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FROM INTENTION TO USE: A LONGITUDINAL INVESTIGATION ON CUSTOMER READINESS AND FACILITATING CONDITIONS FOR SELF-SERVICE TECHNOLOGY

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Abstract

This research explores the relationship between intention and actual usage of self-service technology (SST), and investigates the effects of facilitating conditions and customer readiness on customer adoption of SST. To analyze the longitudinal effect, a two-stage survey was conducted and lasted for seven months. As it is well known that behavior intention does not necessary lead to actual behavior, our findings offer proactive strategies to service providers in turning intention into actual usage. Implications for practitioners are provided and several limitations are discussed.

Keywords: Theory of reasoned action, theory of planned behavior, self-service technology, customer readiness, facilitating conditions

Introduction

It is common today to see people everywhere taking advantage of different technologies to perform their daily activities, such as TV shopping, Internet shopping and online banking. They are prevalent innovations which dramatically change the way in which people perform those activities over the past decades. Specifically, they help marketers realizing revenue from online services under the fierce competition. These changes are profoundly facilitated by the SST development which helps customers performing self-service quickly and conveniently in a high quality way [10].

Prior studies have paid a great attention to understanding the factors or characteristics that possibly motivate current and potential customers to use SST [7] [9] [13] [23] [38]. Although their findings are meaningful, actual SST usage behavior is still inconclusive. Paschal [28] argued that prevailing models or theories (e.g., Theory of Reasoned Action, Technology Acceptance Model) on SST usage behavior produce some contradictions, such as low variance explanatory power and unstable moderating influences. If any one of them occurs, research findings will be biased and readers will be difficult to understand the dynamics (or complexity) of SST behavior pattern. Existing theories and guidelines have paid little attention to conduct an in-depth theoretical examination regarding the “gap” between behavioral

intention and actual behavior [3] [9] [21] [28]. Ajzen [4] mentioned that behavioral intention and perceived behavioral control are often found to be the main effects of actual behavior, but in fact have no significant interaction between them. Ajzen [3] also argued that intention on one hand tends to be overestimated in its certain role to perform expected behavior, and on the other hand, it tends to be underestimated in its ability to predict undesirable behavior. Accordingly, we would like to propose a theoretical model to resolve such an ambiguous (or unstable) relationship between behavioral intention and actual behavior.

In order to consolidate aforementioned relationship, it is necessary to understand how factors related to customer readiness and situational factors (e.g., environmental conditions and service provider) that influence the causal relationship between behavioral intention and SST actual usage. A review of previous studies offers no model to represent the readiness of customers for using SST. The only exception in studying SST usage may be attributed to Meuter et al. [22] in which individual and innovative characteristics were used to explain the adoption of SST. However, their findings do not resolve the problem of the intention-actual gap as we mentioned. The purpose of this study is to develop a conceptual framework that incorporates aspects of theory of planned behavior and facilitating conditions to provide a deeper understanding of the relationship between behavioral intention and SST usage, using customer readiness as a moderator. It should be noted that users' one-time usage behavior may be different from their continued usage behavior. Although SST adoption has received considerable attention in prior studies, the latter temporal effects are still unclear. To the best of knowledge, our study is one of first studies using longitudinal approach to narrow such a gap between behavioral intention and SST actual usage. We outline our research purposes as follows:

(1) **To investigate the moderating effect of customer readiness on SST usage behavior.** Similar to the readiness factors proposed by Meuter et al [22] and the model of TPB [1], we intent to measure and to bridge the gap between intention and behavior.

(2) **To examine the impacts of facilitating conditions on behavior intention and actual usage of SST.**

Both environmental and personal conditions could affect the usage behavior [32] [34]. In this study, we exclude personal conditions based on our research model and survey design.

Literature Review

Theory of Planned Behavior

Understanding the behavior of individuals has always been a concern for social researchers. The theory of reasoned action (TRA) and the theory of planned behavior (TPB) are widely accepted and often used for explaining individuals' behavior [24].

The TPB extends the TRA by adding perceived behavioral control as a factor that can influence intentions and behaviors [1]. Perceived behavioral control is defined as "the perceived ease or difficulty of performing the behavior of interest" ([1], p.183).

According to the TPB, behavior is function of compatible intentions and perceptions of behavioral control and is determined by motivation and ability [19]. Behavior is the manifest, observable response in a given situation with respect to a given target. Single behavioral observations can be aggregated across contexts and times to produce a more broadly representative measure of behavior. "Because many behaviors pose difficulties of execution that may limit volitional control, it is useful to consider perceived behavioral control in addition to intention" [2].

