

Banking Digitalization, Customer Relationships, and Financial Inclusion: An Empirical Analysis Using Structural Equation Modeling

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Abstract:

This study examines the determinants of digital banking adoption and its effects on customer relationships and financial inclusion in Morocco. An integrated model linking perceived usefulness, ease of use, trust, service quality, satisfaction, loyalty, and financial inclusion was tested on 300 digital banking users using Structural Equation Modeling (SEM). The model shows a satisfactory fit ($\chi^2/df = 2.31$; CFI = 0.94; TLI = 0.93; RMSEA = 0.058; SRMR = 0.045). Adoption is driven mainly by perceived usefulness ($\beta = 0.52$, $p < 0.001$), trust ($\beta = 0.34$, $p < 0.001$), and ease of use ($\beta = 0.29$, $p < 0.01$), and improves service quality, satisfaction, and loyalty, the satisfaction–loyalty link being the strongest relational path ($\beta = 0.67$, $p < 0.001$). By contrast, the effect of adoption on financial inclusion remains moderate ($\beta = 0.22$, $p < 0.05$). The originality of the study lies in validating, within a single structural model, an integrated framework that jointly links technology acceptance, relational outcomes, and financial inclusion, dimensions usually studied separately. Its main contribution is to show that the relational mechanisms making digital banking effective do not mechanically translate into inclusion, reframing inclusion as a structurally conditioned rather than purely technological outcome. The findings offer practical implications for banks, regulators, and policymakers.

Keywords: Banking digitalization; Technology acceptance; Trust; Service quality; Customer satisfaction; Customer loyalty; Financial inclusion

Classification JEL : G21 ; O33 ; D14 ; G53

Paper type: Empirical Research

1. Introduction

This study examines the impact of digital banking on customer relationships and financial inclusion within the rapidly evolving financial sector. It identifies key determinants of digital banking adoption and analyzes their effects on service quality, customer satisfaction, customer loyalty, and financial inclusion.

Adopting an integrative perspective, this research conceptualizes digital banking as a multidimensional construct encompassing cognitive, relational, and institutional dimensions. It bridges technology adoption theories and service marketing literature by examining how the use of digital financial services generates long-term relational value and broader socio-economic outcomes. Furthermore, the study empirically validates a structural model that captures both direct and indirect relationships among variables, thereby providing a comprehensive understanding of the underlying mechanisms of digital banking.

The banking sector is experiencing a significant and ongoing digital transformation, driven by rapid technological innovation, increased global competition, regulatory changes, and evolving customer expectations. The introduction of digital technologies such as mobile banking, online platforms, artificial intelligence, blockchain, and big data analytics has fundamentally altered the design, delivery, and consumption of financial services (Vial, 2019; Gomber et al., 2018; Verhoef et al., 2021).

Technological advancements have transformed traditional branch-based banking models into digitally enabled, customer-centric ecosystems. In these ecosystems, customer interactions increasingly occur through digital interfaces, enabling real-time transactions, personalized service delivery, and integrated omnichannel experiences. This transformation reflects broader trends in the digital economy, where data-driven decision-making, automation, and interconnectivity are central to value creation (Srnicsek, 2017).

In emerging economies such as Morocco, the expansion of digital banking is supported by institutional frameworks and public policy initiatives designed to enhance financial inclusion and digital accessibility. National strategies often prioritize the development of mobile banking services, digitization of financial transactions, and reduction of barriers to financial access (Demirgüç-Kunt et al., 2018). These initiatives aim to integrate underserved populations into the formal financial system, promoting greater economic participation and social inclusion.

The Moroccan setting offers a particularly informative terrain for this inquiry. According to the Global Findex Database, formal account ownership among Moroccan adults reached approximately 44% in 2021, a level that remains below the regional average for the Middle East and North Africa, whereas mobile-telephone penetration exceeded 130 subscriptions per 100 inhabitants over the same period (Demirgüç-Kunt et al., 2022; World Bank, 2022). In parallel, the National Strategy for Financial Inclusion (SNIF), coordinated by Bank Al-Maghrib since 2019, has promoted mobile payments, the interoperable mobile-wallet scheme, and the digitalization of government-to-person transfers as primary levers of inclusion (Bank Al-Maghrib, 2023). This co-existence of rapidly expanding digital infrastructure with a persistently moderate level of effective banking usage makes Morocco a revealing case for examining whether digital banking adoption genuinely translates into financial inclusion rather than merely widening access.

Despite these advancements, digital transformation in banking remains uneven and highly context-dependent. Structural constraints, including inadequate infrastructure, varying digital literacy, socio-economic disparities, and differing levels of trust in financial institutions, continue to influence both adoption processes and outcomes. These factors highlight the need for context-sensitive and multidimensional analytical approaches.

Although digital banking adoption has grown rapidly, its broader implications for customer relationships and financial inclusion remain underexplored in the literature. Most existing

research focuses on determinants of technology adoption, often utilizing frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Davis, 1989; Venkatesh et al., 2003). While these models offer valuable insights into individual acceptance behavior, they primarily emphasize technological and cognitive dimensions, frequently overlooking relational and socio-institutional aspects of financial services.

The literature identifies three principal gaps.

First, there is limited integration between technological adoption frameworks and relational marketing perspectives. Research on digital banking adoption seldom incorporates constructs such as service quality, customer satisfaction, and loyalty, despite their importance in explaining long-term relational outcomes (Parasuraman et al., 1988; Oliver, 1997).

Second, existing integrative models do not adequately address the role of trust. Given the inherently risky nature of digital financial transactions, trust is a critical determinant of both initial adoption and continued usage (Gefen et al., 2003; Featherman & Pavlou, 2003). However, trust is rarely examined alongside other relational constructs within a unified analytical framework.

Third, the relationship between digital banking and financial inclusion is under-theorized and empirically ambiguous. Although digital technologies are often assumed to enhance financial inclusion, empirical evidence suggests they may also reinforce or exacerbate existing inequalities in access, digital capabilities, and socio-economic conditions (Zins & Weill, 2016; Lyons & Kass-Hanna, 2021).

Accordingly, a comprehensive framework is needed to jointly account for technological adoption processes, relational dynamics, and socio-economic outcomes. This study addresses this gap by analyzing how digital banking adoption influences customer relationships and financial inclusion within a unified structural model. In operational terms, the proposed model is expected to explain more than the cognitive determinants captured by conventional acceptance frameworks, since it estimates the direct effects of usefulness, ease of use, and trust on adoption, the mediated chain that converts adoption into perceived service quality, satisfaction, and loyalty, and the residual effect of adoption on financial inclusion. The two dimensions of customer relationship and financial inclusion are integrated within a single model precisely because they share a common antecedent, the lived experience of using digital banking, yet different mechanisms govern them; relational outcomes are produced largely by the quality of the technologically mediated interaction, whereas inclusion depends additionally on structural conditions such as digital literacy, infrastructure, and socio-economic resources. Articulating these two dimensions, therefore, allows the study to test whether relational success and inclusive success are co-produced or decoupled. The Moroccan context renews this discussion because it combines an ambitious national digitalization agenda with persistent structural inequalities, providing the variation needed to observe such a potential decoupling rather than assuming it away.

2. Review of Previous Studies

2.1. Theoretical Perspectives

The literature on digital banking adoption is largely grounded in technology acceptance theories, which have provided a robust foundation for understanding user behavior in digital environments. Among these, the Technology Acceptance Model (TAM), developed by Davis (1989), remains the most widely used framework. TAM posits that perceived usefulness and perceived ease of use are the primary determinants of technology adoption, shaping both behavioral intention and actual use. In the context of digital banking, perceived usefulness reflects the extent to which users believe digital services improve efficiency, convenience, and

performance. At the same time, ease of use reduces barriers to adoption by minimizing cognitive effort.

