DOI: 10.71317/jgst.2.9(s4).2026. 796
Journal of Global Social Transformation
Journal homepage: https://rjsaonline.org/index.php/JGST

Examining the Role of Emerging Banking Technologies in Shaping Customer Financial Well-being: The Integration of the Expectation Confirmation Model

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ARTICLE INFO

Submission:
August 12, 2026
Revised:
August 29, 2026
Accepted:
September 14, 2026
Available Online:
September 26, 2026

Keywords:
Financial Wellbeing, Satisfaction, Expectation Confirmation, Perceived Usefulness, Emerging Banking Technologies.

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ABSTRACT

The intensive development of digital technologies has changed the banking business in such developing economies as Pakistan, where AI-based and chatbots are increasingly introduced into customer services. The paper examines these new technologies and their impact on the financial well-being of customers through the Expectation Confirmation Model (ECM). Specifically, it investigates the role of expectation confirmation, perceived usefulness, and satisfaction in financial confidence, control, and financial health in general. The users of the digital banking services in the major urban centers in Pakistan were surveyed on a quantitative basis, and the hypothesized relations were examined using Structural Equation Modeling (SEM) with SmartPLS. The results indicate that expectation confirmation, perceived usefulness, and satisfaction have a strong positive effect on the financial well-being due to the availability of services, facilitating informed decision-making, and confidence of the customers in online platforms. The paper expands ECM into the context of AI-based banking and offers practical implications for financial institutions, technology developers, and policy-makers who intend to maximize AI banking solutions to maximize customer satisfaction, trust, and sustainable financial well-being.

Introduction

The digital revolution has radically changed the way financial services are provided and consumed in the banking industry globally, since the remote innovation of digital technologies has faced the banking sector with a complete change in the manner services are rendered. Financial institutions in developing countries like Pakistan are going to use more intelligent, automated, and customer-centric services and are starting to turn to AI-driven banking and chatbot-supported platforms. These innovations not only increase the efficiency of the operation but also enable the customers to access the financial service in real time, get personalized advice, and make informed financial decisions. Smart banking solutions, such as intelligent decision-support solutions and chatbot interfaces, allow them to serve questions instantly, support transactions, and offer personalized financial support, whereas AI-based analytics can offer predictive insights and recommendations according to customer behavior. With these technologies, it is easy to enhance engagement, convenience, and the general quality of service, making banking more interactive and responsive, in line with the changing customer expectations. Although the use of such technologies is fast gaining momentum, the impact on the financial stability of consumers has not been fully researched, especially in emerging economies such as Pakistan. The majority of the available literature on digital banking has been dedicated to customer loyalty, intention to adopt, and intention to continue to use digital platforms as the end outcomes. Although the studies are very insightful in terms of behavioral intentions and service

satisfaction, they tend to omit the final outcome of the financial well-being that includes financial security of an individual, the level of confidence that one has to meet the short- and long-term financial objectives. As compared to adoption or loyalty metrics, financial well-being is a more important indicator of the impact of the emerging banking technologies, as it encompasses the tangible, real-life benefits that technology offers to customers in favor of improving their financial health and empowerment. The issue, then, is that although the use of AI-driven and chatbot-supported banking has become increasingly popular in Pakistan, not many empirical studies have been conducted to investigate the impact of these technologies on the financial welfare of customers. This knowledge gap restricts the capability of financial institutions to develop services that can comprehensively serve the financial confidence of the users and invest in informed decision-making. and financial empowerment in general. In order to fill this gap, the present research is aimed at studying the impacts of expectation confirmation, perceived usefulness, and customer financial well-being caused by AI-driven and chatbot-enabled banking. It also aims at learning how the combination of these factors leads to financial confidence, control, and better decision-making, which gives a more holistic perspective on the value of digital banking technologies beyond usage intentions. The research is important as far as theory and practice are concerned. It is a theoretical extrapolation of the Expectation Confirmation Model (ECM) into the realm of AI-enabled banking in which financial well-being serves as the major outcome, and a new perspective to interpret customer perceptions and behavioral reactions. In practical terms, it offers practical recommendations to financial institutions, technology developers, and policymakers who should aim at developing user-focused digital services that not only facilitate satisfaction but also sustainable financial empowerment. The study identifies the paradigm shift nature of AI-driven and chatbot-enabled banking technologies in the up-and-coming economies, by portraying that technological innovation can enhance the efficiency and convenience of services, as well as the financial well-being and trust of the customers in ways that are concrete and quantifiable.

Literature Review

Emerging Banking Technologies

The banking sector has been digitalized, and this has transformed the type of operations to be undertaken by the financial institutions as well as how the financial institutions interact with the customers. The new technologies, artificial intelligence (AI), and chatbots are now a constituent part and parcel of the efficiency of the services delivered, customizing, and convenience (Vannucci & Pantano, 2020; Gomber et al., 2018). AI-based banking is the application of data analytics and machine learning to predict a customer, detect fraud, or provide an individual financial recommendation (Rahi et al., 2023). Chatbots and conversational agents are based on natural language processing to provide 24/7 transactional services, simple queries, and guided product search to reduce friction in the customer experience and increase perceived responsiveness (Sarmah et al., 2021). It is empirically proven that these technologies may simplify information, be perceived as useful, but their overall effect on such outcomes as trust, perceived risk, and financial well-being depends on the quality of implementation, transparency, and the ability of users (Vannucci & Pantano, 2020; Quach et al., 2025). Banks such as HBL, Meezan Bank, or UBL have to use the services of AI and chatbots to improve the interaction with users and to provide services (Saif et al., 2025).

