The Academic Journal of Contemporary Commercial Research
Vol. 2, No. 3, 2022
Faculty of Commerce, Cairo University, Egypt

The Impact of Attributions of Self-Service Technology Failures on Its Continued Use

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Abstract

Self-service technologies are reshaping how services are created. However, customers sometimes encounter service failures during the use of these technologies. This paper aims to understand the impact of attributions of service failures on customer recovery expectancy and the continued use of the technology. The research adopted a scenario-based experimental design, where 370 responses were gathered online from automated teller machine users in Egypt. The findings reveal that external attributions of service failures have a significant negative impact on customer recovery expectancy. Moreover, stable attributions of all service failures have a significant negative impact on customer recovery expectancy and on continued use of the technology. Furthermore, customer recovery expectancy has a significant positive impact on the continued use of the technology. This research thus recommends that service firms shall design user-friendly and interactive self-service technologies with suitable tools for self-recovery.

Keywords

Service failure; Customer recovery expectancy; Attributions; continued use of self-service technologies

Article history

Received: *21 January 2022* · **Accepted:** *13 November 2022*

1. Introduction

"Self-service technologies (SSTs) are technological interfaces that enable customers to produce a service independent of direct service employee involvement" (Meuter et al., 2000) Examples of SSTs include "automated teller machines (ATMs), automated hotel checkout, phone banking, online shopping, using the internet to provide services such as package tracking system". In the service industry, customers are coproducing or co-creating services through their collaboration with firms that provide services or involving in self-service technologies such as ATMs and, online services (Lusch & Vargo, 2006). Consumer co-production or co-creation of services is through putting their effort and time which causes variation in the service process, which consequently may increase the chance for failure in service provision (Heidenreich et al., 2015).

Service failure can be defined as "any service-related mishaps or problems (real and/or perceived) that occur during a consumer's experience with the firm" (Maxham and Netemeyer, 2002)." It's very well-established that service failure is inevitable, thus no service firm can entirely avoid service failures. Characteristics of interpersonal service encounters -where there is an interaction between employees and customers- are entirely different from self-service technologies where customers interact only with a machine, thus customers' responses to failures in interpersonal service encounters are different from their responses to self-service technology failures (Meuter et al, 2000). It's very well-established that whenever a service failure occurs, customers search for causal explanations to figure out why that incident has happened. Similarly, Weiner (2000) indicates that individuals tend to seek out more explanations for dissatisfactory incidents than satisfactory ones. When consumers engage in seeking out causal ascriptions for service failures, they make attributions to these service failures. The attribution process is "the process of inferring the causes of events or behaviors"(Heider, 2013). Great attention has been paid to service recovery in interpersonal services using attribution theory (Folkes 1984; Bitner 1990; Bitner et al., 1990; Smith et al., 1999; Maxham and Netemeyer, 2002; Iglesias et al., 2015). Whereas, research on how service failures affect consumer reactions namely; satisfaction, word of mouth, and repurchase intention in the self-service setting is still in its infancy (Köcher and Paluch, 2019). Thereby, the researchers are going to study how different types of self-service technology failures influence their attributions and subsequent behavioral responses namely; customer recovery expectancy and the continued use of self-service technology. This research will provide a guide for organizations to better determine whom customers blame for service failure that encourages customers to solve failures through using self-service technologies(SSTs) theoretically defined as customer recovery expectancy. Customer recovery is a cost-effective strategy for business firms as the customers are the actors who solve the problems during the use of technology-based services through their own resources such as effort, time, knowledge, and skills.

Due to financial inclusion that has been recently implemented by the central bank of Egypt, the role of the banking sector and e-services such as; Fawry, A'man, and

Meza cards become substantial. Thus, addressing service failures in ATMs becomes very considerable.

2. Literature Review

Attributions of Service Failures

Causal attributions reflect the processes that are used by human beings to justify events through making causal explanations (Teas & McElroy, 1986). The attribution theory addresses the "why" questions to explain the reasons (causes) for a specific event, behavior, or phenomenon (Weiner, 1972). The locus dimension of attributions can be defined as "who is responsible for the failure"(Bitner, 1990). Most studies on service failure attributions did not include locus of causality for several reasons. First, it's assumed that service failures are caused by service providers, thus there is no need to find who is responsible for the failure, which can trigger the inclusion of the locus dimension in causal attributions for service failures irrelevant. However, in self-service technologies and the era of service-dominant logic; customers or users of self-service technologies are no longer passive recipients, they are active players and co-producers in the service delivery process (Prahalad & Ramaswamy, 2004). Customers engage with service providers at various phases from delivering services to service recovery and to receiving more customized services (Lusch & Vargo, 2006). Consequently, it's necessary to include the locus dimension of causality attributions when studying service failures in self-service technologies (SSTs). The stability dimension of attributions is referred to as "the perceived variability or permanence of the causal factor". The more the stability of attributions is made, the more the cause of a failure is perceived to be consistent (Weiner, 1985). From previous research, both controllable and stable attributions of service failures trigger negative emotions, and negatively affect loyalty, satisfaction, and word of mouth (Vaerenbergh et al., 2014). It is in line with the findings of Bitner (1990) who state that recurring (stable) service failures increase customer dissatisfaction. Recently Matikiti et al. (2019) reveal that stable and controllable attributions of service failures negatively influence satisfaction with service recovery. As customers perceive the causes of service failures to be repetitive in the future, therefore such failures would happen again if they use the same services. In an interpersonal service setting, customers tend to blame employees and firm for any failure during service delivery instead of blaming themselves (external attribution of failure), contrary to any success in service delivery (e.g. Tam et al., 2016; Bitner, 1990) The findings are supported in service marketing literature and social psychology which concluded that; people tend to blame external parties for any bad outcomes or failure and take credit for any success or positive outcomes to protect their self-esteem. However, it is argued that interactions with employees can vary over time, that's why customers perceive causes for service failures as unstable in a normal service setting. Customers believe that employees' behavior can change after service failure compared to technology-based service. For instance, customers can receive service from different employees however, self-service technology can't be promptly improved (Bitner, 1990). This finding has been recently supported by Belanche et al. (2020), who

conclude that the perceived stability is more pronounced when service is provided by technology, not an employee.

In a self-service setting, customers tend to attribute service failures to bad outcomes (e.g., Harris et al., 2006; Zhu et al., 2013; Heidenrech et al., 2015; Sugathan et al., 2017; Sugathan and Ranjan, 2020). The premise is that the users of SST are involved in the service delivery process by using their skills, knowledge, and efforts (operant resources) to produce services. Hence, customers feel they are part of the outcome whether it succeeds or fails. In this regard, Sugathan et al. (2017) point out that customers make internal attributions of failure when they are involved in the service provision while using their efforts and skills.

Customer Recovery Expectancy

"Customer recovery expectancy (CRE) refers to a customer's estimation of the likelihood that a self-service technology (SST) problem can be solved through his or her own actions inputs". CRE has a critical role during the process of customer recovery, highlighting the application of the theory of expectancy in self-service technologies (Zhu et al., 2013). The study of Zhu et al. (2013) is the first to use expectancy theory in service recovery. The study develops a conceptual framework to capture the process through which customers get involved in customer recovery and their behaviors after self-service technology failures. Importantly, the study concludes that internal attribution followed by perceived control over SST, and interactivity with SST contribute to higher customer recovery expectancy (CRE) positively. Additionally, the study gives support that in the case of low-contact services such as ATMs, customer recovery is better than no recovery at all due to internal attributions made by users. Additionally, CRE yields higher recovery effort, more recovery strategies, and less switching from SST. When it comes to demographics; older customers switch to employee assistance more than younger customers (Zhu et al., 2013), indicating that younger customers have higher customer recovery expectancy than older ones. Furthermore, Nili et al. (2019) confirm that younger SST users can use self-recovery and accept help from other friends or colleagues to solve SST problems, which can eventually support colleagues to possess higher customer recovery expectancy than older users. Nili et al. (2019) define self-service technology (SST) problem or failure as "any gap between user perceptions and expectations with the SST which motivates the user to take corrective action", or "a gap between the service the user expected and the service they received". Yet, service failure may not be perceived as a problem for all SST users, depending on customer's knowledge and previous experience with SST, thus service firms shall provide individually tailored information for customers to help them define and solve their SST problems.

