

RESEARCH ARTICLE

Evaluating user satisfaction through service innovation in the mobile internet industry of Bangladesh

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Abstract: This paper questions the belief that more service innovation always leads to higher customer satisfaction in Bangladesh's fast-growing mobile internet market. It explores four dimensions of innovation: customer engagement, technology, process, and service design. Using data from 300 mobile internet users in urban and semi-urban Bangladesh, the study applies PLS-SEM to examine how these dimensions affect satisfaction. The findings reveal that customer engagement innovation has a strong negative effect, as frequent and unwanted brand communication is often seen as annoying and tiring. Meanwhile, technology, process, and service design innovations have only small effects, suggesting that users now see them as standard expectations rather than special benefits. The study introduces digital exhaustion as an important explanation and suggests that firms focus on simplicity, affordability, and reliable service delivery.

Keywords: *Service innovation, User satisfaction, Mobile internet, Structural equation modelling, Bangladesh, Technological innovation, Customer engagement, Emerging markets*

Introduction

Background of the study

The global economy is no longer goods-dominant, but service dominated where value is created in the services, experiences, contact and digital platform more than in goods only (Vargo and Lusch, 2004). Consequently, companies are no longer dealing with competition based on features, but responsiveness of service, its accessibility, the quality of relationships, and experience. In mobile telecommunications the competition has shifted past the coverage and prices to encompass the billing efficiency, the usability of the apps, personalization and the quality of the communication. Therefore, service innovation involves a combination of technological, process, service design, and customer engagement that help in value co-creation (Lusch and Nambisan, 2015; Vargo and Lusch, 2004).

The traditional service literature presupposes the fact that customer satisfaction is increased with the improvement of service performance. This is evident in SERVQUAL model which describes satisfaction in terms of the gap between the expected and perceived performance (Parasuraman et al., 1988). Similarly,

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research on innovation may take the assumption that there is more value and satisfaction when there is more innovation. Nevertheless, all these assumptions were primarily worked out in steady environments and might not be applicable to new and digitally unreliable markets.

Bangladesh is a significant setting, because the mobile internet industry has grown fast, although, it remains in an unstable state of infrastructure, inconsistency of service provision, sensitivity of prices, and digital disparities. Service innovation in this environment might not necessarily bring positive results to the user. This paper considers service innovation as a multidimensional concept which is a combination of Technological Innovation (TI), Process Innovation (PI), Service Design Innovation (SDI) and Customer Engagement Innovation (CEI). These dimensions can affect User Satisfaction (US) in a different manner. Especially, overuse of the engagement practices, including recurring promotions, notifications, and active communication, can result in intrusiveness, cognitive load, and digital fatigue. Thus, this paper will address the issue of the impact of multidimensional service innovation on user satisfaction levels in the mobile internet sector of Bangladesh with a particular focus on whether CEI generates value or dissatisfaction.

Problem statement

Digital service providers largely consider service innovation as a competitive and customer satisfaction tool (Lusch and Nambisan, 2015; Vargo and Lusch, 2004). Nevertheless, the mobile internet sector in Bangladesh has not seen the high levels of user satisfaction due to the high investment done in network upgrades, applications, billing, and the practice of user engagement. This implies that innovation dimensions do not produce positive results in every case.

One of the issues is that current literature tends to view service innovation as one construct with a direct positive impact on satisfaction. This ignores the fact that other dimensions of innovation can have varying results. Specifically, engagement activities with customers that can include promotional messages, reminders, and customized campaigns can create unrealistic expectations that cannot always be met by a provider, thus leading to higher levels of dissatisfaction. Thus, the empirical evidence about the impact of different dimensions of service innovation on the user satisfaction in Bangladesh is limited, as well as whether CEI can increase user satisfaction or mediate the relationship between other innovation dimensions and user satisfaction. In the face of a lack of such understanding, operators are likely to keep investing in unproductive innovation strategies, and policymakers are likely to focus on digital growth without paying enough attention to user welfare and communication overload.

Motivation of the study

There are theoretical and practical issues driving this study. Its theoretical assumption is that one should not simply assume that increased innovation in service will result in increased satisfaction. In practice, the mobile internet market in Bangladesh is a topical case since it is associated with a high pace of development, competition, diversity of infrastructures, and the capabilities of users. The use of digital engagement strategies by service providers is becoming increasingly common, yet when it is felt that the strategy is invasive or out of touch with the real service performance it will have a detrimental impact on satisfaction instead of promoting it. Another reason that motivates the study is that the evidence in the context of an emerging economy should be context specific as much of the literature written has been made in an advanced economy.

Significance of the study

This report is both an academic and a practical study. It has an academic contribution in the sense that it treats service innovation as a multidimensional phenomenon and looks at TI, PI, SDI, and CEI separately relative to the User Satisfaction (US). It also uses the Expectation-Disconfirmation Paradigm (EDP) that provides the explanation of satisfaction in the contrast between the expectations and the actual performance (Oliver, 1980; Oliver, 2014). This is more applicable in the digital services where communication and promotional claims are very influential in influencing the expectations of the user. In practice, the results

can assist telecommunications managers to determine what types of innovation investments enhance satisfaction as well as what ones can result in digital overload. The paper can also be of use to policy makers and regulators that deal with consumer protection, trust and digital governance.

Research objectives

The objectives of the study are:

1. To test the influence of TI, PI, and SDI on CEI in the mobile internet industry of Bangladesh.
2. To determine the direct influences of TI, PI, SDI, and CEI on User Satisfaction (US).
3. To explore the negative or value-destroying nature of the correlation between service innovation dimensions and US by the intervention of CEI.

Research question

1. What are the factors of assessing user satisfaction using service innovation in the Bangladesh mobile internet business?

Reframing structure of the study variables

This paper views service innovation as a multidimensional concept that is composed of TI, PI, SDI and CEI. TI incorporates infrastructural and technical additions. PI is associated with efficiency, simplification of billing, dealing with complaints, and service delivery. SDI encompasses usability, customization, quality of interface and accessibility. CEI incorporates one-on-one communication, offers, initiatives, and online interactions. Dependent variable is User Satisfaction (US) which is an assessment of user on his/her experience with service. TI, PI, and SDI might influence US both directly and indirectly via CEI, but also CEI might lead to expectations and perceived intrusiveness.

Proposed tasks of the study

The research is going to review the pertinent literature, construct a multidimensional model of TI, PI, SDI, and CEI, apply EDP to describe expectation-performance comparisons (Oliver, 1980; Oliver, 2014), employ Service-Dominant Logic (SDL) to describe value creation and potential value co-destruction (Vargo and Lusch, 2004; Vargo and Lusch, 2008), test direct and mediating relations empirically.

Novelty of the study

The research is new since it aims at questioning the belief that a greater amount of innovation will always translate to greater satisfaction, it gives a critical analysis of CEI as a potentially intrusive and cognitive exhausting idea, provides evidence on a relatively new area of study, Bangladesh, as an emerging market, and brings together EDP, SDL and multidimensional service innovation under a single analytical model. Contrary to the predominantly positive perception of engagement in previous research (Payne and Frow, 2005; Payne et al., 2008), both the beneficial and adverse impacts of engagement are considered in this study.

