

Product information failures on websites and their impact on mobile shopping behaviour

Product
information
failures

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Abstract

Purpose – Inaccurate product information on retail websites lead to dissatisfied customers and profit losses. Yet, the effects of product information failures (PIFs) remain under-explored, with the mobile commerce channel commonly overlooked. This paper aims (1) to investigate the negative effects of PIFs on shoppers' attitudes and behaviours in a mobile context. The authors further (2) evaluate the impacts of the cause and duration of a PIF, changes of expectations towards the retailer after a PIF occurred and how previous mobile shopping experience in general decreases the effects of PIFs.

Design/methodology/approach – The authors conducted a scenario-based experiment with a one-factorial between-subjects design. The six most common PIFs of an international leading online fashion retailer are operationalized and tested against a control group. The final sample consists out of 758 mobile shoppers from the UK.

Findings – The results demonstrate that the perceived severity of PIFs based on showing customers incorrect information is higher when key information is lacking. Further, when the cause of a PIF is attributed to the retailer, it results in higher recovery expectations towards them. The results also reveal that respondents who have shopped mobile before perceive PIFs as less severe than inexperienced ones.

Originality/value – This research expands the online service failure literature by examining PIFs and its effects in the specific context of mobile commerce. The authors also provide recommendations for a better management of PIFs like the incorporation of PIFs information into reporting packs.

Keywords Product information failure, Online service failure, Mobile shopping, Fashion retailing, Shopping behaviour

Paper type Research paper

Introduction

The retail sector has evolved significantly towards being more online, with global online retail sales amounting to 4.9 trillion US dollars in 2021 (eMarketer, 2022). Online shoppers increasingly use mobile devices, with six out of ten online purchases conducted using smartphones (Statista, 2021). Mobile shopping offers new possibilities by providing a



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convenient and timely customer experience (Omar *et al.*, 2021; de Canio *et al.*, 2022) as it has become the preferred retail channel (Saprikis *et al.*, 2018; Hagberg *et al.*, 2016). However, in the absence of being able to physically handle products, e-commerce consumers require high quality and accurate information to make the right purchase decision (Omar *et al.*, 2021), with 30% of shoppers abandoning their shopping carts due to insufficient or inappropriate information on websites (Baymard Institute, 2022). Consequently, mobile shopping websites lacking accurate information can lead to profit losses (Hamouda, 2021), negative word-of-mouth recommendations (Bitner *et al.*, 2000) and reductions in market share (Huang *et al.*, 2015; Tseng *et al.*, 2022). In this paper, we therefore look at mobile e-commerce product information failure (PIF). PIFs describe a category of online service failures in which information is incomplete or inaccurately displayed.

Existing research into online service failure has increased significantly over the last two decades (Holloway and Beatty, 2003; Forbes *et al.*, 2005), though there remains a paucity of information on product information in this context. Further, the extant literature has focused on online service failures via (static) desktop devices (e.g. computers) (Chen *et al.*, 2018a; Roy *et al.*, 2022). As such there is a lack of literature concerning mobile devices and service failure (e.g. smartphones, tablets) (Narang *et al.*, 2021; Omar *et al.*, 2021).

This research makes the following contributions. First, we investigate the negative effects of PIFs on consumers' attitude and behaviour in a specific m-commerce setting. Second, we differentiate six specific PIFs (missing product description, missing product image, missing original selling price, missing promotional savings message, incorrect pricing of a multi buy deal (i.e. multi buy deal is priced more expensive compared to single product costs) and a poor product rating) regarding customers perception and severity. Third, we evaluate the influence of the moderating variables: cause and duration of the PIF (i.e. attribution of controllability and stability), expectations towards the retailer after a PIF occurred and previous mobile shopping experience in general. Finally, our findings assist practitioners in understanding and consequently managing PIFs in mobile shopping environments.

The findings suggest that there is a negative impact of PIFs on shopper attitude and behaviour. Various PIFs are perceived differently though, with the types of failures involving missing product images and incorrect pricing of a multi buy deal perceived as more severe than others. The results also suggest that retailer induced and durable PIFs lead to a high level of expectations towards the retailer. Further, inexperienced mobile shoppers have a higher perceived severity of service failure in comparison to experienced ones.

To achieve these contributions, the structure of this paper is as follows: Next, we evaluate the literature of service failure in the context of mobile and e-commerce and then derive the hypotheses and present the research model. We outline the methodology of our experimental study that lead to an investigation of results. We draw conclusions with respect to existing literature and suggest managerial implications. Finally, we conclude with the limitations of the research and offer recommendations for future research.

Literature review

The phenomenon of service failures has been widely addressed in the literature since the 1990s, with Bitner (1990) landmark research concerning the evaluation of service encounters and Hart *et al.* (1990) conceptualization of service failure as an inevitable occurrence in service delivery procedures. Subsequently, several authors reviewed service failure types, their consequences and recovery measures (Kelley *et al.*, 1993; Hoffman *et al.*, 1995; Holloway and Beatty, 2003). Since the early 2000s, service failures in online environments have become of particular interest to researchers (Holloway and Beatty, 2003; Forbes *et al.*, 2005; Massad *et al.*, 2006).

The extant service failure literature in general examines both logistic (e.g. delivery) and non-logistic (e.g. payment) service failures (Harris *et al.*, 2006; Sengupta *et al.*, 2018). In terms of the research context, authors investigate service failures in the retail sector (Pizzutti and Fernandes, 2010; Sengupta *et al.*, 2018; Ozuem *et al.*, 2016), as well as in other service industries (Khalifa and Liu, 2014; King *et al.*, 2016; Harris *et al.*, 2006) such as hospitality (Tsao, 2018; Sreejesh *et al.*, 2019).

In the following, we focus on online service failures literature. Table 1 compares key publications and distinguishes the existing literature from the current work, shown in the last row.

