Impact of Mobile Banking Application Interactivity on Consumer Engagement:
An Experiment-Based Investigation

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ABSTRACT

The study aims to examine the impact of mobile banking (m-banking) application interactivity on consumer engagement. The study also analyses the moderation effects of perceived security concerns, consumer innovativeness, and consumer involvement. The study employed a 2 (interactivity: high versus low) × 2 (perceived security concern: high versus low) × 2 (consumer innovativeness: high versus low) x 2 (consumer involvement: high versus low) between-subjects experimental design among 376 Indian bank users. The results indicate that interactivity positively impacts consumer engagement in m-banking applications. The results also show the significant moderating effects of perceived security concerns, consumer innovativeness, and consumer involvement. The findings of the study enrich the online engagement literature by examining the impact of interactivity on consumer engagement in the m-banking context. The results of the study will help banks in enhancing their m-banking application interactivity to enhance consumer engagement.

KEYWORDS

Consumer Engagement, Consumer Innovativeness, Consumer Involvement, Interactivity, Perceived Security Concerns

1. INTRODUCTION

Information technology advancements, internet infrastructure development, and mobile phone penetration have motivated marketers to deliver their services using a mobile phone, and banks are no exception (Shankar et al., 2020). Banks are early adopters of technology in delivering their services and use different channels such as automated teller machines, telephone banking, online banking, mobile banking, as well as near field communication to provide their services (Laukkanen, 2016; Shankar and Kumari, 2016). Among all the banking service delivery channels, m-banking is a cost-effective, flexible, and effective channel (Mullan et al., 2017; Shankar et al., 2020). M-banking platforms provide several benefits to banks and are an effective channel for consumers in accessing banking services (Shaikh and Karjaluoto, 2015; Shankar et al., 2019). A consumer can perform transactions, bill payments, mobile and DTH (a digital satellite TV service) recharges and investment and obtain account information over m-banking platforms in an effortless manner (Shankar et al., 2019). Hence, many consumers tend to adopt m-banking platforms to access banking services. By 2019, the total number of m-banking users exceeded 1.7 billion in India, representing 32 percent of the total adult population (Shankar et al., 2020a). The total number of m-banking users is expected to reach the 150

million mark by 2020 and with 1147.92 million wireless connections and 695.72 million broadband connections, India stands at second position in terms of mobile phone and internet penetration (TRAI, 2020). Hence, this is a massive opportunity for banks to deliver banking services using m-banking platforms. Consumers adopt m-banking applications for using banking services, using which is a critical issue for banks (Jebarajakirthy and Shankar, 2021). Hence, banks have endeavored to enhance consumer engagement over m-banking platforms. As consumer engagement enhances the usage of m-banking platforms, banks are keen to know how they can improve consumers' engagement towards the m-banking application.

Further, consumer engagement also helps in acquiring and retaining m-banking users. Along with the traditional service marketing mix, the mobile application's interactivity plays a crucial role in enhancing consumer engagement over m-banking platforms (Bedi et al., 2017; Islam et al., 2019). Mobile application interactivity improves consumer engagement, enhancing usability and personalization (Lee et al., 2015). The m-banking application interactivity includes the interface navigation, content, user, control, and responsiveness to enhance the consumer experience (Lee et al., 2015). Additionally, the application's interactivity offers several functional and hedonic values to the consumers using banking services over m-banking platforms (Cano et al., 2017; Shankar and Datta, 2019).

Moreover, interactivity also reduces consumers' perceived transaction risks and enhances consumer engagement. Several attempts were made in previous literature to examine the role of website interactivity on consumer responses (Coursaris and Sung, 2012; Hood et al., 2015; Bedi et al., 2017; Islam et al., 2019). However, scant efforts were made to examine the effect of mobile application interactivity in different context (Alnawas and Aburub, 2016; Cano et al., 2017; Islam et al., 2019), and there is a dearth of literature examining the effect of interactivity on consumer engagement towards m-banking applications. However, due to the small screen size, navigation complexity, less compatibility, and complex interface, some consumers are skeptical of using the m-banking application to access banking services. Hence, banks are keen to know how to enhance m-banking application interactivity to enhance consumer engagement. Therefore, this study examines the effect of interactivity on consumer engagement over m-banking application platforms using the stimulus-organism-response (S-O-R) framework. The study also examines the moderating impact of consumer involvement, consumer innovativeness, and perceived security concerns between interactivity and the consumer engagement relationship. Scenario-based experimental studies were performed to examine the proposed hypotheses.

