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Fix It or Leave It? Customer Recovery from Self-service Technology Failures☆

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Abstract

Self-service technologies (SSTs), such as airport check-in kiosks, can provide customers faster, better, and less expensive services. Yet sometimes customers experience service failures with these technologies. This study investigates the process by which customers recover from SST failures using their own effort (i.e., customer recovery) and explores their decisions to stay with or switch from the SST. Drawing from expectancy and attribution theories, we develop a process model centered on customer-recovery expectancy and test the model by tracking actual failure responses. The results show that internal attribution, perceived control over the SST, and SST interactivity all positively influence customer-recovery expectancy. In turn, expectancy affects customers' recovery effort and recovery strategies, depending on the availability of competitive information. Furthermore, greater recovery effort increases the likelihood of staying with an SST, whereas more recovery strategies increase the likelihood of switching. The theoretical and managerial implications of these findings include ways to design SSTs to enhance recovery expectancy, a key mechanism of the recovery process, and thus to encourage customers to persist with the technologies.

Keywords: Customer recovery; Expectancy theory; Attribution theory; Self-service technology; Service failure; Service recovery; Cross-channel switching

Millions of customers receive services through automated machine and computer interfaces known as self-service technologies (SSTs). These interactive interfaces, including Internet-based e-tailers, free-standing kiosks, and mobile service applications, empower customers to obtain services without direct employee assistance (Meuter et al. 2005; Zhu et al. 2007). Because of the speed, convenience, and cost savings they promise, purchases through SSTs have become sizable. Annual sales through kiosks are projected to exceed $1.0 trillion by 2014 (IHL Group 2012), and SSTs are said to be one of the "10 ideas that are changing the world" (*Time* 2008).

Nevertheless, SSTs can and do fail at times because of technical or human error. For example, 25% of online shoppers experience problems with websites (Forbes 2008), and only 18% of the time does interactive voice technology, such as automated customer phone service, work effectively (*The Economist* 2004). Such failures can result in missed sales opportunities, customer dissatisfaction, and technology abandonment. For example, more than 2,000 kiosks installed by the U.S. Postal Service are not in use today because of malfunctions and design issues (Selfserviceworld.com 2010).

In light of the risks of malfunctioning SSTs, such as dissatisfaction and lost sales, it is important to understand how customers respond to failures (Bolton, Grewal, and Levy 2007; Puccinelli et al. 2009; Verhoef et al. 2009). Because service personnel typically are not available to address SST errors when they occur, firms must motivate customers to recover from service failures on their own (known as customer recovery) and to stay with the technologies (Holloway and Beatty 2003; Meuter et al. 2000). In other words, they must encourage customers to recover from the failure (fix the SST problem) and not switch from the interface (leave the problem). Therefore, this study

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aims to determine the process by which customers engage in recovery or switching behaviors in response to SST failures.

The services literature identifies three types of recovery from service failures: recovery by the firm, recovery by the customer, and joint recovery by the firm and the customer (Bendapudi and Leone 2003; Dong, Evans, and Zou 2008; Lusch, Vargo, and O'Brien 2007; Meuter and Bitner 1998; Roggeveen, Tsiros, and Grewal 2011). Most empirical studies have focused on recovery by the firm (e.g., Bitner 1990; Grewal, Roggeveen, and Tsiros 2008; McCollough, Berry, and Yadav 2000; Smith, Bolton, and Wagner 1999), though some have considered joint recovery (e.g., Dong, Evans, and Zou 2008). However, customer recovery—in which customers are the sole or principal actors in recovery—is relatively neglected. Gaining a better understanding of customer recovery is crucial, given the expanding role of SSTs in the service landscape.

To address this gap, we conduct an empirical study on customer recovery. We investigate a potential mechanism, called "customer-recovery expectancy" (CRE), that motivates customers to engage in the recovery process. CRE refers to the degree to which customers estimate that they will be effective in resolving the problem through their own actions and inputs. This internally focused evaluation differs from customers' perceptions or evaluations of recovery actions taken by service firms or employees, which until now have been the primary focus of extant literature.

We attempt to answer four questions about CRE. Because CRE might propel customers to take actions on their own to address a service failure, our first research question is, what factors strengthen CRE? We consider three possible antecedents: internal attribution, perceived control over SSTs, and SST interactivity. Second, how does CRE motivate customers to fix a service failure? Here, we examine two fixing behaviors as possible consequences of CRE: customer-recovery effort and customer-recovery strategy. The former emphasizes working harder and longer to solve the problem; the latter involves searching for more appropriate solutions. Third, are these behaviors contingent on SST design features? We explore the possible moderating role of one design feature—namely, the availability of competitive information in the SST interface. Fourth, what are the effects of CRE and recovery responses on switching from the SST? We focus specifically on the likelihood that a customer will abandon the SST and demand employee assistance.

Our research thus makes several contributions to the services literature. First, we help fill a significant research gap by delineating the process of customer, rather than firm or joint, service recovery in the relevant context of SSTs. Second, we apply expectancy theory to introduce CRE as a mechanism for spurring customer-recovery actions. No previous study has used expectancy theory to explain service recovery. Third, this article offers a methodological advance in service failure research by analyzing responses to computer-simulated failures in a general population. We do so to increase the external validity and generalizability of our study. Table 1 highlights the knowledge gaps by presenting sample studies from the services literature.

Theoretical background

Expectancy theory

This study relies on expectancy theory, which describes the process by which people are motivated to engage in coping behaviors to gain cognitive mastery and achieve anticipated results (Heider 1958; Kelley 1973). This motivation process includes expectancy, which is the belief or estimation (developed through observations and ascriptions of past events) of how inputs are likely to result in a certain level of performance (Teas 1981). Studies of social psychology, complaining behavior, and sales management indicate that a higher expectancy of positive outcomes promotes recovery behaviors, especially if the person is the central actor in the task (Oliver 1974; Singh and Wilkes 1996; Teas 1981). We extend the logic of expectancy theory to explain and predict customer reactions to an SST failure in which employee assistance is not available and customers are solely responsible for recovery. The core construct of our conceptual framework is *customer-recovery expectancy* (CRE), which refers to a customer's estimation of the likelihood that an SST problem can be solved through his or her own actions and inputs. CRE differs from expectation of recovery, an extant concept in the services literature (Maxham and Netemeyer 2002; McCollough, Berry, and Yadav 2000). That concept is the customer's estimation of the effectiveness of an *employee's* actions to repair a service failure (Gronroos 1988; Kelley and Davis 1994). Furthermore, CRE differs from the concept of self-efficacy, which is an internal response capability that partially determines expectancy (Bandura 1986; Lent, Brown, and Hackett 1994).