Generally, online service failures are categorized into delivery, product, service, payment and design failures (Roy *et al.*, 2022). Predominantly, delivery and product errors have been considered in the literature (Harris *et al.*, 2006; Chen *et al.*, 2018b; Sengupta *et al.*, 2018) with more limited research focused on service, payment and design failures in the context of e-commerce (Narang *et al.*, 2021; Rohden and Matos, 2022). Pizzutti and Fernandes (2010) outlined design problems focused on failures relating to misleading product descriptions and incorrect product quality indications. Khalifa and Liu (2014) investigated the service quality of an online community as an Internet-based service. They evaluated the adequacy, properness and appropriateness of the websites content and functionalities. More recently, Roy *et al.* (2022) addressed the classification of website design problems, describing service failure as navigational problems and poor, insufficient, incorrect or misleading product information. However, there remains a paucity of research on PIFs where online retailers have inadvertently omitted key selling information.

To date, research into online service failures has largely focused on the desktop shopping context (Khalifa and Liu, 2014; Xu *et al.*, 2020; Roy *et al.*, 2022), leaving the mobile channel (e.g. smartphones, tablets) often overlooked (Narang *et al.*, 2021; Omar *et al.*, 2021). For instance, Narang *et al.* (2021) deal with downtimes of an omnichannel retailer's branded application as service failure and considers its impact on frequency, quantity and monetary value of purchases. In addition, Omar *et al.* (2021) analyse mobile shopping service quality as an indicator for the absence of service failure. A positive impact of high mobile shopping service quality on customer's satisfaction is proved. Similar to that, Hamouda (2021) emphasizes mobile shopping experience and its effect on purchase intention. However, this approach leads the service failure issue completely overlooked. So far, the existing literature only deals with one kind of service failure in mobile applications (Narang *et al.*, 2021) and mobile shopping quality in general (Omar *et al.*, 2021). Consequently, there is a lack of literature addressing service failures and their attitudinal as well as their behavioural outcomes in mobile online retailing.

Research on service failures also considers moderating variables such as previous shopping experience (Pizzutti and Fernandes, 2010; Sengupta *et al.*, 2018; Narang *et al.*, 2021) and the attribution of service failure, including the controllability and stability of the service failure (Harris *et al.*, 2006; Xu *et al.*, 2020). Expectations towards the online retailer after an occurrence of a service failure are also frequently treated as a variable mediating the impact of service failures and shopping outcomes (Harris *et al.*, 2006; Chen *et al.*, 2018b; Khalifa and Liu, 2014). To the best of our knowledge, there is no literature which connects these key constructs with each other (Marriott *et al.*, 2017). To conclude, we identify a significant research gap regarding the impact of PIFs on shopping outcomes in mobile e-commerce (see Table 1).

Hypotheses and conceptual model

Effects of product information failures on mobile shopping outcomes

Providing accurate product information is a retailer's service. When a service does not meet the customer's expectation, a situation of negative feelings and negative behavioural consequences arise (Hess *et al.*, 2003; Holloway and Beatty, 2003). There are different

Table 1.
Overview of key
literature

Authors	Topic	Channel		Medium		Mobile device		Solution		Type of service failure					Moderators				
		Context	Online	Offline	Desktop	Mobile	Browser	App	Delivery	Product	Service	Payment	Design	Other	PIF	Attribution	Expectation	Experience	
Harris <i>et al.</i> (2006)	Service Failure	Services	x		x		x					x			x				
Fizzutti and Fernandes (2010)	Service Failure	Retail	x		x			x				x						x	
Khalifa and Liu (2014)	Service Quality	Services	x		x			x				x						x	
Chen <i>et al.</i> (2018a, b)	Service Failure	Retail	x		x			x										x	
Sengupta <i>et al.</i> (2018)	Service Failure	Retail	x	x	x					x								x	
Xu <i>et al.</i> (2020)	Service Failure	Retail	x		x			x									x		
Narang <i>et al.</i> (2021)	Service Failure	Retail	x	x					x									x	
Omar <i>et al.</i> (2021)	Service Quality	Retail	x					x										x	
Rohden and Matos (2022)	Service Quality	Retail	x		x							x						x	
Roy <i>et al.</i> (2022)	Service Quality	Retail	x		x							x						x	
Current Work	Service Failure	Retail	x					x									x	x	x

Source(s): Table by author

expectation levels with which service performance is associated. First, there is a desired expectation level. When the service performance is above the desired level, satisfaction arises. Anything below the adequate level leads to a service failure (Zeithaml *et al.*, 1993). When there are PIFs in an online environment, the service performance is below the adequate level. To ascertain how far the delivered service performance is away from the desired expectation, measures of the severity of service failure are employed (Hess *et al.*, 2003; Smith *et al.*, 1999). Therefore, the severity of PIF is used as a mediating variable, which determines the effect of PIFs on shopping outcomes. In situations where, for example, the product description is missing, the intended shopping procedure is negatively influenced as compared to cases where the product description is present. The missing information is then perceived as a PIF.

H1. The occurrence of a PIF affects the perceived severity of the failure.

H2. Perceived severity of PIFs negatively influences shopping outcomes.

The mediating role of satisfaction and attitude

Service failures have an impact on attitudinal and behavioural outcome variables (Bitner, 1990; Hess, 2008; van Vaerenbergh *et al.*, 2014; Wirtz and Mattila, 2004). Maxham and Netemeyer (2002) and del Río-Lanza *et al.* (2009) associate service failures with negative effects on overall customer satisfaction – findings consistent with expectancy-disconfirmation theory (Woodruff *et al.*, 1983; Zeithaml *et al.*, 1993; Oliver, 1980). Before a consumer decides to buy or use a certain brand, they develop assumptions about the service performance. These expectations are intended as a benchmark for the service they will receive. Following the consumption of the service, the consumer compares the actual experienced performance with the anticipated one. Confirmation arises when both service levels (actual and anticipated) are consistent and therefore the expectation is met (Woodruff *et al.*, 1983; Zeithaml *et al.*, 1993). Negative disconfirmation (service failure) happens if the delivered service is lower than the anticipated performance and the consumer feels dissatisfied (Woodruff *et al.*, 1983). Furthermore, customer satisfaction is an indicator for behavioural outcomes, including loyalty and word-of-mouth (Andreassen and Lindestad, 1998). Besides the satisfaction with the retailer and its online store, the attitude, i.e. an emotional reaction (MacKenzie *et al.*, 1986; Najmi *et al.*, 2012) towards the retailer is also a determinant for customer behaviour – something consistent with the theory of reasoned action according to Fishbein and Ajzen (1975). Attitudes towards the retailer and its brand has an impact on shopping outcomes, including purchase intention (Goldsmith *et al.*, 2000; Gresham and Shimp, 1985). In view of the described importance of the constructs of satisfaction and attitude, these variables are used as mediators for the effect of PIF on further shopping outcomes, including willingness to stay (Wakefield and Baker, 1998), intention to spend less (Baker *et al.*, 2002), negative word-of-mouth (Baker *et al.*, 2002), likelihood to abandon shopping cart (Wakefield and Baker, 1998) and disloyalty (Wakefield and Baker, 1998).