This study is academically and practically significant. From an academic perspective, first, it proposes a framework to show how mobile application interactivity affects consumer engagement. While extant literature has assessed the impact of different socio-psychological factors on consumer engagement in diverse contexts (Carvalho and Fernandes, 2018; Gong, 2018; Meshram and O'Cass, 2018), this study advances the literature by studying the impact of application interactivity on consumers' engagement and considering the moderating role of consumer involvement, perceived security concerns, and consumer innovativeness in the m-banking context. Second, this study extends the application of S-O-R theory in the e-commerce space. While extant literature has applied various theories in the context of consumer engagement, very few studies have applied S-O-R theory to advance the academic literature of both consumer engagement and interactivity. The study also contributes to S-O-R theory by using it to explore the new phenomenon in a new context. Finally, the study's findings will help banks develop effective marketing strategies to enhance consumer engagement while focusing on application interactivity from the practitioners' perspective. The results will also benefit them in leveraging the use of technology to better engage their consumers.

2. UNDERPINNING THEORY AND HYPOTHESIS DEVELOPMENT

2.1 Theoretical Support

The study uses S-O-R theory proposed by Mehrabian and Russell (1974) to provide theoretical support for the relationship between application interactivity and consumers' engagement. The S-O-R model has been extensively used in the consumer behavior literature (Dedeoglu et al., 2018; Kim et al., 2020; Jebarajakirthy and Shankar, 2021). The S-O-R model proposes that environmental cues (stimuli) impact consumers' cognitive state (organism), which drives consumer behavior (response). In this study, the m-banking application interactivity works as a stimuli, which impacts consumer engagement (response), and consumers' innovativeness, involvement, and perceived security concerns (organism) moderate the association between interactivity and consumer engagement towards the m-banking application.

2.2 Effect of m-Banking Application Interactivity on Consumer Engagement

Interactivity refers to the system's capability to better communicate between sender and receiver and communicator (Rice, 1984). There are several perspectives of interactivity, such as the communication process (Lowry et al., 2009), consumer perception (Gao et al., 2010), and technical features (Coursaris and Sung, 2012). The communication perspective of interactivity explains interactivity as the capability of a system to enhance the communication process between sender and receiver (Lowry et al., 2009). From a technical perspective, interactivity is the system's characteristics, including content, navigation, layout, and customer support facilities, which help users connect with marketers in a better way (Coursaris and Sung, 2012). Further, the consumer perception perspective defines interactivity as consumer perception, including functional benefits, hedonic benefits, ease of use, responsiveness, and user control provided by platforms in interacting with marketers (Cyr et al., 2009; Gao et al., 2010, Wu, 2019). In this study, all three perspective approaches have been used to conceptualize m-banking application interactivity. In previous literature, interactivity was found to be a crucial factor affecting consumer behavior; thus, several attempts were made to examine the impact of interactivity on consumer behavioral intention in different contexts (Dholakia and Zhao, 2009; Chang, 2018; Brüggen et al., 2019; Islam et al., 2019; Wu, 2019; Cheung et al., 2020; Wang et al., 2020). Similarly, the m-banking interactivity may enhance the consumer experience over m-banking platforms and engage them via a specific interface (Sunder et al., 2014). Consumer engagement is also affected by the navigation features of online platforms (Shin et al., 2016). The interactivity of online platforms provides several hedonic and functional benefits (Shankar and Jain, 2021) and enhances consumer engagement (Xu and Sunder, 2014). Further, consumers find an interactive online platform with more features more comfortable to use and useful than a less interactive platform; hence, they tend to adopt the former (Islam et al., 2019). Interactive mobile applications also enhance initial trust towards service providers and enhance consumer engagement (Shankar et al., 2020). Different interactive features of a website such as better user control over the content, quick response to the objective, and a multi-attribute product comparison enhance positive consumer response towards the website (Marzuki et al., 2016). Consumers will tend to adopt a m-banking platform if they find it more convenient than offline banking (Shankar and Rishi, 2020). Banks can enhance service convenience by enhancing application interactivity. Based on the above discussion, the following hypothesis has been proposed:

H1: A highly interactive m-banking application has a more favorable impact on consumer engagement compared to low interactive m-banking application.