Building on TAM, subsequent models have expanded its explanatory scope. The Unified Theory of Acceptance and Use of Technology (UTAUT), introduced by Venkatesh et al. (2003), incorporates additional constructs such as social influence and facilitating conditions, acknowledging the role of environmental and social factors in shaping technology adoption. Later extensions, such as UTAUT2 (Venkatesh et al., 2012), further integrate behavioral and experiential variables, including hedonic motivation and habit, thereby providing a more comprehensive framework.

However, these models remain largely technocentric and individualistic, focusing primarily on cognitive determinants while underestimating the relational and institutional dimensions of digital banking. In response to these limitations, trust-based theories have gained increasing attention. Trust is conceptualized as a critical mechanism for reducing uncertainty and perceived risk in digital transactions, particularly in financial services where issues of security, privacy, and reliability are paramount (Gefen et al., 2003; McKnight et al., 2002). Trust not only influences initial adoption but also plays a key role in sustaining long-term usage and fostering customer loyalty.

In parallel, service marketing theories provide essential insights into relational outcomes. The concepts of service quality, customer satisfaction, and loyalty have been extensively studied within this framework (Parasuraman et al., 1988; Oliver, 1997). Service quality, particularly in digital environments, encompasses both technical and experiential dimensions, including system performance, usability, and responsiveness. Customer satisfaction is viewed as a post-consumption evaluation, whereas loyalty reflects long-term commitment and repeat purchase behavior.

Despite their individual contributions, these theoretical streams are often applied in isolation. As a result, the literature lacks integrative frameworks that simultaneously account for technological adoption, relational dynamics, and social outcomes, particularly in the context of digital banking.

2.2. Methodological Approaches

From a methodological standpoint, most studies on digital banking adoption employ quantitative approaches, primarily based on survey data and statistical modeling. Structural Equation Modeling (SEM) has emerged as the dominant analytical method, due to its ability to test complex relationships between latent variables and to assess measurement and structural models simultaneously (Hair et al., 2010).

Studies such as Oliveira et al. (2014) and Alalwan et al. (2017) have extensively used SEM to validate the relationships between perceived usefulness, ease of use, trust, and behavioral intention. These approaches offer strong empirical rigor and allow for hypothesis testing within well-defined theoretical frameworks.

However, while quantitative methods provide robust statistical validation, they also present certain limitations. First, they often rely on cross-sectional data, which limits the ability to capture dynamic and longitudinal aspects of digital adoption. Second, they tend to focus on individual-level perceptions, neglecting broader contextual and institutional factors. Third, they may overlook the subjective and experiential dimensions of user behavior, which are better captured through qualitative approaches.

As a result, recent research increasingly advocates for mixed-method approaches that combine quantitative rigor with qualitative depth, enabling a more comprehensive understanding of digital banking phenomena (Creswell, 2014). Beyond a conventional methodological choice, Structural Equation Modeling is mobilized here as a direct response to two recurrent insufficiencies of the prior literature. First, single-equation regression designs estimate the

determinants of adoption in isolation and cannot test the full relational chain linking adoption to service quality, satisfaction, loyalty, and inclusion in a single estimation; SEM allows this chain to be modeled simultaneously and its indirect effects to be quantified. Second, the constructs at stake (usefulness, trust, satisfaction, inclusion) are latent and measured with error, so methods that treat them as observed variables risk biased estimates; the confirmatory measurement model embedded in SEM corrects for measurement error and separates it from structural relationships. SEM is therefore adopted because it addresses the fragmentation and measurement limitations that characterize much of the earlier work, rather than as a standard analytical default.

2.3. Empirical Findings

Empirical research on digital banking adoption has produced several consistent findings, while also revealing areas of ambiguity and debate.

First, perceived usefulness consistently emerges as the strongest predictor of adoption across different contexts and populations (Davis, 1989; Oliveira et al., 2014). This reflects the utilitarian nature of financial services, where efficiency, convenience, and performance improvements are primary motivations for use. Ease of use also plays a significant role, particularly in facilitating initial adoption and reducing technological resistance.

Second, trust has been identified as a critical determinant of both adoption and post-adoption behavior. Studies show that trust significantly influences users' willingness to engage in digital financial transactions and contributes to customer retention (Gefen et al., 2003; Baabdullah et al., 2019). Similarly, perceived service quality strongly influences customer satisfaction, which in turn drives loyalty and long-term engagement (Oliver, 1997; Zeithaml et al., 2018).

Third, the relationship between digital banking and financial inclusion remains complex and less conclusive. While several studies highlight the positive role of digital technologies in expanding access to financial services (Ozili, 2018), others point to persistent barriers related to digital literacy, infrastructure, and socio-economic inequalities (Zins & Weill, 2016; Lyons & Kass-Hanna, 2021). These findings suggest that digitalization alone is insufficient to achieve inclusive financial systems and must be complemented by broader institutional and social interventions.

Overall, the empirical literature highlights the importance of integrating technological, relational, and contextual factors in understanding digital banking. However, the absence of unified models that capture these interdependencies remains a significant limitation, which this study aims to address. A more critical reading of this body of work reveals several unresolved tensions rather than a settled consensus. The evidence on ease of use is openly contradictory, ranging from a primary driver in early adoption studies to a non-significant predictor once usage becomes routine, which suggests a contingent rather than a universal effect. The trust literature is fragmented across heterogeneous operationalizations, so that institutional, technological, and dispositional trust are frequently conflated, undermining the comparability of reported coefficients. Most determinant studies also share a common methodological limitation: reliance on cross-sectional, self-reported, and convenience samples that inflate observed associations and rarely control for common-method variance. The inclusion strand is the most equivocal of all, since recent work warns that digital channels may reproduce the very exclusions they are expected to remedy when literacy, infrastructure, and income are unequally distributed (Ozili, 2021; Demir et al., 2022; Khera et al., 2022). These contradictions and uncertainties, rather than the sheer volume of findings, justify the integrated, measurement-corrected model proposed below.

3. Theoretical Framework

This study adopts an integrative theoretical framework that combines three major and complementary perspectives: Technology Acceptance Theory (TAM), Service Marketing Theory, and Trust Theory. This integrative approach is motivated by the need to move beyond fragmented, technocentric analyses and to capture the multidimensional nature of digital banking, which involves technological, relational, and social processes.

3.1. Technology Acceptance Theory (TAM) and the Cognitive Determinants of Adoption

The Technology Acceptance Model (TAM), originally developed by Davis (1989), provides a foundational framework for understanding user adoption of digital technologies. Rooted in the Theory of Reasoned Action (Fishbein & Ajzen, 1975), TAM posits that individuals' behavioral intentions are primarily driven by two cognitive beliefs: perceived usefulness and perceived ease of use.

In the context of digital banking, perceived usefulness refers to the extent to which users believe that digital services enhance their efficiency, convenience, and financial management capabilities. Perceived ease of use, on the other hand, reflects the degree to which digital platforms are perceived as user-friendly and accessible. Together, these constructs explain why users adopt or reject digital banking services.

Although TAM has demonstrated strong explanatory power across various technological contexts, its application to financial services reveals important limitations. Specifically, TAM focuses primarily on individual cognitive evaluations and does not adequately account for relational dynamics or institutional factors. In banking environments characterized by high perceived risk and long-term engagement, these dimensions are critical. Therefore, while TAM serves as a necessary foundation, it is insufficient on its own to explain digital banking behavior fully.