H3a. PIFs negatively influences (overall) satisfaction with the retailer's online store.

H3b. The negative effect from PIFs on shopping outcomes is mediated through the (overall) satisfaction with the retailer's online store.

H3c. PIFs negatively influences the attitude towards the retailer's brand.

H3d. The negative effect from PIFs on shopping outcomes is mediated through attitude towards the retailer's brand.

The role of different types of product information failures

Our understanding of service failure in the context of product information provision is informed by two theoretical perspectives. First, information-gap theory addresses failures

where there is missing information such as product descriptions or images. When customers feel there is a gap between what they know and what they want to know, they feel uncertainty and change their behaviour (Ben-Haim, 2019). In the case of missing information in mobile shopping settings, the consumer is likely to suspend the shopping journey (Kukar-Kinney and Scheinbaum, 2012). Second, fairness theory also supports this assumption as when the customer feels that a service failure results in a situation that is not fair, negative feelings arise such as anger or frustration (McCull-Kennedy and Sparks, 2003). In turn, such negative emotions directly affect other shopping outcomes (Smith and Bolton, 2002; Smith *et al.*, 1999). In particular, PIFs resulting from inaccurate or misleading information lead to the perception of unfairness. Thus, the different types of failures are based on the perceptions of the significance of the information gap (Ben-Haim, 2019) and the severity of the perceived unfairness (Folger and Cropanzano, 2001; McCull-Kennedy and Sparks, 2003).

H4. The perceived severity of PIFs varies between different types of PIFs.

The moderating effect of attribution of controllability and stability

The relationship between firms and customers is based on psychological contracts. These tacit contracts include terms and conditions of an exchange relationship to specify how the individual parties should behave (Morrison and Robinson, 1997; Rousseau, 1989). The central idea is that a commitment is made and therefore something is expected in return (Rousseau, 1989). An online shopper, for example, offers the promise to use and purchase from the retailer's online store, yet in return expects a seamless purchasing process. If PIFs occur, the psychological contract is broken by the retailer in the eyes of the customer. When a psychological contract is violated, there is not only dissatisfaction, but also a feeling of betrayal (Rousseau, 1989; Montes *et al.*, 2015). Betrayed customers are inclined to change their purchasing behaviour negatively towards the retailer (Grégoire and Fisher, 2008; Lee *et al.*, 2013). This means that if a PIF occurs, and the retailer is seen as responsible for this failure (attribution of controllability and stability), the psychological contract is breached. The violation by the retailer causes a sense of betrayal in the mind of the consumer, which leads to high expectations towards the retailer for restitution. For instance, a PIF in the form of a missing product image is directly attributed to the company, whereas low product ratings are assigned by outsiders, which leads to different expectations towards the retailer.

H5. Attribution of controllability and stability influences the effect of PIFs on perceived severity of service failure.

H6. A high attribution of controllability and stability leads to a high level of expectations towards the retailer.

The moderating impact of mobile shopping experience

Based on the mere-exposure effect, shopping experience affects the perception of PIFs. This effect describes the phenomenon that individuals create preferences for things they are familiar with compared to others they do not. Thus, a neutral situation or object might result in a more positive evaluation, merely because of previous experience and recognition (Zajonc, 1968; Bornstein, 1989). More often something is seen or experienced, the more familiar one is with it, which increases consumer appeal for it (Harrison, 1977). In the context of PIFs, this means that due to the positive influence of the mere exposure effect, those customers experienced in shopping on a mobile device have more positive feelings towards familiar shopping situations than less familiar ones. It therefore follows that experienced shoppers perceive PIFs as less severe than inexperienced shoppers. For example, if the promotional savings message is missing from the online product details, experienced consumers will not

perceive the severity of service failure as high due to their previous mobile shopping experience and recognition of the situation.

H7. The perceived severity of PIFs is higher for inexperienced compared to experienced shoppers.

Research model

All seven hypotheses result into a conceptual model (see [Figure 1](#)) which consists of three main elements. In its centre are the effects of service failures on various shopping outcomes. The second element focuses on the mediating effects of satisfaction and attitude. Finally, various influencing constructs explain the moderating impacts on the main effect of service failures on shopping outcomes. In the following section, we explain our methodological approach before empirically testing this research model.

Methodology

Experimental design

To test the conceptual model, we conducted a scenario-based experiment. The study features the most common PIFs of a leading online UK fashion retailer and adopted a one-factorial between subject's design. Seven different scenarios consisting of one control group and six treatment groups were utilized. Moreover, the scenario allocation was determined by a random sampling technique. The first scenario presents an online shopping situation without a service failure, to allow a general comparison to a service failure scenario. The experimental group includes six different treatment groups. The treatments represent different PIFs comprising missing, wrong or poor information regarding the product presentation (see [Table 2](#)). For the detailed scenario description, see Appendix ([Figure A1](#)).

Sample

The population of interest represents all individuals who shop mature women's apparel online and corresponds to the target group of a leading UK online fashion retailer. Hence, we drew a quota sample taking into account gender and age as controls. The sample consists of female UK consumers (100%), predominantly at the age of 40–59 years (88.8%), living mostly in households of 2–3 persons (61.7%) with the majority working as employees (56.7%). The final sample consists of 758 participants and is distributed approximately equally among the seven scenarios. In the “no PIF control group”, 115 participants were randomly allocated. Each experimental stimulus was presented to groups between 102 and 111 participants (see [Table 3](#)).