Behavioral intention

Behavioral intention in this study is defined as "an indication of a person's readiness to perform a given behavior." Consistent with the underlying theory for all of the intention models discussed in our research, we expect that behavioral intention will have a significant positive influence on technology usage. Unfortunately, a review of previous studies offers no model that explains the reasons of why customer intent to or not intent to adopt SSTs. Nevertheless, to the best of our knowledge, most studies (except Meuter [22] and Dabholkar [12]) had not focused on investigating post usage behavior of SST. Further, only few studies addressed the behavioral gap of using SST we mentioned earlier. It is therefore essential to have a research to narrow this gap [27] [28] [29].

As Ajzen [3] said, "The present study also found that conscientiousness; an individual difference variable may play an important part in explaining the gap between behavioral intention and actual behavior", Venkatesh [37] also mentioned that behavioral intention does not represent the external factors and has limited predictive and explanatory ability to deal with uncertainty and unforeseen events between the time intention is formed and behavior performed. Furthermore, behavioral intention is limited in its ability to predict behaviors that are not completely

within an individual's volitional control. Therefore, something is missing between intention and actual usage that worth investigating.

Self-service technology

Self-service technology (SSTs), defined as technological interfaces that aided customer in generating service without direct involvement from the service company's employee [22], are widely deployed for customer service delivery today and customers are providing more and more of their own services during the usage.

Researchers had classified the different usage of SST based on different demographic characteristics (e.g. [20] [23]), most of them focused on the service quality and the relationship between the attitude and the behavior intention toward using SST. Although using SST such as ATM, self-service check-out and check-in technologies, in-store kiosk, among others, is becoming prevalent, not all consumers choose to use the new technologies nor do all consumers see these changes as improvements. Thus, we still have many corners to cover in order to enhance the customer intention to use SST.

Customer readiness

Meuter [22] defined customer readiness as "a condition or state in which a consumer is prepared and likely to use an innovation for the first time." In his study, customer readiness was conceptualized as role clarity, motivation (including intrinsic and extrinsic motivations), and ability. Previous research had revealed significant effects of both intrinsic and extrinsic motivation on behavioral intention to use technologies [14]. Moreover, when people believe that they are incapable of performing a task, they will not engage in the behavior, even if they acknowledged that it is a better alternative [26]. Thus, customer readiness is considered in our study.

Facilitating conditions

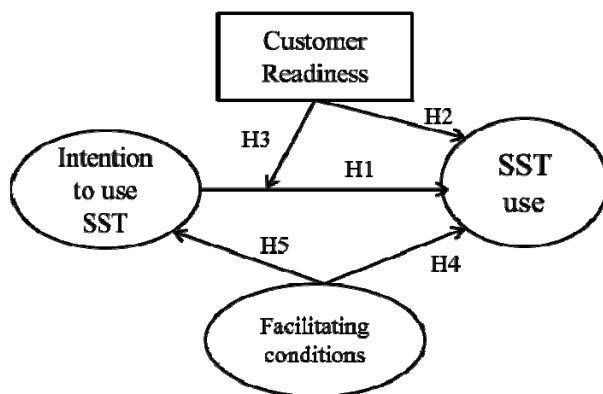
Facilitating conditions are factors in the environment that influence a person's desire to perform a task [32]. Triandis [34, p. 205] defined facilitating conditions as "objective factors, 'out there' in the environment that several judges or observers can agree make an act easy to do". Gerht [16] suggested that individual traits alone may not explain customer behavior and that situational factors should also be examined. Key facilitating conditions are the money, time or technologies that are needed to make use of the innovation. In essence, the absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage [31] [32].

Dabholkar and Bagozzi [11] found situational factors important in moderating customer use of SST delivery options. Further, Meuter [23] found that customers' usage rate of SSTs varied by situation. In this

research, personal factors and behavior will be excluded in facilitating conditions. The rationale of this decision is two folds: (1) some personal factors and behavior will conflict and overlap with the customer readiness, which concerned individual factors, (2) the survey will be conducted using the customers who are ready to pay for train tickets and to take their trips, thus they do not have any personal factors inhibiting the use of SST.

