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Shopping app features: their impact on customer satisfaction and loyalty

Kathrin Sinemus[a], Stephan Zielke[a] and Thomas Dobbelstein[b,c]

[a]Walbusch Chair of Multi-Channel-Management, University of Wuppertal, Wuppertal, Germany; [b]Chair of Market Research, Baden-Württemberg Cooperative State University of Ravensburg, Ravensburg, Germany; [c]Faculty of Management Sciences, University of Technology of Durban, Durban, South Africa

ABSTRACT

Shopping apps support consumers in their shopping process at different stages of the customer journey. They can contain various features, such as an online magazine, shipment tracking or a QR code Scanner. Consumers have the possibility to send product links to friends, chat with retailers' staff, participate in loyalty programs, find a physical store nearby or pay within the app. Consequently, app features represent several touchpoints within the customer journey. Shopping apps are an attractive way for retailers to engage with their customers and increase customer satisfaction and loyalty. Several studies mainly focus on the adoption of mobile apps, while our study investigates the potential outcomes. It further considers the app design by analysing how three app feature groups (pre-purchase, transaction, cross-channel) influence app and retailer satisfaction. Moreover, we consider consumers' channel preference at different stages of the customer journey. To validate our findings, we conducted the study in three different retail sectors. Results show that nearly all feature groups have a positive impact on customer satisfaction with the app and retailer respectively in different sectors. However, consumers' channel preference has a moderating impact on the relationship between app features and customer satisfaction. Our findings provide implications on how to design and advertise shopping apps.

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App features; channel preference; shopping apps; satisfaction; loyalty

Introduction

The range of mobile applications (hereafter 'apps') and their use are increasing (Ahuja and Khazanchi 2016; Boyd, Kannan, and Slotegraaf 2019; De Haan et al. 2018; Herhausen et al. 2019; Verhoef et al. 2017). This poses challenges for retailers, as they have to develop apps to meet customer expectations and thereby create satisfaction and loyalty. Designing apps with features that customers perceive as useful is a challenge, as 91% of downloaded shopping apps are no longer used after 30 days (Statista 2020). Retailers have to address this issue in the app design process.

Shopping apps are defined as mobile apps that are edited and branded by a specific retailer (Bang et al. 2013). Their quick and convenient use is advantageous for consumers (Kim and Baek 2017) and shopping app features support consumers during their shopping

CONTACT Kathrin Sinemus Sinemus@wiwi.uni-wuppertal.de

process. With such features, consumers have the option to find a physical store nearby (Fang 2019), chat with retailers' staff (Roggeveen and Sethuram 2020), pay within the app (Grewal, Roggeveen, and Nordfält 2017), or send a product link to family and friends (Fuentes and Svingstedt 2017; Zhao and Balagué 2015). Previous literature has mainly focused on mobile app adoption (e.g., Natarajan, Balasubramanian, and Kasilingam 2017; Roy 2017), while less studies concentrate on app use outcomes, such as customer satisfaction and loyalty (e.g., Omar et al. 2021). However, research emphasizes the importance of customer loyalty (e.g., Herhausen et al. 2019; Omar et al. 2021; Reichheld and Schefter 2000) as loyal customers spread positive word of mouth about the retailer, purchase repeatedly, and are willing to pay higher prices (Bhattacherjee 2001; Zeithaml, Berry, and Parasuraman 1996).

Few studies have addressed the relationship between customer satisfaction and customer loyalty in the mobile app context (e.g., Baek 2013; Chang 2015; Natarajan, Balasubramanian, and Kasilingam 2017). But what satisfies mobile app users so that they subsequently become loyal? Shopping app features that consumers perceive as useful should be important factors. These features can (1) support the pre-purchase stage, e.g., product finding tools (filter) or chats with the staff, (2) support the purchase stage, e.g., data preservation or shipment tracking and (3) enable channel switching, e.g., multi-channel technologies such as click & collect, check & reserve, product availability check, or QR code scanner. Companies have the opportunity to design their app the way they prefer or rather in the way their customers prefer (Taylor and Levin 2014). 'Application design is the degree to which a user perceives that a mobile application is generally designed well' (Hoehle and Venkatesh 2015, 447). According to Zhao and Balagué (2015), many existing apps are not well designed. The question that consequently arises is which mobile app features make customers satisfied so that they use the app in the long-term and become loyal. In this study, we address this question by analysing various app features and their influence on customer satisfaction. Further, we consider that consumers have different channel preferences for the pre-purchase and the purchase stage (Frambach, Roest, and Krishnan 2007). Since shopping app features provide different support for online and physical store purchases, consumers' channel preference might play a role in this context. In particular, we examine the following research questions:

- Are shopping app users more satisfied and loyal toward the retailer than non-users?
- Do different feature groups have a positive impact on customer satisfaction with the app and with the retailer?
- Does the consumers' channel preference moderate the impact of different feature groups on customer satisfaction with the app?

With our study, we contribute to existing literature in several ways. As a first step, we examine whether app users are more satisfied with the retailer and are more loyal toward the retailer than non-users are. As a second step, we classify different app features into systematic groups and analyse their influence on customer satisfaction with both the app and the retailer. Finally, we consider consumers' channel preference, as features support consumers' online and offline activities differently.

Theoretical background and hypotheses

Customer satisfaction and loyalty in the app context

Customer Satisfaction is defined as 'the consumer's fulfillment response. It is a judgment that a product or service feature, or the product or service itself, provided (or is providing) a pleasurable level of consumption-related fulfillment [. . .]' (Oliver 1997, 13). Customer satisfaction is important as prior literature identified customer satisfaction as a key determinant of customer loyalty (e.g., Atulkar and Kesari 2017; Harris and Goode 2004; Lee and Wong 2016; Olsen 2007; Picón-Berjoyo, Ruiz-Moreno, and Castro 2016; Santouridis and Trivellas 2010; Shankar, Smith, and Rangaswamy 2002; Wallace, Giese, and Johnson 2004; Yang and Peterson 2004). Wallace, Giese, and Johnson (2004, 251) define customer loyalty as 'the customer's attitudinal and behavioural preference for the retailer when compared with available competitive alternatives'. Customer loyalty is important for retailers since loyal customers spread positive word of mouth about the retailer, make repeat purchases and are willing to pay higher prices (Bhattacherjee 2001; Zeithaml, Berry, and Parasuraman 1996). In other words, loyal customers increase retailer's success (Lin and Wang 2006; Reichheld and Schefter 2000). Therefore, retailers are interested in a long-term relationship with their customers (Lee and Wong 2016). The relationship between satisfaction and loyalty has also been observed in a mobile application context, although literature on this topic is sparse (e.g., Baek 2013; Chang 2015; Molinillo et al. 2022). In particular, the literature has not compared how app users and non-users differ in their satisfaction with and their loyalty toward the retailer. However, this examination is highly relevant as it can underline the importance of offering shopping apps for retailers. If app users and non-users do not differ in their satisfaction and loyalty, retailers can do without the costly development of an app. If, as we assume, users and non-users do differ, retailers should recognize the relevance of shopping apps and invest in developing an app with features that can satisfy customers. Few studies compare app users and non-users. Kim et al. (2017) show that shopping app users are more experienced with online shopping and smartphone usage than non-shopping app users. Further literature found that app adopters have a higher average spending (Kim, Wang, and Malthouse 2015; Liu et al. 2019) and purchase frequency (Lim, Xie, and Haruvy 2021; Liu et al. 2019), which are related to behavioural loyalty (Yi and Jeon 2003). While this previous research focuses on observed behaviour, we focus on psychological consequences of app usage such as satisfaction and attitudinal loyalty. Bellman et al. (2011) determine that customers change their attitude toward the brand favourably after app adoption. Wallace, Giese, and Johnson (2004) found that customer satisfaction and loyalty are higher for multi-channel users than for single channel users. Similar results were also shown in a study by Kumar and Venkatesan (2005) as they found that multi-channel shoppers have a higher likelihood of being active with the retailer than single-channel shoppers. Furthermore, Herhausen et al. (2019) show that more touchpoints within the customer journey increase customer satisfaction and loyalty. Shopping apps represent an additional touchpoint in the customer journey and additionally, they support using of or switching between different channels of a retailer (Wagner, Schramm-Klein, and Steinmann 2020). Thus, shopping apps have the ability to retain customers due to their flexibility and convenience (Liu et al. 2019). Features such as a QR code scanner ensure that consumers stay with

