

Understanding Customer Satisfaction in Electronic Commerce Within Kurdistan Region of Iraq's Banking Sector: The Nexus Between Service Quality and User Experience

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Abstract: *The study examines the interplay between service quality and user experience in driving customer satisfaction in the Kurdistan region of Iraq's banking sector, focusing on user experience's mediating role. A partial least square structural equation modelling approach was applied to 305 customers' data across three leading banks in the Kurdistan region of Kurdistan region of Iraq. The findings revealed that service quality and user experience independently drive customer satisfaction with no significant mediation effects. The uncovered insights challenge traditional models and highlight the significance of direct service improvements in fragile economies. The applied PLS-SEM offers granular insights into direct and mediation effects, overcoming the limitations of correlation-based approaches in prior examinations. The study fills a critical gap in Middle Eastern banking literature, which has historically dwelt on Gulf Cooperation Council economies with advanced digital ecosystems. Focusing on the Kurdistan region of Iraq offers a blueprint for analysing service quality in post-conflict economies such as Syria and Afghanistan.*

Keywords: Customer satisfaction, Kurdistan Region of Kurdistan region of Iraq, mediating effects, service quality, user experience

1. Introduction

Amid the high electronic commerce adoption rates, which redefines financial service delivery through digital platforms spanning from business-to-consumer and consumer-to-consumer interactions, the global banking sector continues to undergo significant transformations. As such, e-commerce's proliferation in banking, spurred by personalized engagement, accessibility, and cost efficiency, has improved customer satisfaction as a competitive advantage's instrumental determinant [1]. Nonetheless, post-conflict economies like Iraq with digital adoption lag behind regional peers, bank experience challenges in navigating the infrastructural complexities heightened by COVID-19 [2] and evolving customer expectations (Suardana, 2024). While service quality dimensions (empathy, assurance, responsiveness, reliability, and tangibility) and user experience (personalization, security, and interface intuitiveness) are considered drivers of satisfaction in stable economies [3,4], their interactive influence remains underexplored in trust-sensitive and culturally fragmented regions like the Kurdistan Region of Iraq (KRI).

Meanwhile, extant literature disproportionately dwells on mature digital economies like India [5] and China [6], sidelining economies where institutional fragility and socio-cultural diversity uniquely influence e-commerce dynamics. KRI's banking sector, which is characterised by Arabic, Kurdish and Yazidi demographics offers vital and yet underexplored context to ascertain whether the SERVQUAL and user experience models retain their explanatory power amid sectarian trust divides and low digital literacy. In light of these issues, the current study addresses three vital gaps:

- 1) Previous Technology Acceptance Model (TAM) and SERVQUAL model integrations tend to overlook conflict-zone dynamics, particularly hyperlocal trust-

building, such as Sharia-complaint's mediating impact on perceived usefulness and ease of use.

- 2) Though user experience's role in driving customer satisfaction is well documented in academic studies [7-9], its mediation impact on service quality's influence on customer satisfaction is yet to be ascertained in digitising economies.
- 3) Few evidence-based strategies are available about Iraq banks' prioritisation of SERVQUAL investments, such as AI-driven responsiveness, compared to biometric security.

Following the uncovered empirical problems, this manuscript, therefore, aims to examine the nexus between service quality and user experience and its influence on customer satisfaction in electronic commerce within KRI's banking sector. Consequently, our study pioneers an integrated TAM-SERVQUAL framework to detangle how service quality and user experience collectively influence customer satisfaction in KRI's banking sector. To methodologically contribute to existing literature, our study applies a partial least squares structure equation modelling (PLS-SEM) approach to quantify direct and mediated pathways thereby addressing limitations involving regression-based examinations. Key innovations include identifying diminishing user experience improvements like biometric logins beyond 90% adoption yield negligible satisfaction gains. Furthermore, this study bridges global frameworks with KRI's socio-technical realities, providing a replicable model for digitising economies in fragile countries thereby providing a nuanced understanding of e-commerce satisfaction among bank customers. Practically, the findings provide Iraq banks with actionable levers to allocate resources across competitive uses effectively. The study fills a critical gap in Middle Eastern banking literature, which has historically dwelt on Gulf Cooperation Council

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economies with advanced digital ecosystems. Focusing on KRI offers a blueprint for analysing service quality in post-conflict economies such as Syria and Afghanistan. The next section of the study synthesises TAM and SERVQUAL literature and reviews existing literature to identify empirical gaps and formulate a conceptual model, which forms the key to answering the research questions. Section details the applied (PLS-SEM) approach whilst the results obtained thereof are provided in Section Four. Section Five concludes the study by highlighting the policy implications, limitations and suggestions for future studies.

