The effects of service failures and recovery on customer loyalty in e-services
An empirical investigation

Rui Sousa

Catholic University of Portugal, Porto, Portugal, and

Christopher A. Voss

London Business School, London, UK

Abstract

Purpose – Despite having been widely studied in traditional (bricks-and-mortar) services, the effect of service failures and recovery (SFR) on customer loyalty has received only limited attention in the context of e-services. This paper sets out to empirically test the following set of hypotheses in an e-service setting: *H1*, service failures have a negative effect on customer loyalty intentions; *H2*, failure resolution has a positive effect on customer loyalty intentions; *H3*, satisfaction with the recovery has a positive effect on customer loyalty intentions; *H4*, outstanding recovery results in loyalty intentions which are more favorable than they would be had no failure occurred (service recovery paradox).

Design/methodology/approach – The paper is based on an online survey of actual customers of a commercial e-banking service.

Findings – *H1-H3* are supported, suggesting that: the detrimental effects of failures are also present online; problem resolution leads to increased loyalty; despite the challenging nature of online failures and the reduced degree of human interaction, it is possible to achieve effective recovery in e-services. *H4* is also supported. We observes a recovery paradox effect but it only take place for a small proportion of "delighted" customers, i.e. those who perceived an outstanding recovery. Although unlikely, the impact (size effect) of outstanding recovery on loyalty is substantial.

Research limitations/implications – Future research should examine other types of e-services.

Practical implications – E-service delivery systems should be designed with a strong failure-prevention mindset and include effective service recovery mechanisms. However, in general, e-service providers should not look at superior recovery as a substitute for error-free service. Despite not being a viable strategy in general, delighting customers in the recovery may make sense for the most profitable customers.

Originality/value – The paper provides empirical evidence of the effects of SFR in the context of online service, an area which has received limited attention to date. Unlike other research, this paper draws on data from customers of an actual e-service and therefore benefits from increased external validity.

Keywords Electronic commerce, Customer services quality, Service failures, Customer loyalty, Banking, Portugal

Paper type Research paper

Introduction

The last decade has been witness to an increasing attention in the literature to service failures and recovery (SFR) issues. The main reason for this has been the realization that organized service recovery programs are key tools to firms in their efforts to maintain satisfied and loyal customers. As a result, there has been substantial research on the effect of SFR on customer loyalty (Johnston, 2005). Overall, this work has concluded that:

- service failures have a negative effect on loyalty (Hays and Hill, 1999; McCollough *et al.*, 2000; Roos, 1999; Zeithaml *et al.*, 1996);
- in the event of a service failure, customers expect effective recoveries (Bitner *et al*, 1990); and
- customer satisfaction with the recovery increases loyalty (Miller *et al.*, 2000; Spreng, 1995; Tax and Brown, 1998; Zeithaml *et al.*, 1996).

A significant strand of this work has investigated the existence of a phenomenon known as the "recovery paradox" (McCollough and Bharadwaj, 1992) in which customers who experience a service failure followed by superior recovery exhibit behavioural intentions towards the service provider which are more favorable than they would be had no failure occurred. However, no definite conclusions have been reached, with empirical evidence providing mixed support for the existence of a recovery paradox (Matos *et al.*, 2007).

The last decade has also brought about the emergence and establishment of a new kind of services, namely, services provided through the internet (e-services). In this process, a lot of work has addressed critical issues and success factors in these new service settings. One of the critical success factors that has been consistently reported in the literature has been the ability to achieve successful recovery from failures (Collier and Bienstock, 2006b; Holloway and Beatty, 2003). A successful recovery may avoid undesirable outcomes, such as online customers switching service providers, reverting back to an interpersonal delivery alternative, decide to stop using the internet altogether or even hurting off-line sales in the case of multi-channel service providers. It can also lead to increased loyalty behavioural intentions, including repurchase intentions and positive word-of-mouth. Repurchase intentions are especially important online due to the lower switching costs. Similarly, negative word-of-mouth spreads much faster online (Reichheld and Schefter, 2000), e.g. via customer feedback systems such as epinions, and can have very damaging effects on the reputation of the service provider (Goetzinger *et al.*, 2006).

Although SFR issues have received considerable attention in the literature, these topics have received only limited attention in the context of online services. Specifically, we lack an understanding of whether the knowledge gained in traditional services translates to online environments, given the reduced degree of human intervention in the service encounter, the role that technology plays in mediating customer interaction and the fact that the reasons for dissatisfactory online service encounters have been found to be different from traditional off-line service research (Forbes *et al.*, 2005; Holloway and Beatty, 2003). It has been argued that the degree of customer contact is an important influence on SFR issues (Craighead *et al.*, 2004). As such, the main objective of this paper is to empirically examine the impact of SFR on customer loyalty in e-services.

The ability to achieve effective recovery from failures is an important responsibility of the operations function (Miller *et al.*, 2000; Prajogo, 2006; Roth and Menor, 2003). Therefore, operations managers need an adequate understanding of how customers react to SFR, as part of their required knowledge of target markets for making alignment decisions (Roth and Menor, 2003). Specifically, understanding the impact of SFR on customer loyalty has important implications for the design of the service delivery and recovery systems (Miller *et al.*, 2000), for example, determining how much to invest in delivering reliable service (i.e. problem prevention) *vis-à-vis* providing superior recovery when problems occur (Hays and Hill, 1999; Parasuraman, 2006; Zhu *et al.*, 2004). The increased understanding of this theme would then inform what should naturally be the core of operations management (OM) research on the broader topic of SFR, that is, the design and operation of SFR processes (Johnston and Michel, 2008). As the literature coverage in our paper illustrates, most of the research dedicated to the theme of SFR's impact on loyalty has appeared in research outlets outside the OM field, most notably, in the marketing and general service management fields. Given the important implications of this theme to OM, we argue that it should also be viewed as a relevant OM theme, similar to what occurs to the theme of service quality and its impacts. In this, we follow the suggestion of several researchers that the boundaries of research in service OM need to be extended into cross-functional areas (Johnston, 1999; Roth and Menor, 2003). In this connection, our paper can be seen as a contribution from the OM field to the theme of SFR's impact on loyalty.

The structure of the paper is as follows. First, we review the literature on the impact of SFR on customer loyalty in traditional services and summarize the main hypotheses that have been validated in these settings. Second, we discuss differences in the SFR context between traditional services and e-services. Third, we discuss the impact of SFR on customer loyalty in e-services. In this process, we assess the extent to which the main SFR hypotheses validated in traditional services are expected to hold in e-service settings, given the differences in the SFR contexts. Fourth, we describe the employed methodology, a survey study of customers of an e-banking service geared towards testing SFR hypotheses in e-service settings. We then present the data analysis and discuss the results. Based on these results, we put forward a number of relevant directions for future research and highlight the managerial implications of the findings. Finally, we discuss the limitations of the study and conclude with a summary of the main contributions of the study for research and practice.

Impact of service failure and recovery on customer loyalty in traditional services

Service failures can be defined as the real or perceived breakdown of the service in terms of either outcome or process (Duffy *et al.*, 2006). Service recovery involves the actions a service provider takes in response to a service failure (Gronroos, 1988). These actions are designed to resolve problems, alter negative attitudes of dissatisfied customers and to ultimately retain these customers (Miller *et al.*, 2000). Satisfaction with the recovery effort is defined as an individual's subjectively derived evaluation of the service recovery experience (Duffy *et al.*, 2006).

SFR have been extensively researched in traditional services, around four main themes (Zhu *et al.*, 2004): classification of SFR strategies (Bitner *et al.*, 1990; Kelley *et al.*, 1993); links between failure types and recovery strategies (Craighead *et al.*, 2004; Tax *et al.*, 1998); financial aspects of service recovery (Hays and Hill, 1999; Rust *et al.*, 1995);

and customer evaluation of SFR encounters. Our study falls under the last category, focusing on the impact of SFR on customer loyalty.

There has been substantial research in traditional services on the effect of SFR on customer loyalty (Johnston, 2005). This work has produced four main findings. First, service failures have a negative effect on loyalty behaviour and have been found to be a driving factor in customer switching behaviour (Hays and Hill, 1999; McCollough *et al.*, 2000; Roos, 1999; Zeithaml *et al.*, 1996). Service failures result in the disconfirmation of service expectations leading to negative impacts on different types of loyalty, word-of-mouth and customer retention (Colgate and Norris, 2001). Recent research has found that the most important reason for customers staying with a service provider, given a switching dilemma, was the lack of negative critical incidents (Colgate *et al.*, 2007).