Significance of the study within the Bangladesh set-up

Mobile internet business in Bangladesh is among the rapidly developing sectors of digital services in this country and is at the center of communication, business, education, entertainment and finance. Although a lot of money has been pumped into the fields of innovation and infrastructure, users continue to experience network unpredictability and service failure. Consequently, it is valuable that operators, regulators, and researchers should know how users judge various innovation endeavors.

Overall, this paper states that service innovation does not necessarily enhance customer satisfaction directly and similarly. The results of innovation in Bangladesh mobile internet industry are most probably to be complicated due to the presence of digital expansion and the unstable state of infrastructures and unequal capabilities of users. The analysis of TI, PI, SDI, and CEI concerning User Satisfaction (US) will help the

study to gain a more context-specific insight into service innovation whether engagement-based innovation generates value or brings about digital exhaustion, inflated expectations, and diminished satisfaction.

Literature Review

The literature review will provide a summary of the research presented in the article by Riley and Praed (2010).

The digital services have increased the literature on service innovation and customer satisfaction. Previous researchers tended to believe that higher satisfaction is brought by better service quality and innovation. Recent research, however, indicates that such relationships are more complicated in new digital economies that are characterized by infrastructure unsteadiness, digital disparity, and intensive involvement practices. The current review is based on the top theories and empirical research concerning Technological Innovation (TI), Process Innovation (PI), Service Design Innovation (SDI), Customer Engagement Innovation (CEI), and User Satisfaction (US).

Service-dominant shift and service innovation

Vargo and Lusch (2004) maintained that service, relationships, and interaction produced value as opposed to goods where value is integrated. This applies to the mobile internet services, whereby responsiveness, personalization, and digital interfaces determine user experience. Vargo and Lusch (2008) also stressed the active position of customers in value creation. Nevertheless, the Service-Dominant Logic primarily presupposes the presence of value-generating engagement and is insignificantly concerned with the situations when engagement becomes obstructive or value-destructive. This is a limitation since the current paper assumes that CEI might not necessarily enhance satisfaction.

Satisfaction and quality of service

Parasuraman, Zeithaml and Berry (1988) SERVQUAL model described the idea of satisfaction as the difference between the expected and the perceived service performance. It set a general perception that the higher the quality of service, the higher the satisfaction. Nevertheless, SERVQUAL was constructed in the traditional service context and is not comprehensive enough to reflect the digital challenges of communication overload, intrusive interaction, or digital fatigue. It also fails to draw a line between TI, PI, SDI, and CEI. Thus, it offers a convenient starting point but cannot be used in this research.

User satisfaction and the expectation disconfirmation theory

The primary theoretical basis of the given work is the Expectation Disconfirmation Theory by Oliver (1980) and Oliver (2014). According to this theory, satisfaction is based on reality against the expectations of performance. Positive disconfirmation is more satisfying and negative disconfirmation results in dissatisfaction. This applies very well to the mobile internet services where promotions, technological assertions and service promise must be the factors defining what is expected. In this paper, TI, PI, and SDI are the performance-related factors, whereas CEI is regarded as the expectation-shaping factor. If expectations increase at a pace higher than the performance, there can be dissatisfaction due to the presence of the CEI.

Service innovation as a multidimensional construct

According to Lusch and Nambisan (2015), service innovation was termed as a resource integration and value co-creation process. Their work demonstrates that innovation in service involves improvement of processes, change of service interface, and mechanisms of interaction, in addition to technology. This justifies the application of TI, PI, and SDI as the areas of core innovation and CEI as a mediating process. Nonetheless, the overall approach of their framework is to view engagement as a good thing and fails to properly explain overload or annoyance of extreme engagement.

Customer involvement and open innovation

Chesbrough (2003) opined that companies can obtain competitive advantage through the integration of internal capabilities and external ideas and customer feedback. This is one of the reasons as to why service providers invest in interactive platforms and personalized communication and feedback systems. Open Innovation is a concept that clarifies the strategic foundations of CEI in the current study. Nevertheless, as it does not concern the strategy of satisfaction formation, but innovation, it should be integrated with Oliver (1980, 2014) to discuss the impact of CEI on US.

Customer relationship management and customer engagement innovation

CEI is also supported in the relationship management literature. Payne and Frow (2005) regarded CRM as the strategy process of handling customer relationship and generation of value. Payne, Storbacka, and Frow (2008) focused on value co-creation by means of interactive touchpoints. The studies favor personalizing and being proactive, although they largely presuppose engagement to be advantageous. They fail to state explicitly at which point, the engagement turns invasive or excessive, which causes a significant gap, which the current research fills.

Empirical situation: Mobile internet services in Bangladesh

The context in Bangladesh is significant since the market of mobile internet has grown at a rapid pace yet becomes inconsistent in terms of services, price sensitive and not even digitally literate. According to Rizvi et al. (2021), the market is characterized by quick growth and infrastructural limitations and the ability of various users. Haque et al. (2022) discovered that the level of dissatisfaction still prevails due to fluctuating performance, overcrowding, and unequal service provisions. Their results indicate that visible innovation may not necessarily enhance satisfaction in cases where the delivery of core services is poor. They also suggest that high levels of promotional intensity can raise dissatisfaction in case performance is sporadic.

Connections of literature to the study variables

Technological innovation

Technological Innovation (TI) incorporates infrastructure, speed, reliability and network performance. Bharadwaj et al. (2013) and Yoo et al. (2010) demonstrated that digital infrastructure facilitates interactive service systems, whereas Parasuraman et al. (2005) stressed the influence of digital capability on the electronic services. This promotes a good TI -CEI relationship. Nevertheless, Mick and Fournier (1998) also indicated that speedy technological change could also introduce complexity hence TI does not necessarily enhance US.

Process innovation

Process innovation (PI) incorporates operational efficiency, simplification of billing, access to self-service and quick issue resolution. The researchers Meuter et al. (2000), Homburg et al. (2017), and Tax et al. (1998) determined that self-service technologies promote involvement, efficient processes, and favorable customer experience, respectively, and fair treatment of complaints. This literature facilitates beneficial impacts of PI on CEI and US.

Service design innovation

Service Design Innovation (SDI) incorporates usability, customization, flexibility of services, and package design. Prahalad and Ramaswamy (2004) associated personalization and relevance, Gefen et al. (2003) focused on usability and trust, and Lemon and Verhoef (2016) focused on the consistency of the design in customer experience. This research confirms positive connections between SDI, CEI, and US.

Customer engagement innovation

Customer Engagement Innovation (CEI) incorporates initiatives to talk with customers, customized offers, interactive applications, and digital outreach. Brodie et al. (2011) and Hollebeek et al. (2014) attributed engagement to more positive emotional attachment and customer performance. Nevertheless, Aguirre et al. (2015) believed that over-individualization can cause privacy issues and discomfort. This will argue in favor of the fact that CEI can also minimize satisfaction in cases where engagement is forced.