2. Literature Review

2.1 Theoretical Literature Review

To holistically examine how service quality and user experience collectively shape customer satisfaction in KRI's banking sector, our study synthesises the TAM and SERVQUAL frameworks. This dual theoretical approach addresses critical gaps undermining single-model methods while providing contextualised perspectives on post-conflict economies. According to the TAM, perceived ease of use (PEOU) and perceived usefulness (PU) drive technology adoption [10]. Chen and Aklikokou [11], within the context of e-banking PU captures functional benefits such as 24/7 and time saving while PEOU reflects transaction efficiency and interface intuitiveness. The TAM's relevance is confirmed in empirical studies. For instance, AlHadid et al. [12] established that PEOU and PU explain 62% of m-banking adoption variations in Jordan. However, critical service quality nuances essential in trust-sensitive contexts such as KRI are overlooked by the TAM. Concerning Parasuraman, Berry and Zeithaml [13], the SERVQUAL model's empathy, assurance, responsiveness, reliability and tangibility dimensions offer robust lenses for evaluating service quality. Therefore, integrating the TAM with the SERVQUAL model's dimensions enhances the SEM explanatory capacity for satisfaction determinants. In addition, such an approach uses the SERVQUAL model's expectation-perception gap analysis, which helps to address Iraq's unique trust deficits where customers cite security concerns as customer expectations like AI-driven personalisation demand after COVID-19 and adoption barriers evolve, compared to China [6]. Additionally, this integrated approach guides banks in balancing service empathy (SERVQUAL) with functional utility similar to China's AI-tailored loan offers, which boosted loyalty by more than 34% [14]. While the SERVQUAL-TAM integration has been tested in stable economies like India [15] and China [16], our study pioneers its application in post-conflict settings. Furthermore, we recalibrate PU to encompass hyperlocal needs such as cross-border transaction cases for the Iraqi diaspora and recalibrate PU to include the SERVQUAL model's empathy to address sectarian trust divides. Consequently, our framework does not only advance digital banking discourse but also equips policymakers with actionable levers essential in driving financial inclusion in fragile economies like Syria, Afghanistan and Yemen. To accomplish this, these constructs were operationalised through PLS-SEM, which tested their mediated interaction in shaping customer satisfaction outcomes.

2.2 Related Studies: Hypothesis and Conceptual Model Development

When synthesised, global banking studies reveal that service quality reliability, responsiveness, empathy, assurance and tangibility dimensions serve as critical user experience antecedents [17,18]. Apart from these dimensions aligning with Parasuraman, Berry and Zeithaml [13], the SERVQUAL model also extends its relevance and application to digital banking situations, which Shi and Shang termed a modernised lens [19]. In particular, while assurance (e.g. security transparency) and empathy (e.g. personalised interactions) promote trust in digital banking platforms, responsiveness (e.g. real-time resolutions) and reliability (consistent service delivery) emerge as universal drivers of user confidence. These connections have been nascent and explored in emerging economies like KRI. Empirical studies support this connection. For instance, Selvakumar discovered that the SERVQUAL model's dimensions account for 58-72% of user satisfaction variations in Indian and Middle Eastern banks [20]. In another study, Ncube [17] uncovered that brand trust and functional excellence mediate the relationship between service quality and mobile banking adoption. Ismat et al. identified that security features account for 34% of user metrics improvements [21]. Regardless of these advances, it is to the researchers' attention that there are no studies that empirically tested whether the SERVQUAL model's dimensions retain their predictive power in explaining the KRI's unique post-conflict banking ecosystem where digital adoption lags when compared to advanced economies like China [6]. In light of these insights, the following hypothesis was formulated:

H₁: Service quality has a significant positive impact on bank customers' user experience.