Expectation Confirmation Model (ECM)

Expectation Confirmation Model (ECM) by Bhattacherjee (2001) is based on the expectation-confirmation theory (Oliver, 1980) but differs in that it expands on it to comprehend the post-adoption behavior of the users in an information system. According to the model, users keep using a system when the expectations are met, the perceived usefulness is supported, and satisfaction is realized. Expectation confirmation in digital banking refers to the extent to which the expectations made by customers regarding the performance of the technology in digital banking were met, resulting in an increase in customer satisfaction with the technology and subsequent usage (Thong et al., 2006; Zhou, 2011). The literature in Pakistan and other related settings proves that the perceived usefulness and confirmation are strong predictors of satisfaction and continuance (Rahi & Ghani, 2021; Ahmed et al., 2024). Nevertheless, the traditional ECM research focuses on behavioral continuance as the outcome; to convert ECM to well-being results, the notion of satisfaction needs to be rethought as a mediator of continuance as well as the psychological conditions of perceived financial control, stress reduction, and confidence. This increment is in line with evidence that subjective financial well-being may be affected by satisfaction with financial services (Ladhari et al., 2017). Notably, the main assumption of ECM is the rational assessment of performance in comparison to expectation -a hypothesis that can be tamed by cognitive bias, digital literacy, and trust, which are more or less diverse among populations (Bhattacherjee, 2001).

Customer Financial Well-Being

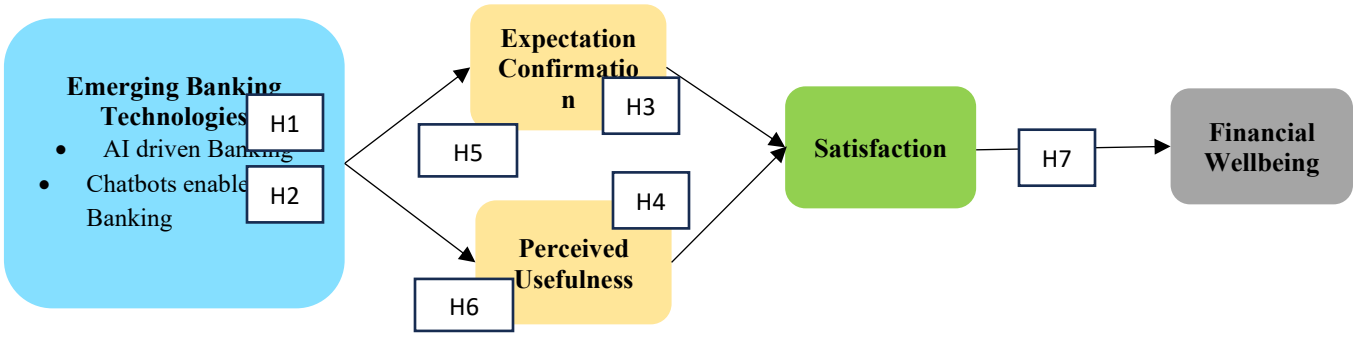
Financial well-being is not limited to financial performance or satisfaction but to a feeling of security, control, and confidence that a customer has in financial decisions (Brueggen et al., 2017). Current and upcoming technologies in banking could have a direct effect on well-being because they can enhance budgeting, saving, and investment choices using AI insights and digital advice apps (Ladhari et al., 2017; Quach et al., 2025). Digital banking is also a promising source of financial inclusion, especially to under-banked segments in developing economies like Pakistan (Rahim et al., 2024). Nevertheless, technological anxiety, digital illiteracy, and the problem of trust can reduce these advantages, and it is essential to comprehend the cognitive and psychological processes connecting the use of technologies and well-being.

Integration of ECM

The incorporation of the Expectation Confirmation Model (ECM) offers a powerful and comprehensive model for the evaluation and reaction of customers to the emerging banking technologies. As formulated by Bhattacherjee (2001), ECM describes the effect of confirmation of previous expectations and the usefulness of the expectation to the user satisfaction (Bhattacherjee, 2001). Research in the FinTech industry also favors these correlations: researchers have shown that these two factors are robust predictors of satisfaction and continuance intention in mobile banking (Erdoğan, 2023). On a bigger scale, perceived usefulness and confirmation have been demonstrated to contribute to further engagement and user retention in the field of open banking research (MDPI, 2024). Because the expectations, experiences, and the perceived value of customers are related dynamically, the interplay of these three factors provides a multidimensional perspective of not only customer satisfaction but eventually of financial well-being that has not been considered through conventional measures such as loyalty or usage. Moreover, the strategy is consistent with the increasing emphasis on humanized digital transformation of financial services, in which less priority is given to adoption and more to customer empowerment, trust, and value creation over the long run (Adedoyin & Dogan, 2025).