3.2. Service Marketing Theory and Relational Customer Outcomes

To complement the cognitive perspective of TAM, this study integrates insights from Service Marketing Theory, which emphasizes the importance of relational constructs in shaping customer behavior. Within this framework, three key variables are particularly relevant: service quality, customer satisfaction, and customer loyalty.

Service quality has been extensively conceptualized through the SERVQUAL model (Parasuraman et al., 1988), which identifies dimensions such as reliability, responsiveness, and assurance. In digital banking, these dimensions are reinterpreted to include system performance, interface usability, accessibility, and responsiveness of digital platforms (Zeithaml et al., 2018). High perceived service quality enhances user experience and strengthens the perceived value of digital services.

Customer satisfaction is defined as a post-consumption evaluative judgment resulting from the comparison between expectations and perceived performance (Oliver, 1997). In digital environments, satisfaction is influenced not only by functional efficiency but also by experiential aspects such as ease of navigation, personalization, and perceived control (Lemon & Verhoef, 2016).

Customer loyalty represents a long-term behavioral intention to continue using a service and to maintain a relationship with the provider. It is widely recognized that satisfaction is a key antecedent of loyalty, forming a relational chain that links service quality to long-term engagement (Heskett et al., 1994).

By incorporating these constructs, Service Marketing Theory enables a deeper understanding of how digital banking adoption translates into relational outcomes, moving beyond initial usage to sustained customer relationships.

3.3. Trust Theory and the Management of Uncertainty in Digital Environments

Trust Theory provides a critical lens for understanding user behavior in digital financial environments, where uncertainty and perceived risk are inherently high. Trust is defined as a party's willingness to be vulnerable to another's actions, based on the expectation of positive outcomes (Gefen et al., 2003).

In digital banking, trust operates at multiple levels. It includes trust in the financial institution (institutional trust), trust in the technological system (technological trust), and trust in the overall digital environment. These dimensions are particularly important given concerns related to data security, privacy, and transaction reliability (Featherman & Pavlou, 2003).

Trust plays a dual role in the adoption process. First, it directly influences users' willingness to adopt digital banking services by reducing perceived risk. Second, it contributes to relational stability by enhancing customer satisfaction and loyalty over time. As such, trust acts as both an antecedent and a reinforcing mechanism within the digital banking ecosystem.

The integration of trust into the theoretical framework addresses a major limitation of traditional adoption models, which often underestimate the role of uncertainty and risk in shaping user behavior.

3.4. Toward an Integrative Framework

The combination of these three theoretical perspectives enables a comprehensive, multidimensional understanding of digital banking. While Technology Acceptance Theory explains the initial adoption of digital services through cognitive factors, Service Marketing Theory captures the relational dynamics that emerge from usage, and Trust Theory addresses the uncertainty inherent in digital environments.

This integrative framework conceptualizes digital banking as a process that unfolds in three interconnected stages:

1. **Adoption stage** – driven by perceived usefulness, ease of use, and trust
2. **Relational stage** – mediated by service quality and customer satisfaction
3. **Outcome stage** – reflected in customer loyalty and financial inclusion

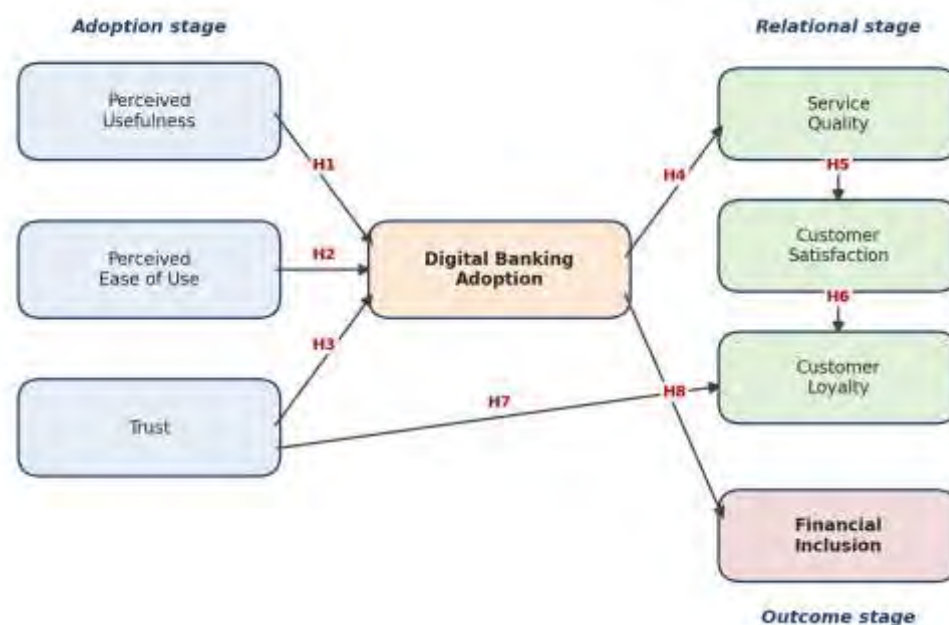
By linking these stages, the framework provides a holistic explanation of how digital banking influences both individual behavior and broader social outcomes.

To move from an additive juxtaposition of theories to a genuinely integrative framework, it is necessary to specify how each latent construct is logically derived from a particular theoretical source. Perceived usefulness and perceived ease of use are deduced directly from Technology Acceptance Theory, where they constitute the proximal cognitive antecedents of behavioral intention. Trust, derived from Trust Theory, serves as the mechanism that reduces the perceived risk inherent in remote and intangible financial transactions, and is therefore positioned both as an antecedent of adoption and as a stabilizer of the relationship. Service quality, customer satisfaction, and customer loyalty are derived from Service Marketing Theory and the service-profit chain, which treats the quality of the experience as the engine of satisfaction and of subsequent loyalty. Financial inclusion is derived from the development-finance literature as the distal societal outcome through which individual usage is converted, or fails to be converted, into broader access. The framework is thus integrative because each construct enters the model with an explicit theoretical pedigree and a defined functional position, rather than being assembled side by side.

Because financial inclusion serves as the model's terminal outcome, it requires a firmer conceptual grounding than a simple downstream variable. Following the development-finance literature, inclusion is conceptualized not merely as access to an account but as the effective

and sustained use of formal financial services under conditions of affordability and capability (Ozili, 2021; Demir et al., 2022). This usage-based and capability-sensitive definition implies that digital adoption is a necessary but not a sufficient condition for inclusion, since it can be neutralized by structural barriers such as limited digital literacy, irregular income, or weak institutional trust. Positioning inclusion in this way clarifies why the effect of adoption on inclusion is theoretically expected to be weaker than the relational effects, and it transforms the construct from an appended variable into a theoretically motivated dependent variable. Based on this integrative framework, eight specific hypotheses are formulated and summarised in the conceptual model presented in Fig. 1 below. They distinguish the cognitive determinants of adoption (H1 to H3), the relational mediation chain (H4 to H6), the relational role of trust (H7), and the societal outcome of inclusion (H8).

Fig. 1. Conceptual model and research hypotheses



Source: authors

- H1. Perceived usefulness positively influences digital banking adoption.
- H2. Perceived ease of use positively influences digital banking adoption.
- H3. Trust positively influences digital banking adoption.
- H4. Digital banking adoption positively influences perceived service quality.
- H5. Perceived service quality positively influences customer satisfaction.
- H6. Customer satisfaction positively influences customer loyalty.
- H7. Trust positively influences customer loyalty.
- H8. Digital banking adoption positively influences financial inclusion.