Service quality's role as the chief cornerstone of customer satisfaction within the context of the banking sector is well documented in academic studies but mechanistic and contextual gaps still exist. Empirically grounded in Parasuraman, Berry and Zeithaml [13], the SERVQUAL model, Nautwima and Asa's [22] meta-examinations reveal that responsiveness and reliability exert strong direct effects on satisfaction. However, Mishra's [23] mediation analysis evidence complicates this narrative as demonstrates that service quality's 28% impact on customer satisfaction operates indirectly through reduced complaint rates, a pathway neglected in KRI's post-conflict banking context. While Zeitun and Anam's [24] comparative examination between conventional and Islamic banks discovered that empathy and assurance were disproportionately instrumental in trust-sensitive regions, Sabir et al. [25] linked tangibility to satisfaction in advanced markets. Such a finding has significant untapped relevance to KRI's ethno-religiously diverse clientele base. Unlike prior studies like Hazra [15] and Kashyap et al. [26] relying on linear regression, which obscures threshold effects, SERVQUAL model dimensions do not interact linearly. To reinforce this notion, Supriyanto et al. [27] discovered that satisfaction returns beyond transaction accuracy of 98%, suggesting that SERVQUAL model dimensions interact non-linearly. Thus, unlike Hazra [15] and Kashyap et al. [26], this study uses PLS-SEM's

bootstrapped approach to test this relationship. Apart from addressing two major limitations in the extant literature, which do not model how service quality impacts bank customer satisfaction in KRI's unique trust deficit after the ISIS and financial crisis, this study also uses confirmatory factor analysis to disentangle direct effects from indirect pathways. This resolves ambiguities surrounding Mishra's [23] correlational analysis. Amid such discoveries, the following hypothesis was formulated:

H2: Service quality has a significant positive impact on bank customer satisfaction.

Focusing on user experience's impact on bank customer satisfaction, studies noted that user experience is a vital determinant of customer satisfaction [28]. Still, studies operationalizing such insights in post-conflict economies are scarce. Thus, to advance this discourse, our study clarifies the lack of clarity concerning user experience's positive impact on customer satisfaction as studies such as Royo-Vela et al. [29] consider user experience to play a crucial mediating role. In contrast, Gregorić [30] considers it to have a high direct impact on customer satisfaction. However, security features are considered to be a huge driver of customer satisfaction [30]. Thus, building on Handani's study on Indonesian Fintech findings, this study examines user experience's positive impact on customer satisfaction [31]. As a result, we proposed the following hypotheses:

H3: User experience has a significant positive impact on bank customer satisfaction.

Building on the above insights, it can be noted that user experience can potentially mediate service quality's impact on customer satisfaction. Though this connection is yet to be explored within the context of KRI's banking sector, studies synthesized technology adoption frameworks like the TAM, highlighting transactional efficiency, personalization, ease of use and critical mediators [32,33]. Moreover, the mediation pathways are conflated by studies. For instance, Liébana-Cabanillas et al. identified hyperlocal customization [34]. On the other hand, Murri's correlation-based mediation claims [35], quantifies indirect effects, isolating UX's mediation from confounding factors like cultural trust deficits. Thus, to address these issues, our study proposes to test the following hypothesis:

H4: User experience significantly mediates the impact of service quality on bank customer satisfaction.

In light of the highlighted relationships and developed hypotheses, a conceptual model shown in Figure 1 will be used to provide answers to the formulated research questions. According to Figure 1, hypothesis 1 (h1) and 2 (h2) represent the impact of service quality on user experience and customer satisfaction, while hypothesis 3 (H3) projects service quality's impact on customer satisfaction. Path H1 to H2 represents the mediating impact of user experience on the relationship between service quality and customer satisfaction.

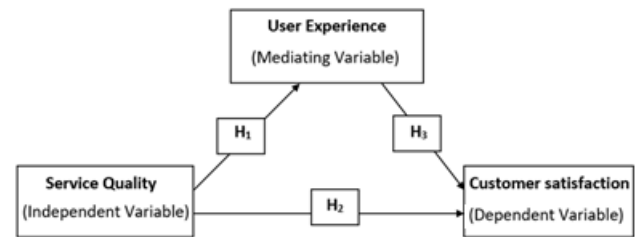


Figure 1: Testing data- load current (amperes)