Research Framework

This framework integrates the Expectation Confirmation Model (ECM) to examine how emerging banking technologies influence customer financial well-being.



Hypotheses Formulation

The findings support **H1**, demonstrating that emerging banking technologies, including AI-driven banking and chatbot-enabled services, positively influence expectation confirmation. This indicates that customers perceive these technologies as fulfilling their initial expectations by delivering efficient, reliable, and accessible banking services. AI-powered features, such as personalized recommendations, automated assistance, and real-time responses, enhance users' experiences and reinforce positive evaluations of digital banking platforms. When customers find that the actual performance of these technologies matches or exceeds their expectations, their confidence in digital banking increases. These findings are consistent with the Expectation Confirmation Model, which proposes that confirmation results from comparing users' expectations with their actual experience. The results also support previous research showing that innovative banking technologies improve users' post-adoption perceptions and strengthen their overall evaluation of digital financial services.

H1: Emerging banking technologies are positively associated with Expectation Confirmation.

Emerging banking technologies, including AI-driven banking and chatbot-enabled services, have a positive effect on perceived usefulness. This suggests that customers consider these technologies valuable because they simplify financial transactions, provide timely assistance, and improve the overall efficiency of banking activities. AI-powered features, such as personalized financial recommendations, automated customer support, and instant transaction processing, enable users to accomplish banking tasks more effectively. As customers experience greater convenience and improved service quality, they are more likely to perceive digital banking platforms as beneficial for managing their financial activities. These findings are consistent with the Technology Acceptance Model, which identifies perceived usefulness as a key determinant of technology evaluation and acceptance. Therefore, enhancing the functional value of AI-enabled banking services can strengthen customers' positive perceptions and encourage greater utilization.

H2: Emerging banking technologies are positively associated with Perceived Usefulness.

Expectation confirmation has a significant positive effect on customer satisfaction. This indicates that when AI-driven banking services and chatbot-enabled platforms perform as customers anticipate, users become more satisfied with their overall banking experience. Meeting or exceeding initial expectations strengthens customers' confidence in digital banking services and encourages favorable evaluations of service quality. In the context of emerging banking technologies, consistent system performance, reliable transactions, and responsive customer support contribute to higher levels of satisfaction. These findings are consistent with the Expectation Confirmation Model, which identifies confirmation as a primary antecedent of post-adoption satisfaction. The results also align with previous studies showing that customers who perceive digital banking services as meeting their expectations are more likely to express greater satisfaction and maintain positive attitudes toward continued use.

H3: Expectation Confirmation is positively associated with Satisfaction.

Perceived usefulness has a significant positive effect on customer satisfaction. This suggests that users are more satisfied when they believe AI-driven banking services and chatbot-enabled platforms enhance the efficiency, convenience, and effectiveness of their financial activities. Features such as instant transaction processing, personalised financial assistance, and round-the-clock customer support increase the practical value of digital banking, leading to more favourable customer evaluations. As users recognise the benefits of these technologies in managing their financial needs, their overall satisfaction with banking services improves. This finding is consistent with the Technology Acceptance Model, which identifies perceived usefulness as a key determinant of users' attitudes toward technology. It also supports previous research demonstrating that the perceived value of digital banking services plays a crucial role in strengthening customer satisfaction.

H4: Perceived Usefulness is positively associated with Satisfaction.

Expectation confirmation significantly mediates the relationship between emerging banking technologies and customer satisfaction. This suggests that AI-driven banking and chatbot-enabled services do not enhance satisfaction solely through their technological capabilities; instead, they first need to meet or exceed users' initial expectations. When customers perceive that these technologies perform as anticipated by providing reliable, responsive, and convenient services, they develop stronger confirmation beliefs, which subsequently increase their satisfaction. Therefore, expectation confirmation serves as an important psychological mechanism linking technological innovation with positive customer experiences. This finding extends the Expectation Confirmation Model by demonstrating that post-adoption evaluations remain essential in AI-enabled banking environments. Financial institutions should therefore focus on consistently delivering the promised service quality to strengthen customer satisfaction through positive expectation confirmation.

H5: Expectation Confirmation mediates the relationship between Emerging Banking Technologies and Satisfaction.

Perceived usefulness significantly mediates the relationship between emerging banking technologies and customer satisfaction. This suggests that AI-driven banking and chatbot-enabled services increase customer satisfaction by enhancing users' perceptions of the practical value and effectiveness of these technologies. When customers believe that digital banking solutions help them perform financial tasks more efficiently, save time, and improve decision-making, they are more likely to evaluate the overall service positively. Thus, perceived usefulness acts as an important mechanism through which technological innovation translates into greater satisfaction. This finding is consistent with the Technology Acceptance Model, which identifies perceived usefulness as a central determinant of users' attitudes toward technology. For banks, improving the functional benefits of AI-enabled services can strengthen customer satisfaction and promote more positive digital banking experiences.

H6: Perceived Usefulness mediates the relationship between Emerging Banking Technologies and Satisfaction.