Measures

We applied measurement scales from existing literature to assess the constructs and to develop the research model (see [Table 4](#)). Different variables, manipulation checks and attention checks were also considered in the data collection procedure. First, the perceived severity of service failure ([Maxham and Netemeyer, 2002](#)) was used to quantify the respondent perceptions of different types of service failure. The overall satisfaction with the retailer's online store ([Maxham and Netemeyer, 2002](#)) and the attitude towards the retailer's brand ([Spears and Singh, 2004](#)) were measured to indicate the consequences of the PIFs. Furthermore, various shopping outcomes and control variables such as willingness to stay ([Wakefield and Baker, 1998](#)), intention to spend less ([Baker et al., 2002](#)), negative word-of-mouth ([Baker et al., 2002](#)), likelihood to abandon shopping cart ([Wakefield and Baker, 1998](#)) and disloyalty ([Wakefield and Baker, 1998](#)) were employed to explore the behavioural and

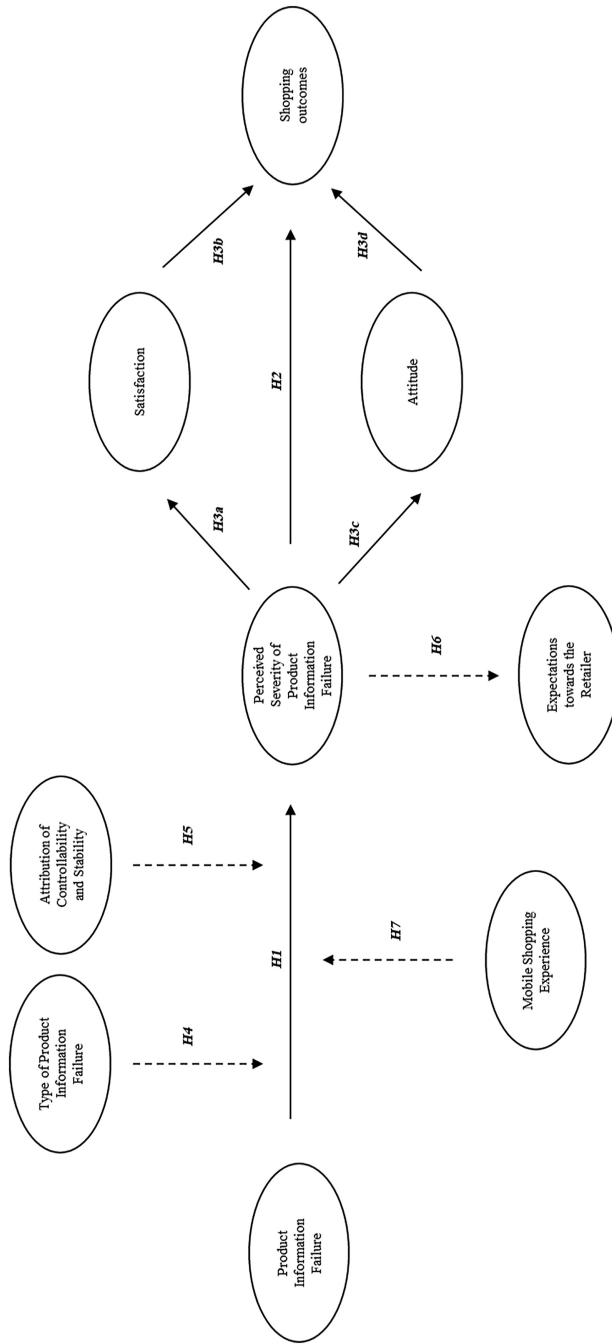


Figure 1.
Research model

Source(s): Figure by authors

attitudinal outcomes of service failures on the consumer. In order to examine influencing variables, the scale attribution of controllability and stability was assessed in the context of the occurring service failure (Hess *et al.*, 2003; Russell, 1982). Finally, customers' service recovery expectations (Hess *et al.*, 2003) and the mobile shopping experience of the participants were also collected. All measures provide a sufficient internal consistency (Cronbach's $\alpha > 0.70$), with exception of attribution of controllability and stability ($\alpha = 0.60$), which is based on an existing scale and therefore adopted for the rest of the process.

Results

Manipulation check

The manipulation of the scenarios worked as intended. An independent sample *t*-test reveals that participants in the control group perceive less severe PIFs in comparison to the respondents in the scenarios with PIFs. This is based on the perceived severity of service failure scale (Maxham and Netemeyer, 2002) with the mean values of no PIF and PIF as participants significantly differ in terms of the perceived severity of PIF ($M_{\text{No_PIF}} = 1.23$, $M_{\text{PIF}} = 2.63$, $t(366.85) = -19.28$, $p < 0.001$). This indicates that the participants in the scenarios with PIFs are also more aware of them and thus the manipulation was effective.

Effects of product information failures on mobile shopping outcomes

Based on the manipulation check, **H1** can be confirmed. Situations with PIFs lead to a higher level of perceived severity of PIF ($M_{\text{No_PIF}} = 1.23$, $M_{\text{PIF}} = 2.63$, $t(366.85) = -19.28$, $p < 0.001$).

