OPEN ACCESS

Volume: 14

Special Issue: 1

Month: June

Year: 2026

P-ISSN: 2321-788X

E-ISSN: 2582-0397

Citation:
Smitha, P et al. "Digital Banking as a Service Innovation: Assessing Customer Awareness and Satisfaction in the Era of Transformation." *Shanlax International Journal of Arts, Science and Humanities,* vol. 14, no. S1, 2026, pp. 80–94.

DOI:
https://doi.org/10.34293/sijash.v14iS1-Jun.11194

Digital Banking as a Service Innovation: Assessing Customer Awareness and Satisfaction in the Era of Transformation

Dr. P. Smitha
Assistant Professor, Department of Commerce, Loyola College, Chennai

Dr. Mini Mathew
K.C, Assistant Professor, Department of Commerce, Loyola College, Chennai

G. Harini
I-MBA, Hallmark Business School, Trichy

Abstract
The concept of digital banking services is viewed as an ecosystem comprised of dimensions such as accessibility, security, usability, personalization, and reliability. It aims at analyzing its impact on customers' satisfaction levels along with investigating the mediatory effects of customer awareness and moderation due to customer digital literacy level. For conducting the research, the sequential explanatory mixed-method design was chosen. Quantitatively, 356 surveys of digital banking customers were conducted and analyzed through Structural Equation Modeling (SEM). Subsequently, a qualitative phase involving 14 semi-structured interviews took place. Based on quantitative data analysis, it can be seen that there is a statistically significant and positive correlation between service innovation and both customer awareness and customer satisfaction. Also, customer awareness is shown to have a statistically significant effect on customer satisfaction and to act as a significant partial mediator between these two variables. Moreover, digital literacy significantly strengthens the positive relationship between customer awareness and satisfaction. From the theoretical perspective, the research links three theories, namely Service Innovation Theory, Service-Dominant Logic, and Expectation-Confirmation Theory, by demonstrating the significance of awareness as a key mental link in the process of value co-creation. From the managerial perspective, it is crucial to stress that financial institutions cannot depend only on technological solutions; the banking industry needs to implement consumer education, transparency, and AI techniques.
Keywords: Digital Banking, Service Innovation, Customer Awareness, Customer Satisfaction, Digital Literacy, Mixed-Method Design.

Introduction

During the last two decades, the banking industry has seen tremendous transformation fueled by fast-moving technology developments, digital penetration, and changing customer demands. Technologies have dramatically changed banking service delivery by transforming its paradigm from one that is based on brick-and-mortar branches to an ecosystem-based one, which relies on technology as the key enabler. Under these circumstances, digital banking becomes not just a technological development, but an important form of service innovation, which brings about changes in the nature of value creation, service delivery, and customer relationship management (Vargo & Lusch, 2004; Gallouj & Savona, 2009). In contrast to product innovation, service innovation involves making improvements in service processes, customer interfaces, and service delivery systems so that customers may have better experiences (Ostrom et al., 2010). Today's digital banking platforms employ various digital technologies, including mobile apps, AI chatbots, blockchain-powered cybersecurity, and advanced analytics, thus making digital channels a valuable resource.

The uptake of digital banking services has been boosted greatly by the availability of internet connections, the spread of smartphones, and increased cooperation between conventional financial companies and fintechs. In many emerging markets, this phenomenon has been facilitated by active promotion of digital financial inclusion by the governments and regulatory authorities in such countries. However, despite significant progress in the development of digital banking systems, the effectiveness of the innovations largely hinges upon customer awareness and acceptance of the changes brought about by digital banking (Alalwan et al., 2017). Customer awareness is understood as the degree of knowledge that customers have about various aspects of digital banking, including its benefits and risks. The Diffusion of Innovations theory suggests that awareness of the benefits associated with innovative products represents the very first step in the adoption process and plays a crucial role in people's decision making (Rogers, 2003).

Satisfaction is yet another important outcome of innovations in digital banking. According to the Expectation-Confirmation Theory (Oliver, 1980; Bhattacherjee, 2001), customer satisfaction arises when the performance of the services fulfills their initial expectations. Customer satisfaction is affected by a number of attributes of the service within the context of digital banking. Such service attributes include accessibility, security, ease of use, reliability, responsiveness, and personalization (Davis, 1989; Parasuraman, Zeithaml, & Malhotra, 2005). All of these attributes can be described as the innovation that is introduced through digital banking services. They determine the level at which customers derive value from the digital services offered. Digital banking may be defined as multidimensional service innovation with respect to accessibility, security, reliability, and personalization.

Despite a considerable body of literature focusing on factors contributing to the uptake of digital banking such as digital banking adoption, trust, and technology acceptance (Alalwan et al., 2017; Yousafzai, Foxall, & Pallister, 2010), only limited studies consider digital banking from the point of view of an innovative service ecosystem with special attention to the impact of customer awareness. In this regard, the idea of co-creation of value within an interaction between a service provider and a consumer as proposed by Service-Dominant Logic theory suggests that awareness can be an effective way to ensure co-creation of value in case of service innovation (Vargo & Lusch, 2004). Hence, there is a need for further research of digital banking as a multifaceted service innovation and its effect on customer satisfaction both directly and via the mediation of customer awareness. To meet this need, the current study will attempt to define major dimensions of service innovation in the field of digital banking and analyze the effect of service innovation on customer satisfaction and its mediation via customer awareness.