Literature trends and developments

Three trends are demonstrated in literature. The initial research to highlight was work by Parasuraman et al. (1988), Oliver (1980) and Vargo and Lusch (2004) who highlighted service performance, expectations and interaction. Second, subsequent reports like Lusch and Nambisan (2015), Payne et al. (2008) and Lemon and Verhoff (2016) concentrated on the themes of ecosystems, platforms of engagement, and customer experiences. Third, recent articles like Haque et al. (2022) and Aguirre et al. (2015) indicate that innovation and involvement are not always positive, particularly in volatile and digitally overcrowded worlds.

Research gaps

Several gaps remain. To begin with, the key theories (Parasuraman et al., 1988, Vargo and Lusch, 2004 and Lusch and Nambisan, 2015) were largely constructed in well-established economies and might not be applicable in new markets like Bangladesh. Second, the numerous studies do not distinguish service innovation but instead discuss it as one construct. Third, previous literature largely assumes that engagement by the customers is a good phenomenon, and almost no consideration is made to digital fatigue, intrusiveness, and dissatisfaction. Lastly, there is little literature that explored CEI as a negative mediating variable between service innovation and satisfaction.

Correlations of literature to the current study

The current research fills these gaps by considering TI, PI and SDI as basic innovative dimensions, CEI as mediating variable, and US as the ultimate outcome. It is also largely based on Oliver (1980, 2014), which is reinforced by Vargo and Lusch (2004, 2008) and informed by Lusch and Nambisan (2015), Payne and Frow (2005), and Payne et al. (2008).

All in all, the literature indicates that the relationships among service innovation, engagement and satisfaction are close, yet not uniformly positive. Thus, this research will hypothesize the various dimensions of service innovation to influence user satisfaction in the Bangladesh mobile internet industry differently and whether CEI is a negative mediating variable.

Methodology

The research study used quantitative research design whereby one cross-sectional survey was used to test relationships that were hypothesized between the variables. To examine the measurement model and structural relationships at the same time, the PLS- Structural Equation Modeling (PLS- SEM) was applied in the study. This approach is suitable to develop and test theories in complicated research environments (Hair et al., 2019).

Research environment and background rationalization

The study targeted the mobile internet market in Bangladesh since it is a booming and a highly dynamic market in an emerging economy. This context is significant in that it will enable the study to test the hypothesis whether the theories that were formed in the context of relatively stable and developed markets stand or fall under circumstances of infrastructural instability, tight competition, and varied user qualities. In Bangladesh, the penetration of mobile internet through the program, Digital Bangladesh, has seen the quality of services become a national issue. Meanwhile, inconsistent service duties, price elasticity, unequal

digital proficiency, and mistrust in publicizing communications can likewise have a potent impact on user reaction particularly to CEI.

Sample and data collection

Active mobile internet subscribers between the ages of 18 years and above residing in the major urban and semi-urban regions of the country namely, Dhaka, Chittagong and Khulna were used as the source of data. A convenience sampling method that is not probability was employed. To achieve the coverage and minimize selection bias, hybrid data collection approach was taken: 60 percent of responses were obtained via online questionnaires that were distributed with the help of social media and email, and 40 percent were obtained through face-to-face interview conducted by trained research assistants with the help of tablet in crowded places like university campuses and transport hubs. Overall, 300 responses were received that could be used. The informed consent, voluntary participation, and the confidentiality were adhered to and ethical approval was obtained in the context of the study.

Table 1: Respondent demographics (\$N=300\$)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	175	58.3
	Female	125	41.7
Age	18–24 years	105	35.0
	25–34 years	120	40.0
	35–44 years	55	18.3
	45+ years	20	6.7
	Secondary/Higher Secondary	45	15.0
Education	Bachelor's Degree	180	60.0
	Master's Degree and above	75	25.0
Monthly Income (BDT)	Below 20,000	80	26.7
	20,001 – 40,000	110	36.7
	Above 40,000	110	36.7
Geographical Area	Urban Centers (Dhaka/Chittagong)	195	65.0
	Semi-Urban Areas (Khulna/Others)	105	35.0

Source: Author's own work

Hypotheses

Customer engagement innovation and technological innovation

Technological innovation (TI) involves the application of new technology infrastructure in the improvement of service delivery like, speed of internet, network coverage and reliability of services. Technological infrastructure, as the center of digital engagement systems, will enable firms to interact with customers via touchpoints (Bharadwaj et al., 2013; Yoo et al., 2010), according to the antecedent research. Reliable and quick technological systems endorse the digital service experience and consequently elicit interactive and customized interaction (Parasuraman et al., 2005).

Digital interaction is greatly motivated by the reliability of services and the quality of services performance as it reduces friction and enhances the perceived usefulness (Davis, 1989; Venkatesh et al., 2003). The customers with a sense of security in the connection and the impeccable digital service can interact more with apps, respond to personal offers, and use digital forms of communication (Verhoeff et al., 2010).

In this connection, technological innovation will be anticipated to enhance customer engagement innovation.

H1: Technology innovation has a positive influence on Customer Engagement Innovation.

Customer engagement and innovation process

Process innovation (PI): This refers to improvement of the working processes in an organization, such as simplified billing, self-service, and efficient solutions of issues. The processes are highly efficient, which

simplifies the lives of the customers, and reduces the effort of the service, which adds significantly to the engagement behaviors (Homburg et al., 2017). This is done using self-service technologies that allow customers to learn about service technologies and, as a result, increases their participation and engagement (Meuter et al., 2000).

Information and communications that are streamlined and complaints that are handled efficiently create a feeling of fairness and transparency upon which the interactive engagement platforms are founded (Tax et al., 1998). The efficiency and the responsiveness of the services are also defined by the improvement of the processes, and the firms offer more individualized and timely digital interactions (Ostrom et al., 2015).

Thus, the organization which is innovative in its service processes will be more likely to motivate a customer-level innovation.

H2: Process Innovation has a positive effect on Customer Engagement Innovation.

Service design innovation and customer engagement innovation

Service Design Innovation (SDI) refers to the redesigning of the services that are offered in terms of customizing the services and offering flexible prices and user-friendly interfaces. The service-dominant logic emphasizes the fact that there is co-creation of value during the process of exchange between companies and consumers (Vargo and Lusch, 2004). Individualization and customization increase the perceived relevance that increases the desire to be engaged by the customers (Prahalad and Ramaswamy, 2004).

The user-centered design and layout improve usability by intuition, which has a beneficial effect on the interaction and engagement in the digital environment (Gefen et al., 2003). The service design must conform to the user preferences and cognition since customers react better to tailored information and are more inclined toward digital platforms (Lemon & Verhoef, 2016).

In this manner, customer engagement innovation is bound to be enhanced due to innovative service design.

H3: Service Design Innovation has a positive influence on Customer Engagement Innovation.