Second, in the event of a service failure, customers expect effective recoveries (Bitner *et al.*, 1990), especially those who seek redress (Blodgett *et al.*, 1993). Therefore, the resolution of the failure avoids a "double deviation" from customer expectations (initial failure and recovery service; Bitner *et al.*, 1990) and leads to increased loyalty behaviour (McCollough *et al.*, 2000).

Third, many studies have shown that, besides problem resolution *per se*, satisfaction with the recovery increases customer loyalty behaviour (Miller *et al.*, 2000; Spreng, 1995; Tax and Brown, 1998; Zeithaml *et al.*, 1996). Accordingly, substantial work has been conducted on achieving a theoretical understanding of the way customers evaluate recovery efforts, most notable of which has been the consideration of several dimensions of justice as determinants of such evaluations (Goodwin and Ross, 1992; Hocutt *et al.*, 1997). Similarly, a number of studies have focused on identifying effective recovery strategies (Kelley *et al.*, 1993; DeWitt and Brady, 2003).

Fourth, a "recovery paradox" (McCollough and Bharadwaj, 1992) has been proposed where customers who experience a service failure followed by superior recovery exhibit behavioural intentions towards the service provider which are more favorable than they would be had no failure occurred (service recovery seen as an opportunity). The paradox is related to a secondary satisfaction following a service failure in which customers compare their expectations for recovery to their perceptions of the service recovery performance (Matos *et al.*, 2007). If perceptions of recovery performance are greater than expectations, a paradox might emerge that secondary satisfaction becomes greater than pre-failure satisfaction. It has been suggested that loyalty is primarily driven by the initial service failure, with recovery performance acting to mitigate the damage to loyalty caused by the failure (McCollough *et al.*, 2000). In this context, the recovery paradox is hypothesized to occur only for very high levels of customer satisfaction with recovery (i.e. when the customer is "delighted"; Ok *et al.*, 2007). Accordingly, delighting the customer requires an enhanced set of recovery ingredients when compared to simply bringing the customer "back to neutral" (Johnston and Fern, 1999).

Empirical studies investigating the service recovery paradox have produced results that vary considerably in terms of statistical significance, direction and magnitude (Matos *et al.*, 2007). While several studies report results consistent with a recovery paradox effect (Hansen and Danaher, 1999; Smith and Bolton, 1998) and several textbook authors make assumptions about the existence of such a phenomenon (Johnston and Clark, 2005; Kotler, 1997; Rust *et al.*, 1996), other studies have cast doubts over it (Andreassen, 2001; McCollough *et al.*, 2000; Zeithaml *et al.*, 1996). A recent meta-analysis of empirical research on the service recovery paradox concluded that its

effect was significant on satisfaction, but non-significant on loyalty intentions (repurchase intentions and word-of-mouth; Matos *et al.*, 2007). A possible explanation for the mixed findings may be that the empirical manifestation of the recovery paradox is dependent on a number of factors:

- failure expectations, recovery expectations and recovery performance (McCollough *et al.*, 2000);
- severity of the failure, prior failure with the firm, company control over the failure and stability of the cause of the failure (Magnini *et al.*, 2007); and
- the difficulty in statistically detecting what appears to be a rare event with small size effects (Michel and Meuter, 2008).

Overall, SFR research in traditional services has supported the following hypotheses:

H1. Service failures have a negative effect on loyalty behaviour.

H2. Failure resolution has a positive effect on loyalty behaviour.

H3. Customer satisfaction with the recovery has a positive effect on loyalty behaviour.

Although empirical evidence has been mixed concerning the recovery paradox, this phenomenon can be formulated around the following two hypotheses:

H4a. Customers who experience a service failure followed by outstanding recovery exhibit loyalty behaviour which is higher than it would be had no failure occurred.

H4b. Customers who experience a service failure followed by only satisfactory (but not outstanding) recovery exhibit loyalty behaviour which is not different from what it would be had no failure occurred.

Differences in the service failure and recovery context between traditional services and e-services

SFR issues are intimately related to service quality. In fact, service failures may be seen as occurring when one or more of the dimensions of service quality are not properly delivered to the customer. E-services differ from traditional services in many aspects associated with service quality and SFR. Key differences include the absence or reduced degree of human interaction and the role that technology plays in mediating customer interaction (Holloway and Beatty, 2003). As a consequence, the quality of e-services comprises dimensions which are different from those associated with the quality of traditional services (Sousa and Voss, 2006). Accordingly, a number of studies have developed instruments specifically devoted to measuring e-service quality, departing from the SERVQUAL dimensions typically employed in traditional services, primarily provided face-to-face (Collier and Bienstock, 2006b; Fassnacht and Koese, 2006; Parasuraman *et al.*, 2005; Wolfinbarger and Gilly, 2003; Yoo and Donthu, 2001). Although the specific quality dimensions put forward vary somewhat across these studies, as a whole they are broadly in line with the set of the e-service quality dimensions proposed by Zeithaml *et al.*'s (2002) comprehensive review, namely: information availability and content (information quality); ease of use; privacy/security; graphic style; and fulfillment.

Consistent with the different nature of online service quality, a number of studies have shown that the types of service failures online are considerably different from traditional services. Holloway and Beatty (2003), based on interviews and a survey of online customers, classified the types of failures in online retailing in six categories:

(1) delivery (e.g. products arriving later than promised, wrong product shipped, product shipped to the wrong address);

(2) web site design (web site failed to function satisfactorily);

(3) payment (e.g. charging errors);

(4) security (breach in security or fraud);

(5) product quality (merchandise failed to meet customer expectations); and

(6) customer service (customers needed to ask for additional information that was not adequately provided by the company).

Cho *et al.* (2003), based on data collected from customer panels and customer feedback posted on customer service centres, identified similar types of failures in online shopping: problems associated with different customer centre approaches, general terms and conditions, delivery issues, security and privacy, failure of information quality and system performance. Forbes *et al.* (2005) employed the critical incident technique with a sample of students to arrive at ten different types of failures in online retailing, falling into two groups: response to service delivery system/product failure (slow/unavailable service, system pricing, packaging errors, out of stock, product defect, bad information, web site system failure) and response to customer needs and requests (errors concerning special order/request, customer error, unexpected variations in product sizes). All of these types of problems have correspondence with the four types of problems identified by Meuter *et al.* (2000) in the use of self-service technologies in general (including, but not limited to, the internet):

(1) *Technology failures.* Those that prevent the customer from engaging with the service (e.g. web site is down or not working properly).

(2) *Process failures.* Those that occur at some point after the customer's interaction with the web site, but preventing correct service fulfillment from occurring (e.g. the items ordered through the internet are never received).

(3) *Poor design.* These affect all customers using the service and can be technology design problems (e.g. web site difficult to navigate) or service design problems (e.g. an aspect of the design of the service beyond the web site interface that the customers do not like, such as the service taking too long to be performed due to the way it has been designed).

(4) *Customer-driven failures.* Those that occur as a result of a customer mistake (e.g. not being able to remember a password to access the service).

Not surprisingly, the identified types of online failures have a good correspondence to the identified quality dimensions in e-services. For example, delivery failures can be seen as poor performance on the fulfillment e-service quality dimension. This suggests that online failures occur when customers are dissatisfied with any of the dimensions of e-service quality.

In summary, in e-services the reduced degree of human interaction and the role that technology plays in mediating customer interaction give rise to a SFR context which is different in terms of the nature of the failures that occur and, consequently, in terms of the recovery strategies that may be adopted.

Impact of service failure and recovery on customer loyalty in e-services
In this section, we assess whether the previously discussed SFR hypotheses, developed for traditional services, are expected to hold for e-service settings. In doing this, we take into account the relevant differences between the SFR contexts of e-services and traditional services.