the same retailer, since they direct them to the retailers' online shop (Trivedi, Teichert, and Hardeck 2020) to get further relevant information for their shopping (Albastroiu and Felea 2015). Their usage can thus also positively influence customer satisfaction while shopping (Hossain, Zhou, and Rahman 2018). Furthermore, the icon of the app on consumers' smartphone is an additional touchpoint as consumers look at their smartphones several times a day (Garg and Telang 2013) and the icon of the shopping app usually includes the retailer name or logo (Bellman et al. 2011). Thus, the consumer is constantly in contact with the retailer. More touchpoints lead to higher satisfaction and loyalty (Herhausen et al. 2019). Furthermore, apps enable a personal communication between the consumer and the retailer via push notifications. The retailer can send information about, e.g., recent promotions or new items (Shankar et al. 2010; Yang and Kim 2012). This form of communication has a positive impact on customer's positive word of mouth (Kim, Yoon, and Han 2016), which is an indicator of loyalty (Yi and Jeon 2003). Hence, the app offers advantages in the shopping process and serves as an additional touchpoint. Therefore, an app has the potential to increase customer satisfaction and loyalty. However, as satisfaction and loyalty can then in turn also increase app usage, the relationship might be more circular and not only one-directional. By this, we mean that consumers first exhibit a certain level of loyalty in order to adapt the app in the first place. But the subsequent use leads to a further increase in loyalty, due to the specific benefits. Overall, we assume that app users are more satisfied and loyal than non-users. Thus, we hypothesize:

H1: App users are more satisfied toward the retailer than non-users.

H2: App users are more loyal with the retailer than non-users.

The impact of shopping app features on customer satisfaction

Previous literature deals primarily with the adoption of mobile apps (e.g., Natarajan, Balasubramanian, and Kasilingam 2017; Roy 2017; Peng, Chen, and Wen 2014). Influencing factors of app adoption are for example perceived usefulness (Natarajan, Balasubramanian, and Kasilingam 2017; Roy 2017), perceived enjoyment (Natarajan, Balasubramanian, and Kasilingam 2017), or perceived app value (Peng, Chen, and Wen 2014). Some studies examine the outcomes of using mobile apps, such as satisfaction (Baek 2013; Chang 2015; Chou et al. 2013; Iyer, Davari, and Mukherjee 2018; Sarkar and Khare 2018), intention to repurchase (Baek 2013; Iyer, Davari, and Mukherjee 2018; Sarkar and Khare 2018), or positive word of mouth (Sarkar and Khare 2018). However, existing research primarily examines the whole app and does not systematically differentiate between app features. One of the few existing studies considering potential app features in a different context was conducted by Baier and Rese (2020). They investigated the impact of various technologies of a multi-channel retailer on customer shopping satisfaction (e.g., click & collect, in-store returns, product testing, or magical mirrors). However, the authors consider shopping apps as a specific technology and not as a channel in which retailers can implement technologies. Furthermore, the authors take physical store technologies, such as events or beacons into account. Consequently, the study has a broader view on technologies and features respectively. Roggeveen and Sethuram

(2020) wrote a commentary on 40 retail technologies and categorize them in ten areas. This is a broad approach and many of the 40 technologies are usually not implemented in a shopping app. Also, the paper is not empirical. However, we consider its differentiation between the pre-purchase and the purchase stage for grouping single app features for our study.

Due to limited budgets, retailers have to focus on the features that customers value most (Baier and Rese 2020). Not every investment in technologies or features guarantees the expected rate of return (Demko-Rihter and Ter Halle 2015). The mere availability of features does not necessarily lead to their use by customers (Ter Halle and Weber 2014), especially since customers may be overloaded by the shopping opportunities which shopping apps can provide (Fuentes and Svingstedt 2017). Therefore, it is important to understand which features or feature groups positively influence customer satisfaction. The research on shopping app design or rather shopping app features has just emerged (Li et al. 2020). The literature uses different terms for (app) technologies, e.g., multi-channel technologies (Ortlinghaus, Zielke, and Dobbelstein 2019), physical store technologies (Baier and Rese 2020), online and offline features (Ahn, Ryu, and Han 2004; Gao and Su 2018), in-store technologies (Roggeveen and Sethuram 2020), social features (Boyd, Kannan, and Slotegraaf 2019; Zhao and Balagué 2015), personal, or transaction features (Boyd, Kannan, and Slotegraaf 2019). In our study, we focus on three groups of app features with regard to different stages of the customer journey and channel switching between these stages: pre-purchase features, transaction features, and cross-channel features.

Pre-purchase features are features that primarily support the pre-purchase stage online. These features inspire customers (e.g., online magazine, personal recommendations, beauty mirror), support their connection to other people (e.g., chat, video chat, sharing product links), help them to find products easily (e.g., product finding tools, saving favourite items), or to be up-to-date (e.g., inbox). Consumers are able to use these features everywhere (Chang 2015; Kim, Lin, and Sung 2013; Roy 2017), since they merely require an internet connection. All features have in common that they help customers to make the decision about a product. When customers use these features, they are still undecided.

Transaction features primarily support the purchase stage online. These features enable consumers to purchase products, which is in line with the definition by Boyd, Kannan, and Slotegraaf (2019). Consumers have the ability to buy products conveniently as their data is stored (Hoehle and Venkatesh 2015), they are able to track the shipment, to participate in the loyalty program and to get information when the desired product will be available again online (e.g., e-mail with reavailability notification). These features have in common that they function when customers have already made the decision to purchase.