2.3 Moderating Effect of Consumer Involvement

The consumer behavioral intention towards service providers varies depending on their involvement level (Gamliel et al., 2013; Lee and Bai, 2014). Consumer involvement refers to consumers' perceived relevance of a website based on their needs, interests, and preferences (ÕCass, 2000). Previous studies have determined the crucial effect of consumer involvement on behavioral intention (Algharabat et al., 2018; Shankar and Jebarajakirthy, 2019; Shankar et al., 2020). A consumer with high participation tends to spend more time on online platforms (Islam et al., 2019) and showing more engagement than other consumers. Further, highly involved consumers tend to try new technology and services compared to consumers having less involvement (Shankar et al., 2020). In the m-banking context, less involved consumers are not aware of the different benefits provided in m-banking applications, hence they are skeptical about using m-banking platforms for banking services. Highly engaged consumers find m-banking applications more useful and tend to use them more frequently for banking services (Shankar et al., 2020). Moreover, consumer evaluation of environmental cues varies based on consumer involvement. Highly involved consumers perceive more value in the interactive m-banking application and thus represent more engagement compare to low involved consumers (Shankar and Jebarajakirthy, 2019). Hence, the following hypothesis has been proposed:

H2: *M-banking application interactivity has a more favorable impact on consumer engagement for highly involved consumers compared to consumers with low involvement.*

2.4 Moderating Effect of Consumer Innovativeness

Consumer innovativeness refers to consumers' tendency to try novel products and services (Roehrich, 2004; Adapa et al., 2020). Previous literature has determined consumer innovativeness is a crucial factor in forming consumer behavioral intention in different contexts (Koschate-Fischer et al., 2018; Adapa et al., 2020; Cha, 2020; Hwang et al., 2020). Consumer innovativeness was found to be a significant moderator for the association between environmental cues such as navigation and consumer attitude towards service-based technology (Frimpong et al., 2017; Hwang et al., 2020). Innovative consumers tend to use new technology and explore different interactive features of online platforms; hence, they generally have a positive response. Similarly, creative consumers prefer the m-banking platform for using banking services (Shankar and Rishi, 2020). However, consumers with less innovativeness are skeptical towards the functional performance of online platforms and hence, do not prefer m-banking platforms for using banking services (Shankar and Jain, 2021).

Due to financial involvement, low-innovative consumers perceived several risks in using banking services over m-banking platforms (Shankar and Kumari, 2019). In contrast, innovative consumers show more engagement because they receive several utilitarian and hedonic benefits when using m-banking platforms (Jebarajakirthy and Shankar, 2021). Further, innovative consumers found m-banking applications effortless due to its interactive features (user-friendly navigation, easy information search, relevant and rich content, and better user control) compared to low-involved consumers (Lee et al., 2015). Hence, the following hypothesis is formulated.

H3: *M-banking application interactivity has a more favorable impact on consumer engagement for innovative consumers compared to less innovative consumers.*

2.5 Moderating Effect of Consumer Perceived Security Concerns

Perceived security concern refers to the degree to which consumers believe that the site is not safe from intrusion and that personal information shared over the platform is not protected (Hussien and Abd El Aziz, 2013, p. 561). In the m-banking context, security plays a more pertinent role in financial involvement (Jebarajakirthy and Shankar, 2021). Several studies have explored the impact of security

concern in the online purchasing context (Chen and He, 2013; Nepomuceno et al., 2014; Shankar and Jebarajakirthy, 2019). Due to security concerns, consumers are vulnerable when using m-banking applications (Jebarajakirthy and Shankar, 2021). Consumers with high perceived security concerns have more fear and uncertainty about online transactions than consumers having low perceived security concerns (Shankar and Jain, 2021). Further, consumers who are afraid of misuse of their personal and financial information tend to use offline banking services, whereas consumers who perceive fewer security concerns feel safe performing transactions over online platforms (Frasquet et al., 2015).

Further, consumers who have high perceived security concerns have less or no engagement with online banking platforms; hence, they do not enjoy exploring m-banking platforms (Shankar et al., 2020). In contrast, consumers with low perceived security concerns represent high involvement on the online platform and enjoy exploring m-banking platforms to use banking services (Shankar and Jebarajakirthy, 2019). Furthermore, consumers with more perceived security concerns distrust online banking platforms and tend to visit a bank branch instead of using a m-banking application (Jebarajakirthy and Shankar, 2021). Hence, the following hypothesis is formulated.