Research Framework and Hypotheses

This research attempts to propose a model of SST usage integrating TPB with facilitating conditions and a moderator of customer readiness. The model is similar in spirit to Meuter’s [23] formulation of the model of SST adoption process in which he integrated diffusion of innovation theory and motivation theory. Following the same line of thought, we considered *role clarity, motivation and ability* as indicators of customer readiness. According to our research motivation and objectives, we proposed a theoretical framework that illustrates our propositions among constructs in Figure 1.



* SST = Self-Service Technology

Figure 1: The Research Framework

Hypotheses

According to well-established theories in IS and social psychology, behavioral intention is an important causal predictor of behavior that mediates the influence of various beliefs and external variables (e.g., individual characteristics, system characteristics, etc.) on behavior [13] [28]. It is related to customer readiness such as role clarity, motivations and ability to perform the behavior. For example, if two customers have equally strong intentions to use SST, the customer who has more ability is more likely to actually use SST. Further, behavioral intention had been empirically demonstrated to be an important determinant of many behaviors, including system use [35]. Therefore, the first hypothesis of this study is:

H1. *Intention to use SST will have direct influence on SST use.*

Using the TPB as a basis to our framework of customer readiness of using SST, we noted that there was missing gap between behavioral intention and usage [3] [28]. Meuter [22] defined Customer Readiness as “a condition or state in which a consumer is prepared and likely to use an innovation for the first time,” in his study, Customer Readiness can be conceptualized as role clarity, motivation which including intrinsic and extrinsic motivation, and ability.

Conceptually, perceived behavioral control is expected to moderate the effect of intention on behavior, such that a favorable intention produces the behavior only when perceived behavioral control is strong. Consistent with these findings, in our study, we discussed the relationship between intention and actual usage behavior which could also be tested in our research, besides, we would like to address the gap between each one using Customer Readiness as a moderator, and thus, the second and third hypotheses of this study are:

H2. *Customer Readiness will have direct influence on SST use.*

H3. *The relationship between intention and SST use will be moderated by Customer Readiness.*

Based on the discussion in this section, the theory of planned behavior to our model of SST use behavior as follows, these prior results implied that perceived external conditions exert a direct influence on behavior, thus the presence or lack of external facilitating conditions in a customer environment will directly influence SST use. We presumed that the relationship between intention and behavior will contingent upon the strength of facilitating conditions (either positive or negative). We further consider facilitating conditions will influence the willingness intention and decision of using SST. Consequently, in general, the fourth and fifth hypotheses of this study are:

H4 *Facilitating conditions will have direct influence on SST use.*

H5. *Facilitating conditions will have direct influence on intention to use SST.*

Method

Operationalization of variables

In this study, customers who have experiences in using ticket vending machine were selected as our participants. Table 1 summarizes the operational definitions of research constructs and their citations. Minor revisions of these constructs were performed in order to meet our research context.

Table1. Definition of research construct

Variables	Definition	Source
Customer Readiness	A condition or state in which a consumer is prepared and likely to	[22]

	use an innovation for the first time	
Role clarity	The customer's knowledge and understanding of what to do	[22]
Intrinsic motivation	The pleasure and inherent satisfaction derived from a specific activity	[35, p. 240]
Extrinsic motivation	The drive to perform a behavior to achieve specific goals/rewards	[35, p. 240]
Ability	Possessing the required skills and confidence to complete the task	[22]
Facilitating Conditions	Objective factors, 'out there' in the environment that several judges or observers can agree make an act easy to do	[34, p. 205]
Intention to use SST	An indication of a person's readiness to perform a given behavior	[4]
SST use	A function of compatible intentions and perceptions of behavioral control	[4]

Measurement development

Although measurement items were adapted from literature, a pre-test was conducted to achieve certain level of face validity. The pre-test involved eight participants (one MIS expert, two doctoral students, and five graduate students) who were familiar with the ticket vending machine. They were asked to provide comments with an eye on eliminating redundant or unrelated items. Facilitating conditions were measured with 2 items adapted from Thompson [33] and Venkatesh [36]. The items for measuring customer readiness were adapted from Meuter [22]. While the items for measuring behavioral intention were adapted from James and Matthew [8], those for measuring actual usage were adapted from Rensel [25].

Respondents were asked to rate each item on a six-point Likert scale, where 1 meant "strongly disagree" and 6 meant "strongly agree". All the questionnaire items and the constructs are listed in Appendix A.