Cross-channel features support channel switching in the pre-purchase, the purchase, and the after sales stage. The difference between cross-channel features and pre-purchase or rather transaction features is that the physical store is involved. Cross-channel features support switching between the online and physical store channel (Wallace, Giese, and Johnson 2004), for example consumers can scan products in the physical store to obtain information about the products online (QR code reader; offline to online) or consumers have the option to return a product in the physical store with the

electronical receipt within the app (online to offline). Furthermore, consumers can use multi-channel technologies to check the availability of products in-store and reserve a product (check & reserve) or pay it in advance (click & collect) before picking it up from the store. During the COVID-19 pandemic, consumers also had the possibility to make an appointment online for shopping in-store (click & meet). In-store, consumers can pay with their digital loyalty card. Moreover, consumers can find the online receipts and the receipts from an offline purchase in the app (electronical receipt). To find the next store, consumers can use the store finder. Consumers can further scan a product in-store and the app shows similar products online (visual search). These features have in common that the online and offline channel are integrated. As they all involve the offline channel, they should be only relevant for customers using this channel.

Until now, literature that examines app features and their influence on customer behaviour is sparse (e.g., Baier and Rese 2020; Daurer et al. 2013; McLean and Wilson 2019). Although, features provide chances to increase customer satisfaction (Baier and Rese 2020). Since there are various potential features, it is important for retailers to find out how the three main types of features (pre-purchase, transaction, and cross-channel) increase customer satisfaction. As previous literature has shown that perceived usefulness has a positive impact on customer satisfaction (Chang 2015; Natarajan, Balasubramanian, and Kasilingam 2017; Sarkar and Khare 2018; Ashraf et al. 2020), we consequently consider the perceived usefulness of shopping app features as independent variables and influencing factors.

Consumers have various shopping motives or goals such as information seeking, search convenience, or service requirements (Verhoef, Neslin, and Vroomen 2007; Heitz-Spahn 2013). Shopping app features can meet consumers' shopping motives through their capabilities and thus contribute to overall satisfaction with the retailer. This is because the fulfilment of shopping motives can lead to increased satisfaction (Christodoulides and Michaelidou 2011). Similarly, previous literature has shown that shopping goal-congruent marketing activities (here promotions) have a positive impact on consumers' attitude (Blom, Lange, and Hess 2021a) and satisfaction (Blom, Lange, and Hess 2021b). We conclude for our study that the congruence of app feature usefulness and consumers' shopping goals leads to higher satisfaction with the app and the retailer.

As the app carries the app features that contribute to the consumers' shopping goals and retailer satisfaction, the satisfaction with the app should mediate the impact of features on retailer satisfaction. Similar to research analysing the impact of product features on customer satisfaction (e.g., Wang, Lu, and Tan 2018), app features could be meaningful drivers of customer satisfaction with a shopping app. Accordingly, Gala, Ghomi, and Wachter (2017) show empirically that the app design has a positive impact on customer satisfaction with the app. We therefore assume that app features positively influence customer satisfaction with the app as they are a part of the app and support consumers in different stages of the shopping process. Satisfaction with the app in turn leads to satisfaction with the retailer, as the app is another touchpoint (Wagner, Schramm-Klein, and Steinmann 2020) and the use of more touchpoints leads to higher satisfaction (Herhausen et al. 2019). Consequently, we assume a mediation effect from the app features via customer satisfaction with the app on customer satisfaction with the retailer. Hence, we hypothesize:

H3: The perceived usefulness of a) pre-purchase, b) transaction, and c) cross-channel features has a positive impact on customer satisfaction with the app.

H4: Customer satisfaction with the app has a positive impact on customer satisfaction with the retailer.

H5: The customer satisfaction with the app mediates the relationship between the perceived usefulness of a) pre-purchase, b) transaction, and c) cross-channel features and customer satisfaction with the retailer.

Consumers' channel preference

Retail customers differ in their preferred channels for the pre-purchase and purchase stage of the shopping process (see Balasubramanian, Raghunathan, and Mahajan 2005). This results in different customer segments, such as pure online shoppers (Herhausen et al. 2019), mostly offline shoppers (De Keyser, Schepers, and Konuş 2015), webroomers (Verhoef, Neslin, and Vroomen 2007), or showroomers (Rapp et al. 2015; Schneider and Zielke 2020).

To take into account that customers have different orientations regarding their channel preference for the pre-purchase and purchase stage, we assume moderating effects from consumers' channel preference on the relationship between the app features and customer satisfaction. Pre-purchase features support consumers in their pre-purchase stage online. They inspire the customer and offer information. Consequently, we assume that the higher the consumers' online pre-purchase channel preference is, the more satisfied they are with an app that integrates useful pre-purchase features. Transaction features support the purchase stage mostly online. Data is stored and consumers can track the shipment. Hence, we expect that the higher the consumers' online purchase channel preference is, the more satisfied they are with an app that integrates useful transaction features. Cross-channel features support channel switching (Wallace, Giese, and Johnson 2004). With the help of cross-channel features, consumers can find the next store to shop, get more inspired by visual search, and get more information about a product by scanning the barcode. As cross-channel features integrate the physical store, we assume that the higher the consumers' offline pre-purchase/purchase channel preference is, the more satisfied they are with an app that integrates cross-channel features. This is because cross-channel features support consumers in their in-store shopping process. In summary, we hypothesize:

H6: Consumers' online pre-purchase channel preference positively moderates the effect of the searching features on satisfaction with the app.

H7: Consumers' online purchase channel preference positively moderates the effect of the transaction features on satisfaction with the app.

H8: Consumers' offline pre-purchase channel preference positively moderates the effect of cross-channel features on satisfaction with the app.

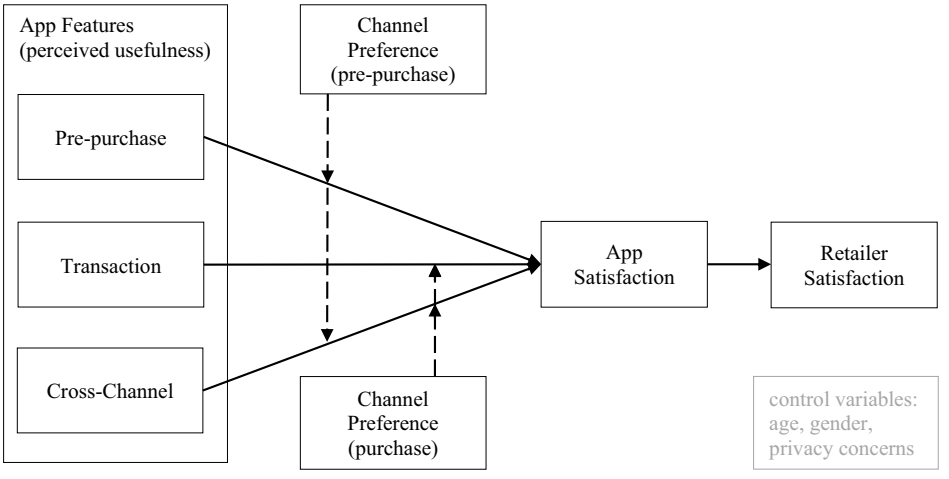

Figure 1. Research model.

H9: Consumers' offline purchase channel preference positively moderates the effect of cross-channel features on satisfaction with the app.

Figure 1 illustrates the research model for the impact of app features (H3 to H9).