To test the second hypothesis **H2**, we applied an independent *t*-test (Field, 2018). The results show that the mean differences between the control and experimental group are significantly different from each other. Participants in the no PIF scenario are more likely to

Type of product information failure		Product information failure	
		Yes	No
Type 1	<i>Missing Product Description</i>	Experimental Group 1	Control Group
Type 2	<i>Missing Product Image</i>	Experimental Group 2	
Type 3	<i>Missing Original Selling Price</i>	Experimental Group 3	
Type 4	<i>Missing Promotional Savings Message</i>	Experimental Group 4	
Type 5	<i>Incorrect Pricing of a Multi Buy Deal</i>	Experimental Group 5	
Type 6	<i>Low Product Rating</i>	Experimental Group 6	

Source(s): Table by author

Table 2.
Research design

Scenario	Frequency	Percentage (%)
<i>No Service Failure</i>		
No Service Failure (CG)	115	15.2
<i>Service Failure</i>		
Type 1: Missing Product Description (EG1)	109	14.4
Type 2: Missing Product Image (EG2)	111	14.6
Type 3: Missing Original Selling Price (EG3)	102	13.5
Type 4: Missing Promotional Savings Message (EG4)	105	13.9
Type 5: Incorrect Pricing of a Multi Buy Deal (EG5)	108	14.2
Type 6: Low Product Rating (EG6)	108	14.2

Source(s): Table by author

Table 3.
Scenario distribution of the sample

Table 4.
Measurement scales

Scale	Type of Scale	Description	Cronbach's α
(1) Perceived Severity of Service Failure (Maxham and Netemeyer, 2002)	5-point scale "not a problem" to "a major problem" 5-point scale "no inconvenience" to "a major inconvenience" 5-point scale "not an aggravation" to "a major aggravation" 7-point scale "strongly disagree" to "strongly agree"	What I experienced on this website is . . .	0.953 (3 items)
(2) (Overall) Satisfaction with the Retailer's Online Store (Maxham and Netemeyer, 2002)	7-point scale "strongly disagree" to "strongly agree" 7-point scale "very dissatisfied" to "very satisfied"	I am satisfied with my overall experience with this online store As a whole, I am not satisfied with this online store (R)	0.853 (3 items)
(3) Attitude towards the Retailer's Brand (Spears and Singh, 2004)	7-point scale "strongly disagree" to "strongly agree"	How satisfied are you overall with the quality of this online store?	0.945 (3 items)
(4) Willingness to Stay (continue shopping) (Wakefield and Baker, 1998)	5-point scale "strongly disagree" to "strongly agree"	I like this retailer I feel positive towards this retailer Shopping at this retailer is desirable I like to remain in this online store as long as possible I enjoy spending time in this online store	0.924 (3 items)
(5) Intentions to Spend Less (Baker et al., 2002)	10-point scale at "much less" to "much more"	How likely are you to spend more or less in this online store than planned?	-
(6) Negative WOM (Baker et al., 2002)	10-point scale at "very unlikely" to "very likely"	I am willing to recommend this online store to others	-
(7) Likelihood to Abandon Shopping Cart (Wakefield and Baker, 1998)	10-point scale at "very unlikely" to "very likely"	How likely are you to proceed to the check out and pay for the product you chose?	-

(continued)

Scale	Type of Scale	Description	Cronbach's α
(8) Outshopping Propensity (Disloyalty) (Wakefield and Baker, 1998)	Semantic differential	In the future, shopping on this website is Not at all – very frequent Unlikely – likely Not probable – very probable Impossible – very possible The cause of the (failure description) is likely to be Temporary – Permanent Stable over time – Varies over time. (R) Changing over time – Unchanging over time Highly controllable by the retailer – Not at all controllable by the retailer (R) Preventable by the retailer – Not at all preventable by the retailer (R)	0.899 (4 items) 0.600 (5 items)
(9) Attribution of Controllability and Stability (Russell, 1982; Hess <i>et al.</i> , 2003)	Semantic differential		
(10) Customers' Service Recovery Expectations (Hess <i>et al.</i> , 2003)	7-point scale "strongly disagree" to "strongly agree"	I expect the retailer to do everything in its power to solve the problem I don't expect the retailer to exert much effort to solve problem. (R) I expect the retailer to try to make up for the (failure description)	0.697 (3 items)
(11) Mobile Shopping Experience	6-point scale "very inexperienced" to "very experienced"	How experienced would you say you are with shopping apparel mobile?	–

Source(s): Table by author

Table 4.

continue their shopping visit (Continue: $M_{No_PIF} = 4.56, M_{PIF} = 3.83, t(756) = 5.28, p < 0.001$). Moreover, participants in the no PIF scenario are more willing to spend money in the online shop (Spend: $M_{No_PIF} = 3.58, M_{PIF} = 2.82, t(756) = 6.86, p < 0.001$) and spread positive word-of-mouth (WoM: $M_{No_PIF} = 3.85, M_{PIF} = 3.08, t(756) = 6.00, p < 0.001$). Further, subjects who experienced a PIF were more likely to abandon their shopping cart (Abandonment: $M_{No_PIF} = 4.00, M_{PIF} = 2.96, t(169.36) = 7.72, p < 0.001$) and not to shop there again (Patronage: $M_{No_PIF} = 3.01, M_{PIF} = 2.66, t(756) = 3.22, p < 0.01$). Finally, the shopping outcomes for participants with the “PIF” scenarios are negative in comparison to the “no PIF” scenario, so we retain [H2](#).

Mediating role of satisfaction and attitude

Hypothesis [H3a](#) was tested based on an independent *t*-test ([Field, 2018](#)). The results show that there is a significant mean difference between the satisfaction of participants in the no PIF and PIF scenarios. The participants who have received a PIF show a lower level of satisfaction (Satisfaction: $M_{No_PIF} = 5.03, M_{PIF} = 3.89, t(199.68) = 10.97, p < 0.001$). We thus confirm [H3a](#).

To assess the mediating role of satisfaction, a simple mediation test was performed ([Hayes, 2022](#)). Perceived severity of PIF affects the mediator satisfaction significantly, $B = -0.672, p < 0.001$, which is in support of [H3a](#). In turn, satisfaction impacts the dependent variables significantly (Continue: $B = 0.636, p < 0.001$; Spend: $B = 0.479, p < 0.001$; WoM: $B = 0.614, p < 0.001$; Abandonment: $B = 0.575, p < 0.001$; Patronage: $B = 0.417, p < 0.001$). These results confirm [H3b](#). To conclude, we found that the relationship between severity of PIF and shopping outcomes to be fully mediated by the variable satisfaction (Continue: Indirect effect $-0.427, 95\% \text{-CI} [-0.497, -0.361]$; Spend: Indirect effect $-0.322, 95\% \text{-CI} [-0.377, -0.267]$; WoM: Indirect effect $-0.412, 95\% \text{-CI} [-0.472, -0.353]$; Abandonment: Indirect effect $-0.386, 95\% \text{-CI} [-0.457, -0.320]$; Patronage: Indirect effect $-0.427, 95\% \text{-CI} [-0.333, -0.232]$) (see [Table 5](#)).