Figure 1. Conceptual framework
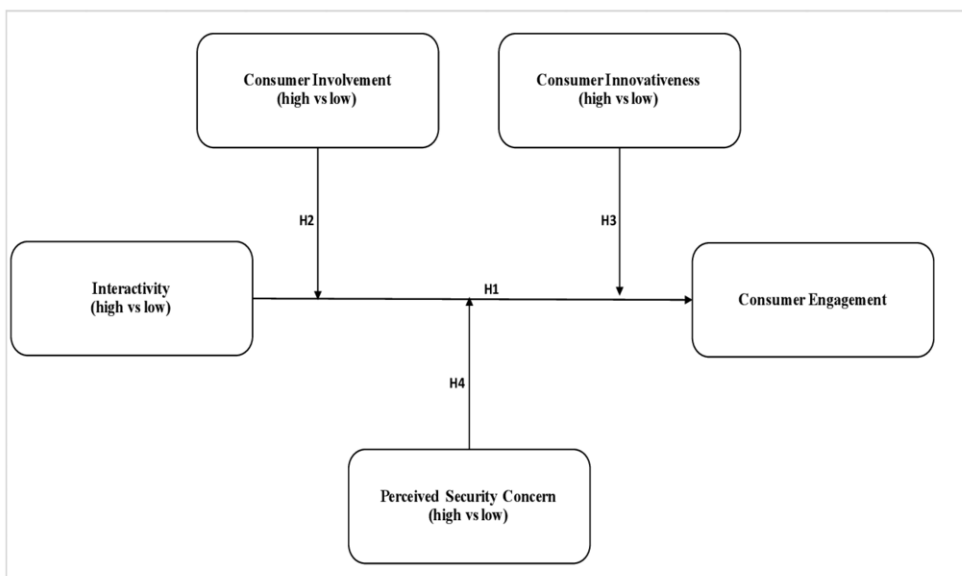
H4: *M-banking application interactivity has a more favorable impact on consumer engagement for the consumer having less perceived security concerns compared to consumers having high perceived security concerns.*

3. METHOD AND ANALYSIS

3.1 Design

A 2 (interactivity: high versus low) × 2 (perceived security concern: high versus low) × 2 (consumer innovativeness: high versus low) x 2 (consumer involvement: high versus low) between-subjects experimental design is employed in this study (See Figure 1). Two scenarios (high vs low interactivity) were developed and further explained in the "*stimuli development*." Both scenarios look alike apart from the change in particular interactive features. In both scenarios, the banks' identity was not disclosed to control the impact of brand equity. Consumer involvement, consumer innovativeness, and consumer perceived security concerns were operationalized using a validated scale. To ensure that data were collected from bank users, we asked one screening question: "Do you have a bank account?" Only respondents who answered "yes" were allowed to undertake the survey.

3.2 Stimuli Development

We manipulated the interactivity; in one scenario, an m-banking application with higher interactive features was used, while in the other, an m-banking application with low interactive features was used (See Table 1). Two dummy versions of the m-banking application (high and low interactive) were devolved for the experiment. These dummy applications had a similar function to the original m-banking application. Content validity of the interactivity manipulation was confirmed by consulting a panel of six experts in the field comprising m-banking, application development, and application interaction about the suitability of the interactivity features. Based on the experts' comments, minor changes were made to the application's interactive features. A set of interactive features had been selected by examining different m-banking applications and previous literature (Coursaris and Sung, 2012; Lee et al., 2015; Shankar et al., 2020). A total of 14 interactive features were used in the study to manipulate the interactivity of the application (See Table 1). The manipulations were made only in the particular interactive features so that both the dummy m-banking applications looked alike. A pilot test was conducted to examine the interactivity manipulation between the two scenarios. A total of 30 university students (M_{age}=23.5 years, 61.2% male) participated. Low and high interactive scenarios were randomly assigned, and they were asked to indicate interactive features on a 5-point Likert scale. Results of the t-test showed that there was a significant difference in interactivity among the scenarios (high and low) used in the experiment.

Table 1. List of manipulated interactive features

- Zoom option	- Sign and symbol
- Multimedia videos	- Images
- Colour	- User reviews
- Customized menu	- Live chat
- Valid link	- Complain tracking
- Personalized screen	- Screen freezing
- FAQ	- Font size

3.3 Administration Procedure

The respondents were selected from students attending two business schools because, first, most of the Indian population is young so, students are a good representation of Indian consumer behavior. Second, e-commerce is part of the course curriculum in all business schools. Students are aware of mobile applications, and their involvement in the experiment would be higher than for other people. Third, according to the Global Mobile Banking Report by KPMG and UBS, India leads the way with the youngest population, average age 30 years, of mobile banking users in the world. Fourth,

according to Business Insider Intelligence's Mobile Banking Competitive Edge Study, 97% of millennials indicated that they used mobile banking. Fifth, using a homogeneous group of students can ensure better control and internal validity (Wang et al., 2016). Sixth, business school students are financially literate and active bank users (Bamforth et al., 2018). Finally, in previous literature, several manuscripts based on an experimental design used students as samples (Islam et al., 2019; Meißner et al., 2019; Sreejesh et al., 2019).

Two scenarios (high and low interactivity) were used to test the impact of the interactivity levels on the m-banking adoption intention. The scenario was randomly allocated to the participants. On the main screen of the dummy m-banking application a short introduction about the nature of the experiment and essential instructions was provided. The same amount of fictitious cash was allocated to each respondent's account to give a feeling of realism. Respondents were asked to enquire about the account information and transfer the funds to established accounts. The transaction process was similar to a real online transaction. After completing both activities, they were asked to respond to a questionnaire. A total of 1,000 students (500 from each institution) were randomly approached by email to participate. A total of 575 students were interested. A total of 400 students participated in the laboratory experiment using the random sampling method. A total of 376 responses were used for data analysis (M_{age}=22.6 years, 54.5% male).