Empirical study 1

Data collection and sample

We conducted an online survey study to test our framework. In the study, we asked respondents about their usage and perception of one selected shopping app from a large global multi-channel apparel retailer. We only considered customers who have purchased an item within the last six months (filter question). To be sure that all respondents have at least some basic knowledge about the app features and are able to evaluate their usefulness, we first presented a video about the apparel retailer's app, where we explained all the features. Then, respondents evaluated the perceived usefulness of the single features. We further asked respondents about their usage of and satisfaction with the app, the satisfaction with the retailer, the loyalty towards the retailer, their channel preference, several control variables (e.g., privacy concerns) and demographics.

We collected data from a commercial online panel three times (in three waves) from October 2020 to January 2021 in a European country. After data correction, the final sample for H1 and H2 contains 309 respondents (205 female, 103 male and 1 diverse). The sample includes 200 app users and 109 non-users. App users are those respondents who indicated in all three data collection waves that they have used the app. The non-users did not use the app in all three data collection waves. This ensured that we did not consider random one-time uses for classifying users. To counteract possible causality problems with regard to app usage and loyalty, we only considered subjects who have previously shopped at the retailer under study, i.e. all respondents are customers of the retailer, so that the app could be potentially useful for them. For the analysis regarding H3 to H9 we

only considered the app users from the first wave with 361 respondents (267 female and 94 male) at an average age of 32 years. We did this to avoid possible biases resulting from data collections in the previous waves.

Measurement and method

We measured satisfaction with the app/retailer with three items on a seven-point Likert scale ranging from totally disagree to totally agree adopted from Wangenheim and Bayon (2007). In order to measure customer loyalty, we used four items based on Yi and Jeon (2003) which were also surveyed on a seven-point Likert scale ranging from totally disagree to totally agree. In order to measure channel preference in the pre-purchase and purchase stage, we used two single-items measured on a seven-point semantic differential with endpoints completely online and completely offline, adopted from Emrich, Paul, and Rudolph (2015) and Shim et al. (2001). In order to determine the perceived usefulness of the shopping app features, we asked the respondents on single seven-point Likert scale items how useful they perceive the respective features with endpoints ranging from not useful at all to very useful. We measured the covariates with single items according to Verhoef, Neslin, and Vroomen (2007) and asked the respondents how important the covariates are for them. As feature groups (pre-purchase, transaction, cross-channel) are the independent variables in our model, we summarize respective features in formative constructs. Appendix A shows the assignment of the single features to the three feature groups.

To test the hypotheses H1 and H2, we used propensity score matching (PSM) to counter self-selection effects (Rosenbaum and Rubin 1985) and to eliminate systematic differences between the groups of users and non-users (Rubin and Stuart 2006). As covariates for the binary regression we considered privacy concerns (e.g., Baier and Rese 2020), risk perceptions (touch and feel) (e.g., Thakur and Srivastava 2015), distance to the next physical store (e.g., Herhausen et al. 2019), age (e.g., Fang 2017), and social interaction (e.g., Koenigstorfer and Groeppel-Klein 2012). To test the hypotheses H3 to H5, we focused on the app users and applied structural equation modelling (SEM) with smartPLS, as the constructs of the app features have formative indicators (Hair et al. 2014b). We further tested H6 to H9 using moderation analysis (model 1) with Hayes' SPSS macro PROCESS (see, Hayes 2018). For the analysis we used 5,000 bootstrap samples. We used age, gender and privacy concerns (Verhoef, Neslin, and Vroomen 2007) as control variables.

Results

Model evaluation

Weights and indicator loadings for the three app feature groups are reported in Appendix B. All indicators meet the common guidelines (Hair et al. 2014a). The maximum variance inflation factor (VIF) value for formative measurements is 2.07 and consequently below the threshold of 5 (Hair, Ringle, and Sarstedt 2011). For reflective constructs that are part of the PLS model (satisfaction with the app and retailer), we consider convergent validity with indicator reliability and the average variance extracted (AVE). The indicator loadings are higher than .88 and indicate a good indicator reliability (Hair et al. 2014a). The values

for average variance extracted (AVE) are higher than .50. The heterotrait-monotrait ratio (HTMT) is lower than the suggested threshold of .85 by Henseler, Ringle, and Sarstedt (2015). Further, the 95% bootstrapping confidence interval does not include 1 for the construct combination, which indicates discriminant validity (Hair et al. 2014a). The internal consistency is confirmed as the value for composite reliability is above .70 (Hair et al. 2014a). In addition, the loyalty construct, which is not part of the PLS model but needed to test H1, shows good internal consistency (Cronbach's alpha = .936). Appendix C summarizes the evaluation criteria for reflective constructs.

Testing of hypotheses

We used propensity score matching (PSM) to compare satisfaction and loyalty between users and non-users of the app (H1 and H2). Table 1 shows the covariates considered in the logistic regression. All covariates except the distance to the next physical store have a (marginally) significant impact on consumers app use. Nevertheless, we consider all theoretically based covariates according to the recommendation by Rubin and Thomas (1996).

Table 2 presents the results of the matching. After the matching, none of the covariates has an impact on consumers app use. We further calculated the percentage reduction in bias for a covariate (PRB) (Rosenbaum and Rubin 1985), which indicates a successful matching with a bias reduction greater than .71 for the initially significant relationships.

After successful matching, we tested the hypotheses H1 and H2 using ANOVA. Results show that app users are more satisfied with the retailer than non-users ($F(1,164) = 11.622$; $p = .001$;
$M_{app\text{-}users} = 5.65 > M_{non\text{-}users} = 5.06$). Hence, H1 is supported. Regarding H2, results show that app users are more loyal toward the retailer than non-users ($F(1,164) = 17.497$; $p < .001$; $M_{app\text{-}users} = 5.27 > M_{non\text{-}users} = 4.45$). In consequence, H2 is supported.

Table 1. Estimates of logistic regression.

Predictor	estimate (standard error)	Wald	p-value
Intercept	1.397 (.958)	2.127	0.145
Gender	−0.903 (.269)	11.252	0.001
Privacy concerns	0.181 (.104)	3.031	0.082
Purchase risk	−0.309 (.130)	5.596	0.018
Social interaction	0.341 (.068)	25.016	0.000
Distance	−0.039 (.958)	0.062	0.528

Table 2. Results of matching.

Before matching				After matching			PRB^2
Non-users N = 109	App-users N = 200	p-value	Predictor c = .05	Non-users N = 83	App-users N = 83	p-value	
1.44	1.28	.001	Gender	1.33	1.34	0.870	0.94
5.67	5.98	.074	Privacy concerns	6.02	5.93	0.660	0.71
6.00	5.90	.012	Purchase risk	5.95	5.93	0.887	0.80
3.39	4.54	.000	Social interaction	3.80	3.93	0.655	0.89
3.66	3.46	.515	Distance	3.39	3.51	0.714	0.40

Note: C = caliper (tolerance measurement for distance in matching); PRB: percentage reduction in bias for a covariate.