Continued Use of Self-Service Technologies

The long-run success and sustainability of an information system such as SST does not depend on first-time usage only but on the continued use of technology

(Bhattacherjee, 2001; Erion and Nilsson 2007; Wang and Chen, 2019). "Continued use of self-service technology can be defined as customer's willingness to participate in service production and delivery in the future"(Dong et al., 2008). As previously mentioned in the literature; the cost of acquiring a new customer is higher than the cost of retaining an existing one, indicating the critical role of continued intention to use an SST (Eriksson and Nilsson 2007). The study of continued use of SST is still in its infancy while there has been much attention to the initial adoption of self-service technologies (e.g., Meuter et al., 2000; Bitner et al., 2002; Meuter et al., 2005; Curran and Meuter, 2005).

Köcher and Paluch (2019) find that service failures similarly affect satisfaction in full-service and self-service settings. However, the effect of service failures on the continued use of service in the future is less severe in a self-service setting than in a full-service one, highlighting one of the advantages of self-service for business firms. Köcher and Paluch (2019) suggest the main reason is the higher levels of internal attributions for service failures in self-service compared to full service. Thus, if customers are dissatisfied with service outcome, the intention for future use of the same self-service will not be affected. This result is in a similar vein with previous studies which state that self-service setting customers are allowed to independently provide service for themselves, then customers are likely to share some of the responsibility for service outcomes (Meuter et al., 2000; Bendapud and Leone, 2003). Due to internal attributions of failure, customers will have the willingness to fix the failure by themselves (Zhu et al., 2013; Agapi, 2017; Sugathan et al., 2017).

Research Problem

There is extensive research devoted to investigating how consumers make inferences about what causes a service failure and how they attribute those failures, as well as studying consumer emotional and behavioral reactions in interpersonal or full-service settings where there is an employee who provides a service for a customer (e.g. Folkes 1984; Bitner 1990; Bitner et al. 1990; Smith et al. 1999; Maxham and Netemeyer 2002; Netemeyer, 2002; Iglesias et al., 2015). However, there is limited research on how service failures affect consumer reactions (e.g., continued use of service) mainly in self-service setting (Köcher and Paluch 2019). In response to Sugathan and Ranjana (2020) suggestion, the researchers will study only one post-failure behavior which is continued use of self-service technology to avoid noisy data and achieve the parsimony principle of scientific research (Sekaran, 2003). Continued use of self-service technology is chosen for three main reasons; First, it is argued that the long-run success and sustainability of an information system such as SST does not depend on first-time usage only but on the continued use of technology (Bhattacherjee 2001; Eriksson and Nilsson 2007; Wang et al., 2019). Second, it has been previously mentioned in the literature that the cost of acquiring a new customer exceeds the cost of retaining an existing one, showing the critical role of continued intention to use an SST (Eriksson and Nilsson, 2007). Finally, the study of continued use of SST is still in its infancy as there has been much attention made to the initial adoption of SST (e.g.,

Meuter et al., 2000; Bitner et al., 2002; Curran and Meuter 2005; Meuter et al., 2005). To the best of the researchers' knowledge, research to date hasn't addressed these gaps. Consequently, this research will investigate first, the effect of attributions of self-service technology (SST) failures made by users of automated teller machines (ATMs) in Egypt on customer recovery expectancy and on the continued use of SST which is the "ATMs" in this research. Moreover, the mediating role of customer recovery expectancy on the effect of attributions of SSTs failures on continued use of SST.

3. Theoretical Model and Hypotheses Development

The research relies on the attribution theory and expectancy theory to build up a theoretical basis for the hypotheses. The researchers are going to employ the same logic of attribution theory specifically, the general model of attribution field" proposed by Kelley and Michela (1980). The attributions of self-service technology failures (technology failure, poor design, process failure, and customer-driven failure) are proposed by Meuter et al. (2000) to study their influence using locus and stability dimensions on customer recovery expectancy and the continued use of self-service technology. Besides, using expectancy theory to examine the effect of customer recovery expectancy on the continued use of SST and to examine the mediating role of customer recovery expectancy on the effect of attributions of these service failures on the continued use of self-service technologies (SSTs). When consumers fail to accomplish their transaction using SST, they tend to search for causes of those failures using dimensions of attribution theory (locus, stability, controllability). Thereafter, the failure is linked with the expectancy of future success or failure.

Impact of Attributions of SST Service Failures on Customer Recovery Expectancy

Internal attributions of failure increase the expectancy of future success (Teas and McElroy 1986; Weiner 2010; Agapi, 2017; Sugathan et al., 2017; Sugathan & Ranjan, 2020). The premise is that consumers will perceive their efforts as effective in solving the failure, which in turn can increase their motivation for recovery of SST failure. Zhu et al. (2013) state that when people consider their efforts ineffective, they cope less or give up. Consistent with the findings of Sugathan and Ranjan (2020), internal attributions of failures lead to increasing customers' efforts, thus they can accomplish their tasks successfully. The intuition is that customers' expectancy of future success can be largely enhanced. In the same vein, Zhu et al. (2013) find that internal attribution of service failure followed by perceived control over self-service technology and interactivity of self-service technology are positive antecedents for customer recovery expectancy. Recently, Hsu et al. (2021) show that internal attributions of service failure during the use of self-service technology make customers believe that they can rectify the service failure situation. Their study has relied on service-dominant logic and attribution theory to empirically investigate how customers of different self-service technologies co-create or co-destruct value after service failures in SST. Thus, the researchers can hypothesize the following:

H1 (a) Internal attributions of self-service technology failures have a positive effect on customer recovery expectancy.

Sugathan et al. (2017) point out that external attributions of service failure trigger customers to feel that they do not enough power to prevent these failures, consequently reducing their expectancy of the future success of self-service technology and diminishing their effort-performance link. Similarly, Agapi (2017) reveals that when customers perceive a service firm as responsible for the service failure in SST (external attributions), they perceive their efforts to solve the problem and recover from the failure as worthless. Consequently, external attribution of SST failures cannot encourage the customers to engage in problem solving (service recovery). In addition to reducing customer recovery expectancy. Hence, the researchers can hypothesize:

H1 (b): External attributions of self-service technology (SST) failures have a negative effect on customer recovery expectancy (CRE).

Previous studies denote that when customers perceive the causes of service failures as stable, they are certain about the future performance of self-service technology. Success is followed by success, and failure is followed by failure, leading to typical (usual) shifts in their expectancy. Thus, this results in a negative effort-performance link. They do not perceive their efforts and inputs to be effective to solve the service failure (Weiner, 1985; Teas and McElroy, 1986; Harvey et al., 2014; Sugathan and Ranjan, 2020For this reason, when service failure is attributed to causes with stable nature, customers do not expect future success, in other words, this lowers their expectancy of future success. Therefore, the researchers can hypothesize the following:

H1(c): Stable attributions of self-service Technology failures have a negative effect on customer recovery expectancy.

Impact of Attributions of SST Service Failures on the Continued Use of Self-Service Technology SST

According to prior literature, there is sufficient evidence that in a self-service setting, customers tend to attribute service failures or share some responsibility for bad outcomes (e.g., Harris et al., 2006; Zhu et al.,2013; Heidenrech et al., 2015; Sugathan et al.,2017; Sugathan & Ranjan, 2020;). In this regard, Agapi (2017) and Sugathan et al. (2017) document that when consumers use SST, they get more involved in service production; they are likely to share some of the responsibility when a failure occurs and tend to use the same SST in the future. This can be ascribed to the fact that they participate with their efforts, knowledge, and skills (operant resources) in such service. Consequently, customers feel that they are part of the outcome whether it succeeds or fails. This is in a line with the recent study of Köcher and Paluch (2019), who reveal that future intention to use a self- service after a service failure will not be severely affected, indicating that if user is unsatisfied with service outcome, he\she will continue to use the same self-service in the future due to the sense of responsibility for failure (internal attribution of failure). Consistently recent study by Sugathan and Ranjan

(2020) confirm that customers will not avoid service settings after facing service failures when they internally attribute these failures especially, if they perceive them as temporary losses (failures) through the positive effort performance link which they make. Furthermore, Hsu et al. (2021) confirm that users of self-service technology are more likely to continue using self-service technology when they perceive themselves partially or fully responsible for the service failure.

H2 (a): Internal attributions of self-service technology failures have a positive effect on the continued use of Self-service Technology (SST).