Expectancy–behavior links. Prior studies of the expectancy–behavior link suggest that when people consider their personal efforts effective, they are motivated to persist with tasks (Sujan 1986). Conversely, when they consider those efforts ineffective, they cope less or give up (Singh 1990). There are three types of behavioral reactions to failure: modifying the effort level, altering the strategy, and seeking assistance (Dixon, Spiro, and Jamil 2001; Sujan 1986), though customers may engage in more than one type. Parallel to this classification, we examine three behavioral consequences of expectancy. The first, *customer-recovery effort*, refers to the amount of time and effort directed toward doing more of or repeating the same steps or process. It reflects how hard a person works to improve the situation (Sujan 1986). The second consequence, *customer-recovery strategy*, is the time spent learning about the service procedure and seeking alternative routes and actions to resolve the problem. Thus, the customer attempts to do things differently or smarter, which demands more diagnostic thinking and active learning than repetitive efforts. The third consequence is *switching to employee assistance*, or withdrawing from the SST interface to seek personal assistance (Dixon, Spiro, and Jamil 2001). This choice means opting out of the technology. All three consequences are behavioral variables that capture customers' actual recovery actions. Unlike prior service recovery studies, these variables are not perceptions, nor are they evaluations of firm or employee

Table 1
Exemplars of service failure and recovery studies.

Study	Method	Sample	Recovery type	Guiding theory	Influencing factors	Customer responses studied
Bitner (1990)	Paper-and-pencil, scenario-based experiment	Travelers in airports	Firm recovery (offer, explanation)	Attribution	• Recovery strategies and physical evidence • Mediators: control and stability attributions	• Satisfaction • Perceived quality • Behavioral intentions
Hess, Ganesan, and Klein (2003)	Paper-and-pencil, scenario-based experiment	Students	Firm recovery	Attribution	• Expectation for relationship continuity	• Failure attribution • Service recovery expectation • Satisfaction after recovery
Maxham and Netemeyer (2002)	Repeated measure field study, survey	Complaining bank customers	Firm recovery	Service recovery paradox	• Multiple failures • Mixed recoveries over time • Lag between failures • Failure similarity	• Expectation of recovery • Failure severity • Attribution of blame • Satisfaction, word of mouth, recommendation, and repurchase intention
Smith, Bolton, and Wagner (1999)	Paper-and-pencil, scenario-based experiment	Students and hotel customers	Firm recovery	Equity and recourse exchange	• Failure type and magnitude Recovery attributes (compensation, speed, apology, initiation) • Main and interaction effects	• Distributive, procedural, and interactional justice • Satisfaction
Swanson and Kelley (2001)	Paper-and-pencil, scenario-based experiment	Students	Firm recovery	Attribution	• Recovery initiated by customer, employee, or firm • Speed, complexity, and stability of recovery efforts	• Service quality, satisfaction (lower or higher than expected), word of mouth, repurchase intention
Harris, Mohr, and Bernhardt (2006)	Paper-and-pencil, scenario-based experiment	Students	Firm Recovery	Self-bias in attribution	• Recovery fee vs. compensation • Online vs. offline medium • Service type: airline vs. banking	• Satisfaction • Future intentions
Dong, Evans, and Zou (2008)	Paper-and-pencil, scenario-based experiment	Students	Firm, joint, and customer recovery	Cocreation	• Customer participation in recovery • Locus attribution as a control variable	• Customer satisfaction with recovery • Customers' role clarity, ability, perceived value, and intention for future cocreation
Grewal, Roggeveen, and Tsiros (2008)	Paper-and-pencil, scenario-based experiment	Students	Firm recovery	Attribution	• Compensation • Stability and locus	• Equity • Repurchase intention
Roggeveen, Tsiros, and Grewal (2011)	Paper-and-pencil, scenario-based experiment	Students	Firm and joint recovery	Cocreation	• Contingency for cocreation in recovery • Compensation, severity, expectation	• Satisfaction • Repurchase intention • Equity

recovery actions; rather, these conceptualizations represent a significant departure from extant literature.

Moderators of expectancy. Expectancy theory suggests that beyond the main effects, the importance or valence of a performance outcome interacts with expectancy to determine behavioral motivations (Vroom 1964). In the sales management field, organizational climate (e.g., Tyagi 1982) and attractiveness of alternative rewards (e.g., Churchill, Ford, and Walker 1979) influence the perceived importance of sales performance and moderate the expectancy of sales behaviors.

We incorporate the availability of *competitive information*, or the amount of factual or evaluative information provided about competitive offerings (Alba et al. 1997), as a moderator into our framework because such a technology feature may elevate task importance. SST design features influence how users adopt and evaluate service technologies (Zhu et al. 2007). Because SSTs are to be used by customers independently, their design properties take on greater importance than they would in technologies for which service agents are present. For example, the availability of competitive information is a key source of value that customers derive from technology-based services (Alba et al. 1997). However, such information can also present attractive alternatives, reducing the importance of fixing an SST failure. That is, competitive information may interact with CRE to affect customer-recovery behaviors.

Attribution theory

We draw on attribution theory to examine the antecedents of CRE. Whereas expectancy theory links customer motivation to subsequent individual actions (i.e., consequences of CRE), attribution theory complements it by explaining the formation of customer motivation (i.e., antecedents of CRE) (Sujan 1986; Teas and McElroy 1986). The two theories have been applied in tandem in motivation-related research, and we follow this tradition (Weiner 1985, 1986).

Attribution is a process of post hoc reasoning in which the causes of a performance or an event, such as failure, are inferred from observation (Weiner 1972). The major insight emerging about causal attribution (Weiner 1985, 1986) is that causal ascriptions have three dimensions, forming a typology of attribution: locus (who is responsible for the event?), stability (what is the likelihood of it recurring?), and control (how much control does the responsible party have?) (Bitner 1990).

Consistent with these insights and reflecting the likely complexity of multiple causes in SST failures, we propose examining three constructs that might act as antecedents of CRE: internal attribution, perceived control over SST, and SST interactivity. *Internal attribution* is the extent to which the customer believes his or her actions are responsible for the SST failure. This internal factor identifies the locus of causality, the central dimension of the attribution process. In the typology, it is an internal, unstable, and controllable causal ascription. *Perceived control* over SST refers to the degree to which a customer believes he or she has the ability to adapt to and direct the SST to fulfill service needs (Averill 1973; Bateson 1985; Hui and Toffoli 2002). It is distinct from a personality disposition toward technology; rather, it refers to the perception of mastery over a technology in a particular situation. Consistent with Weiner's (1986) typology, it is a causal ascription that is internal, stable over a short duration, and not under the direct control of the consumer. It is the customer's *perception of*, not actual control over, his or her ability and surrounding conditions. Finally, *SST interactivity* is the degree to which a customer believes the SST enables arrangement of the amount, style, and sequence of presented information (Steuer 1992). It is an external, stable, and uncontrollable factor that reflects the ease of the recovery task and contributes to expectancy (Dixon, Spiro, and Jamil 2001). Because causal ascriptions shape the expectancy of success (Weiner 1985, 1986), we incorporate these three constructs as potential contributors to CRE. All the constructs and relationships that constitute our conceptual framework appear in Fig. 1.