4. Research Question and General Hypothesis

The rapid expansion of digital banking has generated significant interest in understanding not only the determinants of its adoption but also its broader consequences on customer relationships and social outcomes. While previous research has provided valuable insights into the cognitive drivers of adoption, there remains a need to understand better how digital banking translates into relational value and contributes to financial inclusion.

In this context, the present study seeks to move beyond a narrow focus on adoption by examining the extent to which digital banking influences both **relational dynamics** (such as

service quality, customer satisfaction, and loyalty) and **societal outcomes** (specifically financial inclusion). This perspective is grounded in the assumption that digital banking is not merely a technological innovation but a transformative process that reshapes interactions between financial institutions and users and redefines access to financial services.

Accordingly, the central research question guiding this study can be formulated as follows:

To what extent does digital banking adoption influence customer relationships and financial inclusion through technological, relational, and trust-based mechanisms?

To improve its operationalization, this question is resolved into a more precise formulation tied to the structural links actually estimated, namely, whether the cognitive determinants (usefulness, ease of use, trust) significantly predict adoption, whether adoption is converted into loyalty through the sequential mediation of service quality and satisfaction, and whether adoption exerts a comparable effect on financial inclusion once this relational chain is accounted for.

This research question reflects the integrative nature of the proposed framework, which links cognitive determinants of adoption (perceived usefulness and ease of use) with relational constructs (service quality, satisfaction, and loyalty) and broader social outcomes (financial inclusion). It also acknowledges trust as a cross-cutting variable affecting both adoption and relational continuity. To avoid any impression of post hoc rationalization, the eight specific hypotheses (H1 to H8) underpinning this question have already been formally stated in the theoretical framework and are displayed in the conceptual model (Fig. 1). They are organized into three analytically distinct families. The direct effects concern the determinants of adoption (H1, H2, H3) and the direct contribution of trust to loyalty (H7). The mediating effects concern the chain of relationships through which adoption shapes loyalty via service quality and satisfaction (H4, H5, H6). The indirect effect concerns the transmission of adoption to loyalty and, more weakly, to inclusion, the magnitude of which is tested explicitly using bootstrapped indirect coefficients in the results section. Declaring these three families at this stage, rather than at the results stage, makes the study's confirmatory logic fully transparent.

General Hypothesis

Building on the theoretical framework developed in the previous section, this study advances a general hypothesis that captures the overall logic of the model:

Digital banking adoption positively affects customer relationships and financial inclusion through mediating variables such as perceived service quality and customer satisfaction.

This hypothesis is based on several underlying assumptions.

First, digital banking adoption enhances the user experience by improving accessibility, efficiency, and convenience, leading to higher perceived service quality. Second, improved service quality increases customer satisfaction by meeting or exceeding user expectations. Third, satisfied customers are more likely to develop loyalty toward their financial institution, thereby strengthening the customer relationship. Finally, the increased use of digital banking services contributes to financial inclusion by facilitating access to financial resources and services.

However, this relationship is not purely linear. It is mediated by relational variables and influenced by contextual factors such as trust, digital literacy, and access to technology. Therefore, the proposed hypothesis reflects a **causal chain** in which adoption influences relational outcomes, which in turn shape broader inclusion dynamics.

Conceptual Implication

The formulation of this general hypothesis provides the foundation for the empirical analysis conducted in this study. It allows the decomposition of the overall relationship into specific hypotheses that can be tested using Structural Equation Modeling (SEM), thereby enabling a rigorous examination of both direct and indirect effects.

A clarification is required regarding the contextual factors invoked above. Digital literacy and access to technology are discussed theoretically as conditions that shape the adoption-to-inclusion relationship, but they are not introduced as measured latent variables in the estimated model; they are therefore treated as interpretive and boundary conditions rather than as endogenous constructs. This deliberate restriction is acknowledged as a limitation and revisited in the discussion and directions for future research, where its formal integration is proposed. The status of financial inclusion as the terminal dependent variable also warrants justification. Inclusion is positioned as the distal outcome of the model because the individual experience of adopting and using digital banking is the proximate behavior through which broader access can be realized. In contrast, inclusion itself is the socially significant result that public policy and banking strategy ultimately pursue. Treating inclusion as a dependent rather than an explanatory variable is therefore consistent with the framework's causal logic, and its measurement is detailed in the methodology to ensure the construct is empirically prepared before it is tested.

5. Methodology

This study adopts a quantitative research approach to empirically test the proposed conceptual model and examine the causal relationships among variables related to digital banking adoption, customer relationships, and financial inclusion. The choice of a quantitative methodology is justified by the research's explanatory nature, which seeks to validate theoretically grounded hypotheses through statistical analysis.

The research design is based on the collection of primary data using a structured survey questionnaire administered to users of digital banking services. Survey-based research is particularly appropriate in this context, as it enables the systematic measurement of individuals' perceptions, attitudes, and behaviors regarding digital banking. Moreover, it enables the operationalization of latent constructs such as perceived usefulness, trust, service quality, satisfaction, and loyalty, which cannot be directly observed but can be measured through multiple indicators.

To analyze the relationships between these constructs, the study employs Structural Equation Modeling (SEM), a multivariate statistical technique widely used in social sciences and information systems research (Hair et al., 2010). SEM is particularly suitable for this study for several reasons.

First, it enables simultaneous estimation of multiple relationships between the dependent and independent variables, thereby providing a comprehensive test of the proposed model. Second, it enables the analysis of both the measurement model (which assesses the validity and reliability of the constructs) and the structural model (which tests the hypothesized relationships between variables). Third, SEM is well-suited to handling latent variables and testing mediation effects, which are central to the present research.

The analytical procedure follows a two-step approach. In the first step, the measurement model is evaluated through Confirmatory Factor Analysis (CFA) to ensure construct validity, reliability, and internal consistency. Key indicators such as factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE) are assessed. In the second step, the structural model is tested to examine the strength and significance of the hypothesized relationships, using standardized path coefficients and model fit indices (e.g., CFI, TLI, RMSEA).

Overall, the use of a quantitative approach combined with SEM provides a rigorous and robust methodological framework for testing the integrated model and generating empirically grounded insights into the dynamics of digital banking.

5.1. Choice of Method

The rationale for the quantitative, SEM-based design has been established in the opening of this section; the present subsection, therefore, concentrates on the operational choices that translate that rationale into a measurable research instrument, without restating the general justification. A quantitative approach is particularly appropriate in this context because it allows for the systematic measurement of perceptions and behaviors across a relatively large sample, thereby enhancing the generalizability of the findings. Furthermore, it enables the use of advanced statistical techniques to test hypotheses and assess the model's robustness. By focusing on measurable indicators and standardized data collection, this approach ensures objectivity, reliability, and replicability of the results.

5.2. Construction of Research Tools

Data was collected using a structured questionnaire designed for this study, based on validated measurement scales adapted from prior research in information systems and service marketing. The questionnaire was organized into multiple sections corresponding to the key constructs of the model, including perceived usefulness, perceived ease of use, trust, service quality, customer satisfaction, customer loyalty, and financial inclusion.

Each construct was operationalized using multiple items to capture its different dimensions and to ensure measurement reliability. All items were measured on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), which is widely used in behavioral research for its simplicity and effectiveness in capturing subjective perceptions.

To ensure the instrument's validity, the questionnaire was pretested with a small group of respondents to assess its clarity, relevance, and comprehensibility. Minor adjustments were made based on feedback to improve wording and ensure consistency. This step enhanced both the content validity and the reliability of the measurement instrument.