Contrary to external attributions of service failure which negatively affect the continued use of self-service technology (SST). Hsu et al. (2019) show that customers tend to make external attributions of a service failures to service providers, leading to more anger, and triggering customers to quit these services. Similarly, Agapi (2017) argue that whenever users of SST externally attribute service failures of self-service technology to service firms, they confront the firm through complaining, or disengaging from the technology. Thus, the researchers can hypothesize the following:

H2 (b): External attributions of self-service technology failures have negative effect on the continued use of Self-service Technology (SST).

Sugathan & Ranjan (2020) provide recent evidence by using entity theory beliefs, as customers perceive they do not have sufficient skills or capability to succeed, and therefore, they avoid similar situations. Prior studies indicate that customers tend to quit service providers that are believed to have repetitive service failures in the future. Hence, stable attributions of failures have a negative influence on the continued use of service regardless of who is responsible for the failure (locus attribution). Hence, the researchers can hypothesize that:

H2(c): Stable attributions of self-service technology failures have a negative effect on the continued use of Self-service Technology (SST).

Impact of Customer Recovery Expectancy on the Continued Use of SST

When customers get involved in the recovery (High customer recovery expectancy), they gain cognitive skills about service procedures and try to resolve the failure (Zhu et al., 2013). The more the customers engage in the process of service recovery, the greater the skills and knowledge they gain. A study by Dong et al. (2008) concludes that customers' participation in the recovery of co-created services can indeed enhance customers' skills and knowledge (operant resources), which in turn raise their co-creation intention in the long term. More recently, Hsu et al. (2021) find that when users of self-service technology perceive their efforts and resources are sufficient to rectify the loss from the service failure (high customer recovery expectancy), their continued use of self-service technology is largely enhanced. Based on the previous statements and expectancy theory proposed by Vroom (1964), the researchers can hypothesize that:

H3: Customer recovery expectancy has a positive effect on the continued use of Self-service Technology (SST).

The Mediating Role of Customer Recovery Expectancy on the Impact of Attributions of SSTs Service Failures on Continued Use of SSTs

The attributions which affect expectancy will have a great effect on future intentions (Weiner, 1985). Internal attributions of failure enhance the willingness to use SST in the future after failure, however, external attributions of failure reduce the future use of SST after failure (Sugathan et al., 2017). Agapi (2017) reveal that in case of external attributions of SST failures, customers are likely to quit the service, indicating the negative influence on the continued use of SST. However, internal attributions of SST failures make customers feel responsible for the failure, which in turn may increase their willingness to solve the problem, in other words, enhancing the customer recovery expectancy (Zhu et al., 2013; Sugathan et al., 2017; Kocher et al., 2019). Accordingly, when customers participate in service recovery, they can gain more skills and knowledge about how to interact with an SST which can enhance the future use of SST (Dong et al., 2008; Zhu et al., 2013; Susanto et al., 2016; Foroughi et al., 2019; Sugathan & Ranjan, 2020). This supports the mediating role of customer recovery expectancy on the impact of attributions of SST failures and its continued use in the future. Based on the previous discussion, the researchers can hypothesize the following:

H4 (a) Customer recovery expectancy mediates the positive effect of internal attributions of self-service Technology (SST) failures on the continued use of SST.

H4 (b) Customer recovery expectancy mediates the negative effect of external attributions of self-service Technology (SST) failures on the continued use of SST.

A recent study by Sugathan & Ranjan (2020) conclude that stable attributions of failed co-produced services can diminish customers' expectancy of future success, thus negatively influencing effort-performance link. Customers believe that their efforts are not sufficient enough to succeed, therefore they are less likely to put extra efforts to recover from failures or to avoid similar services in the future. It is in line with prior findings of (Kelley et al., 1973; Harris et al., 2006). Based on the prior literature, when individuals consider their own efforts effective, they are encouraged to insist on doing their tasks and vice versa (e.g., Zhu et al., 2013). Consumers make stable attributions of service failures that can decrease their expectancy of success (Teas et al., 1986; Weiner, 2010). This is also supported by (Sugathan et al, 2017). Hence, consumers will not perceive their efforts as effective to solve the failure, which in turn will lower their motivation for recovery from SST failure. Thereby, the researchers can hypothesize the following:

H4 (c) Customer recovery expectancy mediates the negative effect of stable attributions of self-service Technology (SST) failures on the continued use of SST.

Table 1.1 summarizes the research hypotheses with their theoretical rationale as indicated in prior literature. Besides, figure 1.1 presents the proposed research model.

Table 1. 1 Hypotheses Development

Hypothesis	**Theoretical Rationale**	**References**
H1(a) Internal attributions of self-service technology failures have a positive effect on customer recovery expectancy.	When customers blame themselves for service failures, they perceive their efforts to be effective in solving the failure. This positively influences the effort-performance link or the expectancy of the future success, which can increase the motivation for recovery from SST failure.	Sugathan et al. (2017); Agapi (2017) Zhu et al. (2013); Hsu et al. (2021)
H1(b) External attributions of self-service technology failures have a negative effect on customer recovery expectancy.	External attributions of service failure make customers feel they do not have the power to prevent these failures, consequently reducing their expectancy of the future success of self-service technology and diminishing their effort-performance link. In other terms, customers perceive their efforts to solve the problem and to recover from the failure as worthless. Therefore, external attribution of SST failures cannot encourage the customers to engage in solving the problem (service recovery).	Teas and McElroy (1986); Sugathan et al. (2017); Agapi (2017)
H1 (c) Stable attributions of self-service technology failures have negative effect on customer recovery expectancy.	Consumers make stable attributions of service failures that can decrease their expectancy of success. They are certain that these service failures are repetitive and will happen again in the future. Hence, they will not perceive their efforts effective to solve the failure, which in turn may lower their motivation for recovery from SST failure.	Teas & McElroy (1986); Weiner (2010); Sugathan & Ranjan (2020)
H2 (a) Internal attributions of self-service technology failures have a positive effect on the continued use of self-service technology (SST).	In SST, customers are willing to share responsibility with service firms whenever they are involved in service provision. This is due to the fact that they can participate with their efforts, knowledge, and skills (operant resources) in such types of services. Consequently, customers feel that they are part of the outcome whether it succeeds or fails. Thus, internal attributions of service failures will enhance future intentions to continue using the service and customer recovery. For this reason, the internal attributions of service failure positively affect the continued use of the service.	Agapi (2017); Sugathan etal. (2017); Sugathan & Ranjan (2020); Folkes (1984); Hsu et al. (2021)
H2(b) External attributions of self-service technology failures have a negative effect on the continued use of self-service technology(SST).	When customers externally attribute service failures to service providers, this triggers negative consequences including anger and quitting these services.	Agapi (2017); Hsu et al. (2019)
H2(c) Stable attributions of self-service technology failures have a negative effect on the continued use of self-service technology (SST).	Customers tend to quit service providers that are believed to have repetitive service failures in the future, indicating a negative impact of stable attributions of failures on the continued use of service regardless of who is responsible for the failure (locus attribution).	Harris et al. (2006); Kelley et al. (1973); Weiner (2010); Teas and McElroy (1986); Sugathan & Ranjan (2020)

H3: Customer recovery expectancy has a positive effect on the continued use of self-service technology (SST).	The more the customers engage in the process of service recovery, the greater the skills and knowledge (operant resources) required for the service providers. Thus, self-confidence about how to interact with the SST is enhanced as customers will be willing to engage in the same services.	Zhu et al. (2013); Dong et al. (2008); Foroughi (2019); Wang (2013); Meuter et al. (2005); Vroom's expectancy theory (1964); Hsu et al. (2021)
H4 (a) Customer recovery expectancy mediates the positive effect of internal attributions of self-service technology (SST) failures on the continued use of SST.	The attributions which affect expectancy will have a great effect on future intentions (Weiner, 1985). Internal attributions of failure enhance willingness to co-create from the recovery and to use SST in the future after failure, as they can gain more skills and knowledge about how to interact with an SST, which eventually can enhance the future use of SST.	Agapi (2017); Sugathan et al. (2017); Sugathan & Ranjan (2020); Weiner (1985)
H4 (b) Customer recovery expectancy mediates the negative effect of external attributions of self-service technology failures (SST) on the continued use of SST.	When customers make external attributions of failure, they perceive they are not responsible for solving the failure caused by external parties. Thus, they may not engage in the recovery process that provides more knowledge about how to interact with SST. Consequently, reducing the future use of SST after failure.	Teas and McElroy (1986); Sugathan et al. (2017)
H4 (c) Customer recovery expectancy mediates the negative effect of stable attributions of self-service technology failures (SST) on the continued use of SST.	Stable attributions of failed co-produced services such as SST can diminish customers' expectancy of future success, thus negatively influencing the effort performance link. Customers believe their efforts are not sufficient to succeed, therefore, they are less likely to put extra effort to recover from failures and cannot avoid such similar services in the future to avoid these repetitive failures. Hence, hindering any benefits offered by SST.	Sugathan & Ranjan (2020); Weiner (1985)