3. Methodology

3.1 Research Approach

A Partial Least Squares Structural Equation Modelling (PLS-SEM), a variance-based method combining confirmatory factor analysis with path analysis [36], was applied to analyse the hypothesized user experience's mediation effects on the connection linking service quality with customer satisfaction. Supporting the PLS-SEM's approach, Thakkar cites that PLS-SEM can simultaneously test complex moderation and mediating pathways while considering normal distributions, and smaller sample sizes [36]. Unlike covariance-based SEM approaches used in previous studies [37,38], these two PLS-SEM features represent critical advantages. As a result, the PLS-SEM approach advances existing literature in three specific ways. Firstly, the Smart PLS 4.0 program aided out-of-sample predictive validity testing by blindfolding an innovation not incorporated in previous KRI banking sector examinations, ensuring that the model practically enhances service design optimisation. Secondly, our study's modelling of service quality and user experience higher order reflective formative indicators accounts for multidimensionality aspects oversimplified in Dehghanpouri, Soltani and Rostamzadeh's oversimplified SERVQUAL application [39]. Thirdly, compared with traditional regression analysis approaches applied in banking such as Putri and Ginting [41], the applied PLS-SEM used a bootstrapping method to ensure a rigorous quantification of service quality's indirect effects, offering robust confidence intervals for user experience's mediating role.

390 questionnaire responses were processed using Microsoft Excel and imported into Smart PLS for further analysis involving confirmatory factor analysis, convergent and discriminant validity, and path analysis, with 5000 bootstrap interactions being used to test the significance of the direct and mediating effects. This methodological approach provides a statistically robust framework to disentangle how user experience (digital interfaces) translates service quality investments into measurable satisfaction gains, which addresses empirical gaps in contemporary systematic literature reviews such as Mamakou and Manaras [37]. Apart from being a critical connection, this has also been understudied in emerging Fintech ecosystems.

3.2 Population and Sampling Approach

A hybrid sampling approach integrating convenience and purposive sampling methods to balance practical feasibility and theoretical representativeness. The study population comprised three largest banks, selected for their digital

banking dominance, and collectively serve more than 75% of the region's e-commerce transactions. The banks' names were withheld for confidentiality purposes. Supporting purposive sampling's application, Berndt [42] underscored that it ensured that participants meet predefined criteria, which in this study's case are active online banking platform users with at least 6 months of usage experience. Moreover, Teddlie and Yu noted using purposive sampling enhances a study's external validity by aligning its characteristics with its focus [43], which in this context are the interactive influences of service quality and user experience on customer satisfaction. To warranty adequate statistical power, Hair and others recommended using the 10:1 rule in determining the sample size [44]. Thus, for the three banks, a sample size of 360 customers was used, meaning that 120 questionnaires were distributed per bank. The questionnaires were equally given to each of the three banks' administrators, who were tasked with the mandate of distributing the questionnaires to customers visiting the bank during peak hours to reduce self-selection bias whilst at the same time restricting eligibility to verified online banking users. Consequently, this dual-method design advances sampling rigour in two critical ways. Firstly, unlike previous Iraqi banking studies such as Mohammed et al., which relied on a single-method sampling [45], this study used a hybrid approach, which enhanced ecological validity for digital contexts. Secondly, the applied hybrid approach stratifies quotas across dominant banks to capture cross-sector-wide trends while preserving granular insights into institution-specific practices. Though Mamakou and Manaras identified this gap [37], this study built on their insights to address this gap.

3.3 Data Analysis

The PLS-SEM approach embedded in Smart PLS 4 was used to examine the interactive connection linking service quality and user experience with customer satisfaction. According to Thakkar [36], PLS-SEM is a data analysis technique that combines factor analysis and regression analysis methods to analyse various relationships between latent variables. Apart from this, supporting studies consider SEM as instrumental in estimating mediating and moderating relationships between the desired variables [36]. In this context, the researcher applied the SEM approach so as to determine user experience's mediating effects on the relationship between service quality and customer satisfaction. Moreover, SEM has also been applied in several studies that examined the interactions involving customer satisfaction [37,38,41]. The first approach was to input the questionnaire data into Microsoft Excel and then transfer it to Smart PLS for further coding and analysis. It is from such data analysis activities that the study's results were generated.

3.4 Data Collection Tools

Data were collected using questionnaires administered to 360 customers of three major banks in KRI. The three latent variables, service quality and user experience with customer satisfaction were operationalized using validated scales adapted from related studies. User experience was measured using 18 items across Schrepp, Hinderks and

Thomaschewski [46] and Setiyawati and Bangkalang [47], functional completeness, performance, interface or interaction, content or information, and support or service dimensions. A five-point Likert scale (1=strongly disagree to agree 5=strongly) captured responses, with sample items including "*I find the bank's online platforms pleasing to look at*" (attractiveness) and "*The bank's online banking services are efficient to use*" (efficiency). Service quality was measured using 22 SERVQUAL model items across tangibility, reliability, responsiveness, assurance and empathy dimensions adapted from studies by Dehghanpour, Soltani and Rostamzadeh [39] and Okolo, Ikpo and Ifediora [40]. Examples of the questions included the tangibility question "*The bank uses up-to-date online banking systems*", and the reliability question "*The bank fulfills its promises*", rated using the same five-point Likert scale. Adapted from Alhemoud [48] and Archakova [49], customer satisfaction was measured using 24 items contextualized to e-commerce banking experiences, ranging from 1 (highly dissatisfied) to 5 highly satisfied (5). The scale assessed satisfaction with service quality, service variety, transaction security and ATM availability.