Research hypotheses

When a service failure occurs, it is not always apparent which party is responsible, as is often the case for SST mishaps (Bendapudi and Leone 2003). Both external sources (e.g., poor technology design) and internal sources (e.g., wrong inputs by a customer) can contribute to a negative event (Meuter et al. 2000). We focus on the internal source, or customers' internal attribution, which is the extent to which the customer believes his or her own behavior or effort is responsible for the SST failure. In this crucial dynamic, self-blame can increase the expectancy that the consumer can fix the problem on his or her own. As previous studies suggest, the assignment of blame for the failure determines whom the customer believes should address it (Folkes 1988; Teas and McElroy 1986). If the blame is directed internally, the customer is more likely to take action rather than wait for an external party to rectify the matter.

Furthermore, customers exhibit deeper involvement in service coproduction in the SST setting than they do with conventional services; thus, customers attribute SST failures to themselves more (e.g., Harris, Mohr, and Bernhardt 2006). In Internet-based retail settings, the most common failure that customers cite is their own error (37.1% vs. 1.5% for bricks-and-mortar stores; Forbes 2008). Greater internal attribution therefore generates stronger beliefs that modifying one's own actions will address the failure and result in the desired service.

H1. The greater the internal attribution, the higher is the CRE.

Perceived control over SST, or the degree to which a customer believes that he or she has the ability to adapt to and direct the SST to fulfill service needs, is an ability ascription (Weiner 1986). This perception of personal competence to manage the technology is an internal and stable assessment during the short experience. Similar to other ability ascriptions, it reflects the person's confidence in his or her mastery of a situation and leads to higher expectancy. For example, stronger beliefs in an ability to play chess results in greater expectations of winning a chess match. Such beliefs are not mutable or changeable in the short run.

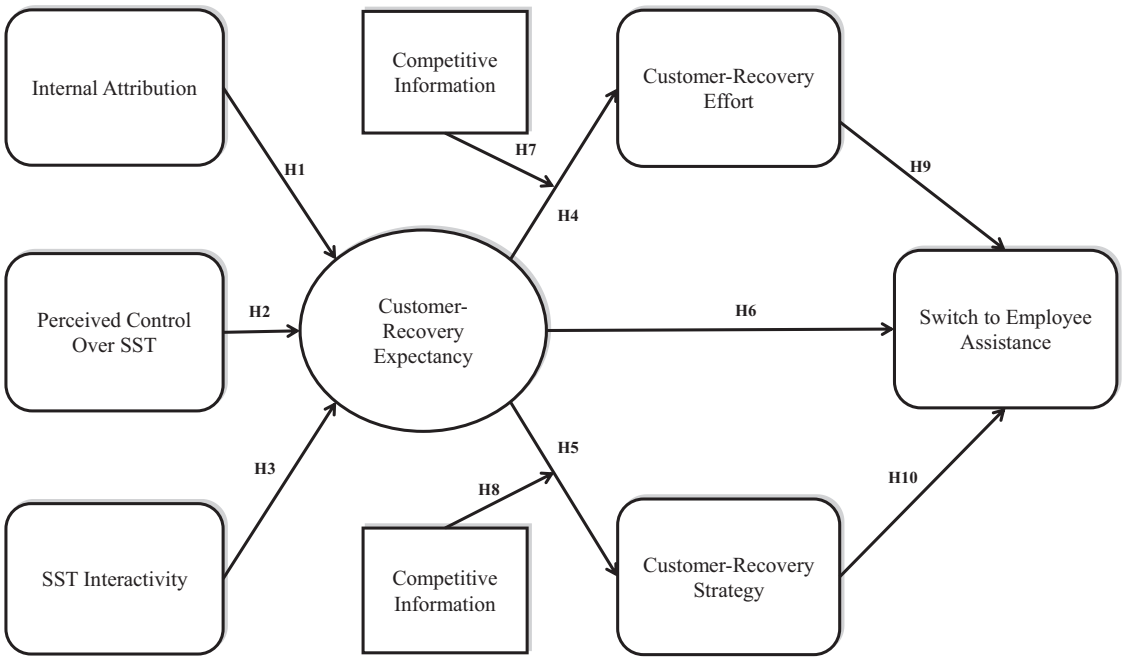


Fig. 1. A model of customer recovery after SST failure.

Bateson (1985) finds that perceived control over a service situation is a key reason that customers prefer self-service over interpersonal service. Thus, when a service failure occurs, perceived control over the technology suggests that the user has the ability to change and improve the situation. Empirical findings from social psychology research indicate that increased perceived control enhances a person's tolerance for frustration and results in a more positive estimation of his or her own performance and impact on the environment (Skinner 1996; Weiner 1985). Along similar lines, we predict that after a failure in an SST setting, greater perceived control leads customers to believe that they are able to direct the service outcome by initiating the recovery process. That is, it heightens recovery expectancy. Greater perceived control corresponds to a sense of having choices to start and regulate actions (Gist 1987; Spreitzer 1995). In contrast, customers with less perceived control may view the technology as imposing more constraints rather than choices and doubt that they can do much to change the outcomes.

H2. The greater the perceived control over SST, the higher is the CRE.

When an SST fails, its interactivity provides different forms of information to the customer, which makes the interface more or less navigable. Thus SST interactivity—or the degree to which the customer perceives the SST enables him or her to arrange the amount, style, and sequence of presented information–can propel the customer to recover from an SST failure, such as by elevating the sense of the SST's responsiveness and communicativeness. Research shows that external, stable, and uncontrollable task ascriptions, such as SST interactivity, influence both motivation and performance (e.g., Dixon, Spiro, and Jamil 2001).

Previous studies of the human–technology interface also find that interactivity signals a higher quality of technology design, by embedding enriched options and routes for service delivery (Griffith 1999). Such a design stimulates positive attitudes toward the technology and an inclination to invest time and energy in overcoming problems. An interactive SST interface also offers a source of empowerment and motivation during the self-service procedure (Hoffman and Novak 1996). Finally, information and choices provided in a speedy, usable, and comprehensible manner help customers form preferences and develop contingency strategies while coping with service problems.

H3. The greater the SST interactivity, the higher is the CRE.

Expectancy estimates are important antecedents of choice behavior (Folkes 1988). For example, if customers expect that complaining will resolve an issue, they are more likely to do so. Alternatively, customers do not complain about a dissatisfactory experience when they believe doing so makes little or no difference (Hirschman 1980; Singh 1990). Prior expectancy studies reveal that when people are motivated to improve their performance, they take several routes toward that end (Sujan 1986). A person might increase effort if he or she believes more intensive effort will improve outcomes, might pursue multiple strategies if it appears that the current approach is leading to poor performance, or might seek assistance if improved efforts and strategies seem unproductive (Dixon, Spiro, and Jamil 2001).

These three routes appear in our study in the forms of customer-recovery effort, customer-recovery strategy, and switching to employee assistance, respectively. We posit that CRE affects all three recovery behaviors. First, customers with higher expectancy invest more time and effort toward fixing the service problem. They repeat attempts at recovery and are more

attentive to the self-service procedure. Second, they actively search for alternative routes to avoid the errors that induced the failure or else adopt new strategies suggested by the SST (e.g., in a "frequently asked questions" [FAQ] menu) to correct the failure. Third, they try the SST channel again, perhaps by moving to another machine interface to obtain the desired service. In contrast, customers with lower CRE leave the technological interface and switch from the SST by seeking interpersonal help.