Research Hypotheses

Direct Effects

- H_1: Service innovation in digital banking positively influences customer awareness.
- H_2: Customer satisfaction is being influenced by Service Innovation
- H_3: customer satisfaction is significantly influenced by Customer awareness

Mediation Effect

- H_4: Customer awareness mediates the relationship between service innovation and customer satisfaction.

Literature Review

Digital Banking as Service Innovation

The digitization of the banking industry has resulted in a change in the emphasis from the conventional transactional services offered by banks towards the delivery of customer-focused and technologically-driven service ecosystems. Modern-day digital banking has emerged as a means of service innovation, which includes technological capability, customer interaction capability, and value co-creation capability. As pointed out by Al-Khouri (2014), digital banking today is not limited to being merely a transactional system but is rather an ecosystem that incorporates artificial intelligence, predictive analytics, blockchain security, and decision-making capabilities. These developments contribute towards improved service efficiency and enhanced customer experience while enabling the provision of personalized financial services. Similar arguments have been made by Dwivedi et al. (2023), who describe digital banking as being synonymous with a shift towards platform-based service ecosystems where innovation contributes towards continual interaction between service providers and customers.

According to the innovation in services literature, innovation in services is not like product innovation because it mainly revolves around improving the process of delivery, the delivery process itself, and how customers interact with the service (Ostrom et al., 2010). Within the financial industry, some examples include the use of apps, biometrics, chatbots powered by AI for customers' queries, among others, which make the customers' experience more convenient and efficient.

Customer Awareness in Digital Banking

The customer's awareness is a key factor that will determine the success of digital banking innovations. The customer's awareness is his/her understanding and knowledge of digital banking characteristics and its benefits and risks. The concept of awareness is drawn from the Diffusion of Innovation Theory where awareness is the first step of innovation diffusion and has a great impact on how customers perceive innovations.

The latest research stresses the importance of ensuring that technological advancements provide beneficial effects if customers are well-informed about them. Chauhan & Singh, (2024) revealed that technological advancements in interface design help enhance the experience of the customer only if users are aware of the functionalities provided by the platform. Similar results were presented by Kaur & Batra, (2023). They concluded that digital awareness had a significant impact on perceived usefulness and was responsible for maintaining customer intention to use digital services. Laukkanen (2022) pointed out the importance of digital literacy when implementing innovation, stating that the lack thereof could reduce its benefits. Baber (2022) proved that customers' trust in digital services was greatly enhanced by their awareness of safety features like encryption, biometric security checks, and fraud detection technology. In other words, these findings suggest that awareness plays a significant role as an essential cognitive process used for the evaluation of innovations in their perception by customers. Those customers who comprehend features and benefits of digital banking will have a positive perception of innovations and get more benefit from service interaction.

Satisfaction of Customers with Digital Banking Services

Customer satisfaction continues to be a crucial criterion for the efficiency of digital banking services. This notion is defined by means of Expectation-Confirmation Theory (Oliver, 1980; Bhattacherjee, 2001). In the context of digital banking, the degree of satisfaction of customers is influenced by numerous variables, including usability, availability, reliability, security, responsiveness, and customization.

Innovative service qualities are another critical factor in influencing consumer satisfaction as stated by a number of researchers. For example, according to Sharma and Rao (2023), the utilization of artificial intelligence-based personalization leads to high levels of customer satisfaction due to personalized recommendations and customized financial products. In order for the process of personalization to be effective, however, consumers should be capable of valuing innovations implemented in the service provision. In turn, Alalwan (2020) discovered that while digital banking services were actively adopted by consumers during the pandemic, consumer satisfaction was mainly influenced by the perception of service innovations, transparency of security measures, and consumer awareness regarding digital security solutions.

As follows from the literature review, consumer satisfaction related to digital banking services not only depends on functional aspects but is greatly influenced by the consumer perception and awareness about innovations.

Relationship between Service Innovation, Customer Awareness, and Customer Satisfaction

The connection between service innovation and customer satisfaction has recently become an area of increasing focus for researchers exploring the digital transformation paradigm. Current findings unanimously show that innovating aspects of services improve customer experience and contribute to higher levels of customer satisfaction. Nevertheless, recent research indicates that the impact of awareness is critical in mediating the relationship between service innovation and customer satisfaction.

According to Al-Khouri (2014), awareness serves as a cognitive connector between innovation in technology and its evaluation by customers. Chauhan & Singh, (2024) established the mediating effect of awareness in the process of linking technological characteristics with customers' satisfaction. Similarly, Kumar and Singh (2024) concluded that the impact of innovations made in service is mediated by the processes of developing customers' awareness and their trust. Rahi et al. (2021) also reported that awareness moderates the effects of perceived usefulness and perceived ease of use of internet banking services on customer satisfaction.

As per the Service-Dominant Logic theory, value is created by interaction between the service provider and the customers (Vargo & Lusch, 2004). It implies that any form of innovation in services cannot bring better results to the customers unless the customers are aware of such innovation and its usage. Such theory justifies the hypothesis stating that customer awareness is the mediator of the relationship.