To test [H3c](#), we used an independent *t*-test ([Field, 2018](#)). The data suggest there is a significant mean difference between the attitudes of participants in the no PIF as compared to the PIF scenarios. The attitude of the subjects in the different PIF scenarios is lower than that of the control group (Attitude: $M_{No_PIF} = 4.99, M_{PIF} = 4.01, t(756) = 7.45, p < 0.001$). Subsequently, we can confirm [H3c](#).

Direct effect	Coefficient	<i>p</i> -value
Product Information Failure → Satisfaction	-0.672	0.000
Satisfaction → Continue	0.636	0.000
Satisfaction → Spend	0.479	0.000
Satisfaction → WoM	0.614	0.000
Satisfaction → Abandonment	0.575	0.000
Satisfaction → Patronage	0.417	0.000
Indirect effect	Effect	95% CI
Product Information Failure → Satisfaction → Continue	-0.427	[-0.497, -0.361]
Product Information Failure → Satisfaction → Spend	-0.322	[-0.377, -0.267]
Product Information Failure → Satisfaction → WoM	-0.412	[-0.472, -0.353]
Product Information Failure → Satisfaction → Abandonment	-0.386	[-0.457, -0.320]
Product Information Failure → Satisfaction → Patronage	-0.427	[-0.333, -0.232]

Table 5.
Mediation: [H3a](#)
and [H3b](#)

Source(s): Table by author

To examine the mediating role of attitude the model 4 in PROCESS is used (Hayes, 2022). Perceived severity of PIF affects attitude significantly, $B = -0.526$, $p < 0.001$, which also confirms H3c. The variable attitude impacts the shopping outcomes significantly (Continue: $B = 0.843$, $p < 0.001$; Spend: $B = 0.565$, $p < 0.001$; WoM: $B = 0.718$, $p < 0.001$; Abandonment: $B = 0.686$, $p < 0.001$; Patronage: $B = 0.504$, $p < 0.001$). Consequently, the H3d can be supported. Further, we confirm that attitude mediates the effect of severity of PIF on shopping outcomes (Continue: Indirect effect -0.443 , 95% CI $[-0.504, -0.383]$; Spend: Indirect effect -0.297 , 95% CI $[-0.342, -0.253]$; WoM: Indirect effect -0.378 , 95% CI $[-0.429, -0.328]$; Abandonment: Indirect effect -0.361 , 95% CI $[-0.415, -0.311]$; Patronage: Indirect effect -0.265 , 95% CI $[-0.308, -0.223]$) (see Table 6).

The role of different types of product information failures

For the comparison of the individual six types of PIFs, a one-factor variance analysis was applied (Field, 2018). The severity of PIF differs significantly for the types of PIF, $F(6, 751) = 108.40$, $p < 0.001$ and therefore confirms H4 (see Table 7). The Tukey post-hoc test shows a significant mean difference for the majority of the investigated PIF types (EG1: -1.205 , 95% CI $[-1.582, -0.828]$; EG2: 2.675 , 95% CI $[-3.050, -2.300]$; EG3: -1.084 , 95% CI $[-1.468, -0.701]$; EG5: -2.076 , 95% CI $[-2.454, -1.699]$; EG6: -1.033 , 95% CI $[-1.411, -0.656]$). However, we found that the type of PIF missing promotional savings message (EG4) does not reveal significant results (EG4: -0.241 , 95% CI $[-0.621, 0.140]$). Overall, the perceived severity of PIF is the highest for the failures missing product image (EG2: $M = 3.90$, $MD = -2.675$, 95% CI $[-3.050, -2.300]$) and where a multibuy deal is incorrectly priced (EG5: $M = 3.30$, $MD = -2.076$, 95% CI $[-2.454, -1.699]$) (see Table 8).

Moderating effect of attribution of controllability and stability

Next, we tested for moderating effect of attribution of controllability and stability on the effect of PIF on perceived severity of PIF. The overall model is significant, $F(3, 639) 7.00$, $p < 0.01$, predicting 2.35% of the variance. The results show that attribution of controllability and stability moderated the effect between the occurrence of PIFs and perceived severity of PIFs significantly, $\Delta R^2 = 1.29\%$, $F(1, 639) = 8.49$, $p < 0.01$. Thus, we can approve H5.

To examine H6, a moderated mediation was calculated using PROCESS model 7. The overall model was significant ($\Delta R^2 = 14.22\%$; $F(2, 640) = 53.05$; $p < 0.001$) as well as the

Direct effect	Coefficient	p-value
Product Information Failure → Attitude	-0.526	0.000
Attitude → Continue	0.843	0.000
Attitude → Spend	0.565	0.000
Attitude → WoM	0.718	0.000
Attitude → Abandonment	0.686	0.000
Attitude → Patronage	0.504	0.000
Indirect effect	Effect	95% CI
Product Information Failure → Attitude → Continue	-0.443	$[-0.504, -0.383]$
Product Information Failure → Attitude → Spend	-0.297	$[-0.342, -0.253]$
Product Information Failure → Attitude → WoM	-0.378	$[-0.429, -0.328]$
Product Information Failure → Attitude → Abandonment	-0.361	$[-0.415, -0.311]$
Product Information Failure → Attitude → Patronage	-0.265	$[-0.308, -0.223]$

Source(s): Table by author

Table 6.
Mediation: H3c
and H3d

Table 7.
Descriptive statistics
per type of product
information failure

Severity of product information failure	Mean	SD
<i>No Product Information Failure</i>		
No Service Failure (CG)	1.23	0.56
<i>Product Information Failure</i>		
Type 1: Missing Product Description (EG1)	2.43	1.06
Type 2: Missing Product Image (EG2)	3.90	0.97
Type 3: Missing Original Selling Price (EG3)	2.31	1.01
Type 4: Missing Promotional Savings Message (EG4)	1.47	0.72
Type 5: Incorrect Pricing of a Multi Buy Deal (EG5)	3.30	1.23
Type 6: Low Product Rating (EG6)	2.26	14.99