For evaluation of the structural equation model, we consider the coefficient of determination (R^2), the cross-validated redundancy (Q^2) and the Standardized Root Mean Square Residual (SRMR) (see Appendix D). The R^2 for customer satisfaction with the app is .343 and R^2 for customer satisfaction with the retailer is .521, indicating weak to moderate predictive accuracy (Hair, Ringle, and Sarstedt 2011). The value for Q^2 is .165 for app satisfaction and .298 for retailer satisfaction and consequently larger than zero (Hair et al. 2014b). The SRMR is .059 indicating a good model fit (Henseler, Ringle, and Sarstedt 2016).

Results of the PLS model show that both the pre-purchase ($\beta = .150$; $p = .027$) and transaction ($\beta = .383$; $p < .001$) features have a positive impact on the satisfaction with the app. Cross-channel ($\beta = .054$; $p = .412$) features do not have a significant impact on customer satisfaction with the app. Consequently, results confirm H3a and H3b, but not H3c. Further, we find support for H4. Customer app satisfaction has a positive impact on customer satisfaction with the retailer ($\beta = .665$; $p < .001$). For testing the possible mediation of app satisfaction, we take the total, the direct, and the indirect effect into account. The observation of the total effects shows that the pre-purchase features ($\beta = .174$; $p = .012$) have a positive impact on customer satisfaction with the retailer. Pre-purchase features do not have a significant direct effect ($\beta = .075$; $p = .215$) on the satisfaction with the retailer, but a significant indirect effect ($\beta = .100$; $p = .028$) via app satisfaction, indicating a full mediation. Results are similar for the transaction features. The total effect is significant ($\beta = .228$; $p = .002$). There is no significant direct effect ($\beta = -.027$; $p = .653$) on the satisfaction with the retailer, but an indirect effect ($\beta = .255$; $p < .001$) via app satisfaction. For the cross-channel features the total effect is not significant ($\beta = .121$; $p = .154$). We cannot find a direct effect ($\beta = .085$; $p = .214$) on customer satisfaction with the retailer, nor an indirect effect ($\beta = .036$; $p = .403$) via app satisfaction. In consequence, results confirm H5a and H5b, but not H5c. Following the recommendation by Peng and Lai (2012), we checked and proved the robustness of our findings using regression analysis in SPSS as an alternative method of data analysis. The results are the same.

We analysed moderation effects using PROCESS.[1] Regarding H6, we can find a marginally significant interaction between the pre-purchase features and consumers' pre-purchase channel preference on customer satisfaction with the app ($\beta = .064$; $p = .014$). The higher the pre-purchase offline channel preference, the stronger is the impact of the pre-purchase features on the satisfaction with the app ($\beta_{85thpercentile} = .378$; $p < .001$; $\beta_{16thpercentile} = .118$; $p = .094$). As we measured channel preference on a semantic differential with lower values indicating higher online preference, this means that a higher online preference in pre-purchase stage weakens the effect of pre-purchase features[2]. As we assumed an effect in the opposite direction, this result does not support H6. The results also do not support H7, as we cannot find a significant interaction between the transaction features and consumers' purchase channel preference on customer satisfaction with the app ($\beta = .032$; $p = .252$). Regarding H8, we observe a significant interaction between cross-channel features and consumers' pre-purchase channel preference on app satisfaction ($\beta = .102$; $p < .001$). The higher the consumers' offline pre-purchase channel preference is, the stronger the impact of cross-channel features on customer satisfaction with the app is ($\beta_{85thpercentile} = .448$; $p < .001$; $\beta_{16thpercentile} = .041$; $p < .675$). For respondents with a strong online pre-purchase channel preference, the effect of cross-channel features even diminishes. In consequence, results confirm H8. Further, we can

find a significant interaction effect between cross-channel features and consumers' purchase channel preference on app satisfaction (β = .079; p < .001). The higher the consumers' offline purchase channel preference is, the stronger the impact of cross-channel features on customer satisfaction with the app is ($\beta_{85thpercentile}$ = .410; p < .001; $\beta_{16thpercentile}$ = .092; p = .133). Again, the effect of cross-channel features diminishes for respondents with a high online purchase channel preference. Hence, the results also confirm H9. Appendix E shows all results of moderation effects.

Empirical study 2

Data collection and sample

To generalize the results from study one, we repeated this study in two additional retail sectors: cosmetics and electronics. We slightly modified the design by randomly assigning the respondents to a retailer and tested hypotheses based on data from app users and non-users. We only considered customers who regularly search or purchase from the retailer. We collected data in May and June 2021 during a five-week period. Students participating in a European research seminar distributed the questionnaires via their family and social networks. The final sample for the cosmetic sector contains 279 respondents (190 female, 89 male) with an average age of 32 and for the electronics sector the sample contains 307 respondents (178 female, 128 male, 1 diverse) with an average age of 32.

Model evaluation

Weights and indicator loadings are reported in Appendix B. Almost all indicators meet the common guidelines (Hair et al. 2014a). We also included the few indicators that do not meet the guidelines, as we could not find differences in results after testing the SEM with and without them. Further, according to Hair et al. (2014a) the elimination of formative indicators should be an exception. Appendix C summarizes the evaluation criteria for reflective constructs.

Results

To evaluate the structural equation model, we again consider R^2, Q^2 and SRMR (see Appendix D). The R^2 values for the structural model are weaker than in study 1 (between .227 and .318). The cross-validated redundancy (Q^2) is larger than zero for all endogenous constructs in both sectors. The SRMR indicates a good model fit with values lower than .08 (Hair, Ringle, and Sarstedt 2011).

The results of the structural equation model show many similarities, but also some differences between retail sectors. While the results for the cosmetics app are very similar to the results for the apparel app analysed in study 1, the results for the electronic app differ in several aspects. In contrast to apparel and cosmetics, cross-channel features have a positive impact on customer satisfaction with the electronics app (β = .218; p = .002). Hence, this result confirms H3c. Further, customer satisfaction with the electronics app mediates the relationship between cross-channel features and customer satisfaction with the retailer (total: β = .132; p = .081; indirect: β = .082; p = .008; direct: β = .050; p = .497). In

Table 3. Results of SEM and moderation analysis.

H	path	Fashion	Cosmetics	Electronics
H3a)	Pre-purchase → AppSat	.150**	.323***	.286***
H3b)	Transaction →AppSat	.383***	.225***	.142**
H3c)	Cross-channel→ AppSat	.054	.101	.218***
H4	AppSat → RetSat	.665***	.454***	.376***
H5a)	Pre-purchase → RetSat (total)	.174***	.111	.138*
	Pre-purchase → AppSat → RetSat	.100**	.147***	.108***
	Pre-purchase → RetSat (direct)	.075	-.035	.030
H5b)	Transaction → RetSat (total)	.228***	.134	.176**
	Transaction → AppSat → RetSat	.255***	.102***	.053**
	Transaction → RetSat (direct)	-.027	.031	.122
H5c)	Cross-channel → RetSat (total)	.121	.207***	.132*
	Cross-channel → AppSat → RetSat	.036	.046	.082***
	Cross-channel → RetSat (direct)	.085	.161**	.050
H6	Pre-purchase x OnPre-pPref → AppSat	.064**	.072**	.096**
H7	Transaction x OnPurchPref → AppSat	.032	−.003	.059
H8	Cross-channel x OffPre-pPref → AppSat	.102***	.152***	.131***
H9	Cross-channel x OffPurchPref → AppSat	.079***	.113***	.064

Notes: AppSat = satisfaction with the app; OffPre-pPref = consumers' offline pre-purchase channel preference; OffPurchPref = consumers' offline purchase channel preference, OnPurchPref = consumers' online purchase channel preference; OnPre-pPref = consumers' online pre-purchase channel preference; RetSat = satisfaction with the retailer; ***p < 0.01; **p < 0.5; *p < 0.10.