Research Gap

While the amount of literature on digital banking is increasing gradually, there still exists a number of research gaps that need to be addressed. First, many studies tend to analyze the concept of digital banking only within the context of theories related to technology adoption, including Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), while few scholars perceive digital banking as a service innovation ecosystem, which consists of different aspects such as accessibility, security, reliability, personalization, and user-friendliness. Second, even though the importance of awareness has been acknowledged in terms of technology acceptance, there is hardly any empirical research concerning the role played by awareness in relation to service innovation and satisfaction among customers. Third, existing studies focus mainly on adoption intention and usage behavior rather than on customer satisfaction after adoption of the digital banking service. Fourth, fragmented research approach prevails in the literature. Fourth, current research utilizes a piecemeal approach to theory and seldom combines the theories of Service-Dominant Logic, Service Innovation Theory, and Expectation-Confirmation Theory. Fifth, a lot of the research focuses on the technical aspects of digital banking products without considering the perception that consumers might have of the innovations. Lastly, there is still little empirical evidence coming out of developing nations and economies that are rapidly going through the process of digitization. This calls for a comprehensive framework which considers digital banking as a service innovation and looks at how customer awareness influences satisfaction.

Conceptual Framework and Variable Description

Based on the literature review, the present study will develop a conceptual framework whereby Digital Banking Service Innovation will be an independent variable, Customer Awareness will be a mediating variable, while Customer Satisfaction will be the dependent variable. Furthermore, there is acknowledgment of Digital Literacy as a moderating variable that could play a role in affecting customer awareness about digital banking innovations.

Dimensions of Service Innovation (Independent Variable)

Digital banking service innovation can be defined as the innovation aspects within digital banking services. In total, there are five dimensions that make up the definition of the term. These include: accessibility (availability and convenience 24/7), security (encryption and biometric authentication), easy-to-use (ease of navigability), personalization (personalized AI-based recommendations), and reliability (transaction accuracy).

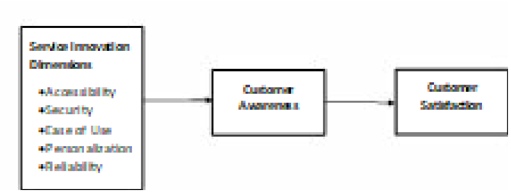
Customer Awareness (Mediating Variable)

Customer awareness can be defined as the awareness that customers have regarding digital banking services. This includes awareness about the various features provided, the security measures adopted, the benefits associated with the services, and even new and innovative capabilities provided by the services. Customer awareness helps customers evaluate the value generated from these innovations, thereby acting as a mediating variable between innovation and satisfaction.

Customer Satisfaction (Dependent Variable)

Customer satisfaction refers to the satisfaction that customers feel with respect to digital banking services. This includes their overall satisfaction with the performance of the digital banking services in relation to their needs and expectations.

Figure 1 Conceptual Model



Methodology

In this study, the methodology utilized involves a sequential explanatory mixed-methods approach to investigate the linkages between digital banking service innovation, customer awareness, and customer satisfaction. Mixed methodologies are deemed suitable for the proposed study since the technique allows for the incorporation of both quantitative and qualitative research techniques and helps in validating the hypothesized relationships. In the first stage, the researchers will employ quantitative data analysis to determine any possible relationships between service innovation, customer awareness, and customer satisfaction using Structural Equation Modeling (SEM). The qualitative analysis comes in the second phase.

The quantitative phase of this study focuses on the target audience who uses digital banking services for at least six months. Out of the target population, 300 people are sampled using stratified sampling technique to ensure that sufficient representation of digital banking users from both the urban and semi-urban settings is achieved. Data will be collected using structured questionnaires that have a five-point Likert scale format. This tool has four main sections namely demographic variables, service innovation, customer awareness, and customer satisfaction. The service innovation variable is operationalised by fifteen items that relate to accessibility, security, ease-of-use, personalisation, and reliability, whereas customer awareness and customer satisfaction have six items each. The collected data will be statistically analysed using SPSS and AMOS/SmartPLS. To begin with, exploratory factor analysis (EFA) will be done to establish the factor structure followed by confirmatory factor analysis (CFA). Finally, structural equation modelling will be applied to examine the interrelationship between the constructs of this study. The reliability of the measure will be evaluated using Cronbach's alpha and composite reliability coefficients whose values should be above 0.80.

The qualitative stage comes after the quantitative research and involves conducting semi-structured interviews with 12–15 respondents selected from the survey group. In the qualitative phase, attempts are made to achieve a better understanding of the nature of customers' perception of innovations in digital banking services, the process of awareness creation, satisfaction factors, and their security and trust issues. Interviews are analyzed through the use of thematic analysis by which interviewees' answers are coded into different themes concerning service innovations, customer awareness, and customer satisfaction.