Concerning the *H1* (impact of service failures), we submit that it is expected to hold in e-services for two main reasons. The first is related to the nature of failures online, in particular, the perceived severity of online failures (or equivalently, the extent to which customers may be more or less forgiving towards online failures). Research in traditional services supports the notion that the severity of failures has a negative impact on loyalty behaviour, even with well-managed recovery actions (Firnstahl, 1989; Weun *et al.*, 2004). The study by Forbes *et al.* (2005) reported that customers appear to assign a high magnitude to online failures. Several reasons may account for this. First, the types of failures online can be considered severe failures from the point of view of the customers. Studies of failures related to self-service technologies in general and e-services in particular, have indicated that the most common failures occurring in these services are technology and process failures (Holloway and Beatty, 2003; Meuter *et al.*, 2000). Technology failures prevent customers from using the service and have been shown to cause high levels of dissatisfaction, especially if they are unexpected (Meuter *et al.*, 2000). These failures may be especially critical because online customers tend to value highly the convenience and control inherent in the internet channel (Keeney, 1999), and these are quite visibly destroyed in the event of a technology failure. Process failures also cause significant complications to the customer, because the customer assumes that the transaction has been completed as expected and the failure only becomes apparent at a later stage (Meuter *et al.*, 2000). Second, because online failures are relatively objective and obvious, customers may recognize more confidently that a failure did occur (Forbes *et al.*, 2005). Finally, interpersonal relationships which in traditional settings can act as a dampening factor for the severity of failure perceived by the customer, are reduced online (Forbes *et al.*, 2005); in many types of online failures, the customer is "alone" as it occurs.

The second main reason for *H1* to hold in e-services is that, for the same degree of perceived severity of failure, the (negative) impact on loyalty intentions is expected to be stronger in online settings. Online customers may be seen as being unencumbered by high switching costs and relation-based attachments (Bergeron, 2001; Zemke and Connellan, 2001). In this context, Forbes *et al.* (2005) found that such customers easily switch to competitors when a failure occurs and are difficult to retain despite an e-service provider's best efforts to recover. Also, service failures have been shown to lead to reduced trust, even in the event of a satisfying recovery experience, and reduced trust in turn leads to reduced customer retention (Ranaweera and Prabhu, 2003). Trust has been considered a key driver of loyalty in e-services (Hoffman *et al.*, 1999; Urban *et al.*, 2000) to such an extent that it has been argued to be a more important driver of loyalty in these services when compared to traditional services (Warrington *et al.*, 2000). As a consequence, the especially damaging effects of failures on trust in e-services suggest that the effects of customer failures on loyalty will be amplified in these settings.

A few studies of e-services have provided preliminary empirical support for *H1*, based on samples of students. Ahmad's (2002) exploratory study found that the occurrence of a service failure in online retailing led to reduced customer retention. Similarly, Forbes *et al.* (2005) found that e-tail customers are not likely to repurchase once a failure has occurred.

Whether the *H2* (impact of failure resolution) is likely to hold online depends on the degree to which online customers expect to have their problem solved, when compared to traditional services (in this hypothesis, we are merely discussing the impact of the occurrence or non-occurrence of problem resolution, without considering the quality of the resolution). We propose that, similar to their bricks-and-mortar counterparts, online customers have the expectation of having their problems solved, facing a "double deviation" scenario if problems are not solved. As discussed earlier, online failures tend to have a more objective nature and be perceived as severe – given that customers can more clearly pinpoint the occurrence of a service failure, it is reasonable to assume that they will expect the failure to be resolved. In addition, several studies have provided empirical evidence for customers being more likely to complain online (Holloway and Beatty, 2003; Snellman and Vihtkari, 2003). Complaining customers have been shown to have a higher expectation of problem resolution than customers who do not complain (Blodgett *et al.*, 1993). Several reasons seem to cause a high likelihood of complaining behaviour online. The multi-channel nature of many of the current e-services facilitates customer complaints by offering new channels that reduce the time and effort required in the process (Holloway and Beatty, 2003; Tax and Brown, 1998). In particular, the internet channel provides the means for complaining, such as online feedback forms and e-mail, which are readily available in the immediate service encounter situation and do not require further search. This is an especially important requirement because many online customers especially value time efficiency. These means also remove the embarrassment of the face-to-face complaining process (DeWitt and Brady, 2003; Tax and Brown, 1998). Also, important types of online failures, namely technology and process failures, force the customer to complain in order to resolve the situation (e.g. to conduct a transaction when a web site is down or to receive the ordered good when delivery fails; Meuter *et al.*, 2000). Thus, as barriers to complaints are lowered and the need for complaining increases, the complaining frequency is expected to increase.

Another factor supporting *H2* online is the fact that lack of problem resolution may have a damaging effect on trust (Kelley and Davis, 1994) which, as discussed earlier, is key for customer loyalty in online settings. This effect may be especially important in online retail settings in which the customers can only assess the physical attributes of products when they receive them and thus expect more generous and efficient product return processes (product returns can be seen as a recovery activity; Mollenkopf *et al.*, 2007). Conversely, a successful recovery builds customer trust because the customer then has the confidence that the firm has enough honesty and integrity to amend errors. Empirical evidence for *H2* in online settings has been provided by Ahmad's (2002) study which reported that online customers were outraged if their problems were not given consideration and solved.

The extent to which the *H3* (impact of satisfaction with recovery) is expected to hold online depends on the degree of effectiveness of the service recovery that can be achieved in e-service settings (in this hypothesis, we are addressing the quality of the recovery associated with problems which have been solved). If recovery effectiveness

can reach high levels, then satisfaction with recovery may also reach such levels as to have a significant impact on customer loyalty.

We find contradictory forces in the online environment concerning recovery effectiveness. On the one hand, a number of factors related to the use of technology in service recovery may lead to increased effectiveness (Tax and Brown, 1998). Examples include frequently asked questions and troubleshooting engines that can automatically walk customers through problem-identification and resolution processes, and online chat sessions with live representatives. Moreover, online customers may be more willing to perform recovery activities by themselves if given the opportunity (Harris *et al.*, 2006) and online settings offer an increased potential for customer participation in service recovery (Dong *et al.*, 2008). In doing so, customers may gain feelings of control over the process and achieve speedier recoveries, overcoming the increased difficulty of reaching customer service employees. These feelings have been shown to be critical motivators for customers to prefer self-services to interpersonal services (Dabholkar and Bagozzi, 2002). Dong *et al.* (2008) found that as the level of customer participation in service recovery increases, customers evaluate their own work more positively and become more satisfied with recovery outcomes. Finally, the internet offers the service provider a few opportunities to perform customized recovery service tailored to individual customers (or customer types; Parasuraman, 2006), based on the customer relationship management (CRM) logic and the wider availability of customer profile information online.

On the other hand, other studies have suggested that it may be more difficult to perform effective recovery in e-service contexts (Bitner *et al.*, 2000; Meuter *et al.*, 2000). This is due to two types of reasons. The first is associated with the different nature of service failures online. As discussed earlier, we posit that customers attribute a high degree of severity to online failures and studies have shown that it is harder to recover from severe failures (Magnini *et al.*, 2007; Matos *et al.*, 2007). The intrinsic characteristics of the types of online failures make them more difficult to recover from, in particular Meuter *et al.*'s (2000) categories of technology, process and customer-driven failures. In the case of technology failures, the customer may resort to interpersonal service either to complain or to receive the desired service (Meuter *et al.*, 2000). Because of the wide reach of the internet, there are a potentially large number of users affected by the breakdown and it may be difficult for the service provider to enable convenient and rapid customer access to a support agent (Sousa and Voss, 2006). This may compromise the speed of response to a service failure, a key part of maintaining loyalty (Miller *et al.*, 2000) and a key attribute of effective recoveries online (Cho *et al.*, 2003). In the case of process failures, because the initial interaction has taken place as expected, the customer expects the service to be provided successfully. Because the failure occurs in a service process behind the "line of visibility" it only becomes apparent at a later stage (e.g. the items ordered through the internet are never received). This deferred nature of fulfillment makes it difficult to detect such failures early and proactively contacting the customer to overcome them (Miller *et al.*, 2000; Sousa and Voss, 2006). This has been shown to be an important requirement for effective recovery from failures in service processes that take place behind the line of visibility (Michel and Meuter, 2008). In the case of customer-driven failures, the absence of customer contact makes it difficult to detect customer difficulties or mistakes in a timely manner and perform on-the-spot customer support (Bitner *et al.*, 2002).