Customer engagement innovation and user satisfaction

Customer engagement innovation (CEI) indicates interactive programs, provides that are customized, and electronic communication types that affect customer experience. The engagement programs enhance emotional attachment and experiential value, which are among the largest elements of satisfaction (Brodie et al., 2011; Hollebeek et al., 2014).

However, excessive digital communication or over personalization of information may lead to saturation of information or privacy threat that may also lead to a decrease in satisfaction (Aguirre et al., 2015). In case the engagement strategies are seen as being intrusive or overwhelming, customer ratings will decline.

As a proposal of the conceptual framework, it is hypothesized that CEI influences user satisfaction negatively.

H4: Customer Engagement Innovation has a negative effect on User Satisfaction.

Firsthand implication of innovation to customer satisfaction

Technological innovation has a direct influence on service performance perceptions. The attributes of the performance such as reliability and speed are known to contribute significantly to the satisfaction as has been found in the expectations-confirmation theory (Bhattacharjee, 2001) and service quality theory (Parasuraman et al., 1988). However, there is also a possibility that because of rapid technological changes the cost of complexity and user adaptation will act to reduce satisfaction because of higher costs (Mick and Fournier, 1998).

H5: Technological Innovation has negative impact on User Satisfaction.

Process innovation enhances efficiency in operation and convenience in service which is already predetermined by the drivers of customer satisfaction (Anderson et al., 1994). Fairness has also been

improved based on simplified billing and good complaints redressing mechanisms that influence perceived fairness and quality of services that influence overall levels of satisfaction.

H6: Process Innovation has a direct impact on Customer Satisfaction.

Continuing the same point, service design innovations can benefit customer experience and perceived value (Lemon and Verhoef, 2016). Flexibility and custom packages will promote value-perceptions, which are the essential components of user satisfaction (Zeithaml, 1988).

H7: There is a direct influence of Service Design Innovation on User Satisfaction.

Going in between customer engagement innovation

Customer engagement involves a relational activity which links innovative activities and customer performance (Brodie et al., 2011). The technological, process, and service design innovations of the firms are primarily transformed into satisfaction outcomes in terms of enhanced engagement experiences rather than in terms of actual impacts on performance only (Hollebeek et al., 2014).

The channels of interaction enable the firms to scout the operating and technological proficiency regarding interactive value-creating processes (Vargo & Lusch, 2008). Thus, CEI is likely to mediate the relations between innovation and user satisfaction.

H8: Technological Innovation does not have a significant correlation with User Satisfaction by Customer Engagement Innovation.

H9: Customer Engagement Innovation has an important mediating role in the relationship between Process Innovation and User Satisfaction.

H10: Customer Engagement Innovation is a strong mediating variable between Service Design Innovation and User Satisfaction.

Conceptual framework

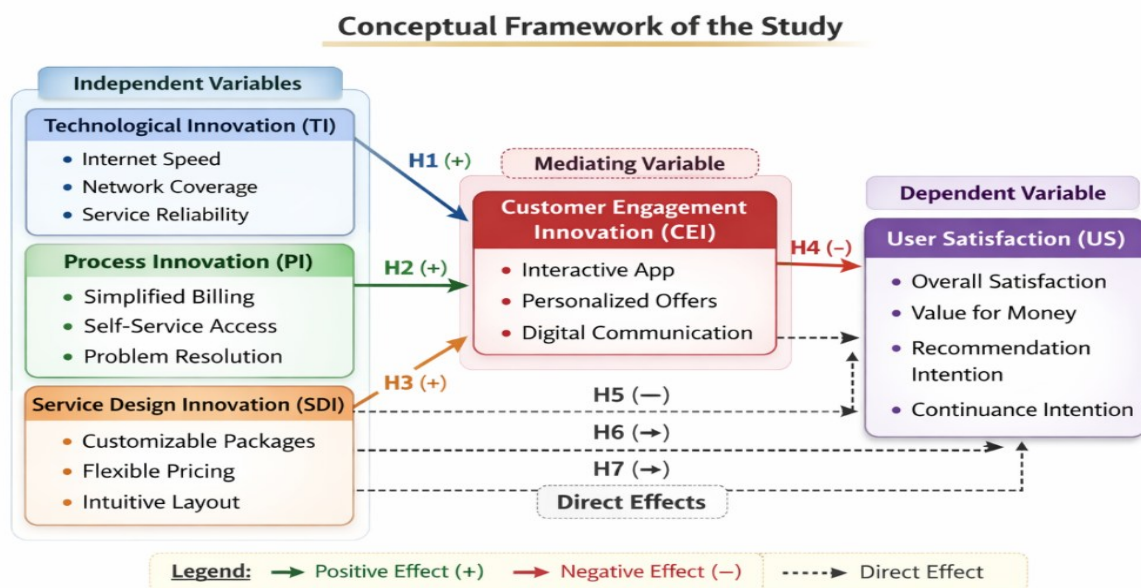


Figure 1: Conceptual framework

Source: Author's own work

Measures

The measures on all the constructs were given in reflective scales that were based on the already existing studies and adjusted to the contextual environment of mobile internet service. The answers were taken on a five-point Likert scale in which 1 = Strongly Disagree and 5 = Strongly Agree.

Table 2: Measurement model and construct operationalization

Construct	Abbreviation	Adapted Source	No. of Items (Original/Final)	Example Item
Technological Innovation	TI	Lee et al. (2015), TSMC	4 / 3	The mobile operator frequently introduces high-speed services (e.g., 4G/5G).
Process Innovation	PI	Chen et al. (2017), IM	4 / 4	The operator has simplified procedures for solving customer problems.
Service Design Innovation	SDI	Lusch and Nambisan (2015), JM	4 / 4	The service interface (app/website) is user-friendly and aesthetically pleasing.
Customer Engagement Innovation	CEI	Payne et al. (2008), JSR	4 / 3	The operator offers unique ways for me to interact with and customize my service.
User Satisfaction	US	Oliver (2014), JCR	3 / 3	I am highly satisfied with the overall mobile internet service provided.