H4. The higher the CRE, the greater is the customer-recovery effort.

H5. The higher the CRE, the greater is the customer-recovery strategy.

H6. The higher the CRE, the lesser is the likelihood of switching to employee assistance (vs. moving to another SST).

An SST can be designed to provide factual and evaluative information about competitive offerings, which is a key source of value that customers seek from technology-based services (Alba et al. 1997). Competitive information, such as price comparisons and customer reviews, appears in technology interfaces to demonstrate a site's transparency and enhance customers' trust in the service provider. Although providing competitive information may offer certain benefits to customers, we hypothesize that it also could have negative effects on the CRE–recovery effort and CRE–recovery strategy relationships because such information dampens customers' motivation to rectify the problem. After an SST failure, customers exposed to high levels of competitive information become aware of attractive alternatives. This information reduces the importance or the need to stay with the current service provider, such that customers are less willing to engage in recovery (Churchill, Ford, and Walker 1979; Jones, Mothersbaugh, and Beatty 2000).

When a customer has been exposed to the possibility and viability of alternative service providers, he or she is less likely to work harder or apply more time to recover from the failure. Thus, customer-recovery efforts decrease. Similarly, customer-recovery strategies, which require diagnostic thinking, learning, and trying to identify the cause of failure, as well as seeking new approaches to avoid error recurrence, diminishes. The motivation for both types of recovery behaviors decreases when an easy recourse (e.g., obtaining services from a competitor) appears. We thus predict that competitive information moderates the effects of CRE on recovery effort and strategy.

H7. The positive impact of CRE on customer-recovery effort is stronger (weaker) when the amount of competitive information available is lesser (greater).

H8. The positive impact of CRE on customer-recovery strategy is stronger (weaker) when the amount of competitive information available is lesser (greater).

In consumer decision making, sunk costs are retrospective, already incurred, and impossible to recover; they can be contrasted with prospective costs, which may be incurred or changed by a future action (Dick and Basu 1994). Sunk costs are particularly relevant in the SST recovery context because users have spent time learning the novel technology and attempting to repair a failed SST. Studies indicate that when investments (time, money, effort) in a relationship increase (Fornell 1992), the economic, social, or psychological sunk costs also jump, tying users to the process and relationship (Bendapudi and Berry 1997; Keaveney 1995). In line with this logic, we argue that the more effort the customer expends to repair the service, the higher is the sunk cost of switching from the technology, such that the consumer stays with that service channel, perhaps even trying another SST machine.

After an SST failure, customers who engage in more recovery strategies also learn about other options; this learning broadens their understanding of ways to obtain the desired service. For example, SSTs often provide contact information for customer service by telephone; this information decreases switching costs and risks, so customers feel less "locked in" to the SST channel (Bansal, Irving, and Taylor 2004). Therefore, they should more likely move to interpersonal service channels. Following the switching behavior literature, we propose that more customer-recovery effort reduces channel switching but more customer-recovery strategy increases it.

H9. The greater the customer-recovery effort, the lower is the likelihood of switching to employee assistance (vs. staying in the self-service interface).

H10. The greater the customer-recovery strategy, the higher is the likelihood of switching to employee assistance (vs. staying in the self-service interface).

Method

We designed a computer-based experiment to simulate a dynamic SST encounter. Using the programming language Macromedia Director, we created a technology interface that enabled customers to obtain a service on their own. The interface incorporated a hypothetical brand to eliminate the possibility of brand bias. The interface mimicked a real-life service failure experience and measured consumers' CRE immediately after the failure; in addition, it recorded their behavioral reactions during the customer-recovery process. This method provided time compression by summarizing events that otherwise would unfold over days or weeks. By using experimental simulations, we also avoided the expense and ethical considerations associated with observing or enacting actual service failures (Bitner 1990).

Stimuli

A 2 (competitive information: low vs. high) × 2 (SST type: transactional vs. customer service) between-subjects experiment tested the hypotheses. On the basis of extensive pretests, we created two SSTs—car rental kiosk (transactional) and intelligent automated teller machine (ATM) (customer service, involving no or minimum service fees)—that are similar to the types of SSTs cited in prior research (Meuter et al. 2000). To ensure realism, we examined the information content, interactive features, and service processes of various commercial websites (e.g., Hertz.com, Budget.com) and kiosk models (e.g., NCR

and Triton System's ATM series) and then incorporated relevant features into the design of the experimental simulations.

We manipulated the competitive information levels in both SST settings by providing, both before and after the service failure, (1) comparative information among offerings in the SST interface and (2) rival provider information in one condition but not in the other (Alba et al. 1997; Zeithaml, Parasuraman, and Malhotra 2002). The car rental kiosk interface compared detailed information about car models and price ranges for rentals. To facilitate customers' comparisons of price and vehicle models, the rental rates for the various car models available from the firm appeared next to the rental rates from rival firms. In the intelligent ATM setting, the self-ticketing service provided other consumers' comments about movies and theaters associated with the ATM vendor. Information about the locations and availability of other ATM stations and interpersonal bank services also appeared on the screen during the service process.

Participants

Although demographics are not the focus of this study, they may influence SST adoption (Meuter et al. 2005), so to control for their impact, we undertook careful sampling. Participants, whose demographic profiles matched the general U.S. population,[4] were recruited from four shopping centers in four states (California, Texas, New York, and Illinois). We followed a quota sampling procedure to mimic the U.S. Census and improve the generalizability of the findings. The data collected from 250 participants who completed all the tasks required in the experiment were used for data analysis.

Tasks and procedure

Prequalified participants were led to a lab area in the shopping center and assigned randomly to one of the four SST interfaces. Participants completed two tasks through the provided interface: a practice task and a main task. For the practice task, participants were to redeem a $50 coupon using the car rental kiosk or purchase two movie tickets through the intelligent ATM. We collected measures of perceived control after task completion. The practice task provided sufficient interaction with the SST to enable the participants to evaluate SST interactivity and perceived control over the SST. In addition, the completion of the practice task masked the purpose of the failure recovery task that followed.

The main task required participants to rent a car for a three-day round trip through the car rental kiosk or cash a check without a service fee through the intelligent ATM. All participants saw the following error message on the screen at the end of the process, indicating that the transaction had failed: "Sorry, your transaction cannot be processed successfully, please click the <Continue> button below to proceed." Then, the interface immediately asked participants to answer questions about their internal attributions and CRE. To control for the failure severity level and its impact on customer-recovery motivation, we held the potential monetary loss constant across the two SST interfaces.

All participants were redirected back to the service recovery interface, which offered four options as the next step, from which they could choose one or more actions: (1) double-check their previous entry, (2) look up the FAQs for guidelines, (3) search information on alternative service locations, or (4) switch from the technology interface. The computer tracked participants' browsing behaviors, including the sequence and time spent on the selected recovery actions. The customer-recovery interface lasted a maximum of 3 min. After the computer experiment, participants completed a paper-and-pencil questionnaire with items related to perceived SST interactivity, manipulation checks, and filler questions. The entire study took approximately 15 min to complete. Finally, they were thanked, debriefed, and given a $5 reward for their participation.