The second type of reason is the reduced degree of human interaction. Findings from traditional services have shown that the role of front-line employees is key for effective recovery. Front-line employees are able to adapt and be proactive (Boshoff and Leong, 1998) and they may monitor the emotional climate of customer complaints and perform appropriate "emotional recovery" (Schoefer and Diamantopoulos, 2008). A customer's anger is abated when employees act in a polite and empathetic manner and demonstrate a strong effort to solve the problem (Tax *et al.*, 1998). An existing rapport between the customer and the service provider (achieved through the face-to-face interactions with service employees) also increases the likelihood of a satisfactory recovery from a service failure, acting as a switching barrier (DeWitt and Brady, 2003). Finally, employees can quickly assess the type of failure (including its severity) and select appropriate recovery strategies, an important requirement for effective recovery (Craighead *et al.*, 2004). On the contrary, e-services encounters are depersonalized and the technology creates a distance between customers and service personnel (Walker *et al.*, 2002). Despite the nature of e-service encounters, it has been shown that online customers still value human interaction in service recovery (Forbes *et al.*, 2005; Holloway and Beatty, 2003). Although e-service providers may offer access to human customer support agents, this typically happens via low richness media, such as e-mail and the phone. Also, although e-service providers may try to replicate human interaction through technology (e.g. by using emoticons, avatars and other similar devices), this will not completely emulate human interaction, especially in what concerns the eliciting of sympathetic feelings. Similarly, although some customization is possible online (e.g. carefully targeted emails and customized recoveries), it cannot match that which can be provided by face-to-face interaction.

While some studies have provided evidence of the contribution of online recovery efforts towards increased customer loyalty (Parasuraman *et al.*, 2005; Mollenkopf *et al.*, 2007), other studies have provided evidence of overall customer dissatisfaction with the service recoveries provided by online service providers (Holloway and Beatty, 2003; Voss, 2003). Given these mixed forces, we submit that it is largely an empirical question whether *H3* will hold online.

The extent to which the *H4* (recovery paradox) holds online depends on the likelihood of achieving an outstanding recovery (as perceived by customers) in these settings (or equivalently, the likelihood of delighting customers with the recovery). In traditional services, there is support for the notion that service providers can only induce high levels of satisfaction with recovery for a small proportion of customers (Kelley *et al.*, 1993). In fact, the concept of "delighting" itself may entail doing something out of the ordinary to positively surprise the customers or going the "extra mile" (Johnston and Clark, 2005, p. 107; Oliver *et al.*, 1997). In addition, delighting the customer may mean providing a personal touch in the recovery effort (Johnston and Clark, 2005, p. 107). Unfortunately for service providers, as customers get used to rising service levels and recovery standards both in the context of a given service and the broader marketplace, the potential to delight may be reduced over time (Rust and Oliver, 2000; Ok *et al.*, 2007).

In e-services, we again find conflicting forces contributing to the likelihood of a recovery paradox. On the one hand, there are factors that work towards making the recovery paradox less likely online. As discussed earlier, the reduced degree of interpersonal interaction, the typically higher number of customers affected by failures and, to some extent, the fairly depersonalized and standardized nature of the customer interface, may make delighting customers even more difficult to achieve than in

traditional services. In addition, the higher perceived severity of online failures, in particular, technology and process failures, is expected to increase customer expectations regarding the quality of the recovery effort (Bitner *et al.*, 1990, Hoffman *et al.*, 1995). This may make it more difficult to exceed such expectations and produce a "delighting" effect. Several studies in traditional services have suggested that an outstanding recovery may not be sufficient to overcome serious service failures (Magnini *et al.*, 2007; Weun *et al.*, 2004), possibly because customers tend to use a non-linear value function to evaluate service recovery outcomes (Smith *et al.*, 1999).

On the other hand, two forces may contribute towards facilitating the occurrence of a recovery paradox online. First, in the case of customer-driven failures, the customer is more likely to blame him(her)self because these tend to occur in service components in which the customer performs more of the service him(her)self (Harris *et al.*, 2006). This, in turn, lowers recovery expectations. These types of failures, however, are generally less frequent than the other types of more severe online failures (Meuter *et al.*, 2000). Second, customers are more likely to complain online; because the recovery paradox manifestations require that, in most situations, customers seek redress (McCollough *et al.*, 2000; Magnini *et al.*, 2007), this will increase the likelihood of empirically observing a recovery paradox effect.

Given these mixed forces, we submit that it is largely an empirical question whether *H4* will hold online.

Methodology

The study consisted of the empirical testing of the five formulated hypotheses (*H1-H4b*). A survey approach was chosen to examine naturally occurring responses within the population of interest (i.e. customers with different recent experiences of SFR). This is a common approach taken in the SFR literature (Tax *et al.*, 1998) and arguably superior to artificially generating responses via a (quasi) experiment (Schoefer and Diamantopoulos, 2008). We chose a methodology that allowed us to collect data from customers of a real world e-service, a requirement of paramount importance in our study. SFR research to-date has often been based on convenience samples (i.e. not actual customers of a service, such as students). Respondents in convenience samples do not worry about delays, financial loss, waiting time, and so on (Michel, 2001) and therefore such studies suffer from limited external validity.

The need for access to data from a large number of customers of a real e-service led us to focus on a single e-service and hence our study is single-industry. This single-industry focus is in keeping with similar industry-specific research in e-services (Boyer and Hult, 2005; Verma *et al.*, 2004). The study consisted in the administration of an online questionnaire to a sample of customers at a major retail e-banking service, which was part of a broader multi-channel banking service. E-banking was chosen for several reasons. First, it is a mature and one of the most widespread types of e-services, with high adoption levels among both service providers (e.g. the majority of banks now offer such a service) and users. Second, in e-banking the web site plays a major role in service provision, given that it is an information service. Third, the range of services offered at e-banking sites tends to be similar across different service providers and countries, enhancing the generalizability of our findings. Fourth, banking services provide access to a large number of customers, a key requirement for ensuring a reasonable number of customers across the different SFR experiences. Finally, traditional banking services

have been studied before in SFR research (Johnston and Fern, 1999; Michel and Meuter, 2008), providing some comparability with our study's findings.

The chosen service, located in Portugal, had about 600,000 customers at the time of the study and is considered a "best practice" service, being ISO9001 certified and having won, among other awards, the "Best Consumer Internet Bank 2003" country award by *The Global Finance* magazine.

In order to test the hypotheses, we have adopted a research design similar to the one adopted by Zeithaml *et al.* (1996) in their testing of comparable hypotheses in traditional services. The design is also similar to Hays and Hill's (1999) OM-oriented "service satisfaction framework". The design was based on the split of the overall sample into groups of customers experiencing different SFR situations (Figure 1) followed by the comparison of loyalty intentions across these groups. Each customer was classified into one of these groups according to the responses to the following cascaded questions included in the questionnaire:

SFR1. Whether the customer had experienced a service problem in the last six months (yes/no).

SFR2. If so, whether it had been resolved (yes/no).

SFR3. If so, the customer was asked to rate the satisfaction with the way the problem had been resolved (1 – very dissatisfied; 5 – very satisfied).

The questions are presented in more detail in the Appendix. Consistent with *H4a* and *H4b*, Group B2.1 (outstanding perceived recovery) was comprised of the customers who reported the highest possible level of satisfaction (5); Group B2.2 (satisfactory perceived recovery) was comprised of the customers who reported a satisfactory (4) level of satisfaction; and Group B2.3 included all the other customers.

