A Methodological Framework for Developing a Managerial Decision-Making Instrument to Evaluate E-Banking Success: Integrating TAM, UTAUT and E-SERVQUAL

Anisa Haxhosaj[1]

Kristaq Kume[2]

[1] *MSc, PhD Candidate, Faculty of Business, "Aleksandër Moisiu" University, Durrës, Albania*
[2] *Prof. Dr., Faculty of Business, "Aleksandër Moisiu" University, Durrës, Albania*

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Abstract

The rapid digitalization of banking services has increased the strategic importance of e-banking, particularly in developing and transition economies. While existing research has extensively examined customer satisfaction and technology adoption, most studies rely on fragmented theoretical models and provide limited methodological support for evaluating e-banking success from a managerial perspective. The primary contribution of this paper is theoretical and methodological. It develops an integrated methodology for studying and evaluating e-banking success by proposing a comprehensive decision-making instrument that combines the core constructs of the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and E-SERVQUAL into a unified conceptual framework. The proposed methodology conceptualizes e-banking success as the combined effect of three interrelated dimensions: bank-related factors, environmental and institutional conditions, and consumer-related characteristics, while accounting for the moderating influence of demographic variables. These dimensions are operationalized through a structured measurement instrument designed to assess service quality, security, digital infrastructure, regulatory support, digital skills, customer attitudes, and perceptions of usefulness. E-banking success is measured through customer satisfaction, continued usage intention, recommendation, and perceived value. Using Structural Equation Modeling (SEM), the proposed methodology enables the simultaneous assessment of latent constructs and their causal relationships, providing a rigorous framework for both academic research and managerial evaluation. Unlike previous studies that focus primarily on empirical testing of individual adoption models, this paper contributes a methodological framework that can be used as a theoretical basis for future empirical research and as a practical instrument for evaluating and improving e-banking success in developing and transition economies.

Keywords: ***E-banking; methodological framework; decision-making instrument; Structural Equation Modeling (SEM); TAM; UTAUT; E-SERVQUAL***

1. Introduction

The rapid digital transformation of financial services has fundamentally reshaped the banking industry, making e-banking one of the principal channels through which banks deliver services and interact with customers. Particularly in developing

and transition economies, where digital financial inclusion has become a strategic priority, the success of e-banking services is increasingly viewed as a key determinant of banks' competitiveness, operational efficiency, and long-term sustainability. Consequently, managers require reliable analytical tools that enable them not only to assess the current performance of e-banking services but also to identify the factors that most strongly influence their success.

Despite the extensive literature on digital banking, existing research has primarily focused on explaining customer adoption, technology acceptance, or service quality through individual theoretical models such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and SERVQUAL. While these studies have significantly improved understanding of customer behavior, they generally examine isolated dimensions of e-banking success and provide limited methodological guidance for managerial decision-making. Moreover, relatively few studies integrate internal bank factors, environmental conditions, and consumer characteristics into a unified analytical framework capable of supporting strategic management decisions, particularly in developing and transition economies.

The present study builds upon these established theoretical foundations while extending previous research in two important respects. First, rather than testing a single technology adoption theory, it integrates the principal constructs of TAM, UTAUT, and E-SERVQUAL into a comprehensive conceptual framework that captures the multidimensional nature of e-banking success. Second, the study makes a methodological contribution by proposing a managerial decision-making instrument that translates these theoretical constructs into an operational methodology for evaluating e-banking success using Structural Equation Modeling (SEM). Unlike previous studies that mainly investigate behavioral relationships, this research develops a framework that can simultaneously support empirical analysis and managerial decision-making.

The conceptual model assumes that e-banking success is determined by three interrelated groups of factors: bank-related factors, including service quality, security, and customer support; environmental and institutional factors, including digital infrastructure, regulatory support, and social acceptance; and consumer-related factors, including digital skills, perceived usefulness, trust, and attitudes toward digital banking. In addition, demographic characteristics are incorporated as control and moderating variables to account for customer heterogeneity and improve the explanatory power of the model. These assumptions are theoretically grounded in TAM, UTAUT, and E-SERVQUAL, which collectively explain technology acceptance, service quality evaluation, and behavioral intention.

Based on this theoretical framework, the study seeks to achieve three main objectives: (i) to identify the principal determinants of e-banking success; (ii) to develop a methodological instrument capable of measuring the relative influence of these determinants; and (iii) to provide managers with an evidence-based decision-support tool for improving digital banking performance. These objectives are translated into a set of hypotheses concerning the direct effects of bank-related, environmental, and consumer-related factors, as well as the moderating role of demographic characteristics and the mediating role of customer satisfaction.