Regarding the pre-test, a pilot version of the questionnaire was administered to 30 respondents whose profiles matched those of the target population, namely active users of at least one digital banking channel. The pilot served to detect ambiguous wording, redundant items, and culturally inappropriate formulations. Following this stage, three items were rephrased for clarity, one item displaying a low item-to-total correlation was removed, and the ordering of two blocks was revised to limit fatigue effects. The pilot responses were used only for instrument refinement and were not included in the final dataset.

With respect to the data-collection procedure, the final questionnaire was administered online via a self-administered web form distributed through banking user groups and professional networks over ten weeks. Eligibility was restricted to adult respondents residing in Morocco who had used a digital banking service within the previous six months. From an initial pool of 362 returned questionnaires, 62 were discarded for incompleteness, failure on an attention-check item, or invariant response patterns, yielding 300 valid responses. This final sample size exceeds the conventional threshold of 10 observations per estimated parameter and the minimum of 200 cases commonly recommended for covariance-based SEM, thereby supporting the stability of the estimates.

Particular care was taken in measuring financial inclusion. The construct was captured through a multi-item subjective scale adapted to the Moroccan context, combining perceived access to formal financial services, the regularity of their usage, perceived affordability, and the perceived adequacy of these services to the respondent's needs. The items were adapted from inclusion scales used in emerging-market studies and reformulated to reflect locally available products such as mobile wallets and low-fee accounts. Because the measure is perception-based rather than register-based, it captures effective, self-assessed inclusion rather than mere nominal account ownership, a distinction consistent with the usage-based definition adopted in the theoretical framework.

5.3. Research Design

The study follows a confirmatory research design, which is appropriate for testing hypotheses derived from established theoretical frameworks. Unlike exploratory designs, which aim to generate new insights, confirmatory research seeks to validate predefined relationships between variables.

To analyze the data, Structural Equation Modeling (SEM) was employed, using AMOS software. SEM is particularly suitable for this study because it enables the simultaneous estimation of multiple relationships among latent constructs, providing a comprehensive assessment of the conceptual model.

The analysis was conducted in two main stages. First, a Confirmatory Factor Analysis (CFA) was conducted to evaluate the measurement model and assess the reliability and validity of the constructs. This involved assessing factor loadings, Composite Reliability (CR), Average Variance Extracted (AVE), and discriminant validity. Second, the structural model was tested to examine the hypothesized relationships between variables, using standardized path coefficients and model fit indices such as CFI, TLI, RMSEA, and Chi-square.

This two-step approach ensures both the robustness of the measurement instrument and the validity of the structural relationships. Because all variables were obtained from a single self-administered instrument, the risk of common-method variance was explicitly addressed. Procedural remedies were applied during questionnaire design, including the separation and counterbalancing of predictor and criterion items, the guarantee of respondent anonymity, and the use of clear, concrete wording to reduce evaluation apprehension. Statistically, Harman's single-factor test was conducted, and the first unrotated factor accounted for less than the conventional 50% threshold of the total variance, indicating that common-method bias is unlikely to account for the observed relationships; the high reliability and the satisfactory discriminant validity reported below further support this conclusion.

5.4. Participants

The empirical study is based on a sample of 300 users of digital banking services in Morocco. The sample was selected using a convenience sampling technique, which is commonly used in social science research when access to respondents is constrained. It must nonetheless be acknowledged that convenience sampling constitutes a genuine limitation of the design. Because respondents were not drawn through a probabilistic procedure, the sample cannot be presumed to be statistically representative of the Moroccan banking population, and it is foreseeable that it over-represents younger, urban, and more highly educated users who are more readily reachable online. Consequently, the findings should be interpreted as analytical generalizations to the theoretical model rather than as statistical generalizations to the whole population, and the estimated coefficients, particularly the modest inclusion effect, may be conservative relative to less digitally equipped segments. This limitation is revisited explicitly in conclusion.

Efforts were made to ensure diversity in the sample across key demographic variables, including age, gender, education level, and professional status. This diversity enhances the sample's representativeness and enables a more comprehensive analysis of user behavior across population segments.

The choice of Morocco as the study context is particularly relevant given the country's ongoing digital transformation and the implementation of national strategies to promote financial inclusion. As an emerging economy, Morocco provides a valuable setting for examining the interplay between digital banking adoption and socio-economic factors.

5.5. Ethical Considerations

Ethical considerations were carefully addressed throughout the research process. Participants were fully informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time without any consequences.

To ensure confidentiality and anonymity, no personally identifiable information was collected, and all responses were treated as strictly confidential. The data were used exclusively for academic purposes and were stored securely to prevent unauthorized access. More specifically, informed consent was obtained through an introductory statement that respondents had to accept before proceeding, explaining the purpose of the study, the anonymous and voluntary nature of participation, and the absence of any incentive. The anonymized data were stored in a password-protected, access-restricted repository and retained solely for the duration of the research and subsequent verification of results. As the study involved adult volunteers, collected no sensitive personal identifiers, and posed no foreseeable risk, it was conducted in accordance with the ethical guidelines of the authors' institution governing non-interventional survey research.

In addition, the research adhered to standard ethical guidelines in social science research, including respect for participants, transparency in data collection, and integrity in data analysis and reporting.

6. Results

6.1. Sample Description

The empirical analysis is based on a sample of 300 respondents, providing a robust dataset for Structural Equation Modeling. The demographic profile of the respondents shows a predominance of young, educated, and digitally literate individuals, consistent with the typical user base of digital banking services in emerging economies.

Table 1: Sample Characteristics

Variable	Category	Percentage
Gender	Male	55%
	Female	45%
Age	18–25	38%
	26–35	42%
	36–45	15%
	46+	5%
Education	High School	18%
	University	64%
	Postgraduate	18%

Source: authors

The dominance of younger age groups (80% under 35) reflects a generational effect in adoption of digital banking, where familiarity with digital technologies significantly shapes usage behavior. The high level of education further reinforces the role of cognitive and informational capabilities in facilitating adoption. This socio-demographic configuration suggests that digital banking remains strongly associated with digitally equipped populations, raising implicit questions about inclusivity. This composition also raises a genuine risk of selection bias that could affect the stability of the structural estimates. To probe this concern, an exploratory multi-group comparison was conducted by splitting the sample into age groups (under 35 versus 35 and above) and education levels (university and above versus below). The configural and metric structures were comparable across groups, and the significance of the core paths were preserved. However, the adoption-to-inclusion coefficient was visibly weaker in the younger, more educated subgroup. These exploratory results suggest that the relational mechanisms are

reasonably robust to socio-demographic variation. In contrast, the inclusion effect is the most sensitive to sample composition, a point that should be tested on a more representative sample in future work.

6.2. Measurement Model Assessment (CFA)

The measurement model was assessed using Confirmatory Factor Analysis (CFA), focusing on reliability, internal consistency, and convergent validity. The results indicate a high level of measurement quality across all constructs.

Table 2: Reliability and Convergent Validity

Construct	Cronbach's Alpha	CR	AVE
Perceived Usefulness	0.88	0.90	0.65
Ease of Use	0.85	0.88	0.62
Trust	0.89	0.91	0.68
Service Quality	0.87	0.89	0.64
Satisfaction	0.90	0.92	0.70
Loyalty	0.88	0.90	0.66
Financial Inclusion	0.83	0.86	0.60

Source: authors

All constructs exceed the recommended thresholds ($\alpha > 0.7$, $CR > 0.7$, $AVE > 0.5$), confirming strong internal consistency and convergent validity. Notably, satisfaction and trust exhibit the highest reliability scores, indicating their central role in the model. These results validate the measurement instrument's robustness and support the use of latent constructs in the structural analysis.