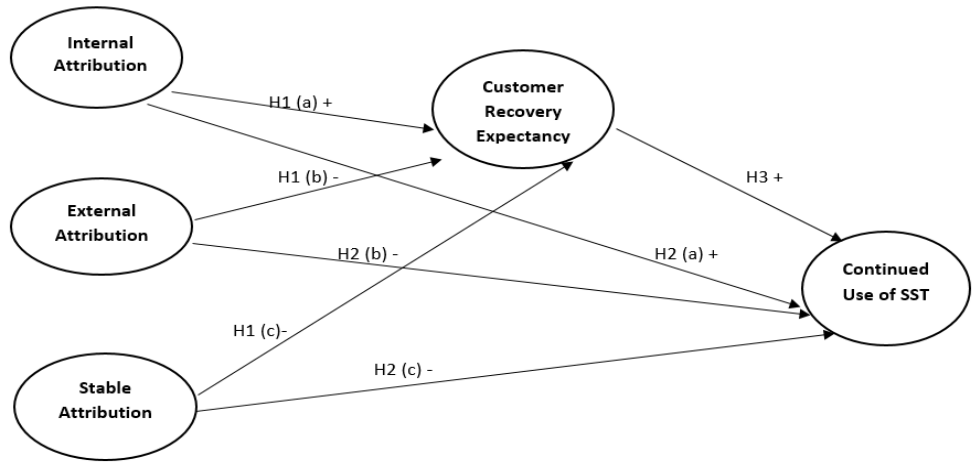

Figure 1. 1 Proposed Research Model

4. Research Methodology

The current research depends on the "Quasi-Experimental" design which can be adopted when it's not possible to assign participants randomly to experimental treatments. In this design, participants self-choose the experimental treatment. A between-subjects (Groups), scenario- based experimental design is adapted to achieve research objectives where each scenario represents a different type of service failure in self-service technology (SST) (Sreejesh et al., 2014). Targeted population is users of automated teller machines (ATMs) in Egypt, and a convenience sample has been employed. A self-administered questionnaire using Google forms has been prepared. Data are gathered online using social media platforms (e.g. Facebook, What's app). t Simple structured measurement items (variables) have been developed using Likert and semantic differential seven-point scales for exogenous, endogenous variables, mediator, and realism checks.

Measurement Items

The measurement items for all the research variables are adapted from existing research with minor modifications to best suit our research context. All variables are measured on a seven-point "Likert" scale except the stability dimension which is measured on a semantic differential scale. Appendix A demonstrates all measurement items and scales employed to measure the research variables accompanied by the scholars who developed these items.

Scenarios

To best suit the research context (ATMs), five scenarios have been developed based on the definitions of five types of service failures in self-service technologies (SSTs) as proposed by (Meuter et al., 2000). The survey starts with a scenario situation in which the respondent will imagine himself\herself facing that scenario situation, and then he\she is asked to answer questions that are related to the described scenario. Each scenario represents one type of self-service technology failure as proposed by (Meuter et al., 2000). Every respondent will self-choose only one of the five scenarios representing types of SST failure. Then, the scenarios' realism will be checked by employing a three-item seven-point Likert scale ranging from "strongly disagree=1" to "strongly agree=7" which are developed by (Zourrig et al., 2014). Kindly check Appendix A for realism checks and Appendix B for scenarios.

Manipulation Checks

In experimental designs, a manipulation check shall be included when treatments are manipulated (Hair et al., 2019). To make sure that the manipulations of service failure types are successful, two manipulation checks are presented for each cell or group where each one represents one type of SST service failure during the use of automated teller machines (ATMs). Manipulation checks have two main purposes. First, they filter respondents who perceive a service failure in the scenario. Second, they determine the type of service failure. Manipulation checks are adapted from the study of (Agapi, 2017) with some modifications to the second item to best suit the research context. Kindly check Appendix B for manipulation checks.

Sample Size

The nature of the statistical analysis that is used to test the research hypotheses is the "Structure Equation Modeling" based on partial least squares (PLS-SEM). It's suggested that the initial minimum sample size for running PLS-SEM is "ten times the largest number of structural paths directed at a particular latent construct in the structural model" (Hair et al., 2011). In other words, ten times the number of independent variables. There are four structural paths directed to the dependent variables (continued use of self-service technologies), three independent variables, and one mediator. The initial total sample shall include at least 40 participants from each scenario. As there are five service failure scenarios, the total sample size shall be at least 200 participants. The total number of collected questionnaires that are valid and completed for further statistical analysis is 370 from five service failure scenarios.

5. Data Analysis and results

First, descriptive statistics for demographic items are presented. Table 1.2 demonstrates the entire sample profile or distribution from different sub-samples representing various service failure scenarios based on age, gender, and education. Table 1.3 demonstrates both sub-samples per each scenario as well as total valid sample size.

Table 1. 2 Sample Profile

Demographic Variables	Category/Level	Frequency	Valid percent
Gender	Male	161	43.5%
	Female	209	56.5%
Age	Under 21	1	0.3%
	21-35	287	77.6%
	36-50	73	19.7%
	51-65	8	2.2%
	Over 65	1	0.3%
Education	High school	2	0.5%
	Institute	4	1.1%
	Bachelor's degree	229	61.9%
	Master's degree	91	24.6%
	Doctoral degree	44	11.9%

Table 1. 3 Number of Valid & Invalid Questionnaires from each Sub-Sample

Service Failure Scenario	Invalid Questionnaires	Valid Questionnaires
Technology Failure	10	70
Process Failure	15	78
Technology-Design Failure	18	80
Service-Design Failure	15	80
Customer-Driven Failure	20	62
Total	**78 (17.4%)**	**370 (82.6%)**

As mentioned earlier in this research, there are different scenarios. Each of them represents different service failures during the use of automated teller machines

(ATMs). Whereas, measurement items are the same throughout the different scenarios. Consequently, the responses may vary based on the described scenario. Concerning descriptive statistics, "n" is the valid number of responses, "mean" is a measure of central tendency, and "standard deviation" is a measure of dispersion. Notably, descriptive statistics are obtained for each scenario independently.

The results for the weighted means of realism indicators are consistent with the threshold of 5 on a 7-point scale (e.g., Gelbrich et al., 2015; Lastner et al.,2016; Agapi, 2017. The results for the weighted means for continued use of self-service technology (SST)" in five service failure scenarios are (6.11±1.17), (5.9± 1.25), (5.9 ±1.40), (5.9± 1.32), (6 ± 1.44) on a 7-point Likert scale (technology, process, technology-design, service design, customer-driven) respectively. Thus, it can be concluded that although participants face different service failures during the use of ATMs, they are likely to continue using ATMs.

For normality testing, skewness and kurtosis measures are obtained. Since skewness and kurtosis do not equal zero, there is a departure from normality. However, skewness values are within (0.083) and (-2.243), which are within the threshold of (±3). Furthermore, kurtosis values are within (-0.019) and (5.055), which are within the threshold of (±10)(Pallant, 2011). Moreover, the total sample size is 370. Therefore, the researchers can use parametric analyses such as: "Pearson Correlation" and "Analysis of Variance" ANOVA) despite the non-normality of the data. One-way analysis of variance (ANOVA) denotes a statistically significant differences among the five service failure scenarios namely; technology failure, process failure, technology design, service design, and customer-driven failure, regarding all research variables except for continued use of self-service technology. The results from ANOVA are as follows, for "external attributions of service failure", (F (4, 365) =15.59, p-values <0.05), "internal attributions of service failures", (F (4, 365) = 26.307, p-values <0.05), "stable attributions of service failures", F (4, 365) = 12.416, p-value <0.05, "customer recovery expectancy", (F (4, 365) = 26.307, p-values <0.05). "continued use of ATMs", (F (4, 365) = 0.326, [-values > 0.05). After performing one-way ANOVA, it can be confirmed that there are statistically significant differences among different service failure scenarios namely; technology, process, technology-design, service-design and customer-driven failures, during the use of automated teller machines (ATMs) concerning all research variables (external, internal, attributions of service failures, stable attributions of service failures and customer recovery expectancy) except for dependent variable (continued use of ATMs). This implies that regardless of any service failure facing individual users of ATMS, they will continue to use it in the future. Furthermore, it implies that the scenarios are well selected and formulated to cover various types of failure. Hence, the researchers proceed with five scenarios.