Customer satisfaction has a significant positive effect on financial well-being. This indicates that customers who are satisfied with AI-driven banking and chatbot-enabled services experience greater confidence in managing their finances, improved financial control, and a stronger sense of financial security. Satisfied users are more likely to rely on digital banking platforms for everyday financial activities, enabling them to make informed decisions and manage their financial resources more effectively. These results suggest that satisfaction extends beyond evaluating service quality and contributes directly to customers' overall financial well-being. The findings are consistent with previous research showing that positive service experiences enhance financial confidence and long-term financial outcomes. Therefore, improving customer satisfaction should remain a strategic priority for banks seeking to promote sustainable financial well-being through digital banking innovations.

H7: Satisfaction is positively associated with Financial Well-being.

Research Methodology

The research design adopted in this study is a quantitative study that will be cross-sectional to explore how AI-based and chatbot-enabled banking technologies can influence customer financial well-being. This study should be conducted using a quantitative survey because it will be possible to systematically measure and test all theoretical relationships between such theoretical constructs as expectation confirmation, perceived usefulness, satisfaction, and financial well-being (Bhattacherjee, 2001; Uddin & Nasrin, 2023). The sample population in this research will include people utilizing digital banking in large urban areas in Pakistan, specifically, those who have already encountered the use of AI-driven or chatbot-powered banking systems. The purposive sampling method is applied to ensure that the participants possess the knowledge and interest in the technologies that they are being studied (MDPI, 2023). The proposed sample size will consist of 300 respondents, and it is aligned with the prior ECM-based FinTech research, as well as is deemed large enough to produce statistically significant results (Bhattacherjee, 2001; Uddin & Nasrin, 2023).

A structured questionnaire that includes a multi-item scale based on the literature is used to gather the data. The important constructs of the Expectation Confirmation Model (ECM), expectation confirmation, perceived usefulness, and satisfaction are operationalized with the help of the items created by Bhattacherjee (2001), reflecting the perceived performance of the user as compared to the previous expectations and general satisfaction. Financial well-being is measured with reliable scales such as the Consumer Financial Protection Bureau (CFPB) 10-item Financial Well-Being Scale, which represents such dimensions as financial control, security, and the possibility to reach financial objectives (Consumer Financial Protection Bureau, 2017). All the items are rated by the respondents on a five-point Likert scale at 1 (strongly disagree) to 5 (strongly agree), as is typical of other research studies on technology adoption and financial well-being (Uddin & Nasrin, 2023).

To achieve content validity, the questionnaire is written following the previous scales that were already tested, and it is tested on a pilot test in which a small population consisting of digital banking users will be involved to consider the clarity, understanding, as well as reliability. The pilot study is used to provide feedback on the measurement accuracy that is adjusted to. The data analysis will include descriptive statistics in summarizing the characteristics of the sample and the responses, and inferential statistics, including regression-based modeling or path analysis, to analyze the interrelationships between expectation confirmation, perceived usefulness, satisfaction, and financial well-being. This method of analysis aligns with the previous ECM studies on FinTech-related settings, where cognitive reconsiderations and contentment are associated with downstream results (Uddin & Nasrin, 2023). Ethical considerations are also followed, whereby the participants are told about the purpose of the study, assurance of confidentiality and anonymity, and an opportunity to withdraw at any point in time. This methodology will offer a rigorous, theoretically supported approach to the issue of the role of the emerging banking technologies in improving the financial well-being of the customers by the combination of a validated theoretical framework with a well-established measure of financial well-being.

Demography

Table 1: Demographics

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	172	57.3
	Female	128	42.7

Demographic Variable	Category	Frequency	Percentage (%)
Age (Years)	18–25	96	32.0
	26–35	118	39.3
	36–45	58	19.3
	Above 45	28	9.4
Education	Intermediate or Below	24	8.0
	Bachelor's Degree	132	44.0
	Master's Degree	118	39.3
	MPhil/PhD	26	8.7
Employment Status	Student	52	17.3
	Government Employee	61	20.3
	Private Employee	124	41.3
	Self-employed/Business	45	15.0
	Other	18	6.0
Monthly Income (PKR)	Below 50,000	58	19.3
	50,001–100,000	104	34.7
	100,001–150,000	82	27.3
	Above 150,000	56	18.7
Experience Using AI/Chatbot Banking	Less than 1 year	74	24.7
	1–3 years	146	48.7
	More than 3 years	80	26.6

Table 1 presents the demographic characteristics of the 300 respondents. Male participants constituted 57.3% of the sample, while females accounted for 42.7%. The largest age group was 26–35 years (39.3%), followed by 18–25 years (32.0%), indicating that most respondents were young adults who actively use digital banking services. In terms of education, the majority held a bachelor's degree (44.0%), followed by a master's degree (39.3%), reflecting a well-educated sample. Regarding employment, private-sector employees (41.3%) represented the largest group, followed by government employees (20.3%) and students (17.3%). Most respondents reported a monthly income between PKR 50,001 and 100,000 (34.7%). Nearly half of the participants (48.7%) had one to three years of experience using AI-driven or chatbot-enabled banking services, suggesting that the sample possessed sufficient familiarity with emerging banking technologies to provide informed responses.

Results

Measurement Model

The measurement model (Fig 2) was first evaluated to confirm the reliability and validity of the constructs.