Quantitative and qualitative results are integrated to provide a holistic analysis of the impact of innovative digital banking services on customer satisfaction mediated by customer awareness. Whereas the quantitative study will show how significant and strong the hypothesized relationships are, the qualitative study will validate the underlying mediation mechanisms and provide contextual support for the customers' experiences. The research is guided by multiple measures of reliability and validity, including composite reliability values greater than 0.80, average variance extracted values greater than 0.60, and discriminant validity verified by the Heterotrait–Monotrait Ratio (HTMT). Besides, triangulating both the quantitative and qualitative data enhances the validity of the study. Ethical considerations include gaining informed consent from all respondents, maintaining confidentiality and anonymity of responses, and ensuring voluntary participation of the respondents without collecting any confidential financial data.

Findings, Results and Analysis

In accordance with the sequential explanatory mixed-method design, the findings of the study are discussed below. Specifically, quantitative findings that are based on survey data and structural equation modelling analysis are provided.

Quantitative Findings

Profile of Respondents

The sample size for the survey was found to be 356 valid responses that came from users of digital banking. According to the demographic profile, the majority of respondents (54%) were men and only 46% of respondents were women. Majority of respondents (62%) were in the age group between 21 and 35 years old, showing the fact that the most common segment among digital banking customers is this particular age range. About 68% of respondents had completed their studies at graduate level and above, and 72% used digital banking for more than one year.

Descriptive Statistics

Based on the descriptive statistics output, there are positive attitudes regarding digital banking services. The average score for Service Innovation was 3.89 (SD = 0.64), Customer Awareness was 3.76 (SD = 0.71), and Customer Satisfaction was 3.94 (SD = 0.68). From among the dimensions of service innovations, the Accessibility dimension has the highest average (4.12), Ease of Use is second (4.05), Security third (3.88), Reliability fourth (3.83), and Personalization fifth (3.57). From this, it can be inferred that customers place much importance on usability and convenience, while personalization aspects need to be improved.

Measurement Model Assessment

The reliability and validity of the measurement model were determined using Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and HTMT. These are shown in Table 1.

Table 1 Reliability and Convergent Validity of Constructs

Construct	No. of Items	Cronbach's Alpha	Composite Reliability (CR)	AVE	Interpretation
Service Innovation	15	0.89	0.91	0.58	Reliable and Valid
Customer Awareness	6	0.86	0.88	0.60	Reliable and Valid
Customer Satisfaction	6	0.91	0.93	0.66	Highly Reliable

Note: Cronbach's Alpha > 0.70, Composite Reliability > 0.70, and AVE > 0.50 indicate acceptable reliability and convergent validity.

The findings revealed high internal consistencies among all variables. The Cronbach's Alpha and Composite Reliability measures fell within the range of 0.86 to 0.91 and surpassed 0.80 respectively. Additionally, all AVE measures were above 0.50, which indicated convergent validity. The discriminant validity was measured based on Heterotrait–Monotrait Ratio (HTMT), as depicted in Table 2 below.

Table 2 Discriminant Validity (HTMT Ratio)

Constructs	Service Innovation	Customer Awareness	Customer Satisfaction
Service Innovation	—	0.72	0.68
Customer Awareness	0.72	—	0.74
Customer Satisfaction	0.68	0.74	—

Note: HTMT values below 0.85 indicate satisfactory discriminant validity.

All HTMT values were below the threshold value of 0.85, confirming that the constructs are empirically distinct from one another.

Structural Model Results

Structural Equation Modelling (SEM) was employed to test the proposed hypotheses. The direct effects are summarized in Table 3.

These findings imply that Service Innovation positively impacts Customer Awareness ($\beta = 0.62$, $p < 0.001$). This implies that innovation in digital banking services positively impacts customers' awareness and recognition of these services. The service innovation positively impacts Customer Satisfaction ($\beta = 0.41$, $p < 0.001$) which supports Hypothesis 2. Furthermore, Customer Awareness has a significant impact on Customer Satisfaction ($\beta = 0.48$, $p < 0.001$). This supports Hypothesis 3 which emphasizes the influence of customer awareness on satisfaction outcomes.

Table 3 Direct Hypothesis Testing Results

Hypothesis	Path	β (Path Coefficient)	t-value	p-value	Result
H_1	Service Innovation → Customer Awareness	0.62	11.48	<0.001	Supported
H_2	Service Innovation → Customer Satisfaction	0.41	7.96	<0.001	Supported
H_3	Customer Awareness → Customer Satisfaction	0.48	9.24	<0.001	Supported

Mediation Test

A mediation test using bootstrapping method was conducted to test the mediating effect of Customer Awareness.

Table 4 Mediation Analysis (Bootstrapping Results)

Hypothesis	Indirect Path	Indirect Effect (β)	t-value	p-value	Mediation Type
H_4	Service Innovation → Customer Awareness → Customer Satisfaction	0.30	6.87	<0.001	Partial Mediation

It is evident that the indirect effect had a statistically significant value ($\beta = 0.30$, $p < 0.001$). As both effects turned out to be significant, it can be concluded that Customer Awareness partially mediates the association between Service Innovation and Customer Satisfaction. It proves that service innovations positively affect customer satisfaction through both direct and indirect effects (increased customer awareness).

Moderation Analysis

The effect of Digital Literacy as a moderator variable in relation to Customer Awareness and Customer Satisfaction was assessed.