Table 1. 4 Means and Standard Deviations for all Research Variables across Different Service Failure Scenarios

Variables	Scenario											
	Technology Failure n=70		Process Failure n=78		Technology Design Failure n=80		Service Design Failure n=80		Customer-Driven Failure n=62		Total n=370	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Realism Checks	6.1190	1.03876	5.1838	1.51724	5.8958	1.20663	5.4583	1.49671	5.3280	1.71407	5.5982	1.44313
External Attributions	5.7893	1.50701	6.1218	1.29794	5.9594	1.42560	5.7094	1.60569	4.2016	2.07880	5.6128	1.70324
Internal Attributions	1.6143	.87299	1.4615	.91363	1.7417	1.29477	2.3000	1.47134	3.5000	1.87569	2.0739	1.48888
Stability of Attributions	2.6095	1.32725	2.5342	1.35197	3.8000	1.73051	3.5208	1.61554	2.5269	1.47295	3.0342	1.60567
CRE	3.0333	1.55847	2.4615	1.39390	3.8958	1.91345	3.5583	1.74118	2.6774	1.68565	3.1532	1.74908
Continued Use of SST	6.1143	1.17938	5.9786	1.25683	5.9000	1.40963	5.9333	1.32529	6.0591	1.44546	5.9910	1.32014

Harmon's one-factor (first factor) method is followed to check common method bias from results of exploratory factor analysis where explained variance by the first factor extracted shall not exceed half of all variance explained by the factors retained. It can thus be concluded that common method bias is not a severe issue. Exploratory factor analysis is valid since the KMO measure of sampling adequacy is 0.806 which exceeds the threshold of 0.5. The Bartlett's test is also significant at a confidence level of 95%. Factors that shall be retained after performing exploratory factor analysis are whose that have values more than one, as proposed by Kaiser Rule. Consequently, six factors shall be retained out of 19. Total variance explained by 6 factors extracted is 73.24%, which exceeds the threshold of 50%. Moreover, the first factor (Harmon's one factor) explains 24.5%, which is less than 50% of the total variance explained (73.24%). Accordingly, common method bias cannot be considered severe in this research (Podsakoff et al., 2003). Consequently, all data collected on these research variables are accepted.

Partial Least Squares-Structural Equation Modeling (PLS-SEM)

Hair et al. (2011) recommend using PLS-SEM when the researchers are willing to predict an existing theory. Hence, the current study employs the PLS-SEM approach.

Confirmatory Factor Analysis

In PLS-SEM, confirmation or evaluation of measurement model is referred to as confirmatory-composite analysis (CCA) (Hair et al., 2019). The first step to confirm the reflective measurement model is to detect outer loadings for measuring indicators. Thereafter, reliability and validity of measurement model shall be tested. Table 1.5 illustrates outer loadings of research variables for the entire sample. All items are retained since their outer loadings exceed the threshold of 0.7.

Table 1. 5 Item Loadings for Measurement Model

Construct	Items*	Outer Loadings
External Attributions	Ex_att_1	0.881
	Ex_att_2	0.891
	Ex_att_3	0.924
	Ex_att_4	0.901
Internal Attributions	In_att_1	0.913
	In_att_2	0.824
	In_att_3	0.865
Stable Attributions	Stable_1	0.895
	Stable_2	0.897
	Stable_3	0.708
Customer Recovery Expectancy	Exp1	0.894
	Exp2	0.842
	Exp3	0.785
Continued Use of SST	Use1	0.874
	Use2	0.801
	Use3	0.887

*For item coding, kindly check Appendix **A**

Composite Reliability

In this research, the composite reliability that is used as CR shall be at least 0.70 (Hair et al., 2017; Hair et al., 2019). All constructs in all scenarios have composite reliability exceeding the threshold of 0.7.

Table 1. 6 Composite Reliability & Average Variance Extracted for Constructs in all Service Failure Scenarios

Construct	CR	AVE
External Attributions	0.944	0.809
Internal Attributions	0.902	0.753
Stable Attributions	0.875	0.702
Customer Recovery Expectancy	0.879	0.708
Continued Use of Self-Service Technology	0.890	0.731

Convergent Validity

Convergent validity is measured by average variance extracted (AVE), The AVE shall be at least 0.5 (Hair, 2017; Hair et al., 2019). This threshold of 0.5 indicates that the construct explains about 50% of its indicators or items, while the other 50% is unexplained. From table 1.6, it can be deduced that all constructs in all scenarios can meet the evaluation criteria for convergent validity, as their average variance extracted exceeds the threshold of 0.5 (Hair et al., 2017).

In this research, the composite reliability that is used as CR shall be at least 0.70 (Hair et al., 2017; Hair et al., 2019). All constructs in all scenarios have composite reliability that exceeds the threshold of 0.7.

Discriminant Validity

In PLS-SEM, the most widely used criterion for discriminant validity assessment is HeteroTrait–MonoTrait ratio (HTMT), contrary to Fornell–Larcker criterion which has been widely used in CB-SEM (Hair et al., 2019). Therefore, HTMT will be used to assess discriminant validity. Kline (2015) denoted that the HTMT ratio should be less than 0.85 to support the discriminant validity whereas, (Hair et al., 2019) suggested that the HTMT ratio shouldn't exceed 0.9 to support discriminant validity. HTMT ratios are below the threshold of 0.9 in all service failure scenarios (Hair et al., 2019). Consequently, all constructs have discriminant validity which denotes that they are distinct from each other and measure different phenomenon.

Table 1. 7 HTMT

	All Scenarios			
Construct	Customer Recovery Expectancy	External Attributions	Internal Attributions	Stable Attributions
Customer Recovery Expectancy				
External Attributions	0.182			
Internal Attributions	0.192	0.685		
Stable Attributions	0.303	0.168	0.094	
Continued Use of Self-Service Technology	0.161	0.103	0.104	0.232

Structural Model

To test the research hypotheses, bootstrapping procedure is conducted in PLS-SEM to determine the significance of path coefficients of the structural model using 5000 sub-sample with replacements. Table 1.8 illustrates the results for hypotheses testing for direct, followed by Table 1.7 for mediation analysis. Additionally, a multi-group analysis (MGA) which is "a class of techniques that allow testing for differences between identical models estimated for different groups of data" (Hair et al., 2017). PLS-MGA is conducted to determine whether these scenarios have statistically significant different effects on the structural model. In other words, through PLS-MGA, the researchers can compare among five path models for five scenarios to indicate if each hypothesis is supported or not throughout the sub-samples for each scenario individually, and for the full sample eventually.

Table 1. 8 Hypotheses Testing (Direct Effects)

Hypotheses	Path	Original Sample (Beta)	T-Values	P-Values	Decision
H1 (a)	Internal Attributions -> Expectancy	0.083	1.192	0.117	Not supported
H1 (b)	External Attributions -> Expectancy	**-0.145**	2.206	0.014*****	Supported
H1 (c)	Stable Attributions -> Expectancy	**-0.292**	5.399	0.000*******	Supported
H2 (a)	Internal Attributions -> Use	0.098	1.315	0.094	Not supported
H2 (b)	External Attributions -> Use	-0.058	0.946	0.172	Not supported
H2 (c)	Stable Attributions -> Use	**-0.242**	4.464	0.000*******	Supported
H3	Expectancy -> Use	**0.196**	3.561	0.000*******	Supported
*** Significant at 0.001 level (one-tailed), confidence level 99.9%, t-values > 3.09, p-value <0.001					
** Significant at 0.01 level (one-tailed), confidence level 99%, t-values > 2.326, p-value<0.01					
* Significant at the 0.05 level (one-tailed), confidence level 95%, t-values >1.645, p-value<0.05					

According to Zhao et al. (2010), the PLS-SEM approach is an extension for Baron and Kenny's mediation (1986) with some modifications, where the bootstrapping procedure is conducted to check the significance of mediation in PLS-SEM. The only requirement for mediation is a significant direct effect of exogenous on a mediator and a significant direct effect of mediator on endogenous, regardless the direct effect of X on Y is significant or not.