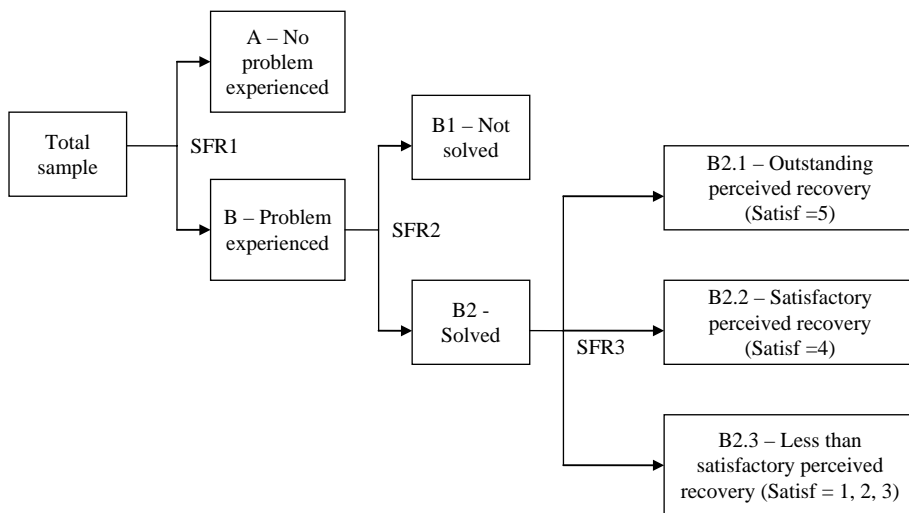We have adapted the format of the original hypotheses to fit this research design as follows:

Figure 1.
Classification of total sample into customer groups experiencing different service failure and recovery situations

H1. Loyalty behaviour for customers experiencing no service problem (A) will be higher than for those experiencing service problems, excluding those who have experienced outstanding recovery (B1 + B2.2 + B2.3).

H2. Within the customer group who has experienced service problems (B), loyalty behaviour for those for whom the problem has been resolved (B2) will be higher than for those for whom the problem has not been resolved (B1).

H3. Within the customer group who have experienced service problems and have had the problems resolved (B2), loyalty behaviour for customers who have high levels of satisfaction with the way the problem was resolved (B2.1 + B2.2) will be higher than for those who have low levels of satisfaction (B2.3).

H4a. Loyalty behaviour for customers who have experienced service problems and have perceived an outstanding recovery (B2.1) will be higher than for those who have not experienced service problems (A).

H4b. Loyalty behaviour for customers who have experienced service problems and have perceived only satisfactory recovery (B2.2) will not be different from loyalty behaviour of those who have not experienced service problems (A).

For the hypotheses which received mixed support in online settings (*H3* and *H4*), we take the default stance that hypotheses from traditional services will hold in e-services.

The next sections discuss the measurement of the research variables and data collection.

Measurement
There have been several conceptualizations of the customer loyalty construct (Dick and Basu, 1994; Oliver, 1997, 1999; Zeithaml *et al.*, 1996). We have focused on loyalty in a conative sense, i.e. related to behavioural intentions (Oliver, 1997, 1999). Loyalty intentions have been generally measured by items related to repurchase intentions and word-of-mouth recommendation (Andreassen, 2001; Brady *et al.*, 2002; Cronin *et al.*, 2000; Dabholkar *et al.*, 2000; Guenzi and Pelloni, 2004; Mattila, 2004; Pullman and Gross, 2004). In this connection, we drew on the definition of conative loyalty by Oliver (1997, 1999) to measure loyalty towards an e-service (web site) by the following items:

L1. The intention to re-use the e-service (web site).

L2. Word-of-mouth recommendation. Similar scales have been commonly used in service quality research (Boulding *et al.*, 1993; Spreng *et al.*, 1995).

The measures are presented in the Appendix.

We took several recommended steps to reduce the threat of common method bias (Podsakoff *et al.*, 2003). First, we provided a psychological separation in our instrument with an introduction that said that we were examining quality issues, and not suggesting any link between our predictor variables (SFR1-SFR3) and loyalty. Second, there was an indication on the first and last pages of the questionnaire that responses were anonymous and confidential. Finally, we used short, specific questions to address each of the separate issues in the survey.

Data collection

The data were collected via the administration of an online questionnaire to a sample of the e-service's customers. We drew on the overall customer database to exclusively target customers fulfilling the following criteria: active customers (customers having made at least two logins to the service in the previous three months), age over 18 years old, excluding bank employees. This screening resulted in a pool of 51,125 eligible customers. The actual target sample for our study consisted of a subset of 70 per cent of this pool, generated through random extraction from the pool (35,781 customers).

The questionnaire was posted on the e-banking service web site, and placed immediately after the login stage. After the targeted customers logged in, they were asked whether they would like to fill in the questionnaire, in which case they were directed to the respective web page. The questionnaire software application kept track of the identification of all targeted customers, recorded respondents and non-respondents and, for the respondents, recorded their actual responses to the questionnaire. The software also ensured that customers who declined to fill in the questionnaire as well as those who did fill in the questionnaire were not asked again. The questionnaire was active on the site for one month, resulting in 5,942 valid responses, yielding a 16.6 per cent response rate.

The final sample is characterized in Table I. This table shows that the predominant demographic profile in the sample was that of a male, young and educated customer. This pattern is in line with the patterns observed for general internet users in the European Union and the USA, as well as for e-banking users (SIBIS, 2003). We conducted a non-respondent bias analysis employing t-tests to compare the profiles of respondents and non-respondents in terms of age, gender and education level (Appendix). The analysis showed no significant differences, indicating the absence of non-respondent bias.

Analysis and results

The analysis was conducted in SPSS 16.0. It comprised two stages: measurement analysis of the loyalty construct; and testing of *H1-H4*.

Variable	Total sample (%)
Age	
(18-25)	9.4
(25-35)	44.8
(35-45)	22.1
(45-55)	14.2
55+	9.5
Gender	
Male	72.0
Female	28.0
Education	
Primary education	3.4
Secondary education	37.9
Higher education (bachelor's degree and above)	58.7

Note: $n = 5,942$

Table I.
Characterization of the final sample

The measurement analysis comprised three stages. First, we assessed the uni-dimensionality of the construct by conducting factor analysis on items L1 and L2. This resulted in a single factor with an eigenvalue higher than 1.0 (eigenvalue = 1.65), explaining 82.4 per cent of the variance. According to the Kaiser-Gutmann rule, this suggests a uni-dimensional latent construct (Brown, 2006, p. 26). Second, we assessed the reliability of the construct: the value for its composite reliability (0.80) was found to be well in excess of the suggested level of 0.70 (Hair *et al.*, 1998). Third, we assessed convergent validity by computing the item-to-total correlations. The obtained value for both measurement items (0.66) was found to surpass the minimum suggested level of 0.40 (Kline, 1986). Collectively, the results support the uni-dimensionality, reliability and convergent validity of the loyalty construct.

In order to test *H1-H4*, the combined sample was classified into different customer groups obtained by splitting the sample according to the responses to variables SFR1 (Groups A and B), SFR2 (Groups B1 and B2) and SFR3 (Groups B2.1-B2.3) – Figure 1. We computed summated loyalty scales for each group by taking the average of the two measurement items, which assumes that the individual item weights are equal (Hair *et al.*, 1998, p. 129). Table II characterizes these groups. It shows that close to 12 per cent of customers experienced a problem in using the service in the last six months. Within these, 56 per cent reported that the problem had been solved. Within this group, close to 8 per cent reported an outstanding recovery. Table III shows more detail on the loyalty levels across the five possible different levels of satisfaction with the recovery.

The hypotheses were tested via *k*-groups analysis of variance (ANOVA) applied to the loyalty scores of the five partitions of the sample: Groups A, B1, B2.1-B2.3. This analysis strategy can be seen as equivalent to considering that each of these mutually exclusive groups has experienced a different SFR treatment (for example, Group B1 consists of the customers who experienced the treatment "problem experienced but not solved"). The Levene test suggested inequality of variances across groups (Levene statistic = 10.5; $p < 0.001$). However, there is evidence that F-tests in ANOVA are robust with regard to inequality of variances (Meyers, 1975; Winer, 1962). In particular, the inequality of variances is not a problem when the ratio of largest to smallest group variances is 4:1 or less (Moore, 1995). The ratio in our sample can be obtained from the

Customer group	N	Percentage within groups	Mean	SD
Total sample	5,942	–	4.12	0.79
SFR1	5,942			
A – no problem experienced	5,030	84.7	4.16	0.77
B – problem experienced	695	11.7	3.94	0.75
No response to SFR1	217	3.6	–	–
SFR2	695			
B1 – problem not solved	267	38.4	3.82	0.95
B2 – problem solved	389	56.0	4.01	0.80
No response to SFR2	39	5.6	–	–
SFR3	389			
B2.1 – outstanding perceived recovery	29	7.5	4.48	0.54
B2.2 – satisfactory perceived recovery	116	29.8	4.14	0.65
B2.3 – less than satisfactory perceived recovery	219	56.3	3.85	0.85
No response to SFR3	25	6.4		

Table II.
Descriptive statistics for the summated loyalty scale across different customer groups

standard deviations in Table II as $0.95^2/0.54^2 = 3.1 < 4$. The results of the ANOVA analyses are shown in Table IV. The F-value is significant at $p < 0.001$, indicating that all group means are not equal, that is, a customer's SFR experience has a significant effect on loyalty. This motivates further investigation of specific group mean differences.