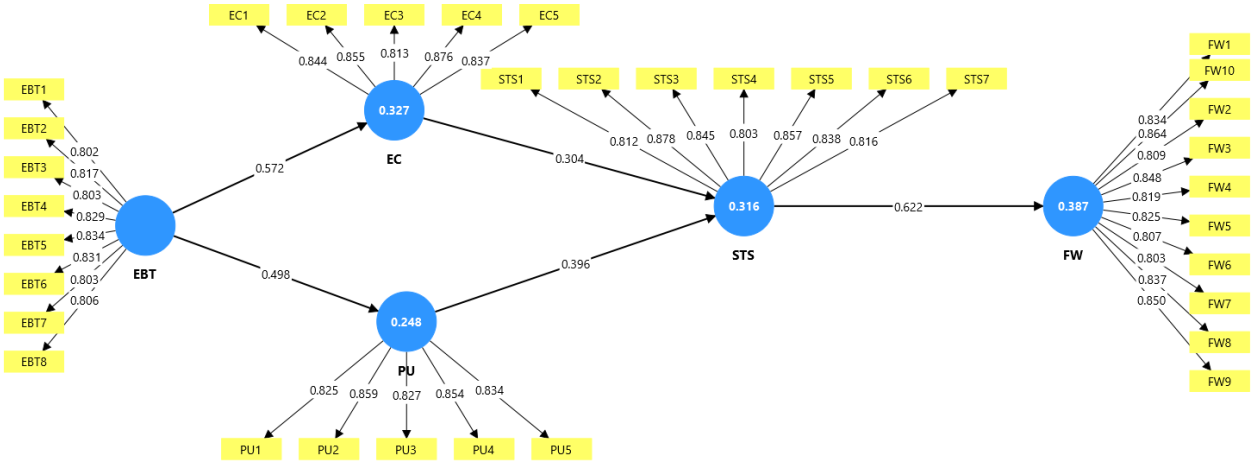


Fig 2: Measurement Model

Reliability and validity tests are one of the central issues to determine the quality and accuracy of measurement models in a research study (Hair et al., 2019; Fornell & Larcker, 1981). Reliability is used to identify if items in a construct are always measuring the same underlying construct (Hair et al., 2019), and it is calculated using Cronbach's alpha and composite reliability (rho_a and rho_c). Average variance extracted (AVE) for validity and particularly convergent validity is an indicator of how much variance in indicators is accounted for by a construct (Fornell & Larcker, 1981). The acceptable thresholds based on the established methodological guidelines are ≥0.70 for reliability and ≥0.50 for AVE, which means that the constructs are consistent and measured correctly (Hair et al., 2019).

Table 2: Outer Model Evaluation

Construct	Items	EBT	EC	FW	PU	STS
Emerging Banking Technologies	**EBT1**	0.802				
	EBT2	0.817				
	EBT3	0.803				
	EBT4	0.829				
	EBT5	0.834				
	EBT6	0.831				
	EBT7	0.803				
	EBT8	0.806				
Expectation Confirmation	**EC1**		0.844			
	EC2		0.855			
	EC3		0.813			
	EC4		0.876			
	EC5		0.837			
Financial Wellbeing	**FW1**			0.834		
	FW10			0.864		
	FW2			0.809		
	FW3			0.848		
	FW4			0.819		
	FW5			0.825		
	FW6			0.807		
	FW7			0.803		
	FW8			0.837		
	FW9			0.850		
Perceived Usefulness	**PU1**				0.825	
	PU2				0.859	

	PU3	0.827	
	PU4	0.854	
	PU5	0.834	
Satisfaction	**STS1**		0.812
	STS2		0.878
	STS3		0.845
	STS4		0.803
	STS5		0.857
	STS6		0.838
	STS7		0.816

The factor loading results (Table 2) show that all measurement items loaded strongly on their respective constructs. EBT item loadings ranged from 0.802 to 0.834, EC from 0.813 to 0.876, FW from 0.803 to 0.864, PU from 0.825 to 0.859, and STS from 0.803 to 0.878. Since all values are above the recommended threshold of 0.70, the results confirm acceptable indicator reliability and support the convergent validity of the measurement model.

Table 3: Construct reliability and validity

	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
EBT	0.928	0.929	0.941	0.666
EC	0.900	0.900	0.926	0.714
FW	0.950	0.951	0.957	0.689
PU	0.896	0.900	0.923	0.705
STS	0.928	0.929	0.942	0.699

As can be seen from Table 3, all constructs have good reliability and convergent validity. The Cronbach alpha values of the scales range from 0.896 to 0.950, and the values of composite reliability (rho_a and rho_c) are above the recommended value of 0.70, indicating a good level of internal consistency. Further, the AVE values are greater than the lower threshold of 0.50, which shows each construct has a variance of more than 50% in its indicators. The results obtained support the reliability of the measurement model as well as having a good level of convergent validity.

Discriminant validity (Table 4) frees the individual constructs to be different and to measure a different concept (Fornell & Larcker, 1981). It is usually measured against inter-construct correlations, with lower values being a good measure of discriminant validity (Hair et al., 2019). This means that constructs according to the Fornell-Larcker criterion ought not to be highly correlated with one another, and this ensures that each construct measures a unique aspect of the model (Fornell & Larcker, 1981).