Table 1. 9 Mediation Analysis

Hypotheses	Path	Direct Effect X>Y	In-Direct Effect X>M>Y	Result	Decision
H4 (a)	Internal Attributions -> Expectancy -> Use	0.098	0.016	No mediation	Not supported
H4 (b)	External Attributions -> Expectancy -> Use	-0.058	**-0.028***	Full Mediation	Supported
H4 (c)	Stable Attributions -> Expectancy -> Use	-0.242	**-0.057****	Partial Mediation	Supported
*** Significant at 0.001 level (one-tailed), confidence level 99.9%, t-values > 3.09, p-value <0.001					
** Significant at 0.01 level (one-tailed), confidence level 99%, t-values > 2.326, p-value <0.01					
* Significant at the 0.05 level (one-tailed), confidence level 95%, t-values >1.645, p-value<0.05					

6. Conclusion

Discussion

The objective of this research is to investigate attributions of self-service technology failures using locus and stability dimensions of attributions theory as antecedents for customer recovery expectancy and continued use of SST. Besides, this research investigates customer recovery expectancy as an antecedent for continued use of SST and as a mediator on the effect of attributions of different types of SST failures as proposed by (Meuter et al., 2000) on continued use of SST.

Unexpectedly, internal attributions of self-service technology failures have insignificant positive effect on customer recovery expectancy in 4 out 5 service failure scenarios namely (technology, process, technology design, and customer-driven failures). This can be attributed to their inability to solve these failures by themselves especially in automated teller machines, because there are no available tools for customers to initiate service recovery. On the contrary intemal attributions of service-design failure contribute to higher customer recovery expectancy. This may be due to the fact that using self-service technology, triggers customers to share some responsibility for service failure. Additionally, customers are motivated to engage in the service recovery process. Referring back to the described scenario, customers may blame themselves for not being aware of cash withdrawal limits per day. is the results are in line with the findings of Zhu et al. (2013), who report that internal attribution of SST service failures is an antecedent for customer recovery expectancy. Unsurprisingly, external attributions of self-service technology failures have a significant negative effect on customer recovery expectancy in 4 out 5 service failure scenarios namely (technology, process, technology design, and customer-driven failures). Consequently, external attribution of SST failures cannot encourage the customers to engage in problem-solving (service recovery). Therefore, reducing the recovery expectancy of customers. This result complies with prior research (e.g., Weiner, 1985; Teas and Mcelory 1986; Sugathan et al., 2017), who argue that customers believe that their efforts are not sufficient to solve service failures that are externally attributed to service firms. Whereas, external attributions of service-design

failure do not yield lower customer recovery expectancy. This is due to the fact that users of ATMs can withdraw some cash even if it is not the desired amount.

When users attribute causes of SST failures to be unchangeable and permanent, they are less likely to estimate their efforts and inputs to be effective in solving SST problems or failures. This result is in line with prior research (e.g., Weiner, 1985; Teas and Mcelory, 1986; Sugathan and Ranjan, 2020), who reveal that the stable nature of service failures makes the customers certain that they will face these failures again when using the same SST. Therefore, the customers do not have the willingness to engage in any sort of service recovery.

Internal attributions of self-service technology failures have an insignificant positive effect on continued use of self-service technology in 3 out 5 service failure scenarios namely (technology, process, and service-design failures). This result can be due to the fact that customers will not have self-confidence in their ability to successfully interact with the self-service technology in the future after facing these failures. They may prefer to switch to full service where they can enter the bank branch, interact with an employee to perform their financial transactions. As expected, users of SST do blame themselves for customer-driven failure as they are the only ones responsible for this failure. This is in line with prior research (e.g.. Sugathan et al., 2017). Moreover, Meuter et al., (2000) indicate the users of SST do not blame themselves especially, after a service failure that is due to the customers' fault. On the other hand, internal attributions of technology-design failure have a significant negative impact on the continued use of SST. This result supports the findigs of Agapi (2017), who conclude that even if customers make internal attributions of service failures, they may quit the SST. This can be ascribed to the fact that users of SST self-doubt their skills and knowledge to interact with SST effectively. Regarding technology-design failure, users of SST blame themselves (internal attributions) or service providers (external attributions) for this failure since users can't navigate SST interfaces easily (Meuter et al., 2000), hence negatively affecting their continued use of the SST. The main reason is that SSTs users may believe that they do not have the necessary skills and knowledge to interact with SST (Agapi, 2017). Moreover, customers may perceive that service providers can not make quick changes to their technology interfaces that can match their skills and knowledge.

The research findings indicate that users of self-service technology (SST) who are responsible for service failures may not quit SST. The main reason is that the users of SSTs do not perceive these failures to be too serious. Moreover, these SSTs provide more benefits or valuable services. According to Tam et al. (2019), perceived usefulness is one of the main drivers of the continued use of SST. In the same vein, Meuter et al. (2000) conclud that if customers are not satisfied with the SST, they will continue using it as they are inclined to avoid interaction with employees. Another reason may be that using SSTs is more relevant than a full-service setting as getting a service from SST is a time-saving option for customers. Regarding the automated teller machines (ATMs) context, ATMs can indeed save more time and money for customers than entering a bank branch to perform any banking transactions. The results also

indicate that when users attribute causes of SST failures to be unchangeable and permanent, it can be inferred that their continued use of SST may be negatively affected. This result is in a similar vein to prior research (Agapi, 2017; Vakeel et al., 2018; Sugathan, & Ranjan, 2020). as According to the previously mentioned studies, customers perceive the causes of service failures as repetitive in the future, thereby, they are concerned that these failures may happen again if they use the same services. Moreover, this research infers that customer recovery expectancy can enhance the continued use of SST. This is consistent with prior studies which confirm that customers' participation in the recovery of co-created services such as self-service technologies (SSTs) may enhance customers' skills and knowledge. Consequently, enhancing their willingness to participate in service production and delivery in the future as they have gained great experience in interacting with the SST (Dong et al., 2008; Wang et al., 2013; Susanto et al., 2016; Foroughi et al., 2019). Furthermore, Hsu et al. (2021) provide recent evidence that customers engage in solving a service failure in SST when they perceive their efforts can enhance the situation of this failure (customer recovery expectancy), and thus their continued use of SST is enhanced. With regard to the mediation analysis results; first, customer recovery expectancy can fully mediate the positive effect of internal attributions of service-design failure on the continued use of SST. This is due to service-design failure itself, where users are not aware of how much they can withdraw per day. After this failure, they get to know the withdrawal limit (self-recovery), consequently, they may use the SST again in the future. However, this hypothesis (H4a) is not supported in all service failures except for service-design failure. This is due to the described scenarios and their application field (automated teller machines), where users of ATMs can not find the crucial tools for self-recovery such as help icons and troubleshooting features. Second, customer recovery expectancy can fully mediate the negative effect of external attributions on the continued use of SST. This can be generalized to all SST service failures except for service-design failures. Due to the nature of service-design failure itself, users of SST are not aware of cash withdrawal policies. They can not also change bank policies. Finally, customer recovery expectancy significantly and partially mediates the significant negative effect of stable attributions on the continued use of SST in a complementary way.

Theoretical Implications

This research extends both attribution theory and expectancy theory by investigating how various attributions made by customers after all self-service technology failures types as proposed by (Meuter et al., 2000) can influence subsequent consumer behaviors (e.g., customer recovery expectancy) and post-recovery behaviors (e.g., continued use of SST). To the best of the researchers' knowledge, this study is the first to shed light on customer recovery expectancy which is introduced by (Zhu et al., 2013) to motivate customers to initiate or involve in self-recovery. In this vein, it has been concluded that if customers perceive the effort-performance link positively, they will continue using SST. The premise is that they become motivated as their

efforts will result in better performance in interacting with SST, which eventually can achieve their desired and valuable outcome (getting a service from SST). Consequently, customer service recovery seems to be critical in retaining existing customers, which has been proven to be less costly than acquiring new customers. Finally, this research has contributed to the notion that customers are an integral part of co-created services such as SST, where service firms provide operant resources (technology itself) for customers who invest these resources (e.g., effort, time, skills, and knowledge) to produce the service. If customers blame firms for the failure (external attributions), this may not negatively influence their future usage of SST (Köcher & Paluch, 2019). In other words, despite users of SST blame the service firm for the failures, they take part of the blame. This can be ascribed to the efforts and time that they invested when using SST. This finding shows how co-created services such as self-service technologies can offset the negative effects of blaming service firms for failures (Harris et al., 2006; Heidenreich et al., 2015).