To examine these hypotheses, the study adopts a quantitative cross-sectional research design based on a structured questionnaire developed from validated measurement scales derived from TAM, UTAUT, and E-SERVQUAL (Parasuraman et al., 1988; Parasuraman et al., 2005; Doros, 2025; Solarz & Adamek, 2021). The proposed relationships are evaluated through Structural Equation Modeling (SEM), which enables the simultaneous estimation of latent constructs and causal relationships while accounting for measurement error and demographic controls. This methodological approach allows the proposed decision-making instrument to estimate the relative contribution of each determinant to overall e-banking success.

The study offers both theoretical and practical contributions. From a theoretical perspective, it advances the digital banking literature by integrating three complementary theoretical perspectives into a coherent methodological framework for evaluating e-banking success. From a practical perspective, it provides bank managers with a scientifically grounded decision-support instrument that facilitates evidence-based resource allocation, prioritization of digital investments, and strategic planning. The proposed methodology is particularly relevant for second-tier banks operating in developing and transition economies, where financial institutions must maximize the effectiveness of digital transformation initiatives under resource constraints.

2. Aims and Objectives

The aims are to increase the capacities of managers and decision-makers to carry out in a more effective and successful manner the tasks related to

- Identify key factors that influence the success of e-banking services.

- Assess the relative weight of each factor.
- Strategic decision-making to increase the use of e-banking services, increase customer satisfaction and the performance of these services

The main objective of this paper is to draft a Methodology for building a Measuring Instrument that can be used by managers and decision-makers in second-tier banks in the process of drafting Strategic Plans and Action Programs to increase the use and quality of e-banking services.

3. Literature Review

Over the last decade, electronic banking (e-banking) has emerged as a critical component of financial sector development in economically developing and transition countries. Advances in information and communication technologies, coupled with policy efforts to enhance financial inclusion, have accelerated the diffusion of digital banking services. Nevertheless, the adoption and success of e-banking in developing economies remain uneven, shaped by institutional constraints, infrastructural limitations, and heterogeneous customer capabilities (Shaikh & Karjaluoto, 2018).

A substantial body of literature emphasizes service quality as a key determinant of customer satisfaction and continued use of e-banking services. Studies conducted in emerging markets consistently show that dimensions such as reliability, responsiveness, system availability, and security exert a strong positive influence on customer satisfaction and loyalty intentions (Jun & Palacios, 2019; Rahi et al 2018; Al-Hawari et al., 2020). In developing contexts, where trust in financial institutions may be fragile, perceived security and privacy protection are frequently identified as the most influential drivers of e-banking acceptance (Raza et al., 2020).

Research focusing on South Asian and African economies provides further empirical support for the central role of service quality. For example, Rahi et al. (2019) demonstrate that e-service quality significantly enhances customer satisfaction and trust, which in turn promotes loyalty in Pakistani banks. Similarly, studies in Nigeria and Kenya confirm that efficiency, system reliability, and transaction accuracy are critical predictors of satisfaction among e-banking users (Boateng et al., 2021). These findings suggest that, in developing economies, banks must prioritize the stability and usability of digital platforms to sustain customer engagement.

Beyond service quality, scholars increasingly integrate technology acceptance perspectives to explain e-banking success. The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) remain dominant theoretical lenses in this literature. Empirical studies indicate that perceived usefulness and perceived ease of use strongly influence customers' intention to adopt and continue using e-banking services (Venkatesh,2022; Nepal and Nepal 2023). In developing economies, these effects are often moderated by facilitating conditions such as internet access, device availability, and digital skills (Mensah, 2021).

Recent work highlights the importance of consumer-related factors, particularly digital literacy and trust, in shaping satisfaction and usage behavior. Customers with higher digital competence are more likely to perceive e-banking as useful and easy to use, leading to higher satisfaction levels (Doros, 2025). Conversely, low digital literacy and fear of fraud remain significant barriers to adoption in less developed banking environments (Kumari and Singh, 2024). These findings underscore the need for banks to complement technological investments with customer education and awareness programs.