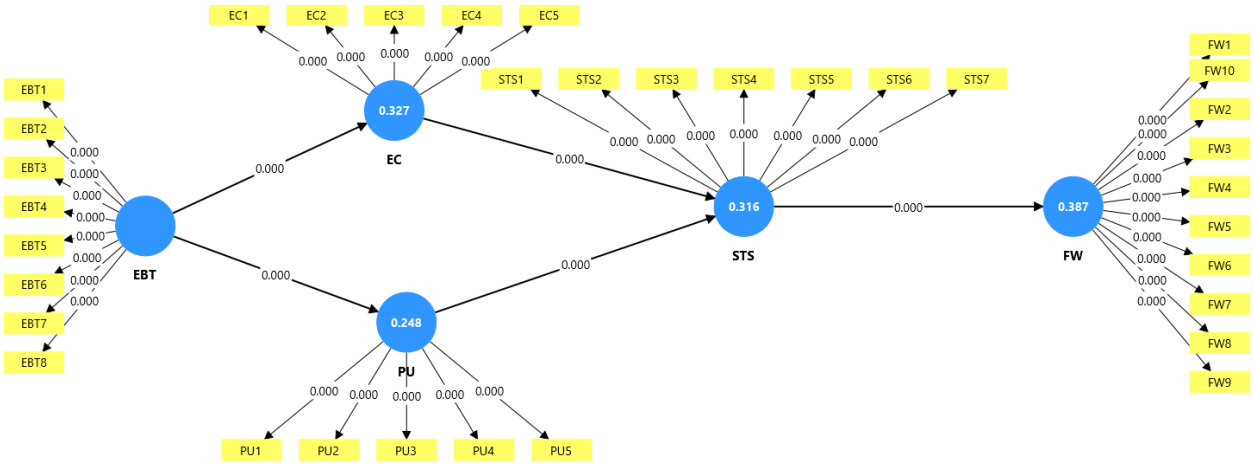
Table 4: Discriminant Validity

	EBT	**EC**	**FW**	**PU**	**STS**
EBT					
EC	0.623				
FW	0.342	0.241			
PU	0.541	0.305	0.447		
STS	0.461	0.452	0.661	0.523	

The results of the discriminant validity are provided in Table 4. The inter-construct correlations have a range from 0.241 to 0.661, which is below the recommended value of 0.85. This implies that they are all empirically different and reflect a different dimension of the proposed research model. Hence, the results support discriminant validity and illustrate that the measurement model has a satisfactory construct distinctiveness.

Structural Model

The structural model (Fig 3) was subsequently assessed to examine the hypothesised relationships among the constructs.



The strength and direction of relationships between constructs in the structural model are assessed using path coefficients, which show the extent to which one variable has an impact on the other (Hair et al., 2019). They have their relevance, which is determined based on t-value and p-value, which determine whether the hypothesized relationships are statistically supported or not (Hair et al., 2019).

Table 5: Path Coefficient

Paths	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EBT -> EC	0.572	0.572	0.039	14.750	0.000
EBT -> PU	0.498	0.499	0.043	11.511	0.000
EC -> STS	0.304	0.304	0.047	6.432	0.000
PU -> STS	0.396	0.397	0.046	8.695	0.000
STS -> FW	0.622	0.624	0.035	17.883	0.000

As seen in Table 5, all the direct relationships proposed are positive and statistically significant. EBT has a significant positive effect on EC ($\beta = 0.572$, $t = 14.750$, $p < 0.001$) and PU ($\beta = 0.498$, $t = 11.511$, $p < 0.001$). EC ($\beta = 0.304$, $t = 6.432$, $p < 0.001$) and PU ($\beta = 0.396$, $t = 8.695$, $p < 0.001$) also significantly influence STS. Finally, STS has a strong positive effect on FW ($\beta = 0.622$, $t = 17.883$, $p < 0.001$). The results do support all direct hypotheses and validate that emerging banking technologies contribute to enhancing financial well-being by means of confirmation, usefulness and satisfaction.

The specific indirect effects were examined to assess mediation and moderation relationships within the model (Hair et al., 2019).

Table 6: Specific Indirect Effect

Paths	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EBT -> PU -> STS	0.197	0.198	0.031	6.434	0.000
PU -> STS -> FW	0.246	0.248	0.034	7.178	0.000
EBT -> EC -> STS	0.174	0.174	0.031	5.693	0.000
EBT -> PU -> STS -> FW	0.123	0.124	0.022	5.589	0.000
EBT -> EC -> STS -> FW	0.108	0.108	0.019	5.650	0.000
EC -> STS -> FW	0.189	0.189	0.030	6.332	0.000

These indirect influences among the study variables are also significant as shown in Table 6. EBT significantly influences STS through PU (β = 0.197, p < 0.001) and EC (β = 0.174, p < 0.001). PU and EC also have indirect effects on FW via STS, with β = 0.246 for the case of PU and β = 0.189 for the case of EC. The serial mediation paths from EBT to FW through PU → STS (β = 0.123, p < 0.001) and EC → STS (β = 0.108, p < 0.001) are also significant. The findings indicate that emerging banking technologies have a positive indirect effect on the financial well-being via perceived usefulness, expectation confirmation and satisfaction**.**

The importance of total effects is that they represent the total impact of one construct on another by summing direct and indirect (mediated) effects, which gives us a full picture of relationships in the model (Hair et al., 2019). They are necessary to realise the real scale of the impact and prevent the underestimation of the relationships functioning via mediators (Hair et al., 2019).