Managerial Implications

Technology design failure can jeaopardize the SST as it has been shown that users may quit the non-user friendly SST. If users of ATMs quit using them, this may increase the workload for bank employees in the bank branches and cause severe waste costs of investing in ATMs. Furthermore, in the era of covid-19, it seems advisable to avoid human interactions to limit the spread of the virus. Therefore, it's very important to design user-friendly and interactive self-service technology (SST) to encourage customers to continue using it, especially because ATMs are frequently used by populations with different educational levels and ages. Hence, we recommend service firms and particularly bank managers to consider customer needs when designing SST such as ATMs, since they can be used to the maximum. It can be a disaster to merely integrate technology without considering customer needs (Meuter et al., 2000; Hilton et al., 2013). In order to avoid service-design failures, banks need to educate their customers about their policies such as (withdrawal or deposit limit per day) through well-designed ATMs which can provide users with the required information to complete any transaction. For instance, when the user chooses to deposit cash, a pop-up message shall denote the deposit cash limit allowed per day and how long does it take for the amount to be credited to the user's account. When users of self-service technologies (SST) perceive service failures to be permanent and unchangeable in the future, they are not willing to put any effort to solve these failures and they are likely to quit the SST to protect the sustainability and long-term success of the technology. Therefore, the researchers suggest service providers get feedback as much as they can from customers after service failures for several reasons. First, figuring out all service failures that may happen with customers to protect them and improve service delivery in the future. Second, reducing customers' perception about the stability of service failure, which in turn can guarantee that these unsatisfactory incidents will not happen again and encourage customers' recovery when they occur.

Last but not least, in self-service technologies context, when a service failure happens and no employee is around, a customer becomes the only actor to initiate or get involved in a service recovery process. Therefore, unless the customers perceive their effort and actions to be effective to solve the service failure, the service failure will not be observed by service firms. Thus, the researchers recommend service firms and particularly banks to design self-service technologies (SSTs) with available and suitable tools to search for the needed information to prevent SST failures without any customer service support on the behalf of firms' employees. This is consistent with (Zhu et al., 2013; Agapi, 2017; Nili et al., 2019). Therefore, firms need to invest in providing self-help options such as (frequently asked questions FAQ , online instructions, video tutorials, etc.) on their websites and help icons on the SST interface and trouble-shooting directions.

Limitations and Future Research

The generalizability of these results is subject to certain limitations. First, this research has only focused on studying self-service technology (SST) namely; ATMs. Consequently, this provides an avenue for further research where customers' responses in different self-service technology settings shall be addressed for instance (e.g., mobile banking, online services, interactive teller machines 'ITM'). Second, this research has been conducted based on scenario-based experimental design. This can be an opportunity for further research as researchers can track actual consumers' behaviors through conducting a field experiment instead of modeling different scenarios for service failures. Third, there are many factors including service failure severity, technology anxiety, and social presence, which can influence attributions of service failures in SST and subsequent behavior. However, this study does not address these factors, thus, future research shall investigate how these factors change to the response of customers towards SST service failures attributions and subsequent behaviors. Fourth, this study depends on convenience sampling which can bias the findings, it is thus recommended to use quota sampling or probability sampling techniques in further research. Fifth, this study collects data online. The self-administered questionnaire is distributed online throughout different social media platforms such as what's app and Facebook. Thus, future research also need to consider offline data to reach more of the targeted respondents. Finally, this study has only examined the main effects of external, internal, and stable attributions. However, the interaction effects between locus attribution and stability attributions have not been investigated. Thereby, an avenue for further research is to investigate the interaction effects of the following; internal and stable attributions, external and stable attributions, internal and unstable attributions, external and unstable attributions of service failures on subsequent consumer behaviors.

References

Agapi. (2017). Customers' Reactions to Self-Service Technology Failure: Attributions of Blame and Coping Strategies

Belanche, D., Casaló, L. V., Flavián, C., & Schepers, J. (2020). Robots or frontline employees? Exploring customers' attributions of responsibility and stability after service failure or success. *Journal of Service Management*, *31*(2), 267–289. https://doi.org/10.1108/JOSM-05-2019-0156

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. MIS quarterly, 351-370.

Bitner, M. J., Ostrom, A. L., & Meuter, M. L. (2002). Implementing successful self-service technologies. *Academy of management perspectives*, *16*(4), 96-108

Bitner, M. J. (1990). Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. Journal of Marketing, 54(2), 69. https://doi.org/10.2307/1251871

Bitner, M. J., Booms, B. H., & Tetreault, M. S. (1990). The Service Encounter: Diagnosing Favorable and Unfavorable Incidents. Journal of Marketing, 54(1), 71. https://doi.org/10.2307/1252174

Curran, J. M., & Meuter, M. L. (2005). Self-service technology adoption: Comparing three technologies. *Journal of Services Marketing*, *19*(2), 103–113. https://doi.org/10.1108/08876040510591411

Dong, B., Evans, K. R., & Zou, S. (2008). The effects of customer participation in co-created service recovery. *Journal of the Academy of Marketing Science*, *36*(1), 123–137. https://doi.org/10.1007/s11747-007-0059-8

Eriksson, K., & Nilsson, D. (2007). Determinants of the continued use of self-service technology: The case of Internet banking. *Technovation*, *27*(4), 159–167. https://doi.org/10.1016/j.technovation.2006.11.001

Folkes, V. S. (1984). Consumer Reactions to Product Failure: An Attributional Approach. *Journal of Consumer Research*, *10*(4), 398. https://doi.org/10.1086/208978

Gelbrich, K., Gäthke, J., & Grégoire, Y. (2015). How Much Compensation Should a Firm Offer for a Flawed Service? An Examination of the Nonlinear Effects of Compensation on Satisfaction. *Journal of Service Research*, *18*(1), 107–123. https://doi.org/10.1177/1094670514543149

Hair, Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *MULTIVARIATE DATA ANALYSIS EIGHTH EDITION* (8th ed.). www.cengage.com/highered

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Heidenreich, S., Wittkowski, K., Handrich, M., & Falk, T. (2015). The dark side of customer co-creation: exploring the consequences of failed co-created services. *Journal of the Academy of Marketing Science*, *43*(3), 279–296. https://doi.org/10.1007/s11747-014-0387-4

Heider, F. (2013). The Psychology of Interpersonal Trust. In *The Psychology of Interpersonal relations*. https://doi.org/10.4324/9781351035743

Hsu, P., Nguyen, T. K., & Huang, J. (2021). *Electronic Commerce Research and Applications Value co-creation and co-destruction in self-service technology : A customer ' s perspective*. *46*(101).

Iglesias, V., Varela-Neira, C., & Vázquez-Casielles, R. (2015). Why didn't it work out? The effects of attributions on the efficacy of recovery strategies. *Journal of Service Theory and Practice*, *25*(6), 700–724. https://doi.org/10.1108/JSTP-04-2014-0073

Kelley, H. H. ;, & Michela, J. L. . (1980). ATTRIBUTION THEORY AND RESEARCH. *Annu.Rev.Psychol*, 457–501.

Lastner, Folse, Mangus, & F. (2016). The road to recovery : Overcoming service failures through positive emotions ☆. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2016.04.002

Lusch, R. F., & Vargo, S. L. (2006). Service-dominant logic: Reactions, reflections and refinements. *Marketing Theory*, *6*(3), 281–288. https://doi.org/10.1177/1470593106066781

Matikiti, Roberts-Lombard, & Mercy. (2019). Customer attributions of service failure and its impact on commitment in the airline industry: an emerging market perspective. *Journal of Travel and Tourism Marketing*, *36*(4), 403–414. https://doi.org/10.1080/10548408.2019.1568949

Maxham III, James G., and Richard G. Netemeyer. 2002. 'Found That All Three Elements of Justice, Distributive, Procedural, and Interactional Justice, Are Key Determinants of Consumer Satisfaction in a Study of the Hotel and Restaurant Industries. In a Study of the Homebuilding Sector'. *Journal of Retailing* 78:239–52

Meuter, Bitner, O. and, & Brown. (2005). Choosing among alternative service delivery modes: An investigation of customer trial of self-service technologies. *Journal of Marketing*, *69*(2), 61–83. https://doi.org/10.1509/jmkg.69.2.61.60759

Nili, A., Tate, M., & Johnstone, D. (2019). The process of solving problems with self-service technologies: a study from the user's perspective. *Electronic Commerce Research*, *19*(2), 373–407. https://doi.org/10.1007/s10660-018-9304-0

Pallant, J. (2011). SPSS SURVIVAL MANUAL A step by step guide to data analysis using SPSS 4th edition. In *Book* (Issue 4).