Note(s): Severity of product information failure
Source(s): Table by author

Table 8.
Tukey post-hoc test

(I) Scenario group	(J) Scenario groups	MD (I-J)	95% - CI
No Product Information Failure (CG)	Type 1: Missing Product Description (EG1)	-1.205	[-1.582, -0.828]
	Type 2: Missing Product Image (EG2)	-2.675	[-3.050, -2.300]
	Type 3: Missing Original Selling Price (EG3)	-1.084	[-1.468, -0.701]
	Type 4: Missing Promotional Savings Message (EG4)	-0.240	[-0.621, 0.140]
	Type 5: Incorrect Pricing of a Multi Buy Deal (EG5)	-2.076	[-2.454, -1.699]
	Type 6: Low Product Rating (EG6)	-1.033	[-1.411, -0.656]

Source(s): Table by author

mediating effect of severity of PIFs between the occurrence of PIFs and expectations towards the retailer ($B = 0.371, p < 0.001$). Moreover, we can see that the moderated mediation is also significant (Index: 0.052, 95% CI [0.017, 0.090]). A PIF that is attributed to the retailer leads to a higher perceived severity of PIFs and thus to higher expectations towards the retailer (see Table 9). These findings confirm H6.

In addition, we outline the mean values of the expectations towards the retailer per type of PIF. The recovery expectations are therefore the highest for instances where the multi buy

Table 9.
Moderated Mediation:
H5 and H6

Direct effect	Coefficient	p-value
Product Information Failure → Expectation towards retailer	-0.010	0.706
Indirect effect	Effect	95% CI
Product Information Failure → Severity of Product Information Failure → Expectation towards retailer	-0.064	[-0.096, -0.037]
Index of moderated mediation	Index	95% CI
Product Information Failure → Attribution of controllability and stability (Mod.) → Severity of Product Information Failure (Med.) → Expectation towards retailer	0.052	[0.017, 0.090]

Source(s): Table by author

deal is incorrectly priced ($M_{EG5} = 5.94$, $SD_{EG5} = 1.16$), followed by a missing product image ($M_{EG2} = 5.56$, $SD_{EG2} = 1.17$) and a missing product description ($M_{EG1} = 5.44$, $SD_{EG1} = 1.11$). See [Table 10](#) for further information.

Moderating impact of mobile shopping experience

Finally, a moderation analysis investigated the impact of shopping experience on the effect of PIF on the perceived severity of PIF. The overall model was significant, $F(3, 754) = 7.00$, $p < 0.001$, predicting 2.89% of the variance. The results show that shopping experience moderated the effect between the occurrence of PIF and perceived severity of PIF significantly, $\Delta R^2 = 0.68\%$, $F(1, 754) = 5.30$, $p < 0.05$. This confirms [H7](#).

Discussion

Theoretical implications

Expanding service failure literature to the mobile context. Service failures are widely discussed in the online retailing and e-commerce literature as they result in considerable foregone sales and ultimately profit losses for companies. It has been repeatedly demonstrated that service failures negatively influence consumer attitudes and purchasing behaviour ([van Vaerenbergh et al., 2014](#); [Hess, 2008](#)). These key findings of the service failure literature are confirmed in the context of PIFs in mobile commerce environments in this paper. Consequently, the assumptions and conclusions of service failures in general are supported as well as expanded on m-commerce settings.

Establishing the consequences of mobile service failures. As consumers' satisfaction ([del Río-Lanza et al., 2009](#); [Maxham and Netemeyer, 2002](#)) and attitudes towards an online retailer ([MacKenzie et al., 1986](#); [Najmi et al., 2012](#)) are considered to be significant factors in affecting behavioural or attitudinal online shopping outcomes, significant emphasis is placed on them in the context of this study. Based on disconfirmation theory ([Woodruff et al., 1983](#); [Zeithaml et al., 1993](#); [Oliver, 1980](#)) and the theory of reasoned action ([Fishbein and Ajzen, 1975](#)), the mediating role of satisfaction and attitude could also be demonstrated in the present work. Thus, we confirm the existing literature and widen it to the specific context of mobile e-commerce.

Introduction of product information failures as a new online service failure category. Until now, informational service failures have been largely underrepresented in the literature ([Narang et al., 2021](#); [Rohden and Matos, 2022](#)), and few studies deal with website related informational service failure ([Roy et al., 2022](#); [Khalifa and Liu, 2014](#); [Pizzutti and Fernandes, 2010](#)). This study expands the literature by analysing six specific PIFs and contributing value by finding that different PIFs lead to different outcomes. There are types of PIFs that have more negative impacts than others, such as missing product images and incorrect

Expectations towards the retailer	Mean	SD
<i>Product Information Failure</i>		
Type 1: Missing Product Description (EG1)	5.44	1.11
Type 2: Missing Product Image (EG2)	5.56	1.17
Type 3: Missing Original Selling Price (EG3)	5.27	1.24
Type 4: Missing Promotional Savings Message (EG4)	4.50	1.28
Type 5: Incorrect Pricing of a Multi Buy Deal (EG5)	5.94	1.16
Type 6: Low Product Rating (EG6)	5.04	1.26

Note(s): Expectations towards the retailer

Source(s): Table by author

Table 10. Descriptive statistics per type of product information failure

pricing of a multi buy deal. Further, there are PIFs which have no consequences at all such as a missing promotional savings message. These findings have their origin in the assumptions of information gap theory (Ben-Haim, 2019) and fairness theory (Folger and Cropanzano, 2001; McColl-Kennedy and Sparks, 2003).