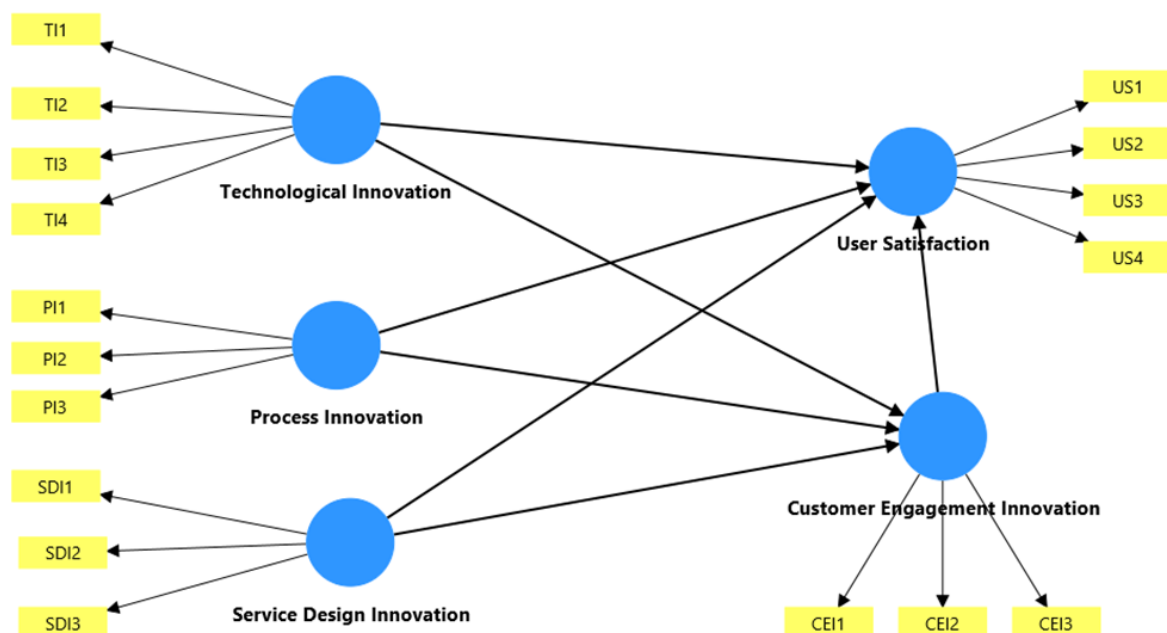
Source: Author's own work

The survey was narrowed down to 17 items and five constructs in the final survey. Complete items are given in Appendix A. To achieve content validity, translation with back translation, expert review and pilot test involving 30 users were used. Some evaluations of the Measurement Model are also done in 3.6.

Evaluation of the measurement model

The model investigates how Technological Innovation (TI), Process Innovation (PI), and Service Design Innovation (SDI) can impact User Satisfaction (US) through Customer Engagement Innovation (CEI), which is a mediator. Measurement of all constructs was done reflectively.

Two of them (CEI2 and TI4) were first eliminated because of weak loadings. The last model demonstrated satisfactory reliability and convergent validity. The Outer loadings were between 0.676 and 0.874, Cronbach 820-0.739, Composite Reliability (CR) 0.836-0.893 and AVE 0.561-0.736. These values comply with suggested thresholds.

**Figure 2: Measurement and structural model diagram**

Source: Author's own work

Table 3: Results of the measurement model assessment

Construct	Items	Loadings (Final)	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted
Customer Engagement Innovation (CEI)	CEI1	0.874	0.745	0.850	0.656
	CEI2	0.688			
	CEI3	0.856			
Process Innovation (PI)	PI1	0.812	0.776	0.870	0.690
	PI2	0.854			
	PI3	0.825			
Service Design Innovation (SDI)	SDI1	0.862	0.820	0.893	0.736
	SDI2	0.840			
	SDI3	0.871			
Technological Innovation (TI)	TI1	0.779	0.773	0.854	0.595
	TI2	0.802			
	TI3	0.709			
	TI4	0.791			
User Satisfaction (US)	US1	0.676	0.739	0.836	0.561
	US2	0.758			
	US3	0.808			
	US4	0.748			

Source: Author's own work

Overall, the measurement model demonstrated satisfactory reliability and convergent validity.

Table 4: Inter-construct correlations and discriminant validity

Construct	PI	SDI	CEI	TI	US
Process Innovation (PI)	0.831	0.479	0.505	0.636	0.874
Service Design Innovation (SDI)	0.479	0.858	0.657	0.523	0.541
Customer Engagement Innovation (CEI)	0.505	0.657	0.810	0.393	0.484
Technological Innovation (TI)	0.636	0.523	0.393	0.771	0.859
User Satisfaction (US)	0.874	0.541	0.484	0.859	0.749

Source: Author's own work

The Fornell Larcker criterion was used to measure discriminant validity. SDI and CEI passed the criterion well. Nonetheless, PI, TI and US had potential of discriminant validity issues due to high inter-construct correlations particularly with US. Thus, in the structural model, these constructs can be taken with some caution.

Common method bias and multicollinearity

Common Method Bias (CMB) was assessed using VIF values. Construct-level VIF values range from When the method is being common, it is sometimes referred to as CMB. Multicollinearity is also a term that is used in the same context. VIF values were used to evaluate the common method, Bias. Construct-level VIFs were between 1.449 and 2.063 and indicator-level VIFs were between 1.322 and 1.977. No significant common method bias was observed since all the values were lower than the conservative value of 3.3. VIF was also used to evaluate the possibility of multicollinearity, and all the values were below the suggested cut-off. It means that the issue of multicollinearity did not occur and the structure estimates are consistent. Evaluation Structural models should enable one to clarify why a particular structure can be observed within a specific environment, especially in relation to its counterparts in that environment where it is typically found.

Structural model evaluation

Structural models must allow one to explain why a certain structure can be found in a certain environment in comparison to its counterparts in the environment in which it is normally found. PLS-SEM was used to

test the structural model. Bootstrapping using 5,000 subsamples and a 95 per cent two-tailed confidence interval was used to test the importance of the hypothesized relationships. The analysis also reports standardized path coefficients (8) of the paths proposed, t-values and p-values to measure the strength and significance of the proposed paths. Moreover, R^2 and q^2 values were also tested to determine explanatory power and predictive relevance of the model

Data Analysis

The results of the PLS-SEM of the 300 respondents that could be used show that the structural model is very highly explanatory. The model has a high predictive power with 91.8% of the variance in the User Satisfaction ($R^2 = 0.918$) suggesting the innovativeness constructs employed alone and in combination can predict the User Satisfaction well. Customer Engagement Innovation ($R^2 = 0.483$) moderated by the antecedent innovation variables is also present.

As far as the postulated courses are concerned:

Concerning direct relations, Process Innovation and Technological Innovation have a very strong, positive and significant effect on User Satisfaction (Process Innovation (0.547, 19.538, $p < 0.001$) and Technological Innovation (0.502, 19.021, $p < 0.001$)). Service Design Innovation (0.017, $t = 0.605$, $p = 0.545$) has a positive but insignificant effect, in its turn, implying that the changes associated with design do not affect satisfaction significantly. Similarly, Customer Engagement Innovation is not a significant direct effect on User Satisfaction ($= -0.001$, $t = 0.040$, $p = 0.968$).

Overall, the findings indicate that Process Innovation and Technological Innovation are the two significant drivers of User Satisfaction and the Service Design Innovation and Customer Engagement Innovation are not so major in this equation. This means that in this respect functional efficiency and technological performance are of greater importance to the users than the engagement initiatives or the service design features singly.