Table 5 Moderation Analysis (Digital Literacy)

Interaction Effect	β	t-value	p-value	Result
Awareness × Digital Literacy → Satisfaction	0.19	3.12	<0.01	Significant Moderation

A noteworthy interaction effect ($\beta = 0.19$, $p < 0.01$) implies that Digital Literacy reinforces the positive correlation between Customer Awareness and Customer Satisfaction. Those customers who have more digital literacy skills reap more benefit out of being aware of advanced features in banks, leading to customer satisfaction.

Model Fit Evaluation

Model fit statistics were calculated through standard goodness-of-fit criteria. The outcomes of the analysis are displayed in Table 6.

Table 6 Model Fit Indices

Fit Index	Value	Recommend Threshold	Interpretation
CFI	0.94	> 0.90	Good Fit
TLI	0.92	> 0.90	Good Fit
RMSEA	0.048	< 0.08	Excellent Fit
SRMR	0.041	< 0.08	Good Fit

The model fit indices demonstrate that the proposed conceptual framework adequately represents the observed data and provides a satisfactory fit.

Coefficient of Determination (R^2)

The explanatory power of the model was assessed using the coefficient of determination (R^2), as shown in Table 7.

Table 7 Coefficient of Determination (R^2)

Endogenous Construct	R^2 Value	Interpretation
Customer Awareness	0.38	Moderate
Customer Satisfaction	0.57	Substantial

It is evident from the results that Service Innovation accounts for 38 percent of the variation in Customer Awareness, and together, Service Innovation and Customer Awareness account for 57 percent of the variation in Customer Satisfaction. Clearly, the results show the significant prediction power of the model.

It can be strongly argued that the results of the SEM analysis clearly validate the hypothesized conceptual model. This is because Service Innovation has a significant impact on both Customer Awareness and Customer Satisfaction, and Customer Awareness positively contributes to Customer Satisfaction. Moreover, Digital Literacy moderates the relationship between awareness and satisfaction, thus indicating that the more digitally literate the customers, the easier it is for them to perceive the value of innovations in terms of satisfaction. With such high model fit and explanatory power, there is no doubt that the banking services work as a multidimensional service innovation ecosystem where customer awareness makes all the difference to satisfaction.

Qualitative Findings

In order to elaborate on the findings presented earlier in this paper, semistructured interviews were performed among fourteen randomly chosen survey respondents. Analysis of interview responses was done using thematic analysis method, which allowed identifying five key themes discussed among participants. Those were: (1) perception of digital banking innovations, (2) mechanisms of awareness formation, (3) security and trust as motivators of innovation, (4) personalization and customer experience, (5) barriers for customer satisfaction.

Theme 1: Perception of Digital Banking Innovations

Majority of interviewees agreed that digital banking services could be regarded as innovative solutions aimed at providing increased convenience and efficiency to the users. In their answers, people repeatedly stressed such characteristics as “time saving,” “convenience” and “ease of use,” referring to the fact that digital banking helps to minimize reliance on visiting traditional bank branches. Yet, some participants mentioned that customers need to be made aware of available innovations. As one of the respondents claimed:

“I use my mobile phone for banking purposes, but till date I have been unaware of several of its facilities as I attended the bank awareness programs.”

From the above statement, it is clear that merely an innovation in technology will not lead to positive evaluations from consumers unless there exists awareness of the benefits that come with such innovation.

Theme 2: Mechanisms of Awareness Creation

Another consistent theme that emerged from the interviews is the significance of awareness creation mechanisms in enabling customers to understand and effectively use digital banking services. The main sources of awareness among interviewees included notices and emails by banks, peer recommendations, and social media or video instructions. Basic features such as transfers and payments were familiar to most customers, while advanced capabilities like automatic saving systems, expenditure analysis, and artificial intelligence-based financial advice were relatively unknown.

Some interviewees indicated that their awareness increased over time as they repeatedly used different digital technologies or came across relevant information from various sources. This suggests that awareness is created as an outcome of using innovative services but requires sufficient understanding and knowledge about new features. Thus, customer awareness appears to become one of the key mechanisms that link innovation to satisfaction outcomes.

Theme 3: Security and Trust As Driving Factors for Innovations

Security innovations became one of the strongest factors that affect customer satisfaction. Biometric verification, one-time password verification, transaction alerts, and fraud monitoring were often mentioned by the participants as tools that increased their trust in digital banking services. Security innovations were often seen by the participants as synonymous to trustworthiness.

As one respondent pointed out:

"Fingerprint log-in system is very safe for me because it feels very modern."

The results show that security innovations have a positive impact on customers, which can be expressed not only through safety but also through customer trust. This finding supports the results obtained during quantitative research where security was found as an important aspect of service innovation.

Theme 4: Personalization and Customer Experience

While most participants agreed that personalized banking services offered significant advantages, there were varied views on the issue of personalization. While some customers enjoyed having functionalities such as transaction categorization and budget summaries, allowing them to effectively control and monitor their financial activities, other participants indicated that the personalization functionality was somewhat lacking and did not provide any valuable advice.

One participant described this by saying:

"The app lets me know my expenses, but I wish it could make better suggestions when it comes to saving or investments."

This theme offers a possible reason for why the mean rating of personalization was relatively low based on the quantitative data presented. As such, there appears to be significant room for improvement on the part of banks to increase customer satisfaction in terms of AI-based personalization strategies.