3.4 Measures

The survey instrument was devolved by taking items from a previously validated scale (See Appendix A). The wording of the items was modified to suit the m-banking context. Four items measuring consumer involvement (Cronbach's α= 0.81) were operationalized using four items taken from Gohary et al. (2016). Three items operationalizing consumer innovativeness (Cronbach's α= 0.83) were adopted from Roehrich (2004). Consumer perceived security concern (Cronbach's α= 0.87) was measured using three items taken from Jebarajakirthy and Shankar (2021). Three items measuring consumer engagement (Cronbach's α= 0.79) were obtained from Shin et al. (2016). A 5-point Likert scale, ranging from 1 to 5 (1= strongly disagree, 5= strongly agree) was used to measure the responses.

4. RESULTS

4.1 Manipulation Check

A manipulation check was conducted to examine the interactive manipulation between the two scenarios (high and low). Respondents were asked to indicate their responses on a 5-point Likert scale for interactive features. The result of the independent sample t-test indicated that there was a significant difference (($t\,374) = 7.48$, $p<0.001$)) between the high (M= 4.02, SD=0.89) and low (M= 1.86, SD=1.11) level interactivity. The scenario realism was also examined for both scenarios, and both low (Mean=4.56, SD=.54) and high interactive (M=4.33, SD=.79) applications seemed realistic.

4.2 Hypothesis Testing

A 2 (interactivity: high versus low) × 2 (perceived security concern: high versus low) × 2 (consumer innovativeness: high versus low) x 2 (consumer involvement: high versus low) analysis of covariance (ANCOVA) was performed to examine the proposed hypotheses. A one-way ANCOVA with consumer engagement as the dependent and m-banking application interactivity (high vs low) as the independent variable was performed to examine H_1. The results of the ANCOVA analysis showed that taking the covariate's constant; the m-banking application interactivity had a significant differential effect on consumer engagement (($F\,(1,\,374) = 46.89$, $p<0.001$)) (See Figure 2). High m-banking application interactivity (M = 3.79, SD = .69) has a more favorable impact on consumer engagement compared to low m-banking application interactivity (M = 3.12, SD = .57) (See Table 2). This confirms the acceptance of H1.
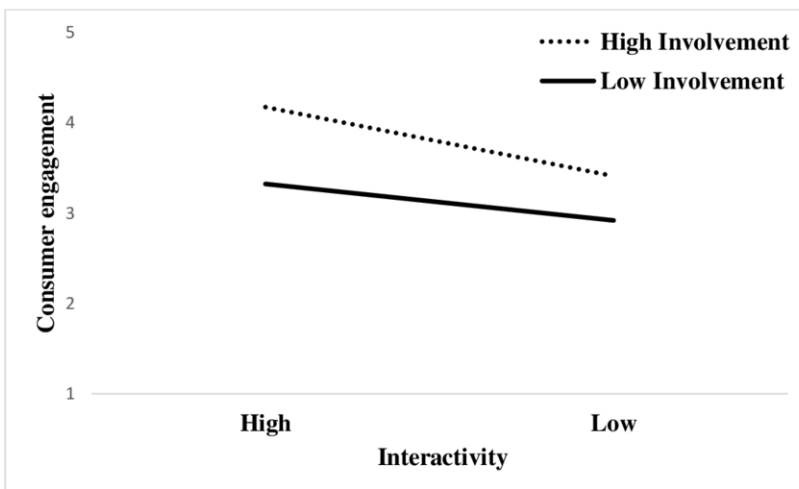
Table 2. Impact of interactivity on consumer engagement

	Consumer engagement	
Interactivity ((F (1, 374) = 46.89, p<0.001))	**Mean**	**Standard Deviation**
High	3.79	.96
Low	3.12	.57

Next, the interactive effect of the m-banking application interactivity and consumer involvement on consumer engagement was examined. The results presented in table 3 indicated that there is a significant interaction effect ((F (2, 373) = 64.56, p<0.001)) of consumer involvement on the association between m-banking application interactivity and consumer engagement. Consumers having high involvement represent a different effect of interactivity on consumer engagement towards the m-banking application (high=4.17 and low=3.32) compared to low-involved consumers (high=3.41 and low=2.92) (See Figure 2). These findings support H2.