Manipulation check

We conducted an analysis of variance to verify the amount of competitive information provided, using the mean of two items ("I found alternative service suppliers through this technology" and "I had full information about choices"; 1 = "strongly disagree," and 7 = "strongly agree") to check the manipulation ($r = .49$). Participants perceived significantly more competitive information provided in the high than the low condition ($M_{high} = 4.62$, $M_{low} = 4.19$; $F(1, 249) = 4.84$, $p < .05$). No other effects were significant.

Measurements

CRE. Because there was no existing measure for CRE for an SST failure, we developed a new three-item measure based on previous expectancy studies (e.g., Sims, Szilagyi, and McKemey 1976; Singh and Wilkes 1996). On seven-point scales, provided immediately after the failure event but before recovery, participants indicated their likelihood to "solve the problem without the help from the service firm," "have control over fixing the problem," or "find a way to solve the problem" (Cronbach's $\alpha = .71$).

Perceived control over SST. We adopted three Likert-type items from Mehrabian and Russell's (1974) study of the service environment and Novak, Hoffman, and Yung's (2000) study of online customer behaviors, which we used to measure customers' perceived control over an SST. Participants indicated their sense of being "dominant/decisive/in control" over the technology interface (Cronbach's $\alpha = .91$).

Internal attribution. The single-item measure of internal attributions is based on various attribution and service failure studies (e.g., Folkes and Kotsos 1986; Hui and Toffoli 2002). Participants indicated the degree to which they believed they were

[4] Of the participants, 50% were between the ages of 18 and 34 years, and 50% were between the ages of 35 and 50 years. In addition, 50% were women. Approximately 25% of the participants had grade school or lower education; 50% finished high school, technical school, or vocational school; and 25% held a college or higher degree. Finally, 25% reported an annual household income of less than $25,000, 50% reported between $25,000 and $79,000, and 25% earned more than $79,000.

Table 2
Descriptive statistics and correlations.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. CRE	4.17	1.42	1.00													
2. ATT	3.65	2.05	0.45**	1.00												
3. INTER	5.09	1.30	0.23**	0.00	1.00											
4. PC	4.80	1.74	0.30**	0.15*	0.34**	1.00										
5. EFF	−.05	.76	0.24**	0.15*	0.13*	0.04	1.00									
6. STR	−.01	.90	0.19**	0.08	0.20**	0.06	0.36**	1.00								
7. SWITCH	–	–	−0.27**	−0.22*	0.02	−0.03	−0.21*	0.04	1.00							
8. Age	1.48	.50	0.11	0.00	0.02	0.11	0.11	0.06	0.24*	1.00						
9. Gender	–	–	−0.06	0.02	−0.06	0.00	0.06	0.09	0.02	−0.05	1.00					
10. Income	2.43	1.19	0.07	0.01	−0.01	0.03	0.01	−0.07	−0.04	0.15*	0.00	1.00				
11. Education	2.76	1.12	0.09	−0.08	0.21**	0.14*	0.25**	0.26**	−0.02	0.21	−0.12	0.19**	1.00			
12. INNO	4.37	1.53	0.14*	−0.05	0.21**	0.11	0.09	−0.07	−0.05	−0.13*	0.08	0.04	0.02	1.00		
13. SST Type	–	–	0.10	−0.04	−0.01	−0.06	0.02	−0.07	−0.31**	0.06	−0.14*	−0.04	0.09	0.03	1.00	
14. Comp. Info.	–	–	−0.05	−0.08	0.00	0.07	−0.06	0.01	−0.02	−0.05	0.02	−0.01	−0.01	0.05	0.02	1.00

Notes: $N = 250$. ATT = internal attribution, INTER = SST interactivity, PC = perceived control over SST, EFF = customer-recovery efforts (standardized score), STR = customer-recovery strategy (standardized score), SWITCH = switch to employee assistance.
* $p < .05$.
** $p < .01$ (two-tailed).

responsible for the SST failure immediately after the failure event (1 = "not at all responsible," 7 = "completely responsible").

SST interactivity. Using existing scales that measure the interactivity of electronic interfaces (Novak, Hoffman, and Yung 2000; Steuer 1992), we applied a seven-item Likert scale to assess customers' perceptions of interactivity (Cronbach's $\alpha = .88$). Two items referred to the real-time interaction, three items to user control, and two items to responsiveness.

Customer-recovery effort. We tracked actual customer-recovery activities and then coded them as a behavioral measure. We assessed customer-recovery effort with one item: the time spent double-checking previous entries and repeating the service process. Customers who left the SST interface immediately after the failure received a score of 0 for this item.

Customer-recovery strategy. We tracked two behavioral items to measure this variable. First, we measured the time spent checking FAQs or alternative service locations. Second, we determined the total number of distinct customer-recovery actions taken, ranging from 0 to 3 (i.e., double-checking and retries, obtaining information from FAQs, and exploring alternative locations). Customers who exited from the SST immediately after the failure received a score of 0 for both items. Because these two items were significantly correlated ($r = .61$), we standardized and averaged them into one variable for hypothesis testing.

Switching. After the SST failure and some recovery activities, participants could exit from the SST interface and seek assistance from service employees. We used a binary measure to indicate whether the customer chose to switch to an interpersonal service channel (1) or stay in the technological service channel by using another SST (0).

Control variables. To control for the potential impact of customers' individual differences on their reactions to SST failures, we included five demographic features and technological tendency measures (i.e., age, gender, education, household income, and customer innovativeness) in our analysis. In particular, customer innovativeness reflects a customer's tendency or personal disposition to be a technology pioneer (Goldsmith and Hofacker 1991; Parasuraman 2000). We measured this variable using the mean score of four seven-point scale items, adopted from Parasuraman's (2000) technology readiness index (Cronbach's $\alpha = .88$).

To examine factor unidimensionality, we subjected the four multi-item, subjective measures (i.e., perceived control, perceived interactivity, CRE, and customer innovativeness) to a confirmatory factor analysis (Gerbing and Anderson 1988). The measures in the model reflected the intended underlying constructs and showed satisfactory overall fit ($\chi^2_{(110)} = 193.84$, $p < .01$; GFI = .92; CFI = .98; RMSEA = .05). The estimated coefficients of the factors were significant at $p < .001$, in support of convergent validity (Bagozzi, Yi, and Philips 1991). The correlation between the two latent constructs, plus or minus two standard errors, did not include 1. For each two-factor pair, we performed a chi-square difference test, and all the values were significantly lower for the unconstrained models, in support of discriminant validity (Bagozzi, Yi, and Philips 1991). Table 2 reports the means, standard deviations, and correlation matrix; Table 3 contains the results of the reliability analysis and standardized item loadings for the multi-item subjective constructs.

Results

Antecedents of CRE

We predicted that customers' internal failure attribution, perceived control over the SST, and SST interactivity would all influence CRE. In a multivariate regression to test the hypotheses, we included seven control variables (age, gender, education, household income, customer innovativeness, SST type, and competitive information availability) to ensure the robustness of the results. The regression results showed that the model explained 33.4% of the variance in expectancy. Internal attribution had the strongest positive impact on expectancy ($\beta = .44$,

Table 3
Measurements: item loadings and reliability analysis.