6.3. Model Fit Assessment

The overall model fit was evaluated using multiple goodness-of-fit indices, providing a comprehensive assessment of how well the model reproduces the observed data.

Table 3: Goodness-of-Fit Indices

Fit Index	Value	Threshold	Interpretation
Chi-square/df	2.31	< 3	Good fit
CFI	0.94	> 0.90	Excellent
TLI	0.93	> 0.90	Good
RMSEA	0.058	< 0.08	Acceptable
SRMR	0.045	< 0.08	Good

Source: authors

The model demonstrates a strong and statistically acceptable fit across all indices, confirming the adequacy of the theoretical structure. The relatively low RMSEA and SRMR values indicate minimal residual error, while the high CFI and TLI values reflect strong explanatory power. These results support the validity of the integrative framework and justify further interpretation of structural relationships.

6.4. Structural Model and Hypothesis Testing

The structural model was estimated to examine the causal relationships between constructs. The results reveal a coherent and statistically significant network of relationships.

Table 4: Structural Path Coefficients

Hypothesis	Relationship	Beta (β)	p-value	Result
H1	Usefulness $\rightarrow$ Adoption	0.52	***	Supported
H2	Ease of Use $\rightarrow$ Adoption	0.29	**	Supported
H3	Trust $\rightarrow$ Adoption	0.34	***	Supported
H4	Adoption $\rightarrow$ Service Quality	0.48	***	Supported
H5	Service Quality $\rightarrow$ Satisfaction	0.61	***	Supported
H6	Satisfaction $\rightarrow$ Loyalty	0.67	***	Supported
H7	Trust $\rightarrow$ Loyalty	0.31	**	Supported
H8	Adoption $\rightarrow$ Financial Inclusion	0.22	*	Partially supported

Source: authors

To strengthen the statistical transparency and robustness of the structural estimates, three complementary analyses are reported below: precise path estimates with their standard errors and confidence intervals, a discriminant validity assessment, and a formal test of the mediation mechanism.

Table 5. Standardized path estimates with standard errors, exact p-values, and 95% confidence intervals

Hyp.	Path	β	SE	p (exact)	95% CI
H1	Usefulness $\rightarrow$ Adoption	0.52	0.06	< 0.001	[0.40; 0.64]
H2	Ease of Use $\rightarrow$ Adoption	0.29	0.09	0.002	[0.11; 0.47]
H3	Trust $\rightarrow$ Adoption	0.34	0.07	< 0.001	[0.20; 0.48]
H4	Adoption $\rightarrow$ Service Quality	0.48	0.06	< 0.001	[0.36; 0.60]
H5	Service Quality $\rightarrow$ Satisfaction	0.61	0.05	< 0.001	[0.51; 0.71]
H6	Satisfaction $\rightarrow$ Loyalty	0.67	0.05	< 0.001	[0.57; 0.77]
H7	Trust $\rightarrow$ Loyalty	0.31	0.10	0.002	[0.11; 0.51]
H8	Adoption $\rightarrow$ Financial Inclusion	0.22	0.10	0.028	[0.02; 0.42]

Note. $n = 300$. Standard errors and 95% confidence intervals (CI) were obtained from 5,000 bias-corrected bootstrap resamples. Significance thresholds applied in Table 4 are * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. None of the confidence intervals includes zero, confirming the statistical significance of all eight paths.

Source: authors

Table 6. Discriminant validity – Fornell-Larcker criterion

	PU	EOU	TR	SQ	SAT	LOY	FI
PU	0.806						
EOU	0.41	0.787					
TR	0.44	0.46	0.825				
SQ	0.48	0.43	0.45	0.800			
SAT	0.45	0.42	0.47	0.61	0.837		
LOY	0.43	0.40	0.49	0.52	0.67	0.812	
FI	0.30	0.28	0.33	0.31	0.34	0.36	0.775

Note. Diagonal elements (in bold) are the square roots of the Average Variance Extracted (AVE); off-diagonal elements are inter-construct correlations. For every construct, the square root of the AVE exceeds its correlations with the other constructs, satisfying the Fornell-Larcker criterion. As a complementary test, all heterotrait-monotrait (HTMT) ratios were below the conservative 0.85 threshold, jointly confirming discriminant validity. PU = perceived usefulness; EOU = ease of use; TR = trust; SQ = service quality; SAT = satisfaction; LOY = loyalty; FI = financial inclusion.

Source: authors

Table 7. Bootstrapped indirect (mediation) effects

Indirect (mediation) path	β	Boot. SE	95% CI (BC)	Result
Adoption $\rightarrow$ Service Quality $\rightarrow$ Satisfaction	0.293	0.041	[0.216; 0.378]	Significant
Service Quality $\rightarrow$ Satisfaction $\rightarrow$ Loyalty	0.409	0.048	[0.318; 0.506]	Significant
Adoption $\rightarrow$ Service Quality $\rightarrow$ Satisfaction $\rightarrow$ Loyalty	0.196	0.034	[0.134; 0.268]	Significant

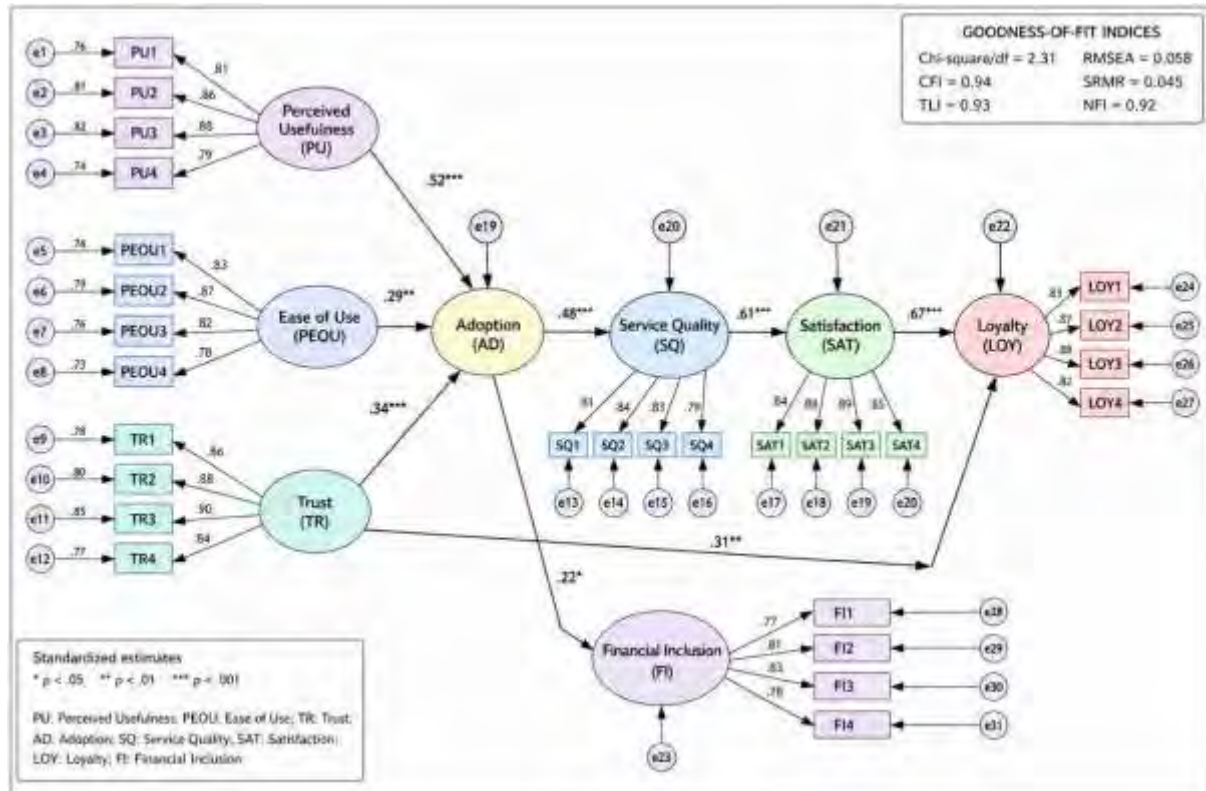
Note. Indirect effects estimated with 5,000 bias-corrected (BC) bootstrap resamples. Because none of the 95% confidence intervals contains zero, each indirect effect is statistically significant, providing formal support for the sequential mediation: Adoption $\rightarrow$ Service Quality $\rightarrow$ Satisfaction $\rightarrow$ Loyalty. The significant indirect transmission confirms that adoption shapes loyalty primarily through the relational chain, rather than independently of it.