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Prahalad, C. K., & Ramaswamy, V. (2004). Co-creating unique value with customers. *Strategy & Leadership*, *32*(3), 4–9. https://doi.org/10.1108/10878570410699249

Sekaran, U. (2003). *Research methods for business : a skill-building approach*. John Wiley & Sons.

Smith, A. K., Bolton, R. N., & Wagner, J. (1999). A model of customer satisfaction with service encounters involving failure and recovery. *Journal of Marketing Research*, *36*(3), 356–372. https://doi.org/10.2307/3152082

Sreejesh, S., Mohapatra, S., & Anusree, M. R. (2014). *Business Research Methods An Applied Orientation*.

Teas, R. K., & McElroy, J. C. (1986). Causal Attributions and Expectancy Estimates: A Framework for Understanding the Dynamics of Salesforce Motivation. *Journal of Marketing*, *50*(1), 75. https://doi.org/10.2307/1251280

Vaerenbergh, Y. V., Orsingher, C., Vermeir, I., & Larivière, B. (2014). A Meta-Analysis of Relationships Linking Service Failure Attributions to Customer Outcomes. *Journal of Service Research*, *17*(4), 381–398. https://doi.org/10.1177/1094670514538321

Wang, W. T., Ou, W. M., & Chen, W. Y. (2019). The impact of inertia and user satisfaction on the continuance intentions to use mobile communication applications: A mobile service quality perspective. *International Journal of Information Management*, *44*(May 2018), 178–193. https://doi.org/10.1016/j.ijinfomgt.2018.10.011

Weiner, B. (2000). Reflections and Reviews Attributional Thoughts about Consumer Behavior. *Journal of Consumer Research*, *27* 382–387.

Weiner, B. (2010). The development of an attribution-based theory of motivation: A history of ideas. *Educational Psychologist*, *45*(1), 28–36. https://doi.org/10.1080/00461520903433596

Zhu, Z., Nakata, C., Sivakumar, K., & Grewal, D. (2013). Fix It or Leave It? Customer Recovery from Self-service Technology Failures. *Journal of Retailing*, *89*(1), 15–29. https://doi.org/10.1016/j.jretai.2012.10.004

Zourrig, H., Hedhli, K., & Chebat, J. C. (2014). A cross-cultural perspective on consumer perceptions of service failures' severity: A pilot study. *International Journal of Quality and Service Sciences*, *6*(4), 238–257. https://doi.org/10.1108/IJQSS-03-2014-0021

Appendix A Measurement items & Scales

Construct	Measurement Items	Measurement Scale
Realism checks	1- "The situation described is realistic". (**Chk_1*)** 2- "The situation described is likely to happen in real life". (**Chk_2*)** 3- "I do not have difficulty to imagine myself in the situation". (**Chk_3*)**	Three items seven-point Likert scales ranging from "strongly disagree=1" to "strongly agree=7", are developed by (Zourrig et al., 2014).
Continued use of SST (dependent variable)	1- "Would you use this SST again if you have the choice?" (**Use1*)** 2- "What is the likelihood that you may choose to use this SST next time you need this service?" (**Use2*)** 3- "How likely will you going to use this SST in the future?" (**Use3*)**	Three items seven-point Likert scales ranging from "Very unlikely"= 1 to "Very likely"=7, are developed by (Dong et al., 2008). Cronbach Alpha = 0.947
External attributions of SSTfailure (independent variable)	1- "In my view, the service provider is fully responsible for the service failure". **(Ex_att_1) *** 2- "The problem that leads to the service failure is caused by the service provider". **(Ex_att_2) *** 3- "The service failure that I encounter is entirely service provider's fault". **(Ex_att_3) *** 4- "The service provider is solely responsible for the service failure". **(Ex_att_4)***	Four items seven-point Likert scales ranging from "strongly disagree"=1 to "strongly agree" =7, are developed by (Heidenreich et al., 2015). Cronbach Alpha =0.971
Internal attributions of SSTfailure (independent variable)	1- "I am responsible for this unpleasant experience". (**In_att_1**)* 2- "I do contribute to this unpleasant experience". (**In_att_2**) * 3- "I shall be blamed for the undesirable outcome". (**In_att_3**)*	Three items seven-point Likert scales ranging from "strongly disagree" =1 to "strongly agree" =7, are developed by (Poon et al., 2004). Cronbach Alpha = 0.7
Stability of attributions of SST failure (independent variable)	"The cause of the problem described is likely to be 1. Temporary [1]/permanent [7]". (**Stability_1*)** 2. "Occurring infrequently [1] /Occurring frequently [7]". (**Stability_2*)** 3. "Changing over time [1] /unchanging over time [7]". (**Stability_3*)**	Three items 7-point Semantic differential scales ranging from 1 to 7, are developed by (Russell, 1982) and used by (Boyoun and Cranage, 2018). Cronbach Alpha =0.7
Customer recovery expectancy (mediating variable)	1- "Participants indicate their likelihood to solve the problem without the help from the service firm". **(Exp1*)** 2-"Have control over fixing the problem". **(Exp2*)** "Find a way to solve the problem". **(Exp3*)**	Three-item seven-point scales ranging from "very unlikely"= 1 to "very likely"=7, are developed by (Zhu et al., 2013). Cronbach Alpha =0.71

Appendix B

1. Technology Failure Scenario

You are heading to use an automated teller machine (ATM) for some banking transactions. You put your debit card in the machine to withdraw cash from your bank account, then, you enter your pin\identification code. However, you get a message saying that the request can't be processed.

Do you experience a service failure in the scenario situation?

- Yes
- No

If you experience a service failure, can the request not be processed?

- Yes, it is
- No, it isn't

2. Process Failure Scenario

You are heading to use an automated teller machine (ATM) for some banking transactions. You put your debit card in the machine to withdraw cash from your bank account, then, you enter your pin\identification code. A few minutes later, you receive a text message from your bank stating the amount of cash deducted from your bank account for the previous transaction, however, you don't receive that amount from the ATM.

1) Do you experience a service failure in the scenario situation?
   - Yes
   - No
2) If you experience a service failure, do you receive from the ATM the amount that has been deducted from the bank account?
   - Yes, it is
   - No, it isn't

3. A Technology Design Failure Scenario

You are heading to use an automated teller machine (ATM) for some banking transactions. You put your debit card in the machine to withdraw cash from your bank account, then, you enter your pin\identification code. You don't have the option to enter the desired amount of cash, and you have to choose from the given amount on the screen.

Do you experience a service failure in the scenario situation?

- Yes
- No

If you experience a service failure, do you have to choose from the given amounts on the ATM that doesn't include the amount you desire?

- Yes, it is
- No, it isn't

3. B Service Design Failure Scenario

You are heading to use an automated teller machine (ATM) for some banking transactions. You put your debit card in the machine to withdraw cash from your bank account, then, you enter your pin\identification code. You don't realize that (ATM) has limits on how much you can withdraw or get per day. The machine doesn't tell you that you exceed your daily limit. It just holds spitting your card back out and you continue trying different amounts until you have been able to get some cash out.

Do you experience a service failure in the scenario situation?

- Yes
- No

If you experience a service failure, does the ATM has limits on how much you can get per day

- Yes, it is
- No, it isn't

4. Customer-Driven Failure Scenario

You are heading to use an automated teller machine (ATM) for some banking transactions. You put your debit card in the machine to withdraw cash from your bank account, then, you enter your pin\identification code. However, the ATM shows you a message that the pin code you enter is incorrect. You continue trying several times, but, the machine takes your card at the end.

Do you experience a service failure in the scenario situation?

- Yes
- No

If you experience a service failure, is the pin code incorrect?

- Yes, it is
- No, it isn't