Table 7: Total Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EBT -> EC	**0.572**	**0.572**	**0.039**	**14.750**	**0.000**
EBT -> FW	**0.231**	**0.233**	**0.026**	**8.763**	**0.000**
EBT -> PU	**0.498**	**0.499**	**0.043**	**11.511**	**0.000**
EBT -> STS	**0.371**	**0.372**	**0.035**	**10.609**	**0.000**
EC -> FW	**0.189**	**0.189**	**0.030**	**6.332**	**0.000**
EC -> STS	**0.304**	**0.304**	**0.047**	**6.432**	**0.000**
PU -> FW	**0.246**	**0.248**	**0.034**	**7.178**	**0.000**
PU -> STS	**0.396**	**0.397**	**0.046**	**8.695**	**0.000**
STS -> FW	**0.622**	**0.624**	**0.035**	**17.883**	**0.000**

All total effects are positive and significant as seen in Table 7. The total effect of EBT on EC, PU, STS and FW is significant for EC (β = 0.572) and meaningful for FW (β = 0.231). There are also significant total effects of EC and PU on STS and FW. STS shows the highest total effect in the relationship between the variables, indicating that the satisfaction level is the most important factor in enhancing financial well-being among all relationships (β = 0.622).

R^2 (Table 8) measures the strength of the structural model, or the degree to which the independent variables explain the variance in the dependent variables (Hair et al., 2019). The greater the R^2, the greater the predictive power of that model. Hair et al. (2019) claimed that R^2 of 0.25, 0.50, and 0.75 are weak, moderate, and strong, respectively.

Table 8: R-Square

	R-square	R-square adjusted
EC	0.327	0.324
FW	0.387	0.385
PU	0.248	0.245
STS	0.316	0.311

Table 8 presents the explanatory power of the structural model. The R^2 values indicate that EBT explains 32.7% of the variance in EC and 24.8% in PU, while EC and PU jointly explain 31.6% of the variance in STS. Furthermore, the model accounts for 38.7% of the variance in FW. The adjusted R^2 values are very close to the corresponding R^2 values, suggesting that the model has stable explanatory power with minimal estimation bias.

The model fit indices indicate how well the proposed model corresponds with the observed data (Hair et al., 2019). Commonly reported fit indicators include SRMR, d_ULS, d_G, Chi-square, and NFI. According to Hair et al. (2019), an SRMR value below 0.08 suggests an acceptable model fit, while an NFI value closer to 1 indicates a better-fitting model.

Table 9: R-Square

	Saturated model	Estimated model
SRMR	0.040	0.052
d_ULS	0.996	1.722
d_G	0.414	0.423
Chi-square	687.815	700.366
NFI	0.913	0.912

The overall fit of the structural model is acceptable, as suggested in Table 9. Both the saturated model (0.040) and the estimated model (0.052) have values which are lower than the recommended value for a good model fit (0.08). Similarly, the NFI values of 0.913 and 0.912 are above the recommended level of 0.90, which further supports the model's adequacy. The d_ULS, d_G, and Chi-square values also indicate that the estimated model is very close to the observed data, thus illustrating that the proposed model is a good representation of the relations among the constructs in the study.

Discussion

This study examined how emerging banking technologies influence customers' financial well-being by extending the Expectation Confirmation Model (ECM) to the context of AI-driven and chatbot-enabled banking services. The findings indicate that all hypothesised relationships are positive and statistically significant, demonstrating that customers' evaluations of digital banking technologies shape their satisfaction and ultimately improve their financial well-being.

The results support H1, showing that emerging banking technologies positively influence expectation confirmation. This suggests that when AI-powered banking services and chatbot applications perform as expected, customers perceive that their initial expectations have been fulfilled. The finding is consistent with the core assumptions of the Expectation Confirmation Model proposed by Bhattacherjee (2001) and supports recent banking studies reporting that advanced digital technologies enhance users'

post-adoption evaluations by providing reliable, accessible, and responsive financial services (Rahi et al., 2021; Lee & Chen, 2022). In Pakistan's banking sector, where digital transformation has accelerated in recent years, AI-enabled services appear capable of meeting customers' expectations regarding convenience and service quality.

The results also confirm H2, indicating that emerging banking technologies significantly improve perceived usefulness. This finding implies that customers consider AI-based banking applications valuable because they simplify financial transactions, reduce service delays, and facilitate informed financial decisions. The result agrees with the Technology Acceptance Model proposed by Davis (1989) and subsequent digital banking research demonstrating that technological innovation strengthens customers' perceptions of usefulness and encourages continued utilization of digital financial services (Raza et al., 2017; Noreen et al., 2023). AI-enabled banking therefore creates value beyond operational efficiency by improving customers' perceptions of service effectiveness.