Implementing the moderating effect of attribution of product information failures and resulting expectations. The moderating effect of attribution of controllability and stability (Xu *et al.*, 2020; Harris *et al.*, 2006) as well as expectations towards the retailer (Khalifa and Liu, 2014; Chen *et al.*, 2018b) have been assessed in online shopping environments. This study emphasizes the dependent relationship between the attribution of a PIF and subsequent customer expectations towards the retailer. Based on literature relating to psychological contracts (Rousseau, 1989; Morrison and Robinson, 1997) and perceived betrayal (Grégoire and Fisher, 2008; Montes *et al.*, 2015), the relationship is theoretically supported. Understanding the implications of such a relationship can be used to derive preventive measures and recommendations for managerial actions. When consumers consider a service failure to be the fault of the retailer and its duration is prolonged, the severity of the failure increases. In turn, because consumers think it is the retailer's responsibility, they expect greater compensation for the mistake.

Highlighting the difference of perceived severity and recovery expectations of product information failures. The most severe perceived PIFs are not the ones with the greatest recovery expectations, they are ranked differently (see Tables 7 and 10). Whereas missing information, such as missing product images, are considered the worst, consumers are more likely to expect correction for incorrect information, such as incorrect pricing of a multi buy deal. Missing information is therefore more likely to be forgiven than false information, and false information therefore requires more previous amends than missing information. Based on the assumptions of psychological contracts (Montes *et al.*, 2015), it can therefore be assumed that the contract violation by false or incorrect information is perceived more severe than for merely missing information.

Revealing the moderating effect of mobile shopping experience in the context of product information failures. This paper further expands the existing literature by adding the moderator of mobile shopping experience. Previously, only online shopping experience was assessed (Pizzutti and Fernandes, 2010; Sengupta *et al.*, 2018; Omar *et al.*, 2021). This study confirms that if a consumer already has experience in mobile shopping, the negative effect of service failure on shopping outcomes decreases. In other words, when experienced mobile shoppers encounter a service failure, it is not as bad as when inexperienced ones do. This approach confirms the assumptions of the mere-exposure effect, where repeated occasions lead to a positive influence on consumers' behaviour (Zajonc, 1968; Harrison, 1977). Therefore, the focus of prevention and recovery measures of PIF should be prioritized on new customers rather than on experienced ones.

Managerial implications

Product information failures demand attention. Retailers need to understand the effects of their most common PIFs and the root causes behind them. This paper demonstrates that even the least serious of PIF has a negative impact on customer behaviour. In an increasingly competitive online retail environment, retailers need to consider their resource allocation in respect to the prevention, monitoring and remediation of PIFs.

Raising the profile and importance of product information failures. Retailers should incorporate PIFs information into management reporting packs. Individually, PIFs maybe considered less egregious than some online service failures but the authors' experience sees websites with many thousands of PIFs that cumulatively represent a management level noteworthy risk to the future success of their company. This research has shown that both

individual consumer behaviour is impacted as well as their levels of retailer recommendations and therefore represents a compound risk to future sales.

Mobile focus first. With nearly 60% of online shopping being executed via the mobile channel, retailers need to change how they review the accuracy and comprehensiveness of their online information. Experiential evidence from the authors shows that retailers review, audit, their online product pages via “at work” desktop/web interfaces rather than through mobile devices, mobile apps or their emulations. While much of the product information seen online will be distributed to both web and mobile channels, there are situations where mobile applications can introduce product information issues that are not seen in the online web version. As such, issues will be apparent to a customer using the mobile channel but the retailer, who is auditing via the webpage, will not be aware of these issues. It is imperative that retailers see and audit all manifestations of their online product information to avoid product information service failures impacting customer satisfaction and potentially sales.

Inexperienced mobile shoppers are more sensitive towards product information failures. When examining new customer conversion statistics, retailers should include the extent of PIFs occurrences for that period. Movements in customer conversion rates, while impacted by many factors, can also be influenced by the quantum of PIFs. This is particularly important when new customer conversion performance is lacking given that this research shows that customers less experienced with a brand/retailer will react more harshly in the face of PIFs. By monitoring and reporting the extent of PIFs, management are able to better diagnose the reason for changes in customer conversion and therefore apply resources more appropriately to remediate any issues.

Limitations and future research agenda

As with all empirical research, this study has some limitations. The paper deals with the six most common service failure of a leading UK online fashion retailer and its target customers. In turn, the results represent a specific case and should be replicated. Future research should survey more PIFs of online fashion retailers. The research setting could be expanded across all retail sectors to include additional types of service failure beyond those occurring in online fashion retailing and considered here. Clearly, the examined sample represents a specific clientele, so subsequent studies could explore respondents across wider age ranges and exhibiting greater gender balance. Additional variables could also be integrated into this research context, including moderating variables such as shopper type (hedonist vs utilitarian) or product type (hedonic vs utilitarian). Lastly, future research might adopt and test recovery measures with regard to the six PIFs examined in this research to deepen our understanding of appropriate management responses to this important ongoing retailing challenge.

Conclusion

To conclude, this paper investigates PIFs as a new category of online service failures, where product information is incomplete or inaccurately displayed. In addition, this research is the first to address online service failures in the context of mobile shopping. The findings reveal that there is a negative impact of PIFs on both shopper attitude and behaviour. Various PIFs are perceived differently though, with the types of failures involving missing product images and incorrect pricing of a multibuy deal perceived as more severe than others. The results also suggest that retailer induced PIFs lead to a high level of customers’ expectations to receive recovery from the retailer. Further, inexperienced mobile shoppers have a higher perceived severity of service failure in comparison to experienced ones. Based on these findings, retailers should pay far greater attention to identifying, reporting and correcting PIFs across both desktop and mobile channels.

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(The Appendix follows overleaf)

(1) Start of your shopping journey on your mobile phone:

Please imagine that you are going to buy knitwear over the web using your smart phone. You do not want to spend too much and look for something classy you can wear on different occasions.

(2) The product search on websites:

After a good search of different retailers' websites, you end up on a gallery webpage of XY (retailer's name) where you see different jumpers that come close to what you were looking for.

(3) Detailed examination of the chosen product:

You click on one of the suggested products that give you more detail. On that page you can have a good look at the colour, the fit and the fabric. To be sure you want to closely inspect all the relevant product information to make a good decision.



Figure A1.
Scenario description:
no service failure

Source(s): Figure by authors

(4) Your purchase decision:

Please answer the following questions assuming that you can afford this piece of knitwear you like it and it will fit you.

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