Sample

Self-service technology becomes a popular tool to differentiate oneself in the market and it now still has the issue of low utility rate by customers. In our study, one specific ticket vending machine in Taiwan High Speed Rail Company (THSRC) was selected as our research SST, since the utility rate for ticket vending

machine is just 19.2% in August, 2010 (<http://www.insightxplorer.com/>) and we tried to collect data in two stages to see if customer readiness can truly lead to usage intention as well as actual use.

We set up two-stage online questionnaires which were hosted by GEBRC lab in National Chengchi University (<http://www.gebrc.nccu.edu.tw/hbsst/>). Stage 1 survey started from January 2010 for two weeks, we advertised an announcement on a very heavy traffic BBS (<telnet://ptt.cc>) in Taiwan to call for participants. The exclusion of 72 invalid questionnaires resulted in a total of 2,318 valid ones. Among them, 1,520 of respondents were experienced users (i.e., who have experience in using ticket vending machine), whereas 798 respondents were inexperienced users. These inexperienced users were thought to be valuable to our research, because of our research purpose. We therefore invited them to participate in our second-stage survey. After seven months (July 2010), the second-stage survey was conducted. Similar to the first-stage survey, we sent an invitation via email to those prospective participants based on the email addresses that were recorded by the first-stage database. At the end of the survey, a total of 356 respondents were collected. During the past seven months, 131 of them have bought the tickets from the SST and thus turned into experienced users, whereas 225 of them did not buy any tickets from the SST and should be seemed as inexperienced users as the stage 1.

Consequently, those 131 experienced users (i.e., never used in January but have used the SST during the two-stage survey) are eligible to our longitudinal analysis. Among the usable samples, the web-based sample of respondents was comprised of slightly more males (59.4%) than females (40.6%). Most of them (57%) are in the 24 to 28 year age group, while 37.2% of them are in 19 to 23. As for occupations, 58.5% of them were students, while the rest of them (41.5%) were white-collars.

Result

Descriptive statistics

Descriptive statistics were calculated and shown in Table 2.

Table 2. Descriptive statistics among variables

Construct	Means	S.D.
Customer Readiness	4.74	0.49
Role clarity	4.86	0.59
Intrinsic motivation	4.32	0.70
Extrinsic motivation	4.83	0.61
Ability	4.97	0.57
Facilitating Conditions	4.79	0.61
Intention to use SST	3.74	0.44
SST use	1.86	0.51

Analytic strategy for assessing the model

The pilot test survey and the confirmatory factor analysis (CFA) statistical procedure were used to reduce the number of scale items for each construct to be utilized in the SEM structural model testing of the hypotheses. The reduced numbers of scale items were those that the pilot test and CFA procedure determined to best represent the measurement of their respective constructs. In this study, AMOS 18.0 was the software used to assess the measurement and the structural models.

The measurement model

The measurement model was tested using CFA. As shown in Table 3, factor loadings ranging from 0.628 to 0.938 exceeded the acceptable value of 0.50, as recommended by Fornell and Larcker [15]. The internal consistency of the measurement model was assessed by computing the composite reliability. As Bagozzi and Yi [5] suggest, all composite reliabilities were above the 0.70 benchmark. The average variance extracted for all constructs exceeded the threshold value of 0.50 recommended by Fornell and Larcker [15]. Since the values of reliability were above the thresholds, the scales for evaluating the constructs were deemed to exhibit convergence reliability.

Table3. Summary of construct loadings and reliability

Factors	Items	Standardized Factor loadings	AVE	Composite reliability	Cronbach's Alpha
Role clarity	Role1	0.858	0.85	0.838	0.788
	Role3	0.841			
Intrinsic motivation	Intri1	0.873	0.832	0.918	0.865
	Intri2	0.872			
	Intri3	0.888			
	Intri4	0.694			
	Intri5	0.817			
Extrinsic motivation	Extri1	0.758	0.8	0.896	0.848
	Extri2	0.778			
	Extri3	0.824			
	Extri4	0.853			
	Extri6	0.758			
Ability	Ab1	0.835	0.848	0.9	0.789
	Ab2	0.918			
	Ab3	0.843			
Facilitating Conditions	FC1	0.842	0.743	0.707	0.749
	FC2	0.628			
Intention to use SST	Int1	0.87	0.887	0.977	0.847
	Int2	0.938			
SST use	Use1	0.861	0.771	0.742	0.740
	Use2	0.668			