The investigation of specific group differences in ANOVA was performed via a priori (or planned) comparisons corresponding to the five hypotheses (Hair *et al.*, 1998). We specified an adequate contrast for each hypothesis in SPSS and tested each of these. We applied the multiple comparison Bonferroni adjustment to the resulting SPSS p-values, a conservative method to avoid inflation of the Type I error. The adjustment consists in multiplying the original test's p-value by the number of comparisons made and comparing this to the set significance level. Thus, in our case, we have multiplied the SPSS p-values by 5 and compared this value to the 0.05 intended significance level. Table V shows the results of the contrast tests. The results show support for all hypotheses.

Discussion

Support for *H1* suggests that the detrimental effects of service failures also appear to be present online. As discussed earlier, this may be because customers perceive online failures as severe and/or because for a given severity of failure the impact on loyalty is highly damaging online.

The support received by *H2* suggests that online customers have the expectation of having their problems solved. As discussed previously, this may be due to online failures having an objective nature and being perceived as severe, customers having a high likelihood of complaining online and the especially damaging effect that lack of problem resolution may have on trust and hence loyalty in online settings.

The support received by *H3* suggests that it is possible to achieve effective recovery in e-services. It may be that the use of technology in service recovery and the increased willingness of online customers to perform recovery activities by themselves overcome

Level of satisfaction (SFR3)	Number of customers	Percentage within group B2	Mean	SD
5	29	7.5	4.48	0.54
4	116	29.8	4.14	0.65
3	162	41.6	3.91	0.85
2	43	11.1	3.82	0.74
1	14	3.6	3.29	0.99
No response	25	6.4		

Note: $N = 389$

Table III.
Descriptive statistics for the summated loyalty scale across different levels of satisfaction with recovery

Source of variance	Sum of squares	Mean square	df	F-ratio
Between groups	48.1	12.1	4	19.8 ($p < .001$)
Within groups	3442.8	0.6	5,611	

Note: valid $N = 5,616$

Table IV.
Results of the four-group ANOVA

Table V.
Results of the contrast tests

Hypothesis	SPSS contrast (A, B1, B2.1-B2.3)	Value of contrast	SE	t	Non-adjusted sign. level (two-tailed)	Adjusted sign. level (two-tailed)[b]	Concl.
H1 (A vs B1, B2.2, B2.3)[a]	(−1, 0.33, 0, 0.33, 0.33)	−0.2548	0.0355	−7.177	0.000	0.000	Support
H2 (B1 vs B2)	(0, −1, 0.33, 0.33, 0.33)	0.2990	0.0728	4.105	0.000	0.000	Support
H3 (B2.1, B2.2 vs B2.3)	(0, 0, 0.5, 0.5, −1)	0.4613	0.0826	5.583	0.000	0.000	Support
H4a (A vs B2.1)	(−1, 0, 1, 0, 0)	0.3301	0.1013	3.258	0.003	0.015	Support
H4b (A vs B2.2)	(−1, 0, 0, 1, 0)	−0.0104	0.062	−0.169	0.866	1.000	Support

Notes: Testing of *H1-H4b*; [a]contrast $= -1$ A $+ 0.33$ B1 $+ 0$ B2.1 $+ 0.33$ B2.2 $+ 0.33$ B2.3. This contrast intends to compare Group A with a group of customers comprising all customers in Group B except those in Group B2.1 (i.e. Groups B1, B2.2 and B2.3 in the context of the five-group ANOVA). The contrast weights add to 1. [b]Obtained by multiplying the non-adjusted *p*-value by the number of comparisons (five; Bonferroni correction)

the difficulties created by the reduced degree of interpersonal interaction and the challenging characteristics of the types of failures in e-services. Overall, the support received by *H2* and *H3* stresses the importance of developing effective service recovery for customer loyalty. Inferior recovery performance can lead to what Bitner *et al.* (1990) termed a double deviation from customer expectations: the service provider fails to deliver on the initial service and the recovery service.

The support received by *H4a* suggests that it is possible to achieve an outstanding recovery (as perceived by customers) in online settings (or equivalently, it is possible to delight customers with the recovery), thus producing a recovery paradox. Accordingly, support for *H4b* suggests that the recovery paradox manifests itself only for outstanding recovery efforts (not for merely good/satisfactory efforts). Therefore, the previously discussed factors favoring a recovery paradox online (self-attribution of blame for customer-driven failures and high likelihood of complaining) may be sufficient to counter the difficulties for delighting the customer resulting from the de-personalized nature of the recovery and the high-perceived severity of failures.

Perhaps, a more interesting question than establishing whether or not a recovery paradox is possible online, is to assess the likelihood and magnitude (size effects) of such a phenomenon. Our data show that the likelihood of a recovery paradox is quite small. The studied e-service was generally considered a best practice service and had no policy to deliberately vary the intensity of the recovery effort across different types of customers (although this effort might naturally vary across individual customers due to other reasons, such as the type of failure experienced, random factors, etc.). Despite this, only about 8 per cent of its customers were "delighted" in the recovery process (Table III). This result is consistent with findings from traditional services. For example, Michel and Meuter's (2008) study of the recovery paradox in a traditional banking service revealed that only 5.4 per cent of the customers were delighted with the recovery effort. Although we must exert caution in generalizing our results to other e-services, they suggest that in e-services it may be difficult to delight a large proportion of customers in the recovery process. This reinforces the detrimental effect of failures in e-services: when a failure occurs, only a small proportion of customers may be delighted and consequently taken to loyalty levels above error-free service; for the large majority of customers experiencing failures, at best e-service providers may be able to restore loyalty to levels existing prior to the failures. Thus, there is only weak support for considering recovery in e-services as an "opportunity" when compared to the loyalty level resulting from error-free service. Therefore, in general, e-service providers should not look at superior service recovery as a substitute for error-free service.

Concerning the magnitude of the recovery paradox, our data show that an outstanding recovery increased the loyalty level by 0.330 (value of the contrast corresponding to *H4a* in Table V). This magnitude is of reasonable value and is similar to that of the impact of a failure (0.255; *H1*) and problem resolution (0.299; *H2*; Table V). This finding is in contrast with some studies in traditional services, which reported very low size effects. For example, the above-discussed study in banking by Michel and Meuter (2008) reported statistically significant paradox mean differences in overall satisfaction with the service provider and recommendation intentions of only 0.16 and 0.18, respectively, (1-5 scale). Although we must exert caution in generalizing our results to other e-services, they seem to indicate that a recovery paradox, although being equally

unlikely in online settings, when achieved seems to be able to create a more substantial impact on loyalty. That is, the loyalty payoff of delighting customers in the recovery process may be higher than in traditional services. This suggests that, although delighting customers in recovery may not a viable strategy in general (given the low likelihood of achieving a paradox), it may make sense for the most profitable customers for whom substantial loyalty increases can be especially rewarding in the long-run. Therefore, segmenting customers according to their profitability and adopting different recovery levels across segments may be a more viable strategy online than in traditional services.

Jointly, the findings related to *H1* and *H4* indicate that failures online are detrimental and that there is limited support for seeing service recovery as an "opportunity". This provides insights into determining how much to invest in delivering reliable service (i.e. problem prevention) *vis-à-vis* providing superior recovery when problems occur. If we compare the frequency of the service recovery paradox (29 customers out of 5,942) with the frequency of a service failure (695 customers out of 5,942; Table II) we conclude that investments in a better, more reliable error-free service may yield much higher returns than investments in a service recovery program. Our results suggest that, in general, the balance might have to be tipped towards prevention. In particular, a strong prevention mindset might be applied to the design stages of the service delivery system (web site and supporting systems) because in online settings these stages determine a larger part of the overall service experience.

Future research directions
Our study opens a number of directions for future research. The findings stressed the importance of designing e-service delivery systems with a failure prevention mindset. The delivery systems supporting an e-service have a specific nature in that they mainly process information (Sousa and Voss, 2006) and there is still limited knowledge in OM about how to manage such operations. Therefore, future research should increase our knowledge about operations for which the main input is information (Hayes, 2002; Heim and Sinha, 2001).