Table 3. Moderating effect of consumer involvement on the association between interactivity and consumer engagement

Interactivity ((F (2, 373) = 64.56, p<0.001))	Consumer engagement	
	High consumer involvement	Low consumer involvement
High	4.17(.56)	3.41(.72)
Low	3.32 (.97)	2.92 (.75)

Figure 2. Moderating effect of consumer involvement

Next, the interactive effect of the m-banking application interactivity and consumer innovativeness on consumer engagement was examined. The results showed in table 4 indicated that there is a significant interaction effect $((F (2, 373) = 45.82, p<0.001))$ of consumer innovativeness and m-banking application interactivity on consumer engagement. For innovative consumers, interactivity has a more favorable impact on consumer engagement (high=4.05 and low=3.30) compared to less innovative consumers (high=3.53 and low=2.94) (See Figure 3). These findings support H3.

Finally, the interactive effect of perceived security concerns and m-banking application interactivity on consumer engagement was examined. The results showed in table 5 indicated there is a significant interaction effect $((F (2, 373) = 93.80, p<0.001))$ of perceived security concerns on the association between interactivity and consumer engagement. A consumer with low perceived security concern shows different engagement towards m-banking application (high=4.11 and low=3.27) compared to consumers with high perceived security concerns (high=3.47 and low=2.97) (See Figure 4). Hence, based on the above findings, H4 is supported.

Table 4. Moderating effect of consumer innovativeness on the association between interactivity and consumer engagement

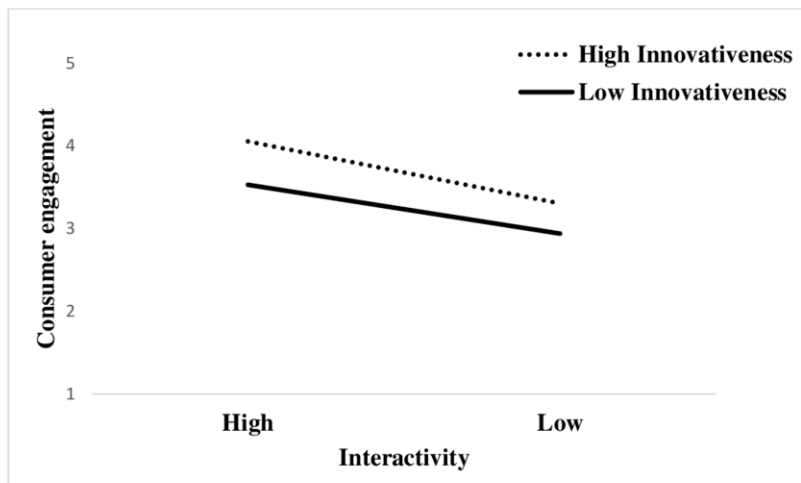| Interactivity $((F (2, 373) = 45.82, p<0.01))$	Consumer engagement	
	High consumer innovativeness	Low consumer innovativeness
High	4.05(.63)	3.53(.55)
Low	3.30(.34)	2.94(.74)

Figure 3. Moderating effect of consumer innovativeness

Table 5. Moderating effect of consumer perceived security concern on the association between interactivity and consumer engagement

Interactivity ((F (2, 373) = 93.80, p<0.001))	Consumer engagement	
	High perceived security concern	Low perceived security concern
High	3.47(.72)	4.11(.85)
Low	2.97(.57)	3.27(.91)

Figure 4. Moderating effect of perceived security concern
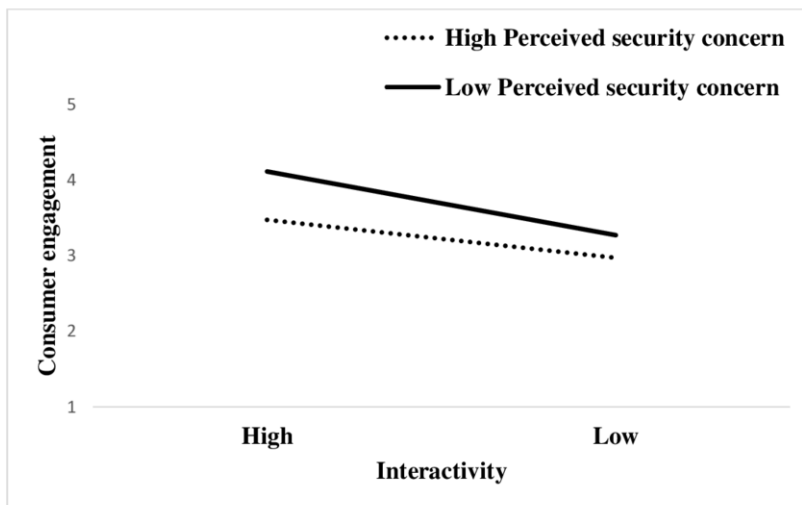
4.3 Common Method Bias

Since the same respondents provided the data for both dependent and independent constructs, there is a possibility of common method bias (CMB). We have used a latent factor test to confirm the non-occurrence of CMB. The results of the common latent factor test indicate that the differences in the factor loading values for measurement items before and after introducing the common latent factor is less than 0.2 (Podsakoff et al., 2003). Thus, the test indicates the absence of CMB. Further, we also added a marker variable in the questionnaire and the correlation between the marker variable and the study constructs was low indicating an absence of CMB (Malhotra et al., 2006).