Support for H3 demonstrates that expectation confirmation positively affects customer satisfaction. When banking technologies consistently deliver the performance customers anticipate, satisfaction increases accordingly. This relationship reflects one of the fundamental propositions of ECM and has been consistently reported in studies examining digital banking and mobile financial services (Bhattacherjee, 2001; Rahi et al., 2021). The finding suggests that banks should prioritize consistent service quality and system reliability to strengthen customer satisfaction with AI-enabled banking platforms.

Similarly, H4 confirms that perceived usefulness significantly enhances customer satisfaction. Customers who believe that AI-driven banking technologies improve the efficiency and effectiveness of financial management are more likely to report higher satisfaction levels. This finding supports previous evidence that perceived usefulness remains one of the strongest determinants of satisfaction in technology-based financial services (Davis, 1989; Jain & Kumar, 2022). The practical implication is that digital banking platforms should continuously introduce features that create tangible value for users rather than focusing solely on technological sophistication.

The mediation analysis further provides important theoretical insights. The significant indirect effects through expectation confirmation and perceived usefulness demonstrate that these cognitive evaluations partially explain how emerging banking technologies enhance customer satisfaction. Rather than influencing satisfaction directly, AI-enabled banking improves satisfaction by fulfilling customer expectations and increasing perceptions of usefulness. These findings reinforce the post-adoption perspective of ECM and highlight the importance of customer perceptions in determining successful technology implementation (Bhattacherjee, 2001; Rahi et al., 2021).

Finally, the results strongly support H7, revealing that customer satisfaction has a substantial positive effect on financial well-being. Satisfied users of AI-driven banking services report greater financial confidence, improved financial control, and better overall financial well-being. This finding extends previous ECM research by demonstrating that satisfaction is not merely associated with continued technology usage but also contributes to meaningful personal outcomes. The result aligns with studies suggesting that digital financial services can improve financial capability and individual well-being by providing timely information, personalized recommendations, and easier access to financial resources (Brüggen et al., 2017; CFPB, 2017; Rahi et al., 2024). Thus, customer satisfaction serves as the primary mechanism through which emerging banking technologies generate broader financial benefits.

Overall, the findings demonstrate that AI-driven banking and chatbot-enabled services contribute to customers' financial well-being through a sequential process in which technology improves expectation confirmation and perceived usefulness, leading to greater satisfaction and ultimately enhanced financial well-being. The model explains a meaningful proportion of variance in the endogenous constructs, indicating that ECM provides an appropriate theoretical framework for understanding post-adoption outcomes in emerging digital banking environments. These findings contribute to the growing literature by positioning financial well-being as an important consequence of emerging banking technologies rather than limiting the analysis to technology adoption or continuance intentions.

Conclusion and Recommendations

The conclusions of this paper indicate that AI-based and chatbot-enabled banking systems are very useful in improving the financial health of customers. Using the Expectation Confirmation Model (ECM), it was demonstrated that expectation confirmation, perceived usefulness, and satisfaction have a strong effect on financial confidence, control, and general financial health. In contrast to the previous studies that mostly looked at the aspect of adoption or loyalty or even continuance intention, the research highlighted in the present study puts special emphasis on financial well-being as an important and less explored consequence. The satisfaction of the users and the perception of the usefulness of technologies in the case of fulfilling their expectations increase the likelihood of making conscious financial choices, controlling resources, and feel more trusted and empowered in digital banking systems. This

has been particularly applicable in emerging economies such as Pakistan where there is a fast pace in adoption of digital but the issue of financial literacy and empowerment still exists.

According to these results, financial organizations ought to dedicate themselves to developing user-friendly AI and chatbot-based solutions that surpass the expectations of their customers, such as personalized guidelines, smart decision-support systems, and in-app guidance to enhance financial literacy and general wellness. Frequent feedback channels must be introduced to measure the satisfaction, find areas of concern and polish the services so as to build trust and interest. There should be encouragement by policymakers and regulators to the human-centered digital banking practices, which are inclusive and secure, and accessible and promote financial education, to ensure that the maximum benefits are realized by the society. Ethical AI and transparency, as well as privacy protection, should also be built into technology developers to enhance user confidence and satisfaction.

On the whole, this paper shows that artificial intelligence and chatbot-powered banking technologies are not just functional means but the strategic ones in order to promote financial health. The perceived usefulness, perceived satisfaction, and expectation fulfillment can all be used to help financial institutions create digital banking solutions, which empower users, create trust, and sustain positive financial performance, which can lead to a more financially stable and empowered society.

Limitation and Future Research Direction

This study has several limitations. First, the data were collected using a cross-sectional survey, which limits the ability to establish causal relationships among the study variables. Second, the sample consisted only of digital banking users from urban areas of Pakistan, which may restrict the generalizability of the findings to rural populations or other countries. Finally, the study relied on self-reported responses, which may be subject to common method bias and respondent perception. Despite these limitations, the study provides useful evidence on the role of emerging banking technologies in enhancing customer financial well-being. Future Research

Future studies may validate the proposed model in different countries and cultural settings to improve the generalizability of the findings. Researchers can also examine additional factors, such as trust, digital literacy, perceived risk, or technology readiness, to better understand customer responses to emerging banking technologies. Moreover, longitudinal studies could provide deeper insights into how AI-driven banking influences financial well-being over time as users gain more experience with digital financial services.

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