Theme 5: Obstacles to Customer Satisfaction

In spite of relatively positive evaluations of the digital banking services, some obstacles were listed by the participants which restricted their overall level of customer satisfaction. These included technical issues at times, lag in app update process, lack of information on innovative services, and problems faced by less literate customers while working on the digital platform.

This finding aligns with previous quantitative results concerning the effect of digital literacy as an intervening variable. The customers who demonstrated high levels of digital literacy found it easier to leverage innovative service capabilities and consequently achieved higher customer satisfaction.

Integration of Quantitative and Qualitative Results

Integration of results from both quantitative and qualitative analyses shows a strong consistency between both approaches. First, the results obtained from qualitative research are consistent with statistical associations derived using SEM. Moreover, qualitative data helps explain how these associations arise.

Table 8 Integration of Quantitative and Qualitative Findings

Quantitative Finding	Qualitative Confirmation
Service Innovation positively influences Customer Awareness	Respondents reported learning about innovative features through bank communication, peer recommendations, and awareness programs.
Customer Awareness mediates Customer Satisfaction	Interview participants with greater knowledge of digital banking features reported higher satisfaction levels.
Personalization received comparatively lower ratings	Respondents expressed expectations for more advanced and meaningful personalized recommendations.

Digital Literacy moderates Satisfaction	Older and less digitally skilled users reported difficulties in utilizing innovative banking features effectively.

From all these results, it appears that awareness acts as the key factor through which innovations in services lead to value for the customer. In fact, any innovative characteristic will produce value for the customer only when the latter is aware of its significance and usefulness.

Interpretation of Results

These results offer robust evidence of the theories that form the basis of this research investigation. Based on Service-Dominant Logic, the process of value creation is based on service providers interacting with the customer. The findings have revealed that customer awareness plays a crucial role in value creation by making customers capable of recognizing the value in innovative digital banking solutions and using them.

The Technology Acceptance Model can be applied to interpret these results because those customers who viewed these innovations as useful and easy to use had a higher level of satisfaction. Expectations Confirmation Theory can be used here as well because, according to it, satisfaction emerges when customers' expectations concerning the service provided are confirmed.

Moreover, the findings support the Diffusion of Innovation Theory, given their emphasis on the importance of awareness during the innovation adoption process. The element of awareness was shown to be crucial in helping customers assess and become aware of innovative banking services offered, thus affecting the final level of satisfaction achieved. As a whole, these findings suggest that digital banking innovation is more than just an adoption of technology; it is a service innovation ecosystem.

Important Empirical Contributions of the Study

The study makes many important empirical contributions to the academic body of knowledge on digital banking innovations and customer value. The first one is that the study views digital banking innovation as a multidimensional construct involving access, security, reliability, usability, and personalization factors. The second is that it recognizes the role played by customer awareness as a key partial mediator between service innovation and customer satisfaction. This helps explain an important innovation process through which innovation creates customer value. Third is that it illustrates the importance of digital literacy as a moderator of innovation outcomes. Fourth, the mixed-method research design used in the study allows for methodological triangulation. The last contribution is that it finds personalization to be an under-researched aspect of digital banking services.

In this regard, the research shows that the introduction of innovation in digital banking services plays a crucial role in improving customer satisfaction, either directly or indirectly by increasing their awareness. In essence, customer awareness acts as a mental approach through which customers are able to identify the value inherent in innovative services of digital banks. Of all the service innovation dimensions analyzed, those of accessibility and user-friendliness were identified as the most significant in terms of contributing towards customer satisfaction. Meanwhile, personalization was observed to have more potential for future improvement. It can also be argued that digital literacy acts as a mediator that increases the impact of awareness on customer satisfaction. From these findings, digital banking during the time of transformation should be seen as an ecosystem of service innovation.

Implications of the Study

Theoretical Implications

In this regard, there are several implications of the findings made as part of the current research for the development of relevant literature pertaining to service innovation, digital transformation, and customer behavior in finance. Firstly, the present study significantly contributes to service innovation theory by offering an extended view of digital banking as a multi-dimensional service innovation environment instead of solely focusing on the technological dimension. Although most previous empirical studies dealing with the topic under consideration relied heavily on the technology adoption theories like TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003), the current paper takes into account the issue from the service innovation perspective through considering a number of aspects such as accessibility, security, ease of use, personalization, and reliability altogether.

Second, the paper helps in contributing to the expanding literature on the topic of customer awareness since it helps understand how awareness operates as the mechanism of mediation between service innovation and customer satisfaction. So far, literature has only considered awareness as the antecedent of technology adoption and acceptance (Rogers, 2003; Alalwan et al., 2017). Yet, results indicate that awareness acts as the cognitive link where customers learn about, understand, and value innovation within the services. The significant partial mediation implies that technological innovations may not always lead to customer satisfaction unless there is sufficient awareness about the innovation. This result expands upon Diffusion of Innovation Theory (Rogers, 2003), as it highlights the importance of awareness after adoption.

Thirdly, the paper enhances the theoretical basis of SDL by presenting evidence on how value is created through the process of customer engagement with innovations in the service offering (Vargo & Lusch, 2004; Vargo & Lusch, 2008). The results show that awareness plays an important role in facilitating customer involvement in the process of value co-creation through making it possible for customers to be able to take advantage of new banking services.