Our study also concluded that service recovery is important to retain customers and that, as a consequence, e-service providers should establish adequate service recovery systems. Two areas related to the design and operation of online service recovery systems need to be addressed by future research.

First, we need to understand what differentiates recovery that gives high satisfaction from that which has low satisfaction. This should include the uncovering of recovery strategies that may lead to "customer delight" and to reaping the benefits of the recovery paradox in e-service settings. Parasuraman *et al.* (2005) proposed that the quality of online recovery comprises the dimensions of responsiveness, compensation and ease of contact with human agents. However, future research needs to go into more detail and actually identify different types of recovery strategies (e.g. e-mail apologies, discounts on future transactions, personal phone calls and letters, etc.) and assess perceived satisfaction in different contexts.

Second, we know little about which SFR context variables are relevant for choosing an adequate recovery strategy in online settings. Research in traditional services suggests that different SFR contexts (e.g. in terms of the type of failure, customer

involved, etc.) require different recovery strategies and puts forward a number of factors that might be used as starting points.

One relevant factor may be the type and degree of severity of the service failures (Smith *et al.*, 1999; Zhu *et al.*, 2004). In this process, it would be important to classify into meaningful categories the several types of service failures that may occur online. Meuter *et al.*'s (2000) classification (technology, process and customer-driven failures) and Holloway and Beatty's (2003) six categories of problems (delivery, web site design, customer service, payment, security and miscellaneous) are good starting points, but they need to be complemented by an assessment of the degree of perceived severity of the different types of failures, along the lines of existing research in traditional services (Craighead *et al.*, 2004). This is especially relevant for online settings because the reduced degree of human interaction makes it more difficult for the service provider to quickly assess customer perceptions of failures.

Another important factor could be the profile of customers. Research in traditional services has often made claims that service providers need to cater to the individual customer in dealing with service failures (Reichheld and Sasser, 1990) and has highlighted the need for service providers to segment customers for the purpose of designing recovery strategies (Craighead *et al.*, 2004). We need to understand the extent to which different customers should be offered different recovery processes online. This issue may be especially relevant in e-services because, compared to traditional services, these services are typically exposed to a larger number of customers with different profiles and requirements (Boyer *et al.*, 2002). It would be of particular interest to examine the effectiveness of different recovery strategies for customers exhibiting different degrees of preference and familiarity with the internet channel, as opposed to off-line channels. Some customers may prefer a less-intrusive recovery approach (e.g. by e-mail), while others may value a personal phone call (Collier and Bienstock, 2006a). These differences across recovery strategies are important because they influence the cost of the recovery effort. Since only a limited number of characteristics of a customer can be readily determined when the provider needs to proactively deal with a service failure (Craighead *et al.*, 2004), it would be important for future research to identify the most relevant customer attributes that are practical to collect in online settings.

A final important factor of the SFR context may be the "value recovery target", i.e. the recovery level necessary to retain customers (Zhu *et al.*, 2004). This in turn may depend on other SFR context variables, such as the level of competition, industrial practices, guarantees (Zhu *et al.*, 2004), as well as the previously discussed variables (type of failure, severity of failure and customer profile). Future research should provide guidance to service providers as to the level of service recovery that should be offered to customers in online settings.

Our study does not address the issue of whether it is cost-effective to employ service recovery. Future research should investigate the costs and benefits associated with individual recovery strategies, as well as the overall recovery effort. Reichheld and Schefter (2000) have argued that loyalty may be more important in e-services than for comparable, traditional services because: attracting new customers has been found to be considerably more expensive in e-services; the profitability of individual customers accelerates much faster on the web; and the cost of serving a customer decreases much faster on the web.

In addition, Hitt and Frei (2002) in a study of the banking sector found that online customers were more profitable than off-line customers. Both these studies suggest that more overall investment in service recovery efforts per customer may be awarded in e-services than in traditional services, but this needs to be further examined. The concept of customer efficiency (Xue and Harker, 2002) may be a powerful tool to analyze cost-benefit issues in the context of service recovery activities. In particular, it would be important to identify recovery strategies that make the recovery process transaction-efficient, that is, saving the time expended by the e-service provider and the customer in these activities (Xue and Harker, 2002).

Many types of e-services in today's business landscape are multi-channel (Sousa and Voss, 2006; Vishwanath and Mulvin, 2001). As discussed earlier, this is a factor that may contribute to increased recovery effectiveness in e-services. Our empirical investigation of a multi-channel e-service concluded that it was indeed possible to achieve effective recovery. Despite the prevalence of multi-channel e-services, single-channel (internet-only) e-services exist in a limited number of sectors and it may be questionable whether effective service recovery can also be achieved in these settings. Future research should examine this.

Overall, the directions for future research that we put forward would make important contributions to inform the design of SFR systems.

Managerial implications

We combine our findings, associated discussion (including the resulting directions for future research) and the extant literature to put forward preliminary guidelines for managing SFR in e-services. These recommendations are exploratory in nature and require further development and validation. We offer four guiding principles, as follows:

(1) *E-service delivery systems should be designed which a strong failure-prevention mindset.* This principle results from our findings that online failures are detrimental and that there is limited support for seeing service recovery as an "opportunity". Faced with the decision of whether to fire-fight a single service problem to retain a customer, or to spend time and money for process improvement, the latter strategy may be more likely to have a higher return on investment. Since failures in e-services have the potential to affect a large number of customers and because of the relatively high levels of customer propensity to switch regardless of the recovery strategy employed (Forbes *et al.*, 2005), this design area may have to receive stronger attention than in traditional services. Recent research in e-banking has suggested that there may be an "optimal" web site design in terms of quality priorities (that is, one that pleases equally well all customers), which means that the investments in a high-quality web site could eventually be spread across the whole of the customer base (Sousa *et al.*, 2008). Moreover, adequately investing in prevention will reduce failure rates and thus make it easier to provide outstanding recovery for a small number of carefully selected customers, taking advantage of the limited effects of the recovery paradox online. This could be achieved by the application of quality management practices focusing on prevention, especially, when applied to the service delivery system design stages.

(2) *E-service recovery systems should have the ability to detect and adjust to different SFR contexts.* Despite the emphasis on prevention, achieving 100 per cent reliability can be impossible or cost prohibitive in most settings. Therefore, service failures are inevitable. Our study concluded that service recovery is important to retain customers, and, as a consequence, e-service providers should establish adequate service recovery systems. Based on the previous section, we propose that, in the event of a failure, a service recovery system should have the ability to: quickly characterize the SFR context and deploy a recovery strategy matching that context. Relevant SFR context aspects include the type of failure, perceived severity of failure, customer profile (profitability, degree of preference for the internet channel, etc.), value recovery target, among others.

(3) *E-service recovery systems should focus on delighting the most profitable customers.* Our findings on the recovery paradox suggest that it is difficult to delight customers. In recognition of this, service providers might consider applying a CRM logic (Greenberg, 2001) by applying extraordinary recovery efforts only for their most profitable customers. Because of the limited number of these customers, this would have the additional advantage of facilitating the use of personalized recovery efforts, thus maximizing the potential to delight.

(4) *E-service recovery systems should take advantage of the potential of the internet technologies.* We put forward several illustrations of this principle, based on the extant literature. A first example is the possibility of exploring the potential of the internet for designing recovery strategies that involve low additional cost. Recovery systems may be designed in order to involve customers in the co-creation of recovery activities in a way to enable the transfer of specialized skills to customers (Dong *et al.*, 2008). Recovery systems can also be automated, further reducing the marginal cost of a recovery. These strategies may be especially powerful in the case of the selling of digital products. Software developers provide an excellent example of these as they often release software before it is fully debugged; later, they may employ automated recovery systems to expedite problem finding and debugging (see for example the Crash Reporter system from Apple Inc. (2004)) and/or offer free downloads of patches or updates to fix the problems (Arora *et al.*, 2006). A second example involves designing recovery systems that encourage and assist customers in embracing the technology-based feedback mechanisms to facilitate complaining (Dong *et al.*, 2008). This is especially important online given that, in the absence of this feedback, it is very difficult for the service provider to detect service failures (Ahmad, 2002). A third example relates to the potential of online settings for collecting and acting on customer profile data (e.g. profitability level, demographics, etc.). A great deal of information about customers can be generated and processed automatically at a low cost in e-services due to the internet data exchange between providers and customers. This can facilitate the segmentation of customers for recovery alignment decisions. Finally, the technology offers some (limited) opportunities to overcome some of the SFR challenges of online settings. For example, in the future, customer interfaces may be developed that have the capability to mimic the positive aspects of interpersonal encounters; or there may be systems in place that not only monitor how an e-service is functioning but also prevent failures before they happen and/or provide real-time service recovery for customers as they interact with the web site.

