), 1313-30.

- Vesel, Patrick and Vesna Zabkar (2010), "Relationship Quality Evaluation in Retailers' Relationship with Consumers," *European Journal of Marketing*, 14 (9/10), 1334-65.
- Walker, Rhett H., Margaret Craig-Lees, Robert Hecker, and Heather Francis (2002), "Technology-Enabled Service Delivery: An Investigation of Reasons Affecting Customer Adoption and Rejection," *International Journal of Service Industry Management*, 13 (1), 91-106.
- Walker, Rhett H. and Lester W. Johnson (2006), "Why Consumers Use and Do Not Use Technology-Enabled Services," *Journal of Services Marketing*, 20 (2), 125-35.
- Wang, Cheng, Jennifer Harris, and Paul G. Patterson (2012), "Customer Choice of Self-service Technology: The Roles of Situational Influences and Past Experience," *Journal of Service Management*, 23 (1), 54-78.
- Weber, Robert Philip (1990), *Basic Content Analysis* (2nd ed.): SAGE Publications.
- Weijters, Bert, Devarajan Rangarajan, Tomas Falk, and Niels Schillewaert (2007), "Determinants and Outcomes of Customers' Use of Self-Service Technology in a Retail Setting," *Journal of Service Research*, 10 (1), 3-21.
- Wittenbraker, John, Brenda Lynn Gibbs, and Lynn R. Kahle (1983), "Seat Belt Attitudes, Habits, and Behaviors: An Adaptive Amendment to the Fishbein Model," *Journal of Applied Social Psychology*, 13 (5), 406-21.
- Wood, Stacy L. and C. Page Moreau (2006), "From Fear to Loathing? How Emotion Influences the Evaluation and Early Use of Innovations," *Journal of Marketing*, 70 (3), 44-57.
- Wood, Wendy, Jeffrey M. Quinn, and Deborah A. Kashy (2002), "Habits in Everyday Life: Thought, Emotion, and Action," *Journal of Personality & Social Psychology*, 83 (6), 1281-97.
- Woodruff, Robert B., Ernest R. Cadotte, and Roger L. Jenkins (1983), "Modeling Consumer Satisfaction Processes Using Experience-Based Norms," *Journal of Marketing Research*, 20 (3), 296-304.
- Wu, Jen-Her and Shu-Ching Wang (2005), "What Drives Mobile Commerce? An Empirical Evaluation of the Revised Technology Acceptance Model," *Information & Management*, 42 (5), 719-29.
- Xinyuan, Zhao, Anna S. Mattila, and Li-Shan Eva Tao (2008), "The Role of Post-Training Self-Efficacy in Customers' Use of Self Service Technologies," *International Journal of Service Industry Management*, 19 (4), 492-505.
- Yen, HsiuJu Rebecca, Kevin P. Gwinner, and Wanru Su (2004), "The Impact of Customer Participation and Service Expectation on Locus Attributions Following Service Failure," *International Journal of Service Industry Management*, 15 (1), 7-26.
- Zhu, Zhen, Cheryl Nakata, K. Sivakumar, and Dhruv Grewal (2007), "Self-Service Technology Effectiveness: The Role of Design Features and Individual Traits," *Journal of the Academy of Marketing Science*, 35 (4), 492-506.