Table 4. Results of hypotheses testing.

H	Path	Fashion	Cosmetics	Electronics
H1	App-user > non-user → RetSat	Confirmed	Not surveyed	Not surveyed
H2	App-user > non-user → Loyalty	Confirmed	Not surveyed	Not surveyed
H3a)	Pre-purchase → AppSat	Confirmed	Confirmed	Confirmed
H3b)	Transaction → AppSat	Confirmed	Confirmed	Confirmed
H3c)	Cross-channel → AppSat	Rejected	Rejected	Confirmed
H4	AppSat → RetSat	Confirmed	Confirmed	Confirmed
H5a)	Pre-purchase → AppSat → RetSat	Confirmed	Confirmed	Confirmed
H5b)	Transaction → AppSat → RetSat	Confirmed	Confirmed	Confirmed
H5c)	Cross-channel → AppSat → RetSat	Rejected	Rejected	Confirmed
H6	Pre-purchase x OnPre-pPref → AppSat	Rejected	Rejected	Rejected
H7	Transaction x OnPurchPref → AppSat	Rejected	Rejected	Rejected
H8	Cross-channel x OffPre-pPref → AppSat	Confirmed	Confirmed	Confirmed
H9	Cross-channel x OffPurchPref → AppSat	Confirmed	Confirmed	Rejected

Notes: AppSat = satisfaction with the app; OffPre-pPref = consumers' offline pre-purchase channel preference; OffPurchPref = consumers' offline purchase channel preference, OnPurchPref = consumers' online purchase channel preference; OnPre-pPref = consumers' online pre-purchase channel preference; RetSat = satisfaction with the retailer.

consequence, the results also confirm H5c. In contrast to the apparel app, we cannot find support for the interaction between the cross-channel features and consumers' channel purchase preference on customer satisfaction with the electronics app (β = .051; p = .258). Hence, H9 is rejected. Table 3 presents all results in detail. Table 4 summarizes the confirmation or rejection of hypotheses for all three apps (sectors).

Once again, we checked the results for robustness. All results are the same.

Summary and discussion

This study supports the assumption that app users are more satisfied and more loyal toward the retailer than non-users. Further, we show that the perceived usefulness of app features influences satisfaction with the app and with the retailer. All feature groups have

a positive impact on customer satisfaction with the app. Pre-purchase features are important in all sectors as they have a direct effect on customer satisfaction. However, the perceived usefulness of pre-purchase features depends on consumers' pre-purchase channel preference. The perceived usefulness of these features is more relevant for consumers with offline pre-purchase channel preference than for consumers with online pre-purchase channel preference. This effect suggests that the video embedded in the questionnaire acted as an advertisement that increased awareness of the features for consumers with a stronger offline orientation. This results in higher consumer satisfaction because the pre-purchase features additionally support offline-oriented consumers in their product search. Online-oriented consumers already know most of the features (Kim et al. 2017), so that the effect on satisfaction is smaller.

Transaction features have a positive impact on customer satisfaction irrespective of consumers' purchase channel preference. These results are in contrast to our expectations. Transaction features seem important for both consumer groups. Consumers who prefer to buy online need these features to complete their purchase, while consumers who prefer to buy offline seem to value these features regardless of whether they would also make a purchase through the app. In addition, the transaction feature data preservation is necessary in order to use other features such as click & collect, which is relevant for consumers with an offline preference. This holds in all three retail sectors.

Cross-channel features are especially important for electronics. They have a direct effect on customer satisfaction with the app and an indirect effect on retailer satisfaction. The reason could be that electronic products are more utilitarian (Blom, Lange, and Hess 2021b) and information-intensive. Consumers often search for a lot of information before they buy an electronic product (Frasquet, Mollá, and Ruiz 2015). Cross-channel features support the buying process in two cases. In the first case, consumers first search for information on the internet. After getting enough information, they want to touch and see the product in the shop. In this case, multi-channel technologies simplify the buying process as the customers only need to pick up the product in the shop. In the second case, consumers first want to go to a shop to touch and see the product. If customers need more information, they have the option to use the QR code scanner or visual search to get more information. Hence, such technologies might be more relevant for information-intensive products, such as electronics compared to apparel or cosmetics.

For the apparel and cosmetics app, the importance of cross-channel features depends on consumers' channel preference, while cross-channel features have no main effect in these sectors. Consumers' offline pre-purchase and purchase channel preferences strengthen the impact of cross-channel features on customer satisfaction. For consumers with strong online (and weak offline) channel preference, the effect of cross-channel features is small or even non-significant. An explanation might be that cross-channel features are not relevant for customers who do not consider to search and/or purchase in a physical store. This is in line with prior research on channel-based shopper segmentation. Among other segments, literature identified pure online shoppers (e.g., Frasquet, Mollá, and Ruiz 2015; Herhausen et al. 2019), who rarely use the offline channel for shopping particular product groups. Consequently, cross-channel features are irrelevant for such consumers.

In summary, shopping apps seem to be more interesting for consumers who prefer to shop in-store. Based on our findings, we can establish that pre-purchase and cross-channel features are more strongly related to app and retailer satisfaction for this customer segment. An explanation might be that shopping apps are an additional shopping channel for consumers who prefer offline stores. For consumers who prefer the online channel, shopping apps might merely be a substitute for the internet channel, as they can use many features on the website as well. This might lead to cannibalization effects of channels, which occur when channels – here website and app – are very similar in their attributes (Liu et al. 2019). Consequently, consumers with an offline channel preference value the pre-purchase and cross-channel features of shopping apps more than consumers with an online channel preference.