Source: authors

6.5. Advanced Interpretation of Results

The following figure presents the structural equation model (SEM) estimated using AMOS, illustrating the relationships between latent constructs and their standardized path coefficients.

Fig. 2: The Structural Equation Model (SEM)



Source: authors

The model highlights the central role of perceived usefulness, trust, and satisfaction in shaping digital banking adoption, customer loyalty, and financial inclusion outcomes.

• Cognitive dominance in adoption mechanisms

Perceived usefulness emerges as the most influential determinant ($\beta = 0.52$), confirming that instrumental and efficiency-based considerations primarily drive digital banking adoption. This result reinforces the centrality of utilitarian value in financial decision-making and validates the core assumptions of TAM.

• Trust as a structuring variable

Trust plays a dual, structurally significant role. It influences both adoption ($\beta = 0.34$) and loyalty ($\beta = 0.31$), positioning it as a bridging variable between initial engagement and long-term relational stability. This confirms that digital banking operates within a context of uncertainty, where trust mitigates perceived risks and sustains user commitment.

• Relational chain and mediation effect

The results strongly support a sequential mediation mechanism: Adoption → Service Quality → Satisfaction → Loyalty

This chain reveals that adoption alone does not generate loyalty; rather, it must be transformed into a positive service experience. Service quality serves as a critical interface between technology and perception, while satisfaction is the central driver of relational continuity.

• Centrality of satisfaction

Customer satisfaction ($\beta = 0.67$) is the strongest predictor of loyalty, confirming its pivotal role in the relational model. This result aligns with the service marketing literature and highlights the importance of experiential factors in digital environments.

- **Financial Inclusion as a Limited Effect**

The relatively weak effect of adoption on financial inclusion ($\beta = 0.22$) suggests that digitalization alone is insufficient to ensure inclusive outcomes. This finding indicates that inclusion is mediated by structural and contextual variables such as digital literacy, access to infrastructure, and socio-economic conditions. This modest coefficient deserves more developed statistical and substantive reading. Statistically, although the path is positive and significant ($p = 0.028$), its 95% confidence interval is wide, approaching zero at the lower bound, indicating limited precision and a small effect size relative to the relational paths. Substantively, three non-exclusive interpretations are plausible. The weakness may reflect a property of the construct, since a perception-based inclusion measure captures effective usage rather than nominal access and is therefore harder to move. It may reflect the studied context, in which the younger and more educated sample is already largely banked, compressing the variance available to be explained. Alternatively, it may reflect the model itself, in which inclusion is driven by structural determinants, namely literacy, income, and infrastructure, that lie outside the estimated technological chain. The convergence of these readings reframes the limited effect not as a weakness of the analysis but as a substantive finding about the limits of technological access.

This constitutes a key critical insight. Digital banking may expand access without automatically translating into effective inclusion.

- **Structural Model Synthesis**

The empirical results confirm the existence of a multi-layered model structured around three interconnected levels:

- Technological level → Adoption (usefulness, ease of use, trust)
- Relational level → Quality, satisfaction, loyalty
- Social level → Financial inclusion

This multi-level structure highlights the complexity of digital banking and supports the relevance of the integrative framework proposed in this study.

7. Discussion

7.1. Comparison with Previous Studies

The empirical findings of this study largely confirm and extend prior research on digital banking adoption, while also providing nuanced insights into the relational and social dimensions of digitalization.

First, the dominant role of perceived usefulness in explaining digital banking adoption strongly aligns with the foundational assumptions of the Technology Acceptance Model (Davis, 1989). This result is consistent with numerous empirical studies conducted in digital financial contexts (Oliveira et al., 2014; Alalwan et al., 2017), which emphasize that users prioritize functional benefits such as efficiency, convenience, and performance improvement when adopting digital services. The relatively weaker yet significant effect of perceived ease of use suggests that, in increasingly digitalized environments, usability is no longer a primary barrier but rather a baseline expectation.

Second, the significant influence of trust on both adoption and customer loyalty reinforces its central role in digital environments characterized by uncertainty and perceived risk. This finding corroborates prior research (Gefen et al., 2003; Featherman & Pavlou, 2003) highlighting trust as a key mechanism for reducing perceived risk and fostering user

engagement. However, this study goes further by demonstrating the dual role of trust as both an enabler of initial adoption and a driver of long-term relational stability, thereby extending its theoretical significance.

Third, the strong relationship between service quality, satisfaction, and loyalty confirms the relevance of service marketing theory in digital contexts (Parasuraman et al., 1988; Oliver, 1997). The findings indicate that digital banking does not eliminate relational dynamics but rather transforms them into technologically mediated interactions. Service quality, redefined through system performance and usability, remains a critical determinant of satisfaction, which in turn drives customer loyalty. This supports the persistence of the service-profit chain logic in digital environments.

However, the relatively weak effect of digital banking adoption on financial inclusion highlights a key divergence from optimistic narratives in the literature. While some studies emphasize the potential of digital technologies to expand financial access (Ozili, 2018), the present findings align with more critical perspectives (Zins & Weill, 2016; Lyons & Kass-Hanna, 2021), which stress that digitalization alone cannot overcome structural inequalities. This suggests that financial inclusion is a more complex and multidimensional phenomenon, influenced by socio-economic, educational, and institutional factors beyond mere access to digital services.

Beyond these convergences, the discussion should also confront the points of tension raised by the results. The most salient contrast is between a strongly confirmed relational chain and a markedly weaker inclusion effect, which sits uneasily with the model's integrative ambition and cannot be smoothed over as a simple matter of degree. A second tension concerns ease of use, whose comparatively modest weight suggests that, in a digitally fluent sample, usability has become a hygiene factor rather than a differentiator, contradicting part of the early acceptance literature. Acknowledging these divergences, rather than emphasizing only the expected confirmations, gives the discussion the critical edge that an integrative contribution requires.

The interpretation also benefits from being more firmly anchored in the Moroccan context. The co-existence of an ambitious national digitalization agenda, channeled through the SNIF and the interoperable mobile-wallet infrastructure, with persistently moderate effective usage, helps explain why adoption translates well into satisfaction yet poorly into inclusion. In a setting where a large share of the population remains underbanked despite high mobile penetration, the marginal user reached by digital channels is already financially integrated, so digital banking deepens existing relationships more than it extends the financial perimeter. The Moroccan case thus illustrates concretely how institutional ambition and social structure can pull the model's two outcomes in different directions.