3.5 Validity and Reliability Tests

In order to determine that the constructs warranted validity, Explanatory Factor Analysis (EFA) was conducted to identify latent structures within the service quality, user experience and customer satisfaction data set, retaining items with factor loadings of at least 0.70 [50]. The dimensionality reduction method, EFA [51] was critical for extracting theoretically coherent service quality, user experience and customer satisfaction constructs. Convergent and discriminant validity were subsequently evaluated to confirm the measurement model's robustness. Convergent, which reflects the degree to which the measured items converge on their respective constructs [52] was determined using the Average variance Extraction (AVE). This was accomplished by selecting variables with AVE values > 0.50 to indicate adequate shared variance [50]. Discriminant validity, which measured whether the constructs were empirically distinct, was determined using the Heterotrait-Monotrait Ratio (HTMT). Based on Rasoolimanesh's propositions [53], HTMT values > 0.90 confirm the absence of excessive correlations between the service quality, user experience and customer satisfaction constructs. Cronbach's alpha (α) and composite reliability (CR) were used to evaluate the PLS-SEM's internal consistency and reliability, both requiring thresholds of at least 0.70 [50]. These applied metrics confirmed the stability of the measurement items for service quality, user experience and customer satisfaction. Following the PLS-SEM validation, structural model fitness tests were conducted as detailed in the subsequent section.

3.6 Model Fitness Tests

This study conducted a series of model fitness tests to evaluate the robustness of the proposed structural model in capturing the interactive effects of service quality and user experience on customer satisfaction in e-commerce platforms within North Iraq's banking sector. To assess model adequacy, the Standard Root Mean Square Residual (SRMR) was employed, with values below 0.08 indicating

acceptable model fit [50]. As a goodness-of-fit measure in structural equation modelling (SEM), SRMR quantifies the discrepancy between the observed covariance matrix and the model-predicted covariance matrix, where lower values reflect stronger alignment between the model and empirical data, while higher values signify poorer fit. Complementing this analysis, model fit was scrutinized using Hu and Bentler's criteria [54], including the χ^2/df ratio (threshold < 3) and the Normed Fit Index (NFI) (threshold > 0.95). The NFI was utilized to evaluate the estimated model's capacity to achieve a statistically satisfactory fit relative to a baseline null model, while the χ^2/df ratio ensured parsimony by penalizing model complexity. Additionally, the chi-square test of model fit was incorporated, with statistically significant results required to confirm the model's validity in representing the interplay between service quality, user experience, and customer satisfaction in the specified context. To further validate the model's overall fit, two distance-based metrics the Squared Euclidean Distance (d_ ULS) and the Geodesic Distance (d_ G) were analyzed. Following Ringle et al. [50], both measures were benchmarked against their respective bootstrap-generated confidence intervals; values falling below these thresholds served as evidence of adequate model fit. Collectively, these diagnostic procedures ensured rigorous validation of the structural model's ability to explain the hypothesized relationships underpinning customer satisfaction dynamics in North Iraq's digital banking environment.

4. Results

4.1 Demographic Analysis

305 questionnaire responses, comprising 72.13% male respondents and 27.87% female respondents, indicate that male individuals predominantly lead the best-performing banks in KRI. These results are crucial for tailoring electronic products and services, as well as for developing strategies to effectively cater to male customers' preferences and needs, utilizing service enhancements and targeted marketing approaches. The banks' most extensive customer distribution is within the 23-27-year age group, comprising 30.82% of the total respondents. This possibly represents emerging adults and young professionals actively using e-banking services in KRI. As such, banks can utilize this information to understand their customers' behaviour and preferences and develop user-friendly digital platforms.