Theoretical implications

Our study extends the existing literature in multiple ways. Firstly, we show that app users are more satisfied and have a stronger attitudinal loyalty toward the retailer than non-users. Previous research has found this relationship only for behavioural loyalty and in a different context. Liu et al. (2019), for example, did not consider the impact on attitudinal loyalty and studied the effect for only one retailer in the non-prescription drugs and cosmetics sector. We considered three benchmark apps from different sectors, following a recommendation by Liu et al. (2019) for further research. Furthermore, we classified app-users based on their continuous usage over different time periods. Previous literature often examines customer behaviour directly after adoption and refers to participants who have used the app once as app users (Kim, Wang, and Malthouse 2015; Liu et al. 2019; Wang, Malthouse, and Krishnamurthi 2015). This approach can cause biases, as customers often use an app more often in the beginning after downloading when the app is new for them and they want to try out different features. This behaviour settles down over time until a continuous or even no usage results (Kim, Wang, and Malthouse 2015). To address this problem, we only refer to participants who have used the app several times over a certain period as app users. Secondly, we classified app features into three feature groups that reflect their use in different stages of the customer journey and channel switching between these stages. Previous literature has mostly considered the whole app as a technology (e.g., Baier and Rese 2020), while we consider the comprehensive range of app features in a mobile app context. Thirdly, we confirm the positive effect of app features on customer satisfaction across retail sectors, but we also observed differences in effects of cross-channel features. This aspect is important as the relevance of app features differs across industries and products. Apparel and cosmetics tend to be more hedonic products while electronics tend to be more utilitarian products that involve more goal-directed search, as the study by Blom, Lange, and Hess (2021b) shows. Consequently, app features vary in their importance depending on the product category. Fourthly, we consider consumers' channel preference in the pre-purchase and purchase stage. The consideration of consumers' channel preference is important as it depends on the situation (Balasubramanian, Raghunathan, and Mahajan 2005), in this study being at the stage of the purchase process. Previous literature often does not consider consumers' channel preference at the pre-purchase and the purchase stage (e.g., Ortlinghaus, Zielke,

and Dobbelstein 2019; Rathee and Rajain 2019; Yu, Sun, and Guo 2019). Our study extends literature by considering the different customer journey stages for analysing app features and channel preferences as prior research is sparse (e.g., Boardman and McCormick 2018).

Managerial implications

The results show that app users are more satisfied and loyal than non-users. Consequently, retailers should invest in app design and advertise their app to promote the particular features and their usefulness. For example, retailers have the option of showing a short video in the app store, where consumers can see the benefits of the app before downloading it. Regarding consumers' channel preference, retailers should promote the app particularly in the offline channel as the offline channel preference strengthens the effect of the perceived usefulness of pre-purchase and cross-channel app features on customer satisfaction. For example, retailers can deploy beauty mirrors in their stores to allow consumers to try products virtually in-store. Sales staff can explain to consumers that they can also use a beauty mirror app feature at home. Another option would be to advertise the beauty mirror app function close to the in-store mirrors.

Further, retailers should try to increase app attractiveness by investing in a comprehensive range of app features, which is contrary to previous literature (Baier and Rese 2020). A comprehensive app design optimally supports consumers in their shopping process. Customers have many more opportunities to choose what suits them when there is a comprehensive range of features. Thus, the app is more likely to meet a variety of consumer needs. Retailers can further inform consumers with offline channel preference about additional cross-channel features via push messages. For example, when consumers search for the next physical store in the app, the retailer can send a push message with information about the availability check feature. Furthermore, a comprehensive range of app features is important to stand out from the mass. As the results by Kim et al. (2017) show, shopping app users generally have more apps installed, but spend less time on each app. Consequently, retailers need to make their app more attractive to customers compared to competing retailer apps. This is particularly important for retailers with a strong offline customer base. Investing in cross-channel features is especially important for retailers selling utilitarian products that require intensive information search. In summary, we can say that it is not enough to have an app that just offers an option to purchase. In this case, retailers would pass chances to increase customer satisfaction and thereby loyalty.

Limitations and further research

Our study has some limitations and offers opportunities for further research. First, the participants selected themselves into the treatment groups. Like previously conducted quasi-experimental studies (Kim et al. 2017; Lim, Xie, and Haruvy 2021; Liu et al. 2019; Wang, Malthouse, and Krishnamurthi 2015), we used PSM to control such effects. The PSM method cannot completely solve the problem (Liu et al. 2019), but the performance of our matching was quite good (bias reduction greater than .71). Another point is the causality problem between app usage and customer satisfaction and loyalty. We have presented our arguments in the theory section and also existing literature suggests this causal relationship (Kim, Wang, and Malthouse 2015; Lim, Xie, and Haruvy 2021; Liu et al. 2019). However, we

also acknowledge that the relationship is not only one-directional. We therefore only hypothesized differences between the two groups of users and non-users. Nevertheless, future research can analyse causal effects of app features on satisfaction and loyalty in longitudinal. Second, we analysed one specific app in each of the three retail sectors. Future studies can examine multiple apps in the same sector to validate the results. Third, we operationalized feature groups as formative constructs to cover the variety of specific features offered in the app. Further research could supplement our analysis by using reflective measures. Such measures would increase comparability of feature perception between apps. In addition, the allocation of individual features could be discussed, for example the visual search. This does not have to be used exclusively in-store. However, we have assigned it to the cross-channel features because the frequency of use seems to be highest here and the use is comparable to the use of the QR code scanner. Alternatively, it would have been possible to assign them to the pre-purchase features. However, the examination confirmed our allocation, as both weights (non-significant) and loadings are worse. Future research could also analyse how customers categorize app features and assign them to different feature groups. Fourth, in our study, cross-channel features include online-to-offline and offline-to-online features. An individual consideration could provide additional insights. Fifth, we do not distinguish between online and mobile channel preference. Further research could examine differences between online and mobile channel preference to investigate differences in browser and app use. Sixth, we included different product groups and assumed in our discussion that these groups differ in their utilitarian and hedonic orientation. Future research could more precisely control and analyse the role of utilitarian and hedonic products or individual shopping orientations. Finally, future studies should analyse the impact of app features in different cultural contexts. While we conducted our study in Europe, Asian customers might have different expectations of app features.

Notes

1. When analysing interaction effects between app features and channel preference, we controlled for the other app feature groups.
2. To calculate PRB, the following formula was used, analogous to Rosenbaum and Rubin (1985, p. 36):
   $PRB = 1 - |(b_M/b_1)|$
   b_M = mean difference between control group and treatment group before matching
   b_1 = mean difference between control group and treatment group after matching.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Kathrin Sinemus is research assistant at the Walbusch Chair of Multi-Channel-Management at University of Wuppertal, Germany. Her research focuses on multi-channel management and consumerbehaviour. Her research interests include mobile applications particularly shopping apps.

Stephan Zielke is professor and holds the Walbusch Chair of Multi-Channel-Management at University of Wuppertal, Germany. His research focuses on multi-channel management and retail marketing. His research interests include analyzing consumer behavior in multi-channel systems, channel integration, multi-channel technologies and pricing issues.

Thomas Dobbelstein is professor at Baden-Wuerttemberg Cooperative State University, Germany and honorary research professor at Durban University of Technology, South Africa. His research focuses on customer behavior and decision processes. His research interests include the use and value of information.

ORCID

Stephan Zielke http://orcid.org/0000-0002-0184-3478
Thomas Dobbelstein http://orcid.org/0000-0003-2852-7587

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Appendix A: Assignment of app features.