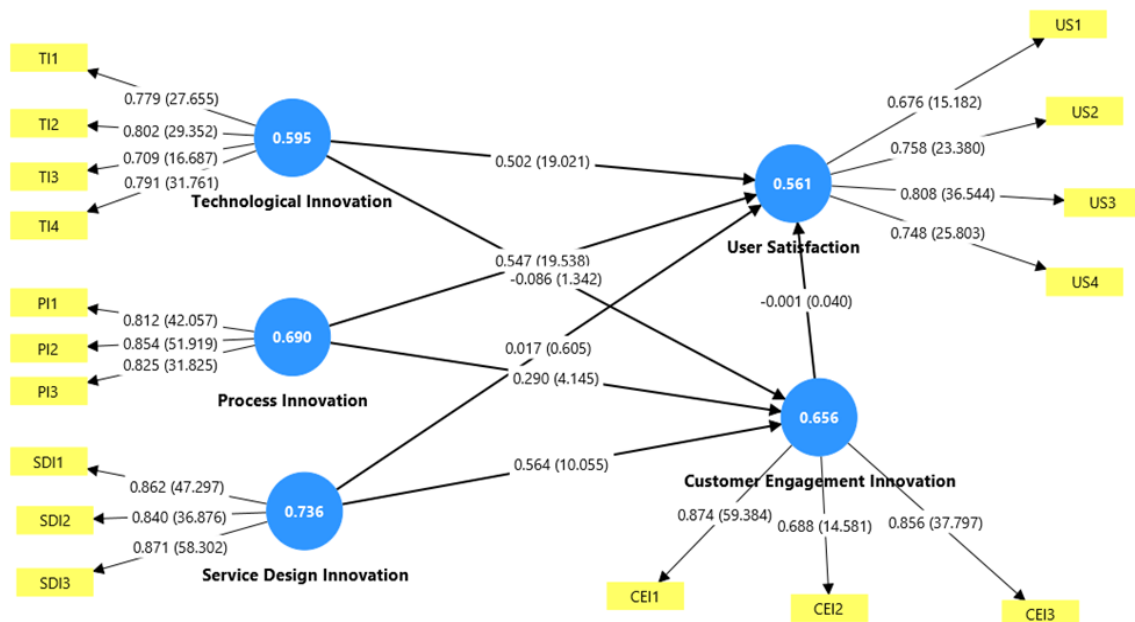


Figure 3: Structural model results

Source: Author's own work

Descriptive statistics

Standardized scores of constructs were computed using descriptive statistics. The data were standardized to PLS-SEM and therefore, all the constructs have a mean of 0.000 with a standard deviation of 1.000. This shows the similarities in distributions among constructs. In general, the respondents demonstrated moderate service innovation and user satisfaction impressions.

Table 5: Descriptive statistics of constructs (N = 300)

Construct	Abbreviation	Mean (μ)	Standard Deviation (σ)	Interpretation of Mean
Customer Engagement Innovation	CEI	0.000	1.000	Moderate perception of engagement innovation
Process Innovation	PI	0.000	1.000	Moderate perception of process improvements
Service Design Innovation	SDI	0.000	1.000	Moderate perception of service design quality
Technological Innovation	TI	0.000	1.000	Moderate perception of technological advancement
User Satisfaction	US	0.000	1.000	Moderate overall user satisfaction

Source: Author's own work

Measurement model assessment

The measurement model was evaluated on the reliability, convergent validity, and discriminant validity. Findings indicate the presence of good reliability and convergent validity. Most loadings were more than 0.70, the Cronbachalpha was between 0.739 and 0.820, the CR was between 0.836 and 0.893 and the AVE was between 0.561 and 0.736.

Table 6: Reliability and convergent validity

Construct	Items	Loadings (Final)	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted
Customer Engagement Innovation (CEI)	CEI1	0.874	0.745	0.850	0.656
	CEI2	0.688			
	CEI3	0.856			
Process Innovation (PI)	PI1	0.812	0.776	0.870	0.690
	PI2	0.854			
	PI3	0.825			
Service Design Innovation (SDI)	SDI1	0.862	0.820	0.893	0.736
	SDI2	0.840			
	SDI3	0.871			
Technological Innovation (TI)	TI1	0.779	0.773	0.854	0.595
	TI2	0.802			
	TI3	0.709			
	TI4	0.791			
User Satisfaction (US)	US1	0.676	0.739	0.836	0.561
	US2	0.758			
	US3	0.808			
	US4	0.748			

Source: Author's own work

Overall, the constructs show satisfactory reliability and convergent validity. Discriminant validity was assessed using HTMT. Most values were acceptable, but the PI–US value exceeded the recommended threshold, indicating a possible discriminant validity issue.

Table 7: Discriminant validity (Heterotrait–monotrait ratio)

Construct	PI	SDI	CEI	US
Process Innovation (PI)	—	0.596	0.639	1.115
Service Design Innovation (SDI)	0.596	—	0.795	0.693
Customer Engagement Innovation (CEI)	0.639	0.795	—	0.604
User Satisfaction (US)	1.115	0.693	0.604	—

Source: Author's own work

Thus, discriminant validity is acceptable for most constructs, but Process Innovation and User Satisfaction should be interpreted with caution.

Structural model and hypothesis testing

Bootstrapping with 5,000 resamples was the method to test the structural model. The model had good explanatory strength in terms of $R^2 = 0.483$ (CEI) and $R^2 = 0.918$ (US). This implies that the model accounts for 48.3 percent of the variance in CEI and 91.8 percent of the variance in US.

Table 8: Results of the structural model (direct path coefficients)

Path	Hypothesis	Coefficient (β)	t-value	p-value	Result
Process Innovation $\rightarrow$ User Satisfaction	H1	0.547	19.538	0.000	Supported
Service Design Innovation $\rightarrow$ User Satisfaction	H2	0.017	0.605	0.545	Not Supported
Technological Innovation $\rightarrow$ User Satisfaction	H3	0.502	19.021	0.000	Supported
Customer Engagement Innovation $\rightarrow$ User Satisfaction	H4	-0.001	0.040	0.968	Not Supported
Process Innovation $\rightarrow$ Customer Engagement Innovation	H5	0.290	4.145	0.000	Supported
Service Design Innovation $\rightarrow$ Customer Engagement Innovation	H6	0.564	10.055	0.000	Supported
Technological Innovation $\rightarrow$ Customer Engagement Innovation	H7	-0.086	1.342	0.180	Not Supported

Source: Author's own work

These findings indicate that Process Innovation and Technological Innovation yield huge boost to User Satisfaction. Customer Engagement Innovation is also highly augmented by Process Innovation and Service Design Innovation. Nonetheless, SDI to US, CEI to US, and TI to CEI were not significant.

Assessment of model fit

Standard indices were used to measure model fit. The value of SRMR (0.121) is higher than the recommended value (0.08), and it does not represent the optimal model fit. The d ULS value of 2.226 is also an indication that there is a certain divergence between empirical and model implied matrices. Thus, the model can be regarded as highly explanatory, but the absolute fit must be viewed with caution.