Table 1: Demographic analysis

Variable	Description	Frequency	Percentage
Gender	Male	220	72.13%
	Female	85	27.87%
	Total	305	100
Age group	18-22 years	40	13.11%
	23-27 years	94	30.82%
	28-32 years	74	24.26%
	33-37 years	60	19.67%
	38 years and above	38	12.46%
	Total	305	100

Marital status	Single	30	9.84%
	Married	255	83.61%
	Divorced	5	1.64%
	Widowed	15	4.92%
	Total	305	100
Academic level	Diploma	37	12.13%
	Bachelor's degrees	102	33.44%
	Master's degrees	104	34.10%
	PhD degrees	18	5.90%
	Other	44	14.43%
	Total	305	100
Employment status	Unemployed	25	8.20%
	Employed	210	68.85%
	Business owner/ entrepreneur	70	22.95%
	Total	305	100

Married respondents constitute a high percentage of the best-performing banks in KRI (83.61%), indicating that family-oriented financial needs are a crucial component in developing service quality. This aligns with the gender-related findings, suggesting that banks should increase their provision of e-banking and e-commerce services tailored explicitly to married customers, addressing their e-banking concerns to enhance satisfaction and loyalty. The information provided in Table 1 also exhibits that bank customers in KRI hold distinct levels of academic qualifications. As such, 12.13% held Diplomas, 33.44% Bachelor's degrees, 34.10% Master's degrees, 5.90% PhD degrees, and 14.43% other academic qualifications. Based on these findings, one can infer that bank customers with higher educational qualifications, such as Master's degrees and PhD degrees, have different e-commerce and service quality expectations essential for improving their user experience and customer satisfaction compared to customers with lower academic qualifications, such as diplomas. Another vital aspect highlighted by the findings in Table 1 is that KRI's employment levels have a significant impact on e-commerce and service quality expectations, which are crucial for enhancing user experience and customer satisfaction. 8.20% of the bank customers were unemployed, 68.85% were employed, and 22.95 owned businesses. Therefore, it can be reasonably assumed that many bank customers primarily use e-banking services for depositing salaries, making payments, and conducting other transactions. In this regard, service quality improvements can also focus on enhancing efficiency and convenience for business professionals and employed individuals.

4.2 Factor Analysis

Following Table 2's findings, excellent psychometric properties were established as evidenced by factor loadings ranging from 0.700 to 0.817. While AVE values surpassed the 0.50 cutoff (service quality: AVE = 0.726; customer satisfaction: AVE = 0.714; and user experience: AVE = 0.722), indicating convergent validity [50], both internal consistency and composite reliability were confirmed by values exceeding 0.70.

Table 2: Factor analysis

Variable	Abbr.	Construct	Load	α	CR	AVE
Service quality	TA1	The bank uses up-to-date online banking systems and tools.	0.807	0.842	0.872	0.726
	TA4	The bank's physical structures reflect the type of services it provides.	0.745			
	REL5	My bank accurately records and safely keeps all my information.	0.809			
	RES1	Customers always receive adequate support from the bank to meet their needs.	0.796			
	ASS4	Customers always receive adequate support from the bank to meet their needs.	0.718			
	EMP2	The bank's employees offer customers personalized attention.	0.817			
Customer satisfaction	CS7	Easy-to-use ATM	0.724	0.806	0.826	0.714
	CS9	Bank image and reputation	0.804			
	CS13	The convenience of the bank location	0.787			
	CS16	Available parking space nearby	0.787			
	CS20	Availability of loans	0.740			
	CS21	The quality service of e-banking	0.736			
User experience	UX1	I enjoy using the bank's online banking platforms.	0.782	0.819	0.842	0.722
	UX7	Online banking applications are slow to use.	0.725			
	UX9	The banking applications are not practical and lack several realistic features.	0.794			
	UX10	The online banking services do not meet my expectations.	0.700			
	UX13	The bank's online banking services are inferior to other banks.	0.782			
	UX16	It feels interesting to use the bank's online banking services.	0.766			
	UX18	The bank uses conventional means to provide online banking services to customers	0.728			

4.3 Validity Tests

The Smart PLS' HTMT test results in Table 3 indicate that discriminant validity was achieved across the variables of service quality, user experience, and customer satisfaction, as evidenced by HTMT values that are substantially below the 0.90 threshold [53]. This indicates that the variables' constructs are empirically distinct. Amid such observations, the study further investigated the SEM's fitness, and the results obtained are presented in the next section.