These research results are also an indication of the validity of Expectation-Confirmation Theory (Oliver, 1980; Bhattacherjee, 2001), which suggests that customer satisfaction occurs when there is confirmation or even exceeding of previous expectations about the level of performance of a given service. The significant correlations found between the variables of service innovation, awareness, and satisfaction indicate that innovative banking services positively influence customer satisfaction only if customers have knowledge of the benefits that come with innovations. Additionally, the significant role played by digital literacy moderates the relationship under investigation and adds insights into digital transformation theory (Bharadwaj et al., 2013).

In general, the proposed research successfully bridges the gaps in understanding the relationships between Service Innovation Theory, Diffusion of Innovation Theory, Service-Dominant Logic, and Expectation-Confirmation Theory by developing a theoretical framework that allows us to understand how digital banking innovations affect customer satisfaction via awareness. In this regard, the proposed framework provides a solid theoretical base for future research in the areas of digital services, customer experience, and digital transformations, especially in the context of emerging markets.

Managerial Implications

Several implications for banking managers and other stakeholders who aim to enhance customer experience in the realm of digital banking can be drawn from the results obtained in this study.

First of all, the findings indicate that technological innovation alone cannot guarantee customer satisfaction. Awareness turns out to play an essential mediating role, which means that, in addition to investing in innovations, it is necessary to create educational and communication efforts directed at customers. Indeed, in accordance with the main ideas of innovation diffusion studies (Rogers, 2003), awareness-building activities such as digital literacy projects, onboarding guides, demonstration presentations, webinars, and other kinds of educational initiatives may help customers learn about innovative features of digital banking and benefit from them.

Secondly, the generally low scores accorded to personalization reveal the need for more innovative approaches focused on customers by banks. It is worth noting that numerous researchers have suggested that personalized services improve customer experience and create strong relationships (Sharma & Rao, 2023; Bharadwaj et al., 2013). Hence, it would be necessary for banks to invest in artificial intelligence, predictive analytics, and machine learning technologies to enable the provision of personalized financial advice, tailor-made financial products, and other personalized financial solutions that may help in retaining clients for a longer period of time.

Thirdly, security innovations have emerged as a crucial factor when it comes to creating the right perception of customers and their level of satisfaction. The implementation of security innovations such as biometric authentication, fraud detection systems, encryption technologies, as well as the monitoring of transactions in real time makes a significant contribution to customer satisfaction. In line with previous research (Baber, 2022; Alalwan, 2020), managers should pay special attention to effective communication about cybersecurity solutions implemented by the bank and its policy towards protecting client information.

Fourth, the significant moderating influence of digital literacy indicates that the banks need to develop differentiated customer strategies that vary depending on the different customer segments. For instance, older customers and those with poor digital literacy would require extra effort to provide more service options, including easy interfaces, multi-language help, customer assistance, and training in the use of technology. Increasing the digital literacy of the customers helps them to be aware of the new products offered by the bank, thus reinforcing the connection between awareness and customer satisfaction.

Lastly, the banks need to implement continuous customer feedback and improvement measures. This could include customer analytics, customer satisfaction surveys, behavioral analysis, and feedback analysis through AI. The use of such measures would help in understanding the demands of the customers and how to provide services to meet their demands. Continuous customer service improvement is important as the banking industry becomes increasingly technological. Customer-centric service strategies are important to retain customer satisfaction and loyalty (Vargo & Lusch, 2004; Ostrom et al., 2010). Therefore, shows that successful digitization of banking services not only calls for technology but also the integration of innovation, knowledge, digital literacy, personalization, and security in the quest for creating unique customer experiences and maintaining competitive advantage.

Conclusion and Directions for Future Research

This research study analyzed the impact of digital banking as an innovation in the field of service innovation on customer awareness and customer satisfaction during the period of digital transformations. The outcomes of the study indicate that service innovation positively influences customer satisfaction both directly and indirectly by influencing customer awareness. Customer awareness turned out to be a key cognitive tool through which customers were able to perceive the benefits of innovations provided by digital banking services. The results further show that digital banking is not limited to technology alone, but rather should be viewed as a comprehensive innovation service system that involves accessibility, security, reliability, personalization, and convenience.

Further, digital literacy emerged to have positively moderated the connection between awareness and customer satisfaction, suggesting that more digitally literate customers will be able to extract maximum benefits from new banking services. This study makes several contributions to the body of literature on innovation, service innovation, customer satisfaction, and digital transformation by offering a theoretical framework on how innovation generates value for the customers through awareness. Management-wise, the results imply that not only technology development is crucial for successful implementation of digital banking initiatives, but also the awareness of their customers about these services. Further research could consider longitudinal approaches, international comparative research across different countries at various levels of development, and the effectiveness of certain awareness-raising activities on customer satisfaction and loyalty.

References

(Note: Typo corrected from “Hauhan” to Chauhan; publication metrics integrated).