Table4. Correlations

Construct	Role clarity	Intrinsic	Extrinsic	Ability	Facilitating Conditions	Intention to use SST	SST Use
Role clarity	0.850						
Intrinsic	0.698	0.832					
Extrinsic	0.703	0.707	0.800				
Ability	0.846	0.554	0.779	0.848			
Facilitating Conditions	0.663	0.455	0.472	0.687	0.743		
Intention to use SST	0.614	0.481	0.709	0.719	0.605	0.887	
SST Use	0.285	0.189	0.288	0.379	0.213	0.246	0.733

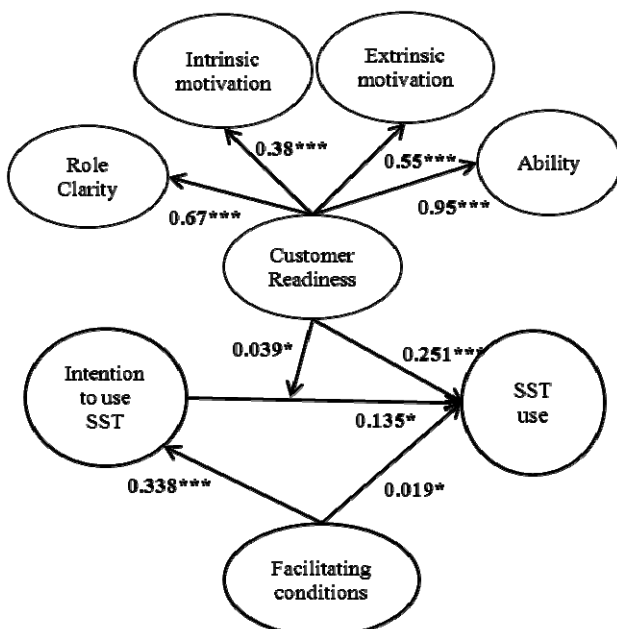
* Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs. For discriminate validity, diagonal elements should be larger than off-diagonal elements.

Table 4 shows that the variances extracted by constructs were greater than any squared correlations among constructs; this implied that constructs were empirically distinct. In summary, the measurement model test, including convergent and discriminate validity measures, was satisfactory.

The fitness measures for the measurement models are shown in Table 5. χ^2 , GFI (goodness-of-fit index), NFI (normalized fit index), CFI (an incremental fit index of improved NFI), RMSEA (root-mean-square error of approximation) and MI (modification index) were used to test the goodness of fit of the proposed model which is suggested by authors [7] [26] [27]. Consequently, all the fitness measures in the study fell into acceptable ranges and the proposed model provided a suitable fit.

Table5. Overall fits of models (After moderating effect)

Fit index	Criteria	Results	Suggested by authors
$\chi^2/d.f.$	<3	2.45	Bentler and Bonett [7]
GFI	>0.85	0.882	Hadjistavropoulos et al. [27]
NFI	>0.9	0.946	Bentler and Bonett [7]
CFI	>0.9	0.98	Bentler and Bonett [7]
RMSEA	<0.08	0.024	Hair et al. [26]



***Significant path (p<0.001)
 **Significant path (p<0.01)
 *Significant path (p<0.05)

Figure2. Results of structural modeling analysis (After moderating effect)

We examined the structural equation model by testing the hypothesized relationships among the research variables (see Figure 2). The results showed that customer readiness had a significant effect on SST use ($\beta=0.135$, $p<0.001$) and facilitating conditions also had a significant effect on SST use ($\beta=0.19$, $p<0.05$), supporting hypotheses 2 and 4. The results also showed that facilitating conditions had a significant, direct influence on intention to use SST ($\beta=0.338$, $p<0.001$), hypothesis 5 supported. Moreover, intention had a readiness moderate influence ($\beta=0.251$, $p<0.05$), hence, hypothesis 1 and 3 were supported. As expected, the link between intention and use will be moderated by customer readiness ($\beta=0.39$, $p<0.05$).

Conclusions and Discussion

This study presented and validated a multi-facet model to evaluate the relationship among customer readiness, facilitating conditions, intention and behavior. As with any study, this research is subject to limitations, and our findings should be interpreted in light of them. With empirical analysis, this research had found several implications and limitations as followings.