Table 3: HTMT test for discriminant validity

	Service quality	User experience	Customer satisfaction
Service quality	0.698		
User experience	0.587	0.619	
Customer satisfaction	0.423	0.566	0.611

4.4 Model Fitness Tests

Table 4 provides evidence of a well-fitted model. As such, the SRMR value of 0.038 falls within the required threshold of 0.08, indicating a good overall fit [55]. The NFI value of 0.977, which exceeds 0.95, indicates a reasonably good fit. To further reinforce the model's good fit, the Chi-square value of 18.326, which is significant at 0.01 level, indicates an excellent fit. Moreover, D_G and D_ULS exceed the corresponding confidence interval values according to Bido, Da Silva and Ringle's recommendations [56], indicating a

good fit. Therefore, the study's model can be used to derive robust, reliable, and valid practical and policy insights into the interplay between service quality and user experience, as well as their influence on customer satisfaction in electronic commerce within KRI's banking sector.

Table 4: Model fitness test

	SRMR	NFI	Chi-Square	d_G	d_ULS
Saturated Model	0.038	0.977	18.326*	0.964	1.113
Estimated Model	0.038	0.977	18.326*	0.964	1.113

4.5 Path and Mediation Analysis

According to the established path analysis results, SQ has a significant impact on UX ($\beta_1 = 0.38$, $p = 0.000$), validating Hypothesis 1. While the study validates Hypothesis 2 ($\beta_2 = 0.118$, $p < 0.001$), indicating that SQ has a significant impact on CS, Hypothesis 3 is also supported, showing that SQ has a significant effect on CS ($\beta_3 = 0.447$, $p < 0.001$). With a VAF of 0.57, the 5,000 bootstrapped samples indicate a partial mediation effect (SQ • UX • CS) of 0.513, with lower and upper confidence intervals of 0.52 and 0.69, respectively. This yields a high total indirect effect of 0.631, validating Hypothesis 4. Given that more potent effects fall within the range $0.15 \leq f^2 < 0.35$, the impact of SQ on UX and UX on CS is more pronounced. The R-squares indicate that SQ and UX influence 62% of KRI bank customers' satisfaction variation.

Table 5: Path analysis results

	β	t.stat.	p-val.	R2	F2	95% CI	Hypothesis
SQ -> UX	0.38	9.014	0.000	0.43	0.52	[0.23, 0.37]	H ₁ : Supported
SQ -> CS	0.118	7.561	0.000	-	0.29	[0.18, 0.32]	H ₂ : Supported
UX -> CS	0.447	2.327	0.000	0.67	0.48	[0.45, 0.58]	H ₃ : Supported
SQ -> UX-> CS	0.513	1.820	0.074	-	-	[0.52, 0.69]	H ₄ : Not supported

Variance Accounted For (VAF) = 0.37

4.6 Discussion

The established Smart PLS path analysis findings align with and challenge existing frameworks, providing context-specific insights. Firstly, the study uncovered that service quality significantly enhances user experience by 0.385,

validating the SERVQUAL model's applicability within the context of KRI's banking sector. Though this finding diverges from Al Tamer's Middle Eastern research [57], it aligns with Mishra's (2020) Asian study. In particular, reliability ($\beta_1=0.86$, $p=0.000$) and assurance ($\beta_2=0.86$, $p=0.000$) emerged as critical service quality drivers in KRI,

highlighting increased security needs absent in stable economies like India [20]. Apart from validating and refining the SERVQUAL model's contextualization as theoretical contributions, these insights can be used to provide actionable strategies for banks and policymakers. For instance, these insights call for banks in fragile economies to invest in cybersecurity and modern banking systems to ensure uninterrupted services to address KRI's unique banking challenges.

Drawing attention to service quality's direct impact on customer satisfaction, a significantly positive coefficient of 0.188 at a 0.01 level was established with responsiveness and reliability being critical. Apart from this finding aligning with the SERVQUAL model, it also corroborates findings by Selvakumar [20] and Mishra [23] underscoring service quality positively impacts customer satisfaction through reduced complaint rates. Mohamed et al. contend that reliability and assurance dimensions as critical customer satisfaction drivers [45]. However, such insights were nascent explored in KRI's post-conflict banking context where digital adoption has been lagging. Moreover, this study has addressed the lack of consensus among academic debates with studies such as Shari et al. linking tangibility aspects such as user-friendly interfaces to customer satisfaction in advanced markets [58] and Zeitun and Anam [24] comparative examination between convention and Islamic banks highlighted that assurance and empathy are disproportionately vital in driving customer satisfaction.