We also calculated the variance inflation factor (VIF) to examine multi-collinearity. The VIF values were found to be less than 3 for all variables, suggesting the absence of multi-collinearity (Roberts and Thatcher, 2009).

5. DISCUSSION

This study examines the effect of application interactivity on consumer engagement of the m-banking application. Further, this study investigates the moderating impact of the degree of consumer

involvement, consumer innovativeness, and consumer perceived security concerns on consumer engagement in the m-banking application.

The results indicated that interactivity has significant effects on consumer engagement towards the m-banking application. The findings were consistent with previous literature (Lee et al., 2015; Islam et al., 2019). The m-banking application's interactive features reduce information search efforts and effectively provide adequate solutions to the customer. Further, the m-banking application's interactive features offer real-time and accurate information about functioning; thus, consumers perceive the m-banking applications as easy to use. Moreover, better user control over function and interactive navigation make the application easy to use, and consumers respond with high engagement.

The study also investigated the moderating impact of consumer involvement on the association between interactivity and consumer engagement towards the m-banking application. Results showed that consumer involvement significantly moderates the relationship between interactivity and consumer engagement to the m-banking application, which is consistent with previous literature (Quach et al., 2016). Consumers with high involvement found interactive features more useful and tended to engage more compared to low-involved consumers. The results also indicated that consumer innovativeness positively moderates the association between interactivity and the m-banking application. Innovative consumers tended to be more engaged in m-banking applications if they found it interactive compared to less innovative consumers. The findings are consistent with previous literature (Lee and Bai, 2014). Innovative consumers found interactive features more useful and easy to use; hence, they showed more engagement towards m-banking applications than less innovative consumers. Finally, the results indicated that consumer perceived security concerns significantly moderate the association between interactivity and consumer engagement towards the m-banking application. These findings are consistent with the findings of previous studies (Jebarajakirthy and Shankar, 2021). Consumers with less security concerns found interactive applications safe and tended to use them to perform transactions. In contrast, consumers with high-security concerns perceived several risks in using banking services over the m-banking application platform.

6. IMPLICATIONS

6.1 Theoretical Implications

This study carries several theoretical and practical implications. From the theoretical point of view, this study contributes to mobile application interactivity, consumer engagement, and the m-banking literature. This study proposed and obtained support for a theoretical model to examine the effects of interactivity on consumer engagement in the m-banking context. This study carries several academic contributions; first, this study examines the impact of interactivity on consumer engagement towards m-banking applications using a scenario-based experimental method. In previous literature, attempts were made to investigate the effect of application interactivity on behavioral intention in different contexts (Chang, 2018; Brüggen et al., 2019; Islam et al., 2019; Wu, 2019; Cheung et al., 2020; Wang et al., 2020). But little effort was made to examine the effects of interactivity on consumer behavioral intention in the m-banking application context. Hence this study contributes to the interactivity literature. Second, two scenarios (high versus low interactivity) were developed in the study, which varied in terms of the embedded features. The manipulation was compelling, and in the future, this research design may be used in other mobile commerce contexts. Thus, manipulation of interactive features in the mobile application is another contribution in the m-banking context.

Third, this study also contributes to use of the S-O-R model. To date, the S-O-R model has been mainly applied to investigate the influence environmental cues have on consumer behavior. The study extends the application of the S-O-R model to the context of the m-banking application interactivity. This study enriches the S-O-R model literature by proposing a framework that explains how consumer engagement towards m-banking applications is influenced by interactivity. Fourth, the effect of interactivity on consumer behavioral intention is not straightforward; hence, it is required

to examine how the impact of interactivity is moderated or mediated by several socio-psychological variables. Therefore, to understand this mechanism, this study examined the moderating effects of consumer involvement, consumer innovativeness, and perceived security concerns on the association between interactivity and consumer engagement in the m-banking application context.

Fifth, this study also contributes to the m-banking application literature. In the past, attempts were made to examine consumer behavioral intention in the m-banking context (Shankar et al., 2020a); however, little effort was made to investigate consumer engagement. This study contributes to the m-banking literature by examining how interactivity affects consumer engagement towards m-banking applications. Sixth, this study also contributes to the consumer engagement literature. Previous studies examined consumer engagement in a different context, but little effort was made to investigate consumer engagement in the m-banking context. Hence, this study contributes to the consumer engagement literature by examining the effect of interactivity on consumer engagement towards the m-banking application.