First, to minimize the gap between behavioral intention and usage, we tried to collect longitudinal data and analysis, to find out what condition to make customers who wanted try SST, but did not actually try. The link from intention to use became significant after customer readiness construct moderate effect. As expected, the results suggest that Customer Readiness is higher among users as opposed to non-users of SST and could moderate the gap between intention and actual usage, which means there is truly a missing gap from intention to use, and since the customer readiness moderate effect on the gap still not significant enough ($p<0.05$), we believed that there are something missing part between the behavioral intention and actual usage, based on Ajen's [3] research, we believed that, again, there are other factors which could also effect and enhance the relationship.

Second, we used Meuter's [23] theory of customer readiness, which had strong effect on actual use of SST, which means people who have clear role clarity, intrinsic motivation, extrinsic motivation and ability will have impact on SST trial, highly readiness can have effect on people's decision of trying SST.

Third, constructed framework of this study fits the research topic and it is suitable to explain and evaluate the behavior intention of customer when using SST, which means facilitating conditions can also influence the behavior intention and also actual

usage, the environmental conditions such as service's provider's instruction and atmosphere can have effect on behavior intention more than actual trial, we can conclude that facilitating conditions first have influence on user's mind whether to try, then depends on each user's readiness, to actually trial.

Last, though we just investigated the case of ticket vending machine in Taiwan High Speed Rail Company, there are still many types of SST to study: Kiosks in retailing store, tour-guide kiosk, and so on.

Implications for Practice

The factors investigated encompass perceived attributes of the customer readiness and facilitating conditions in terms of related behaviors and demographics. The study provides meaningful strategic implications for retailers as well as advances theory in service marketing about individuals that can be applied to a host of other service industries where self-service technology options are offered or being considered.

This study explored the specific ticket vending machine in Taiwan High Speed Rail Company (THSRC). We therefore generated some insights for THSRC's managers:

- (1) This study helps augment earlier studies developed to understand the importance of examining consumer readiness in the context of the specific situation of using self-service technology, especially when deploying new SSTs.
- (2) Customers with different degrees of readiness, capacity or willingness to embrace new technologies reflect their different degrees of knowledge, control or comfort toward new technologies. It is possible that customers will be frustrated in self-service technology settings, it is reasonable that customers with different degrees of readiness toward technology might reinforce or weaken their value or satisfaction resulted from their readiness and environment conditions. Customer with low CR can be trained to have ability and knowledge of self-service technology and by adding coupon and more fun into kiosk to inspire customer motivation.
- (3) As for companies, if marketers can be innovative in providing more functional tools that enables the customer more engage in the situation (e.g. by viewing 3-D lodging options), they maybe more motivation to use the SST and turn the experience such as word-of-mouth and continue use that can make the SST more benefit, not just the by-product in store or anywhere.
- (4) When customers interact with a self-service technology at the first time, the encounter plays an

important role to the impression of a customer. While customers have additional encounters with the technology, the customers will hold a lasting impression of the first contact interaction. Therefore, the design and management of the service delivery system is an important issue for firms. Furthermore, since the utility of using ticket vending machine, the managers of THSRCs should encourage their employees to have rapport relationships with customers and know what their customers need.

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Appendix A. Measurement items

Item	Questions
Role clarity	
Role1	I feel certain about how to effectively use the SST
Role3	The steps in the process of using the SST are clear to me.
Intrinsic motivation	
Intri1	Using the SST would provide me with personal feelings of worthwhile accomplishment.
Intri2	Using the SST would provide me with feelings of enjoyment from using the technology.
Intri3	Using the SST would provide me with feelings of independence.
Intri4	Using the SST would satisfy my personal needs.
Intri5	Using the SST would allow me to feel innovative in how I interact with a service provider.
Extrinsic motivation	
Extri1	Using the SST would provide me with added convenience.
Extri2	Using the SST would provide me with economic benefits.
Extri3	Using the SST would allow me to order a refill more quickly.
Extri4	Using the SST would allow me to order a refill whenever I want.
Extri6	If I tried to use the SST, my prescription would be ordered successfully.
Ability	
Ab1	I am confident in my ability to use the SST.
Ab2	Using the SST is well within the scope of my abilities.
Ab3	My past experiences increase my confidence that I will be able to successfully use the SST.
Facilitating conditions	
FC1	Specialized instruction concerning the system was available to me.
FC2	A specific person (or group) is available for assistance with system difficulties
Intention to use SST	
INT1	I intend to use the SST in the future.
INT2	I predict I would use the SST in the future.
SST use	
Use1	How many times have you used the SST (for the past few months)
Use2	How often do you used the SST (for the past few months)