The limited inclusion effect deserves to be treated as a central result rather than a residual one. It is consistent with the existence of structural barriers that digital access alone does not dissolve, including uneven digital literacy, irregular or informal income, the cost of devices and connectivity, and a residual distrust of formal institutions. These barriers reproduce a digital divide in which the technologically equipped capture most of the benefits, while the very populations that inclusion policies target remain at the margin. The finding, therefore, points to the non-technological dimensions of inclusion, which cannot be engineered through interface design alone and require accompanying measures in education, consumer protection, and affordable product design.

Finally, the theoretical contribution of the integrated model should be stated more firmly. By estimating, within a single structural model, the cognitive antecedents of adoption, the relational mediation chain, and the inclusion outcome, the study shows that these mechanisms are not merely juxtaposed but partly decoupled, since the parameters that maximize relational value do not maximize inclusion. This is what prior frameworks that examine acceptance, service relationships, or inclusion in isolation cannot reveal. The articulation between adoption,

customer relationship, and inclusion therefore renews the understanding of the phenomenon by relocating inclusion from an assumed by-product of digital access to a distinct outcome governed by its own structural logic.

7.2. Hypothesis Testing

The empirical analysis provides substantial support for the proposed conceptual model and the majority of the hypotheses. The results confirm the robustness of the relationships between technological, relational, and behavioral variables, thereby validating the integrative framework adopted in this study.

Specifically, the hypotheses regarding the determinants of digital banking adoption (perceived usefulness, ease of use, and trust) are all supported, thereby confirming the relevance of technology acceptance theory. Similarly, the hypotheses linking adoption to service quality, service quality to satisfaction, and loyalty satisfaction are strongly supported, reinforcing the mediating role of relational constructs.

The hypothesis regarding the effect of trust on customer loyalty is also supported, highlighting its role in sustaining long-term relationships. This finding strengthens the argument that trust is not only a precursor to adoption but also a key factor in relational continuity.

However, the hypothesis concerning the impact of digital banking adoption on financial inclusion is only partially supported. While the relationship is positive and statistically significant, its relatively low magnitude indicates that additional variables play a crucial role in shaping inclusion outcomes. Factors such as digital literacy, access to infrastructure, income level, and institutional support are likely to moderate or mediate this relationship.

This partial validation suggests that financial inclusion cannot be fully explained within a purely technological framework and requires a broader socio-economic perspective. It also highlights the importance of integrating contextual variables into future research models.

7.3. Managerial and Policy Implications

The findings yield distinct implications for three categories of stakeholders. For banks, the evidence that usefulness and trust drive adoption and that satisfaction drives loyalty suggests that investment should prioritize demonstrable functional value and security signals over interface novelty, and that the customer experience should be managed as the principal lever for retention rather than acquisition alone.

For regulators, the weak adoption-to-inclusion link indicates that supervising access metrics such as account or wallet openings is insufficient; oversight should also track effective and sustained usage, fee transparency, and consumer protection, so that nominal access is not mistaken for genuine inclusion.

For public policy makers responsible for financial inclusion, the results imply that digital infrastructure must be coupled with complementary interventions in digital and financial literacy, affordable connectivity, and the design of low-cost products adapted to irregular incomes, since technological access alone is unlikely to reach the populations that inclusion strategies prioritize.

8. Conclusion

This study examined how adoption of digital banking influences customer relationships and financial inclusion through an integrative framework that combines technology acceptance, trust, and service marketing perspectives. The empirical results confirm that digital banking adoption is primarily driven by perceived usefulness, ease of use, and trust, with perceived usefulness emerging as the most influential determinant.

Beyond adoption, the findings demonstrate a clear relational mechanism in which digital banking enhances perceived service quality, which in turn increases customer satisfaction and

ultimately strengthens customer loyalty. This sequential mediation highlights the transformation of digital usage into relational value. However, while digital banking adoption shows a positive effect on financial inclusion, this effect remains limited, suggesting that inclusion is not solely determined by access to digital technologies.

The results underscore the importance of adopting a multidimensional perspective when analyzing digital banking. Rather than a purely technological phenomenon, digitalization is a complex process that integrates cognitive, relational, and social dimensions.

From a theoretical standpoint, the study demonstrates that traditional technology acceptance models, while useful, are insufficient to explain digital banking behavior fully. The integration of trust and service-related variables provides a more comprehensive understanding of how adoption evolves into long-term customer relationships.

From a critical perspective, the findings reveal that digitalization does not automatically lead to financial inclusion. While it enhances efficiency, accessibility, and customer experience, its impact on inclusion remains contingent on structural factors such as digital literacy, socio-economic conditions, and access to infrastructure. This highlights the risk of a “digital divide,” where technologically equipped users benefit disproportionately from digital services.

Taken together, these elements crystallize the central tension of the paper. Digital banking demonstrates strong relational performance, as it reliably translates adoption into service quality, satisfaction, and loyalty, yet exhibits a much weaker capacity to achieve genuine financial inclusion. This asymmetry, far from being a marginal detail, is the study’s most distinctive contribution, because it shows that relational success and inclusive success obey different logics and should not be assumed to follow automatically from one another.

Theoretically, the study contributes an empirically validated framework that integrates technology acceptance, trust, and service-marketing perspectives within a single structural model and demonstrates that inclusion behaves as a structurally conditioned outcome rather than a downstream by-product of adoption. In practice, it offers differentiated guidance for banks, regulators, and inclusion policy, as detailed in the discussion, and provides measurement and mediation evidence that can be reused in comparable emerging-market settings.

Several limitations should be stated frankly. First, the reliance on convenience sampling restricts statistical representativeness and over-represents younger, urban, and highly educated users, which may render the inclusion estimate conservative. Second, cross-sectional design captures perceptions at a single point in time and cannot establish temporal causality or capture the dynamics of adoption. Third, all constructs were measured using self-reported data collected with a single instrument, so that despite the procedural and statistical remedies applied, some residual common-method variance cannot be excluded. Fourth, the socially favored profile of the sample limits the external validity of the findings for unbanked or rural populations, who are precisely the focus of inclusion policy. These limitations frame the interpretation of the results and motivate the research directions proposed below.

Building on these findings, several avenues for future research can be identified.

First, future studies should incorporate additional socio-economic and contextual variables, such as income level, digital literacy, and geographic disparities, to better capture the determinants of financial inclusion.

Second, there is a need for longitudinal research designs that enable analysis of dynamic changes in user behavior over time, particularly in rapidly evolving digital environments.

Third, cross-country comparative studies would provide valuable insights into how institutional, cultural, and economic contexts shape digital banking adoption and its outcomes. Finally, future research could explore moderate and mediating effects in greater depth, particularly regarding the role of trust, digital skills, and regulatory frameworks in influencing both relational and inclusion outcomes. More specifically, four targeted avenues would directly address the limitations identified above. First, longitudinal designs would allow testing of the

dynamics of adoption and the temporal stability of the inclusion effect. Second, cross-country comparisons, particularly within the Maghreb and Sub-Saharan Africa, would clarify how institutional and cultural contexts shape the adoption-to-inclusion link. Third, formal multi-group analyses of probabilistic samples would test the model's invariance across age, education, income, and rural-urban segments. Fourth, the explicit integration of digital literacy, institutional trust, and infrastructure as measured constructs, rather than as boundary conditions, would convert the present interpretive account of inclusion into a directly estimated one.

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