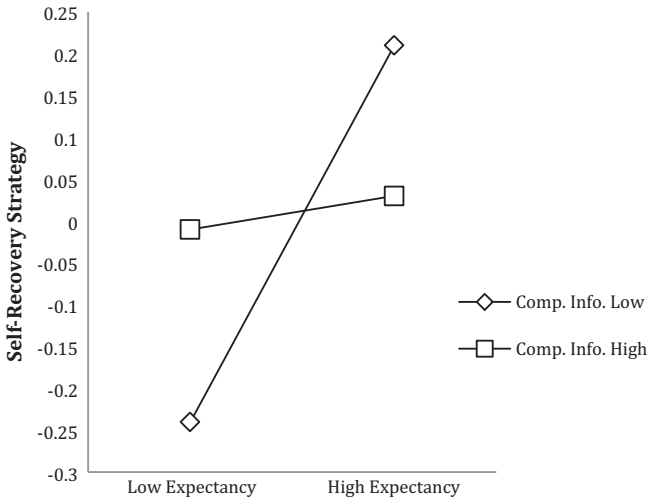
Measures	λ
Perceived control (1 = "strongly disagree," 7 = "strongly agree"; $\alpha = .91$)	
1. While working with the service technology, I felt dominant.	.88
2. While working with the service technology, I felt decisive.	.90
3. While working with the service technology, I felt in control.	.84
SST interactivity (1 = "strongly disagree," 7 = "strongly agree"; $\alpha = .88$)	
1. When I used the service there was very little waiting time between my actions and the computer's response.	.57
2. Pages on the screen I visited usually loaded quickly.	.64
3. I could stay in each step at my own pace.	.73
4. I could focus on the content I had interest in.	.79
5. I could browse pages back and forth easily during the process.	.75
6. This technology responded correspondingly to the requests I entered.	.66
7. This technology offered information related to the message I entered earlier.	.64
Customer-recovery expectancy (1 = "not at all likely," 7 = "absolutely likely"; $\alpha = .71$)	
1. If I try to fix it, I will solve the problem successfully without the company's help.	.58
2. If I try to fix it, I will have control over fixing the problem.	.90
3. If I try to fix it, I will find a way to solve the problem.	.58
Customer innovativeness (1 = "strongly disagree," 7 = "strongly agree"; $\alpha = .88$)	
1. In general, I am among the first in my circle of friends to acquire new technology when it appears.	.67
2. I can usually figure out new high-tech products and services without help from others.	.87
3. I enjoy the challenges of figuring out high-tech gadgets.	.86
4. I find I have fewer problems than other people in making technology work for me.	.80

Notes: λ = item loading, α = Cronbach's alpha.

$t = 7.93, p < .01$), followed by perceived control ($\beta = .17, t = 2.82, p < .01$) and SST interactivity ($\beta = .14, t = 2.25, p < .05$). Therefore, we find support for H1–H3. The control variables did not have significant impacts on expectancy, with the exception of consumer innovativeness, which exerted a positive effect ($\beta = .13, t = 2.33, p < .05$) (see Table 4).

Impacts on customer-recovery behaviors

In H4, we predicted that greater customer-recovery expectancy would be associated with more recovery effort, and in H7, we theorized that this impact would be weaker when more competitive information was available. Similarly, we predicted in H5 that greater expectancy would enhance the use of recovery strategy and, in H8, that this impact would be diminished by more available competitive information in the SST interface. To test these hypotheses, we conducted a multivariate analysis of variance, with the availability of competitive information as the independent variable; CRE, the five customer demographics (age, gender, education, income, and customer innovativeness), and SST type as covariates; and the recovery effort and recovery strategy as the dependent measures.



Note: The values for customer-recovery strategy are standardized scores.

Fig. 2. Interactive effects of availability of competitive information on customer-recovery strategy.

The results showed that CRE had a significant, positive effect on both recovery effort ($F(1, 249) = 11.73, p < .01$) and recovery strategy ($F(1, 249) = 11.72, p < .01$), in support of H4 and H5. However, the interaction between expectancy and competitive information on customer-recovery effort was not significant ($F(1, 249) = .74, p > .05$), so there is no support for H7. In contrast, there was a significant, positive interaction between expectancy and the availability of competitive information on recovery strategy ($F(1, 249) = 9.02, p < .01$). In a follow-up test, we converted the expectancy measure into a two-group categorical variable (low vs. high) to plot the interaction patterns (see Fig. 2). Expectancy resulted in significantly more recovery strategies when competitive information was low (i.e., standardized score of recovery strategy changed from −.24 to .21; $F(1, 249) = 6.43, p < .05$), but it remained at almost the same level when there was a lot of competitive information (standardized score of recovery strategy changed from .01 to .03; $F(1, 249) = .27, p = .61$). These findings support H8. Fig. 2 plots the interaction effect.

Of the covariates, education had a positive association with recovery effort and recovery strategy ($F(1, 249) = 12.31$ and 17.49, respectively, $ps < .01$). Customer innovativeness was positively associated with recovery strategy ($F(1, 249) = 4.48, p < .05$). No other covariates were significant.

Impacts on switching choice

We predicted in H6 and H9 that CRE and customer-recovery effort would have negative associations with switching to

Table 4
Results of hypotheses tests.

A. Regression analysis results on CRE

Effect on:	From:	Standardized coefficient (*t*-value)	Hypothesis
CRE	Internal attribution	.44 (7.93)**	H1 supported
	Perceived control	.17 (2.83)**	H2 supported
	SST interactivity	.14 (2.25)*	H3 supported
	Age	.09 (1.62)	–
	Gender	−.03 (−.51)	–
	Education	.01 (.23)	–
	Household income	.06 (1.05)	–
	Customer innovativeness	.16 (2.33)*	–
	SST type	.10 (1.75)	–

B. MANOVA results on customer-recovery effort and customer-recovery strategy

Effect on:	From:	$F(1, 249)$	Hypothesis
Customer-recovery effort (EFF)	CRE	11.73**	H4 supported
	Competitive information	.62	–
	Competitive information × CRE	.74	H7 not supported
	Age	.39	–
	Gender	1.99	–
	Education	12.31**	–
	Income	.73	–
	Customer innovativeness	.57	–
	SST type	.01	–
Customer-recovery strategy (STR)	CRE	11.71*	H5 supported
	Competitive information	.01	–
	Competitive information × CRE	9.02**	H8 supported
	Age	.04	–
	Gender	3.11	–
	Education	17.49**	–
	Income	2.87	–
	Customer innovativeness	4.48*	–
	SST type	2.85	–