Limitations

The study is not without its limitations, which provide additional opportunities for future research. The investigation is based on one service industry, e-banking, a very important type of service in today's e-service landscape. We believe that the findings can be generalized to other task-oriented e-services, but caution must be exercised in extending the conclusions of this study to other services. It may be important for future research to test the developed hypotheses in other types of e-services.

We faced severe restrictions concerning the length of the survey instrument, due to a number of reasons. First, the bank studied was extremely keen on administering a questionnaire that would cause the least amount of trouble for their customers. The bank routinely conducts customer surveys on a number of issues, so that they have a policy of keeping each questionnaire as short as possible. Second, we needed to maximize the sample size for increasing the statistical power of the proposed analyses. In particular, the five-groups ANOVA design required a minimum number of observations in each group. Respondents have been found to be especially sensitive to lengthy questionnaires when they are administered online (Fram and Grady, 1995). A large number of items can also lead to participant fatigue, boredom and inattention, which, in turn, can lead to inappropriate response behaviour (Drolet and Morrison, 2001). We have consciously accepted these restrictions as the necessary trade-off for achieving increased external validity, an important requirement in our research. As a consequence, of these restrictions, we were unable to better frame the current research by asking additional questions about the SFR context (e.g. type of failure, perceived severity of failure, customer profile, type of recovery received, etc.). Future studies should investigate in more detail the online SFR context.

The nature of the employed methodology prevented us from targeting customers experiencing a failure in the last six months and who might have defected as a result. Given the low likelihood of failures in the studied service, we believe that the number of such customers is small. In addition, it would be reasonable to assume that customers who defect due to a service failure, if targeted by the survey, would fall in groups B1 (problem experienced and not solved) or B2.3 (problem solved, but with low degree of satisfaction); and they would report very low levels of loyalty behaviour. As a consequence, their inclusion in the sample would strengthen the validity of *H1-H3*, and would not affect *H4a* and *H4b* (Table V).

Finally, our study might be improved in two aspects related to the customer loyalty construct. First, we have focused on loyalty behavioural intentions, what Oliver (1999) called conative loyalty. Although previous research has provided empirical support for the causal link between intentions and actual actions (Venkatesh and Davis, 2000), future research may examine if loyalty behaviour is linked to loyalty actions (what Oliver (1999) calls action loyalty). Second, following the approach generally used by past studies (Mollenkofp *et al.*, 2007), we have conceptualized loyalty intentions as a uni-dimensional construct, comprising items for repurchase intentions and word-of-mouth and this has been supported by the data analysis. Recent research has raised the possibility of these two aspects of loyalty actually being two separate constructs (Söderlung, 2006). Due to the restrictions of questionnaire size mentioned above, we were not able to include multiple items for each of these two aspects, a limitation faced by past research into SFR issues (Michel and Meuter, 2008). Future research might include multiple items for repurchase intentions and word-of-mouth,

assess whether these are separate constructs and examine whether the impact of SFR differs across these two aspects.

Conclusions

This study contributes to research in e-services in several ways. Overall, the results show that failures are detrimental and support the key role of service recovery in maintaining, although not necessarily driving, customer loyalty. This answers calls from a number of researchers for a better understanding of how to retain customers in e-services (Bolton *et al.*, 2004; Reichheld and Schefter, 2000; Zeithaml *et al.*, 2002). The findings suggest that the different nature of encounters in e-services relative to traditional services – notably, the reduced degree of interpersonal interaction and the mediating role of technology – does not reduce the key role of recovery in maintaining customer loyalty. This is an important result, given that loyalty has been considered harder to achieve in e-services than in traditional services.

The research hypotheses, matching those from traditional services, were broadly supported. This further extends the generalizeability of research in traditional services into the context of online service. Thus, the study provides general support in defense of theories that draw parallels between online and off-line services, answering calls for research examining the applicability of traditional notions of service management in e-service settings (Roth and Menor, 2003).

Concerning the recovery paradox hypothesis, this study goes beyond validation of the relationships found in traditional services to achieve a deeper understanding of this phenomenon in e-services. The empirical evidence suggests that a recovery paradox is unlikely online but, when it occurs, it may have a substantive impact on loyalty.

The study provides empirical evidence of the effects of SFR in the context of online service, an area which has been relatively unexplored to-date despite the considerable attention it has received in traditional services (Holloway and Beatty, 2003). In doing so, the study investigated actual customers in a real e-service setting, increasing the external validity of the results. Such an approach has been lacking in existing e-service research which tends to employ convenience samples (mainly students), rather than samples taken from the actual customer base of service providers. We have no knowledge of other studies that have explicitly tested the impact of SFR on loyalty using a sample of actual online customers.

The main responsibility for delivering error-free service and achieving effective recovery lies with the operations function and the service delivery system (Miller *et al.*, 2000; Roth and Menor, 2003). Accordingly, this study makes a number of contributions more closely related to OM. First, it answers calls for the OM community to recognize the importance of service recovery (Johnston and Michel, 2008). The results suggest that OM managers should concentrate on preventing failures and, when a failure does occur, they need to resolve the problem, fix the customer relationship and improve the system (improve service processes so that the problem is not repeated). This implies that service recovery systems need to encompass all of Miller *et al.* 's (2000) stages, i.e. pre-recovery, immediate recovery and follow-up recovery. Second, it offers several preliminary guidelines that operations managers can use to design and manage SFR recovery in e-services:

- E-service delivery systems should be designed which a strong failure-prevention mindset.
- E-service recovery systems should have the ability to detect and adjust to different SFR contexts.
- E-service recovery systems should focus on delighting the most profitable customers.
- E-service recovery systems should take advantage of the potential of the internet technologies.

Finally, our study sheds light on an important OM design decision, namely, determining how much to invest in delivering reliable service (i.e. problem prevention) *vis-à-vis* providing superior recovery when problems occur. Our results suggest that, in general, in e-services the balance might have to be tipped towards prevention.

The study opens a number of directions for future research with the goal of increasing our still limited understanding of SFR issues in e-service settings. This constitutes a research agenda that explicitly considers issues that are specific to e-services and that depart from traditional services issues.

By having conceptualized, empirically examined and extended the knowledge on the impact of SFR on customer loyalty in e-service settings, we hope that our study will contribute to fostering much needed prescriptive work on this front.

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Appendix. Measures of research variables and non-response bias analysis

Service failure/recovery

SFR1. Have you experienced any problem in using the (name of e-banking service) service (web site) in the last six months? (yes/no).

SFR2. Has the problem been resolved? (yes/no) (only for customers replying yes to SFR1).

SFR3. How satisfied are you with the way the problem was resolved? (only for customers replying yes to SFR2) (1 – very dissatisfied; 5 – very satisfied).

Customer loyalty

L1. Intention to re-use the (name of e-banking service) service (web site).

L2. Intention to recommend the (name of e-banking service) service (web site) to a friend or relative.

Both items used a five-point Likert-type scale ranging from "1 – strongly disagree" to "5 – strongly agree" (Table AI).

Customer attribute	Respondents ($n = 5,942$)		Non-respondents ($n = 29,839$)		p-value[a]
Education	*Percentage of sample*				
Primary education	3.4		3.8		0.136
Secondary education	37.9		38.6		0.312
Higher education (bachelor's degree and above)	58.7		57.6		0.116
Gender (male %)	72.0		73.1		0.082
	Mean	*SD*	*Mean*	*SD*	
Age (years)	36.7	14.3	37.0	12.5	0.107

Table AI.
Non-response bias analysis

Note: [a]Two-sided *t*-tests for population proportions (education level and gender) and mean (age)

Corresponding author
Rui Sousa can be contacted at: rsousa@porto.ucp.pt