Table 9: Model fit indices

Fit Index	Saturated Model	Estimated Model
SRMR	0.121	0.121
d_ULS	2.226	2.226
d_G	n/a	n/a
Chi-square	∞	∞
NFI	n/a	n/a

Source: Author's own work

Indirect effects: Mediation analysis

Bootstrapping was performed using 95 percent bias corrected confidence intervals as tests of mediation. All the indirect effects were not statistically significant. Because all confidence intervals contained zero, Customer Engagement Innovation (CEI) is not in the middle of the association between PI, SDI, TI, and US.

Table 10: Results of the mediation analysis (specific indirect effects)

Indirect Path	Hypothesis	Specific Indirect Effect (β Indirect)	t-value	95% C.I. (Lower)	95% C.I. (Upper)	Result
Process Innovation $\rightarrow$ Customer Engagement Innovation $\rightarrow$ User Satisfaction	H2b	-0.000	0.038	-0.018	0.014	Not Supported
Service Design Innovation $\rightarrow$ Customer Engagement Innovation $\rightarrow$ User Satisfaction	H3b	-0.001	0.040	-0.029	0.029	Not Supported
Technological Innovation $\rightarrow$ Customer Engagement Innovation $\rightarrow$ User Satisfaction	H4b	0.000	0.031	-0.005	0.007	Not Supported

Source: Author's own work

In summary, no mediation effect was found.

Discussion and Recommendations

Supported and rejected hypotheses

The findings indicate that Process Innovation (PI) to User Satisfaction (US) is positive and significant (0.547, p 0.001) and Technological Innovation (TI) to User Satisfaction (US) is also positive and significant (0.502, p 0.001). Service Design Innovation (SDI) $\rightarrow$ US, on the other hand, is not significant (0.017, p = 0.545) and Customer Engagement Innovation (CEI) $\rightarrow$ US is also not significant (0.001, p = 0.968). Besides, PI to CEI (0.290, p = 0.001) and SDI to CEI (0.564, p = 0.001) are significant, and TI to CEI is not significant (β = -0.086, p = 0.180). All the indirect effects via CEI are not significant. As such, the direct effects of PI and TI to US are only supported and the assumption of engagement-based mediation is dismissed.

Discussion of major results

The results show that functional reliability and operational efficiency are the primary factors that have led to user satisfaction in the mobile internet industry in Bangladesh, and not engagement intensity or design enhancement. It seems that stable network operation, easy billing and quick response are the most appreciated features by the users. This corroborates the Expectation-Disconfirmation Paradigm (EDP), since the level of satisfaction relies rather on actual performance of the service than promotional or relationship activities. The fact that US has a high R^2 (0.918) also confirms high role of these core factors.

Service design innovation discussion

Even though SDI is supposed to make user experience better, its direct impact on US is insignificant. This is an indication that usability of the interface, package flexibility and customization can now be regarded as commodity necessities and not determinants of satisfaction. Nevertheless, SDI substantially enhances CEI, i.e. it facilitates exchange, but does not directly enhance satisfaction.

Customer engagement innovation discussion

The most crucial discovery is related to CEI. Even though the previous literature usually considers engagement as creating value, this research demonstrates that CEI does not directly enhance US or mediate other impacts of innovations. This implies that individualized offers, proactive message, and interactive touchpoints cannot be sufficient to increase satisfaction in this respect. In case the core service is not stable, the engagement can be disregarded or regarded as noise instead of value.

Alternative explanations

These findings could be attributed to a few reasons. First, the service design and engagement can be already normalized in the market and therefore will not have a significant impact on satisfaction. Second, the moderation between perceptions of constructs can be a sign of low variability in responses. Third, the large

value of the HTMT between PI and US (1.115) indicates that there is a conceptual overlap. Fourth, the model fit is not ideal (SRMR = 0.121), and one should take the results with caution.

In general, results indicate that service innovation is context sensitive and multidimensional. Technological and process innovation are the only technology in this study that have significantly positive effects on satisfaction whereas service design and customer engagement innovation do not.

Theoretical contribution

The theoretical contribution of this study is the challenge of the assumption that service innovation raises satisfaction. It demonstrates that the effects of various dimensions of innovation are different. The research builds on EDP by demonstrating that TI and PI are better explanatory factors than engagement processes in a new market. It also adds to Service-Dominant Logic as it demonstrates that value co-creation via CEI does not simply occur when core service performance is erratic.

Methodological contribution

The study methodologically has a contribution in that it is undertaken through a PLS-SEM parallel multiple mediation model that measures direct and indirect effects of TI, PI, SDI, and CEI on US. It also discloses reasonable reliability and convergent validity but obviously admits discriminant validity and model fit restrictions. The analysis is supported using 300 respondents and 5,000 bootstraps resamples.

Practical implications

The practical implication is apparent: the mobile internet operators in Bangladesh ought to lead using a performance-first innovation strategy. As PI and TI are the most significant predictors of satisfaction, the managers need to concentrate on the network stability, the quicker response to complaints, the simplified billing, the efficiency of self-service, and continuous service provision. The tools of engagement can assist in communication, but not the quality of operations.

Recommendations

According to the results, it is offered to propose the following recommendations:

Value technology reliability

The operators need to enhance the consistent coverage, high speed, and continuity of the services since the performance of technology has a high impact on satisfactory aspects.

Enhance effectiveness in the process

Strategic priorities should be given to clear billing, fast problem-solving, and effective self-service systems since process innovation has the greatest direct impact on satisfaction.

Approach service design as supportive

The service design cannot and must be enhanced, yet it cannot bring higher levels of satisfaction by itself in the absence of trusted core service.

Make the methods of engagement simple

Non-promotional and selective and relevant but not regular and frequent personalized communication and proactive outreach must be used.

Enhance control of quality and communication of services

To enhance the quality-of-service provision by digital promotional messages, the policy makers ought to provide equilibrium in the various regulations.

Limitations

There are a few limitations in the study. It concentrates solely on the mobile internet industry in Bangladesh hence little generalization can be made. Its cross-sectional structure identifies the perceptions at a single point in time. The research is also based on self-reported information, and that could contain perceptual bias. Moreover, between PI and US and the non-optimal SRMR (0.121), discriminant validity issues need to be approached carefully.

Future study directions

This model should be tested in future studies in other sectors and nations to find out whether the results are context specific. Longitudinal studies may evaluate the relevance of CEI in cases where service reliability increases with time. Other variables that may be included in future research are perceived intrusiveness, digital fatigue, cognitive overload, privacy concern, and trust. Survey data would also be strong by integrating it with the objective measures of network uptime, number of complaints, or app usage statistics.