Feature	Definition	Availability		
		A	C	E
Pre-Purchase				
Product finding tools	Tools used to find products (e.g., filter)	X	X	X
Saving favourite items	Saves products for later decisions	X	X	X
Chat	Enables interactions with personnel via online chat	X		X
Personal product recommendations	Ads with personal recommendations based on prior searches		X	X
Inbox	An electronic folder in which consumers receive information about promotions or answers from online support		X	
Beauty mirror	A tool which enables consumers to try out clothes/cosmetics virtually with the help of a smartphone camera		X	
Online magazine	Editorial content about latest trends	X	X	
Sharing product links	Sharing product links with friends and family via social media	X	X	X
Transaction				
Data preservation	A tool that saves login, address, and payment data	X	X	X
Loyalty program	Consumers' participation in loyalty programs	X	X	X
Shipment tracking	Tracking shipment after online purchases		X	X
Email for re-availability	An email that informs consumers when a desired item is available again online	X		
Cross-channel				
Payment via QR code	Payment with loyalty card	X		X
Click & collect	Consumers buy the products online and pick them up in-store		X	X
Check & reserve	Consumers reserve products online and pick them up and pay in-store		X	
Electronic receipt	List of the purchased products online and in-store	X		X
Store finder	A tool that helps the consumer to find the next physical store online in the app	X	X	X
QR code scanner	An optical scanning device that scans QR codes or product barcodes with a camera to receive more information about the product	X	X	X
Click & meet	A tool used to make an appointment for shopping in-store		X	X
Visual search	A tool used to find similar products within the app by taking a picture of an item	X		
Product availability check	A tool used to check the in-store availability of an item online		X	X

Notes: A = Apparel, C = Cosmetics, E = Electronics.

Appendix B: Evaluation of formative constructs.

	Apparel			Cosmetics			Electronics		
	VIF	weight	loading	VIF	weight	loading	VIF	weight	loading
Product finding tools Saving favorite items	1.22	.280**	.621***	1.18	.465***	.724***	1.16	.365***.	.629***
Chat	1.26	.449***	.697***	1.29	.214	.598***	1.30	.413***	.761***
Personal product recommendations	1.48	.281**	.719***	-	-	-	1.17	.087	.453***
Inbox	-	-	-	1.37	.093	.524***	1.21	.185	.557***
Beauty mirror	-	-	-	1.31	.084	.481***	-	-	-
Online magazine	-	-	-	1.23	.274**	.562***	-	-	-
Sharing product links	1.55	.345**	.630***	1.44	.115	.515***	-	-	-
	1.53	.149	.626***	1.33	.344***	.679***	1.25	.428***	.731***
Data preservation	1.28	.133	.566***	1.19	.466***	.756***	1.13	.334**	.618***
Loyalty program	1.25	.638***	.871***	1.19	.502***	.779***	1.14	.742***	.903***
Shipment tracking	-	-	-	1.14	.386***	.667***	1.05	.263*	.468***
Email for re-availability	1.3	.476***	.776***	-	-	-	-	-	-
Cross-channel									
Payment via QR code	1.97	.294*	.725***	-	-	-	1.33	-.073	.341***
Click & collect	-	-	-	1.67	.235	.617***	1.72	.534***	.763***
Check & reserve	-	-	-	1.59	-.010	.504***	-	-	-
Electronical receipt	2.07	.016	.660***	-	-	-	1.12	.071	.272**
Store finder	1.36	.585***	.869***	1.32	-.274*	.213	1.16	-.048	.212*
QR code scanner	1.96	.170	.708***	1.12	.357**	.578***	1.36	.526***	.746***
Click & meet	-	-	-	1.44	.304*	.581***	1.83	-.022	.566***
Visual search	1.54	.213	.692***	-	-	-	-	-	-
Product availability check	-	-	-	1.36	.666***	.804***	1.14	.372**	.613***

Notes: ***p < .01; **p < .05; *p < .10.

Appendix C: Evaluation of reflective constructs.

Construct	Items	Apparel	Cosmetics	Electronics
Loyalty toward the retailer	I like X more than other retailers.	.947		
CA	I have a strong preference for retailer X.	.928		
	I give prior consideration to X when I have a need	.927		
	for a product.	.858		
	I would recommend X to others.	.936		
Satisfaction with the app	I am fully satisfied with the X app.	.917	.941	.954
CR	The X app fulfils my expectation.	.918	.933	.935
AVE	Overall, I am very satisfied with the service that the	.914	.945	.933
	X app offers me.	.940	.958	.962
		.839	.883	.895
Satisfaction with the retailer	I am fully satisfied with X.	.913	.927	.954
CR	X fulfils my expectation.	.938	.922	.921
AVE	Overall, I am very satisfied with the service that	.900	.922	.962
	X offers me.	.941	.946	.959
		.841	.853	.885
HTMT		.785	.531	.484

Notes: X is a replacement for the respective retailer; CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted; HTMT = heterotrait-monotrait ratio; to the right of the items is the indicator reliability.

Appendix D: Quality criteria and model fit.

	Apparel		Cosmetics		Electronics	
	AppSat	RetSat	AppSat	RetSat	AppSat	RetSat
R^2	.343	.521	.318	.277	.307	.227
Q^2	.165	.298	.213	.179	.260	.186
SRMR	.059		.061		.059	

Notes: AppSat = satisfaction with the app; RetSat = satisfaction with the retailer.

Appendix E: Results of moderation effects in detail.

Value of moderator	Effect	t	p	BootLLCI	BootULCI
Pre-purchase x online pre-purchase channel preference → app satisfaction					
Apparel					
2.00 (16th percentile)	.118	1.678	.094	−.0204	.2583
4.00 (50th percentile)	.248	5.812	.000	.1645	.3328
6.00 (85th percentile)	.378	5.804	.000	.2502	.5067
Cosmetics					
2.00 (16th percentile)	.286	2.657	.008	.0743	.4990
4.00 (50th percentile)	.431	6.822	.000	.3068	.5556
6.00 (85th percentile)	.575	7.945	.000	.4331	.7185
Electronics					
1.00 (16th percentile)	.278	2.571	.010	.0654	.4921
2.00 (50th percentile)	.375	4.673	.000	.2171	.5329
4.00 (85th percentile)	.567	7.636	.000	.4212	.7137
Transaction x online purchase channel preference → app satisfaction: not significant					
Cross-channel x offline pre-purchase channel preference → app satisfaction					
Apparel					
2.00 (16th percentile)	.041	.675	.499	−.0785	.1606
4.00 (50th percentile)	.245	6.081	.000	.1658	.3242
6.00 (85th percentile)	.448	7.315	.000	.3282	.5696
Cosmetics					
2.00 (16th percentile)	.016	.176	.860	−.1680	.2010
4.00 (50th percentile)	.321	5.078	.000	.1967	.4459
6.00 (85th percentile)	.626	7.506	.000	.4619	.7903
Electronics					
1.00 (16th percentile)	.108	.127	.395	−.1421	.3591
2.00 (50th percentile)	.240	.092	.009	.0586	.4222
4.00 (85th percentile)	.504	.092	.000	.3219	.6866
Cross-channel x offline purchase channel preference → app satisfaction					
Apparel					
2.00 (16th percentile)	.092	1.504	.133	−.0283	.2127
4.00 (50th percentile)	.251	6.182	.000	.1715	.3316
6.00 (85th percentile)	.410	7.128	.000	.2976	.5243
Cosmetics					
2.00 (16th percentile)	.207	2.423	.016	.0390	.3763
4.00 (50th percentile)	.434	6.161	.000	.2957	.5735
6.00 (85th percentile)	.548	6.062	.000	.3701	.7261
Electronics: not significant					