Finally, in previous studies, either feature orientation, communication process orientation, or perception orientation were used to conceptualize interactivity. However, this study used all of the above orientations to measure interactivity, which enriches the interactivity literature.

6.2 Managerial Implications

Apart from contributing to the literature, this study carries several practical contributions for banks and m-banking application development teams. The study's findings suggest how banks can enhance application interactivity to improve consumer experience over m-banking applications. The results indicate that interactivity significantly enhances consumer engagement towards the m-banking application. Hence, banks should incorporate interactive features such as enhanced user control, perceived responsiveness, content richness, two-way communication, and perceived personalization in their m-banking applications to enhance interactivity. The banks should also make the m-banking application easy to use to strengthen consumer engagement of the m-banking application. Further, banks should also provide a multi-lingual interface so that consumers can select their preferred language. Banks must ensure that several options, such as live chat, tollfree number, and email, are available for customer support services when using the mobile banking application. Moreover, banks should use rich media content, such as images and videos, to provide information to enhance consumer engagement of the m-banking application.

Further, the results indicated that consumer involvement positively moderates the association between interactivity and consumer engagement of the m-banking application. Hence, banks should provide several promotional offers to encourage consumer involvement. Further, consumer innovativeness also positively moderates the association between interactivity and consumer engagement towards m-banking applications; hence, banks should segment their market according to consumer innovativeness and target those consumers.

The results also indicated that consumers' perceived security concerns negatively moderate the effect of interactivity on consumer engagement towards the m-banking application. Consumer perceived security risk is one of the major hurdles in consumer adoption and usage of the m-banking application. Hence, banks should ensure the safety and security of financial transactions over m-banking applications to enhance consumer engagement of the m-banking application. Banks should also ensure that information shared by consumers over m-banking applications will not be shared with third parties. Inclusion of face recognition and fingerprint recognition should also be provided by banks to reduce the chances of unauthorized login over m-banking applications. Banks should also arrange awareness seminars to reduce consumer security concerns.

7. LIMITATIONS AND FUTURE RESEARCH

The study carries some limitations that may be resolved in future studies. First, the responses for this study were collected from Indian consumers only. In the future, samples from other countries might be considered for generalizing of the findings. Second, this study is cross-sectional in nature. Mobile application design is emerging and very dynamic; hence, longitudinal research should be carried out to validate the study's findings. Third, consumer involvement, consumer innovativeness, and consumer perceived security concerns have been used as moderating variables in this study. In future studies, the moderating impact of other variables, such as consumer skepticism and consumer technological readiness, might be examined to explore the context further. Fourth, we examined the effect of interactivity on consumer engagement. In the future, researchers may examine the impact of interactivity on other consumer behavioral outcomes, such as channel choice, satisfaction, trust, commitment, loyalty, and advocacy. Finally, it is interesting to see differences in the effect of interactivity on consumer engagement based on customer demographic profiles. Similar studies could be conducted between different groups of customers (e.g., between young and elderly customers and between male and female customers), and the results compared. Such studies will provide useful insights to banks to better design their strategies for targeting those specific demographic groups.

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APPENDIX A - ITEMS MEASURING THE CONSTRUCTS

Scenario Realism

This scenario seems realisticWhat is described in this scenario could happen in real life

Consumer Involvement

Using m-banking application would be valuable
Using m-banking application would be involving
Using m-banking application would be needed
Using m-banking application would be relevant

Consumer Innovativeness

I am always seeking new ideas and experiences
I do not prefer a routine way of life to an unpredictable one full of change
I like meeting people who have new idea

Perceived Security Concern

I think m- banking application ensures the safe transmission of its users' information
I think m- banking application shows great concern for the security of any transactions
I think that my financial information will not be intercepted by unauthorized third parties over m- banking application.

Consumer Engagement

Time appeared to go by very quickly when I was using the m-banking application
I felt in control when I was using the m-banking application
I spent more time on the m-banking than I had intended
While using the m-banking application, I was able to block out most other distractions
While using the m-banking application, I was absorbed in what I was doing
While using the m-banking application, I was immersed in the task that I was performing
I had fun interacting with the m-banking application
Using the m-banking application provided me with a lot of enjoyment
Using the m-banking application bored me (Reverse coded)
I felt in control while I was using the m-banking application
I felt that I had no control over my interaction with the m-banking application (Reverse coded)
Using the m-banking application excited my curiosity
Using the m-banking application aroused my imagination
Interacting with the m-banking application made me become interested in it

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