Our findings further validated that user experience significantly drives customer satisfaction ($\beta_3=0.447$, $p=0.000$), emphasising intuitive design and personalized features. However, user experience dimensions such as security and interface are more critical in KRI because of low digital literacy [59], contrasting with mature markets where advanced features dominate [60]. Unlike KRI with trust deficits, Gegorić uncovered that security features explain more than half of variations in satisfaction in stable markets [30]. Where Ye and Zeng argue that user experience must compensate for institutional fragility in situations involving trust deficits [61], our study has, therefore, tested Zhan and Nakajima theorized non-linearity diminishing returns and utilised the PLS-SEM bootstrapped quadratic approach to ascertain KRI's user experience' saturation point [62].

Contrary to Iskanto, Murti and Indrajaya who established that user experience plays numerous intermediary roles in different contexts [35], user experience did not significantly mediate service quality's impact on customer satisfaction ($\beta=0.513$, $p=0.074$). The indirect effect accounted for 37% of the total effect as noted by the VAF. Thus, unlike Adil's study ascertaining perceived service quality dimensions' impact on customer satisfaction in Indian bank settings [5], and Wang's examination of experience's impact on customer satisfaction with online banking in China [6], our study is the first of its kind to validate such interactive connections. This, therefore, suggests that service quality and user experience operate independently in KRI's fragmented digital ecosystem to influence customer satisfaction. Additionally, trust-building initiatives through indirect service improvements such as reliable transactions

may supersede mediated pathways through user experience. Thus, unlike Djelassi, Diallo and Zielke who only theorized about self-service technology experience [63] and Ke and Su user experiences correlation-based mediation claims [64], our study has successfully established user experience' mediating effects on service quality impact on customer satisfaction in a post-crisis context of KRI.

5. Policy Implications

The findings provide vital policy implications, specifically for KRI Banks. In particular, the findings advocate that KRI banks must prioritise and improve user experience design, especially assurance ($\beta=0.85$) and reliability ($\beta=0.85$) to deal with KRI's trust-deficit environment. Similarly, while AI-driven personalization tools and services are essential for catering to KRI's tech-adaptive youth (23-27 years; 30.82% of the sample), service quality improvements are necessary to address post-conflict security needs. Other customer-centric innovations such as offline-digital hybrid services can be utilized to cater for regions with intermittent internet access. Integrating hyperlocal features like Sharia-compliant options and Arabic or Kurdish interfaces can prove essential in enhancing inclusivity. Concerning user designers, the findings underscore the significance of optimizing mobile interfaces for low-bandwidth environments to cater for KRI's infrastructure challenges and enhance security transparency such as real-time fraud alerts to foster trust in digital transactions. Policymakers must develop digital literacy initiatives targeting rural populations and older adults (12.46% adoption greater than 38% cohort) to bridge KRI's rural-urban digital divide. In addition, public-private partnerships can be fostered to combine technological innovation with public trust, especially in state-owned banks. Mandating transparency in service quality metrics like uptime reports is instrumental in holding banks accountable.

6. Conclusions

The study's main emphasis was to examine the interplay between service quality and user experience in driving customer satisfaction in the North Kurdistan region of Iraq's banking sector, focusing on user experience's mediating role. According to the findings, service quality and user experience independently drive customer satisfaction with no significant mediation effects. Consequently, the uncovered insights challenge traditional models and highlights direct service improvements' significance in fragile economies. The applied PLS-SEM offers granular insights into direct and mediation effects, overcoming correlation-based approaches' limitations applied in prior examinations. Additionally, the study fills a critical gap in Middle Eastern banking literature, which has historically dwelt on Gulf Cooperation Council economies with advanced digital ecosystems. Focusing on KRI offers a blueprint for analysing service quality in post-conflict economies such as Syria and Afghanistan.

6.1 Limitations and suggestions for future studies

The study is not void of limitations. For instance, it focuses on three major banks in KRI, which limits its

generalizability to KRI's other diverse regions like Baghdad and other post-conflict economies. The utilised study sample of 305 respondents may underrepresent niche demographics such as elderly or rural users. Moreover, using convenience sampling can cause self-selection bias problems. To address these limitations, future studies can replicate the study across other regions in KRI such as Shia or Sunni majority areas to ascertain institutional and cultural moderators. Future studies can also prioritise underrepresented groups such as older adults and rural customers to address KRI's urban-rural digital divide. In addition, comparing findings with other post-conflict economies such as Afghanistan to identify context versus universal-specific drivers of satisfaction is vital.

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