References

- Aguirre, E., Mahr, D., Grewal, D., de Ruyter, K., & Wetzels, M. (2015). Unraveling the personalization paradox: The effect of information collection and trust-building strategies on online advertisement effectiveness. *Journal of Retailing*, 91(1), 34–49. <https://doi.org/10.1016/j.jretai.2014.09.005>
- Anderson, E. W., Fornell, C., & Lehmann, D. R. (1994). Customer satisfaction, market share, and profitability: Findings from Sweden. *Journal of Marketing*, 58(3), 53–66. <https://doi.org/10.1177/002224299405800304>
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37(2), 471–482. <https://doi.org/10.25300/MISQ/2013/37.2.3>
- Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, 25(3), 351–370. <https://doi.org/10.2307/3250921>
- Brodie, R. J., Hollebeek, L. D., Juric, B., & Ilic, A. (2011). Customer engagement: Conceptual domain, fundamental propositions, and implications for research. *Journal of Service Research*, 14(3), 252–271. <https://doi.org/10.1177/1094670511411703>
- Chen, L. C., Kuo, C. M., & Tseng, C. Y. (2017). Investigating an innovative service with hospitality robots. *International Journal of Contemporary Hospitality Management*, 29(5), 1438–1458. <https://doi.org/10.1108/IJCHM-08-2015-0414>
- Chesbrough, H. W. (2003). The era of open innovation. *MIT Sloan Management Review*, 44(3), 35–41.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, 27(1), 51–90. <https://doi.org/10.2307/30036519>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2019). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- Haque, M. S., Rahman, M. M., & Islam, M. T. (2022). Service disconfirmation and user satisfaction in Bangladesh's mobile industry. *Asian Journal of Marketing*, 25(1), 1–20.
- Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014). Consumer brand engagement in social media: Conceptualization, scale development, and validation. *Journal of Interactive Marketing*, 28(2), 149–165. <https://doi.org/10.1016/j.intmar.2013.12.002>
- Homburg, C., Jozić, D., & Kuehn, C. (2017). Customer experience management: Toward implementing an evolving marketing concept. *Journal of the Academy of Marketing Science*, 45(3), 377–401. <https://doi.org/10.1007/s11747-015-0460-7>
- Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing*, 80(6), 69–96. <https://doi.org/10.1509/jm.15.0420>
- Lusch, R. F., & Nambisan, S. (2015). Service innovation: A service-dominant logic perspective. *MIS Quarterly*, 39(1), 155–175. <https://doi.org/10.25300/MISQ/2015/39.1.07>
- Meuter, M. L., Ostrom, A. L., Roundtree, R. I., & Bitner, M. J. (2000). Self-service technologies: Understanding customer satisfaction with technology-based service encounters. *Journal of Marketing*, 64(3), 50–64. <https://doi.org/10.1509/jmkg.64.3.50.18024>
- Mick, D. G., & Fournier, S. (1998). Paradoxes of technology: Consumer cognizance, emotions, and coping strategies. *Journal of Consumer Research*, 25(2), 123–143. <https://doi.org/10.1086/209531>

- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(4), 460–469.
- Oliver, R. L. (2014). *Satisfaction: A behavioral perspective on the consumer* (2nd ed.). Routledge.
- Ostrom, A. L., Parasuraman, A., Bowen, D. E., Patrício, L., & Voss, C. A. (2015). Service research priorities in a rapidly changing context. *Journal of Service Research*, 18(2), 127–159. <https://doi.org/10.1177/1094670515576315>
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12–40.
- Parasuraman, A., Zeithaml, V. A., & Malhotra, A. (2005). E-S-QUAL: A multiple-item scale for assessing electronic service quality. *Journal of Service Research*, 7(3), 213–233. <https://doi.org/10.1177/1094670504271156>
- Payne, A., & Frow, P. (2005). A strategic framework for customer relationship management. *Journal of Marketing*, 69(4), 167–176.
- Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the Academy of Marketing Science*, 36(1), 83–96.
- Prahalad, C. K., & Ramaswamy, V. (2004). Co-creation experiences: The next practice in value creation. *Journal of Interactive Marketing*, 18(3), 5–14. <https://doi.org/10.1002/dir.20015>
- Rizvi, A. A., Karim, R., & Ahmed, S. (2021). Infrastructure investment and customer satisfaction in developing economies. *Journal of Development Studies*, 15(3), 112–135.
- Tax, S. S., Brown, S. W., & Chandrashekar, M. (1998). Customer evaluations of complaint experiences: Implications for relationship marketing. *Journal of Marketing*, 62(2), 60–76. <https://doi.org/10.1177/002224299806200205>
- Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68(1), 1–17. <https://doi.org/10.1509/jmkg.68.1.1.24036>
- Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1), 1–10. <https://doi.org/10.1007/s11747-007-0069-6>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Verhoef, P. C., Reinartz, W. J., & Krafft, M. (2010). Customer engagement as a new perspective in customer management. *Journal of Service Research*, 13(3), 247–252. <https://doi.org/10.1177/1094670510375461>
- Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, 21(4), 724–735. <https://doi.org/10.1287/isre.1100.0322>
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52(3), 2–22. <https://doi.org/10.1177/002224298805200302>

Appendix A: Full Measurement Scales

The following survey instrument was used to collect data from 300 mobile internet subscribers in Bangladesh. All items in Sections B and C were measured using a five-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree).

Section A: User demographics

- **Age** (Open-ended)
- **Gender:** Male, Female, Other
- **Monthly Income Level (BDT):** Below 10,000; 10,000–30,000; 30,001–50,000; 50,001–70,000; Above 70,000
- **Highest Level of Education:** Secondary or below, Higher Secondary, Bachelor's Degree, Master's Degree, Above Master's

Sections B & C: Measurement items

Construct	Item Code	Measurement Item	Adapted Source
Technological Innovation (TI)	TI1	The speed of the internet is consistently satisfactory.	Lee et al. (2015)
	TI2	The mobile network provides strong and wide coverage (4G/5G).	
	TI3	The service is reliable with minimal interruptions.	
	TI4	The quality of streaming and downloads is excellent. (Removed)	
Process Innovation (PI)	PI1	The subscription and billing process is simple and user-friendly.	Chen et al. (2017)
	PI2	I can easily access self-service features through the app or USSD.	
	PI3	My problems are resolved in real-time or with minimal delay.	
	PI4	Billing and payment processes are streamlined and error-free.	
Service Design Innovation (SDI)	SDI1	I am able to customize my data packages according to my needs.	Lusch & Nambisan (2015)
	SDI2	I find the bundled services (calls, data, and entertainment) useful.	
	SDI3	The pricing plans offered are innovative and flexible.	
	SDI4	The overall service layout is designed to be highly intuitive for the user.	
Customer Engagement Innovation (CEI)	CEI1	The mobile app is interactive and easy to use.	Payne et al. (2008)
	CEI2	Social media support is responsive and helpful. (Removed)	
	CEI3	I regularly receive personalized offers based on my usage pattern.	
	CEI4	The operator engages me through personalized and proactive digital communication.	
User Satisfaction (US)	US1	I am satisfied with the overall mobile internet service.	Oliver (2014)
	US2	I would recommend this service to others.	
	US3	I believe I receive good value for the money I pay.	
	US4	I intend to continue using this mobile internet service.	

Note: Items TI4 and CEI2 were excluded from the final structural model analysis because their outer loadings fell below the required 0.50 threshold during scale purification.