C. Logistic regression results on switching to employee (interpersonal) assistance

Effect on:	From:	*B*	Wald	Exp(*B*)	Hypothesis
Switching to employee assistance	CRE	−1.28**	10.00	.28	H6 supported
	EFF	−5.20**	10.74	.01	H9 supported
	STR	1.25*	6.26	3.48	H10 supported
	Age	2.29**	11.81	9.89	
	Gender	−.65	1.32	0.52	
	Education	−.08	.08	.93	
	Household income	−.07	.10	.94	
	Customer innovativeness	.62	2.92	1.87	
	SST type	1.57**	8.34	4.78	
	Competitive information	−.06	.01	.94	

* $p < .05$.
** $p < .01$ (two-tailed).

interpersonal service, such that customers would stay with the SST channel. In contrast, we theorized in H10 that customer-recovery strategy would involve a positive link and customers would switch from the SST channel to interpersonal assistance. We employed a logistic regression model to test H6, H9, and H10. The dependent switching variable was dichotomous (switch to employee assistance or stay with the SST channel), and we used the predicted values of all variables in the resultant model to compute the probability of switching. The logistic regression showed a significant model fit ($p < .001$; −2 log-likelihood = 92.57, Cox and Snell $R^2 = .34$, Nagelkerke $R^2 = .46$). The model correctly classified more than 74% of the cases, compared with a hit rate of 56% based on proportional chance (Morrison 1969). For switching customers, a higher CRE reduced chances of switching to employee assistance ($B = -1.28$, Wald = 10.00, odds ratio = .28, $p < .01$), in support of H6. Customers who applied more recovery effort also were less likely to switch ($B = -5.20$, Wald = 10.74, odds ratio = .01, $p < .01$), whereas those who pursued more recovery strategies were more likely to switch ($B = 1.25$,

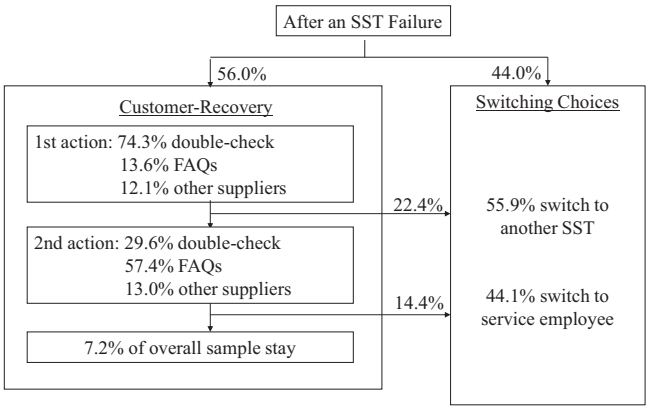


Fig. 3. Description of customer-recovery behaviors.

Wald = 6.26, odds ratio = 3.48, $p < .05$), in support of both H9 and H10.[5]

Among the seven control variables (age, gender, education, household income, customer innovativeness, SST type, and competitive information), the type of SST influenced switching choices ($B = -1.57$, Wald = 8.34, odds ratio = 4.78, $p < .01$). In particular, customers of transactional SSTs were more likely to stay with the channel and move to another SST outlet; conversely, users of relational SSTs were more likely to switch to employee assistance. In terms of demographics, age mattered; older customers switched more often than younger customers to employee assistance ($B = 2.29$, Wald = 11.81, odds ratio = 9.89, $p < .01$).

Additional analysis of customer-recovery behaviors

To obtain more insight into customer-recovery behaviors, we conducted another analysis of the behavioral data, in which we categorized participant actions by sequence (first, second, and third). Fig. 3 presents the frequency distribution and the flow of the actions.

On average, customers navigated 4.17 pages (SD = 3.42) and spent 57.04 s (SD = 61.69) double-checking their entries as recovery efforts; they browsed 4.46 pages and used 42.83 s (SD = 40.11) to perform recovery strategies. That is, these customers often followed different routes and took multiple actions to resolve an SST problem, in support of our research framework and theorization that customer recovery consists of multiple antecedents.

Although all the participants experienced the same failure manipulation, when responding to the paper-and-pencil questionnaire item about whether they had a problem using the technology, only 156 (62.4%) admitted their failure experience; 55 participants (22%) said "no," and the rest (15.6%) refused to answer. This finding suggests that simulated scenarios and measures of actual behaviors, as we used in this study, provide a truer picture of responses to SST failures than hypothetical scenarios and questionnaires, which may be prone to self-report biases.

Discussion

This study examined the process by which customers engage in customer recovery and switching behaviors in response to SST failures. We discovered that greater internal attribution, perceived control, and SST interactivity all contribute to higher CRE. Moreover, expectancy results in greater recovery effort, more recovery strategies, and less switching from the technology. In addition, we found that competitive information moderates the impact of CRE on recovery strategy. Finally, recovery effort inhibits, whereas recovery strategy encourages, switching from SSTs to interpersonal assistance.

Our study, however, did not find a significant moderating effect of competitive information on the CRE–recovery effort link. A possible explanation is that customer-recovery effort, or working harder through repeated trying, is less cognitively demanding than strategic actions for customer recovery, or working smarter through more diagnostic thinking, learning, and trying. Thus, customer-recovery efforts might be less susceptible to the moderating effect of competitive information.

In summary, expectancy plays a central role in the customer-recovery process. Our model holds for a general population sample, exposed to simulated failures with measures of actual behaviors, and it demonstrates high external validity. Table 5 summarizes the key findings and implications of our study.

Theoretical contributions and implications

To the best of our knowledge, this study is the first to examine the process of self-initiated recovery by customers in a disrupted, coproduced service setting. Although much attention has centered on firm-initiated recovery, customer recovery has received limited theoretical and empirical study. At a time when SSTs are becoming more pervasive, it is critical to understand how firms can encourage customers to repair service failures on their own. Our study fills a significant gap in the services literature by delineating the process of customer-, rather than firm- or jointly, initiated recovery in the relevant SST context.

As a second contribution, our study highlights the application of expectancy theory for SST research. Customers play an increasing role in service creation and delivery, which requires new frameworks to explain and predict their reactions to SST failure and recovery. Expectancy theory points to CRE as a central mechanism that spurs customers to take constructive action and fix service problems. Previous studies have not used expectancy theory to explain recovery actions. By coupling it with attribution theory, we developed and tested a convincing model of the antecedents, consequences, and contingencies of customer-recovery expectancy.

[5] To rule out the possibility of a demand effect, we conducted a supplemental study with the intelligent ATM interface to compare participants' behavioral reactions with or without explicit measures of expectancy immediately after SST failures ($n = 47$ and 53, respectively). In a series of analyses of variance, we found no significant difference on any measure of customer-recovery behavior ($p > .60$). A cross-tabulation of the two groups and switching choices also indicated no difference ($\chi^2_{(1)} = 1.40$, $p > .23$). Thus, the demand effect did not seem to be a concern for our experiment.

Table 5
Summary of key findings and implications.