1. Alalwan, A. A. (2020). Mobile banking adoption: An examination of version 2 of unified theory of acceptance and use of technology and the moderating role of trust. Technology in Society, 63, Article 101413. https://doi.org/10.1016/j.techsoc.2020.101413
2. Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., & Williams, M. D. (2017). Examining factors influencing Jordanian customers’ intentions and adoption of internet banking. Journal of Retailing and Consumer Services, 34, 106–117. https://doi.org/10.1016/j.jretconser.2016.08.017
3. Al-Khouri, Ali. (2014). Digital Payment Systems: Global Opportunities Still Waiting to be Unleashed. Business and Economic Research. 4. 136. 10.5296/ber.v4i2.6296.
4. Arcand, M., PromTep, S., Brun, I., & Rajaobelina, L. (2019). Mobile banking service quality and customer relationships. International Journal of Bank Marketing, 37(7), 1565–1589. https://doi.org/10.1108/IJBM-10-2018-0270
5. Baber, H. (2022). Cybersecurity innovation and customer trust in digital banking services. International Journal of Bank Marketing, 40(7), 1433–1453. https://doi.org/10.1108/IJBM-12-2021-0556
6. 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
7. Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. MIS Quarterly, 25(3), 351–370. https://doi.org/10.2307/3250921
8. Boateng, H., Adam, D. R., Okoe, A. F., & Anning-Dorson, T. (2016). Assessing the determinants of internet banking adoption intentions: A social cognitive theory perspective. Computers in Human Behavior, 65, 468–478. https://doi.org/10.1016/j.chb.2016.09.017
9. Chauhan, S., & Shukla, A. (2024). Digital banking experience, customer awareness, and satisfaction in emerging markets. Journal of Financial Services Marketing, 29(1), 84–99. https://doi.org/10.1057/s41264-023-00241-1
10. Chauhan, S., & Shukla, A. (2024). Digital service interface innovation and customer satisfaction in emerging economies. Journal of Business Research, 174, Article 114497. https://doi.org/10.1016/j.jbusres.2024.114497
11. 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
12. Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., . . . Wamba, S. F. (2023). So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. International Journal of Information Management, 71, Article 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642
13. Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J., Eirug, A., Galanos, V., Ilavarasan, P. V., Janssen, M., Jones, P., Kar, A. K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B., . . . Williams, M. D. (2023). Artificial Intelligence (AI) for performance excellence: Opportunities, challenges and research agenda. International Journal of Information Management, 68, Article 102558. https://doi.org/10.1016/j.ijinfomgt.2022.102558
14. Gallouj, F., & Savona, M. (2009). Innovation in services: A review of the debate and a research agenda. Journal of Evolutionary Economics, 19(2), 149–172. https://doi.org/10.1007/s00191-008-0126-4
15. Hanafizadeh, P., Behboudi, M., Koshksaray, A. A., & Tabar, M. J. S. (2014). Mobile-banking adoption by Iranian bank clients. Telematics and Informatics, 31(1), 62–78. https://doi.org/10.1016/j.tele.2012.11.001
16. Kaur, B., & Batra, N. K. (2023). Technology adoption of digital banking and women consumers: An empirical investigation. International Journal of Experimental Research and Review, 32, 278–287. https://doi.org/10.52756/ijerr.2023.v32.024

17. Kaur, P., & Ali, S. (2023). Perceived innovation and customer satisfaction in mobile banking: The mediating role of awareness. Journal of Retailing and Consumer Services, 72, Article 103287. https://doi.org/10.1016/j.jretconser.2023.103287
18. Kumar, S., & Singh, R. (2024). Service innovation, customer awareness, and satisfaction in post-pandemic digital banking. International Journal of Bank Marketing, 42(2), 211–234. https://doi.org/10.1108/IJBM-03-2023-0145
19. Laukkanen, T. (2016). Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. Journal of Business Research, 69(7), 2432–2439. https://doi.org/10.1016/j.jbusres.2016.01.013
20. Laukkanen, T. (2022). Digital literacy as a moderator in mobile banking adoption. Electronic Commerce Research, 22(4), 891–909. https://doi.org/10.1007/s10660-021-09467-3
21. Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of Marketing Research, 17(4), 460–469. https://doi.org/10.1177/002224378001700405
22. Ostrom, A. L., Bitner, M. J., Brown, S. W., Burkhard, K. A., Goul, M., Smith-Daniels, V., Demirkan, H., & Rabinovich, E. (2010). Moving forward and making a difference: Research priorities for the science of service. Journal of Service Research, 13(1), 4–36. https://doi.org/10.1177/1094670509357611
23. 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
24. Rahi, S., Ghani, M. A., & Ngah, A. H. (2021). Factors propelling the adoption of internet banking: The role of e-customer service, website design, brand image and customer satisfaction. International Journal of Business Information Systems, 38(4), 551–569. https://doi.org/10.1504/IJBIS.2021.119424
25. Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press.
26. Sharma, R., & Rao, P. (2023). Artificial intelligence-driven personalization and customer satisfaction in digital banking. Journal of Retailing and Consumer Services, 75, Article 103498. https://doi.org/10.1016/j.jretconser.2023.103498
27. 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
28. 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
29. 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
30. Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2010). Explaining internet banking behavior: Theory of reasoned action, theory of planned behavior, or technology acceptance model? Journal of Applied Social Psychology, 40(5), 1172–1202. https://doi.org/10.1111/j.1559-1816.2010.00615.x