Key findings	Implications
Overall framework	
• The overall conceptual framework supported by the empirical data.	• This study fills a significant gap in SST research regarding the customer-recovery process. • CRE plays a central role throughout the customer-recovery process, indicating the utility of expectancy theory in SST research.
Antecedents of CRE	
• Internal failure attribution has the strongest positive impact on CRE, followed by perceived control (H1 and H2). • SST interface interactivity positively influences CRE (H3).	• Locus of causality, perceived ability, and SST task feature are the contributing factors to CRE. • Internal failure attribution is the most important driver of CRE, consistent with findings in previous expectancy literature.
• These determinants remain effective even when demographic variations and SST-type differences are modeled in the estimation.	• Need to design interfaces that elevate perceived control and interactivity.
• Customer technology innovativeness positively affects CRE.	• Need to customize SST interfaces for customers with high vs. low innovativeness.
Behavioral consequences regarding customer recovery	
• Higher CRE results in more recovery efforts (H4). • Higher CRE stimulates more recovery strategies (H5). • Competitive information moderates CRE's impact on STR (H8)	• CRE is a potent motivator of customer-recovery efforts and strategies and inhibits switching behaviors. • Need to build positive expectancy in SST users to induce participative behaviors in recovery.
• Education and customer innovativeness influence recovery behaviors.	• Be cautious about providing competitive information in SST interfaces, especially after service failures.
Behavioral consequences regarding switching choices	
• CRE negatively affects switching from SSTs to personal assistance (H6).	• Dissatisfactory experience along with low CRE in one channel prompt switching to another channel.
• EFF deters channel switching (H9). • STR increases switching to employee-assisted services (H10).	• Need to differentiate two types of behaviors—efforts and strategies—in customer-recovery studies.
Additional findings	
• Although all participants experienced an SST failure as part of the experiment, only 60% admitted that it occurred.	• Discrepancy between intention and actual behavioral measures underscores the need to examine actual decision and behavior measures in service research.
• More users initially made attempts to recover from an SST failure than to switch.	• Firms should design features to facilitate customer-recovery behaviors.

Third, this study also operationalizes the CRE concept empirically. Whereas prior studies (e.g., Teas and McElroy 1986) have used expectancy conceptually to explain motivations, we explicitly measure it and thereby verify the attribution–expectancy linkages as well as a contingent condition (Tyagi 1982). The latter adds nuance to our understanding of the impact of customer motivation in customer-initiated recovery.

A fourth contribution is methodological: we examine actual recovery behaviors by customers, whereas most prior studies have used intentions as proxies (Dixon, Spiro, and Jamil 2001). Although intention measures are more accessible, they are not fully subject to the conditional constraints and subconscious motives that affect choices in real settings (Folkes 1988). We designed computer interfaces to track the type, sequence of, and time spent on recovery actions; they provide a deeper understanding of the actions customers take to resolve problems.

Finally, our study offers new insights into customer switching behaviors across service channels. Previous studies suggest that price dispersion and information search preferences motivate multichannel shopping (Alba et al. 1997; Pan, Ratchford, and Shankar 2003). We add the finding that a dissatisfactory experience, combined with low expectancy of recovery outcomes, prompts customers to switch to another channel. This study responds to recent calls for cross-channel research in service and retailing sectors (Grewal and Levy 2009).

Managerial implications

Our study offers several important implications for firms that want to design appropriate strategies and technologies to minimize service failures and encourage customer recovery. Firms should design SST interfaces that mitigate human mistakes and enhance perceived control and interactivity. Interfaces that give timely signals of user errors, such as an immediate warning about an unusually large cash withdrawal from an ATM, can increase customers' self- or internal failure attribution. Training or practice sessions for first-time users could improve their perceived control or ability to use the machines. An interactive SST also may offer an appropriate range and number of choices for each customer and enable users to navigate quickly and easily through the system for their recovery endeavors. Another means to encourage recovery is to target customers selectively. Our study results are consistent with research that shows that people who are more resourceful (e.g., higher education, innovative) believe they can handle greater challenges. Therefore, firms should target SST services, at least initially, to educated

customers who are high-technology adopters because this segment is more apt to engage in self-recovery.

In light of the moderating effects of competitive information, firms also should carefully weigh the potential reduction in customer-recovery behaviors against the possible benefits of providing customers with additional information. Firms are not obligated to direct customers to rival offerings, and it may be better and more cost-effective to retain customers by providing other forms of information, such as the location of the nearest help desk, customer service representative, or working SST.

Our findings related to channel switching behaviors show that more participants (56%) initially opted to fix the SST problem rather than switch from it (44%). Therefore, firms clearly have an opportunity to retain customers after a failure. They might offer multiple SSTs in a location, so that customers can access a working machine readily. For customers who are tempted to switch to interpersonal help, firms should make sales assistants available, especially for newly introduced SSTs. Even if personal services are difficult to offer on-site, a direct telephone line or quick online connection to a live customer service representative may be helpful (Green 2009).

Finally, we find that many customers do not acknowledge failure or are reluctant to report a significant problem. Low expectancy and embarrassment may stop them from reporting SST problems (Singh 1990). Therefore, firms should develop ways for customers to voice their service dilemmas and request help easily. For example, noticeable help buttons can be inserted throughout the SST interface. The SST could also monitor customer inputs and detect errors, noting them to customers as they occur, along with providing solutions.

Further research

Several important avenues for research arise from our findings. In particular, replications in different service settings would increase the generalizability of our findings. We investigated customer service and transaction SSTs using hypothetical brands, but to determine the impact of relational ties between customers and firms, additional studies should collaborate with actual service firms to gather customer-recovery data. Such extensions could support an investigation of the globality of attributions in relational SST services (Hess, Ganesan, and Klein 2003). In addition, self-help SSTs (e.g., hospital portals explaining treatment programs) give customers information and a means to train themselves about core offerings (Meuter et al. 2000), so it would be useful to determine if our findings related to customer-recovery efforts and strategies also hold for self-help SST failures.

Previous service failure studies in non-SST settings suggest that the failure type influences customers' recovery expectations (e.g., Smith, Bolton, and Wagner 1999). It is also conceivable that customers recover more easily from certain kinds of failures than from others. We asked customers to make an internal attribution without specifying the type of failure, but further research could consider how SST failure types (e.g., technology, process, poor design, customer-driven) affect both customer-recovery expectancy and behaviors.

Our study assumed that employee assistance was available to customers after an SST failure; however, other service scenarios exist in which no direct personnel are immediately available. Further research could investigate alternative situations and paths that customers might take after SST failures. For example, other than trying another self-service machine, they might switch to another service provider or simply leave with their service needs unmet. How do these experiences influence their relationships with the service provider? These are important questions to explore.

Finally, additional research is necessary on joint recovery, such as when remote or on-site assistance is available. Firms increasingly offer such hybrid forms, such as in the examples of remote diagnostic and repair services for computers, copiers, and medical analyzers (e.g., Zuboff 2009). It would be useful to know whether customers sense more control over a technology-based exchange if a salesperson or technician is available (Chang 2006) and how much assistance is optimal, such that it balances the needs of customers for individual attention against the cost of providing more customized services.

Conclusion

SST failure and recovery represents a rich context for understanding the service domain. As these technologies become more integral components of service experiences, further knowledge is required on the complexity of the issues that surround their usage, including what happens when the SSTs do not work. Ongoing research that reveals the dynamics of customer and SST interaction would provide valuable guidance and enhance customers' experiences with SSTs.

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