Another important stream of research focuses on the environmental and institutional context in which banks operate. Studies show that regulatory support, consumer protection mechanisms, and the overall maturity of digital infrastructure play a critical role in fostering trust and encouraging e-banking usage (Yoon & Occeña, 2018; Ozili, 2020). In transition economies, weak regulatory enforcement and inconsistent digital infrastructure can limit the effectiveness of bank-level initiatives, even when service quality is high (Gherghina et al., 2022).

From a managerial perspective, recent literature emphasizes that second-tier banks must adopt a holistic approach to improving e-banking services. Rather than focusing solely on technological upgrades, banks are encouraged to integrate service quality management, cybersecurity investments, customer support systems, and institutional cooperation into a coherent digital strategy (Rahi et al., 2023; Sadiq et al., 2023). Empirical evidence suggests that banks which align internal capabilities with external environmental conditions achieve higher levels of customer satisfaction and digital service success.

Despite the growing body of empirical research, several gaps remain. Many studies focus on isolated determinants of e-banking success and rely on single-theory frameworks, limiting their explanatory power. Moreover, research in smaller developing and transition economies remains scarce, and methodological contributions that translate theoretical insights into practical decision-support instruments are still limited (Khan et al., 2022; Moraru & Ilie, 2022).

In response to these gaps, recent studies call for integrated models that combine service quality, technology acceptance, and contextual factors using advanced analytical techniques such as Structural Equation Modeling (SEM) (Hair et al., 2021; Raza et al., 2023). Such approaches allow researchers and practitioners to capture the complex interactions between bank-related, environmental, and consumer-related drivers of e-banking success. Consequently, there is a growing need for methodologically rigorous and managerially oriented frameworks that support evidence-based decision-making in second-tier banks operating in developing economies.

4. Methodology

4.1 Research Design

For the construction of the Managerial Decision-Making Instrument for Evaluating E-banking Success study adopts a quantitative, cross-sectional research design to examine the determinants of e-banking service success in second-tier banks. The core of this model is the multidimensional analysis performed using Structural Equation Modeling (SEM), which allows for the simultaneous identification and estimation of structural relationships among latent constructs that reflect the factors that influence the success of e-banking services and the effectiveness of e-banking services.

In addition to the core theoretical constructs derived from TAM, UTAUT, and E-SERVQUAL, the model incorporates demographic characteristics as control variables. This approach enables the isolation of the net effects of bank-related, environmental, and consumer-related factors on e-banking success, while accounting for individual heterogeneity among users.

4.2 Conceptual Model

The conceptual model is designed to measure e-banking success based on the theoretical frameworks of Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and SERVQUAL. The model posits that e-banking success is influenced by a combination of service quality, security, trust, ease of use, and perceived usefulness of the services, with consumer satisfaction acting as a mediator between these factors and the outcomes of usage intention, loyalty, and recommendation behavior (Figure 1).

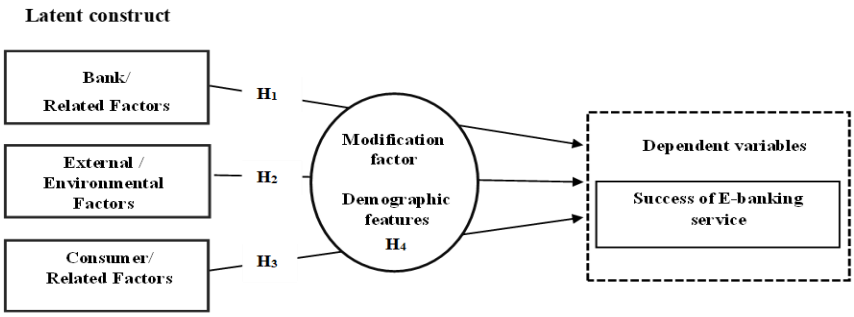


Figure 1: Conceptual Model

4.3 Demographic variables and justification for the Inclusion in SEM equation as Control Variables

The inclusion of demographic variables as control factors in the proposed SEM framework is theoretically and methodologically justified, particularly within the context of e-banking research in developing and transition economies. Prior studies consistently indicate that demographic characteristics such as age, gender, education, employment status, income level, and place of residence shape individuals' access to technology, digital literacy, and attitudes toward electronic financial services. Failure to account for these background characteristics may lead to biased estimates of the structural relationships among the core theoretical constructs.

From a theoretical perspective, models such as TAM and UTAUT implicitly acknowledge the moderating or

conditioning role of demographic factors. UTAUT, in particular, explicitly identifies age, gender, experience, and voluntariness as key moderators of technology acceptance relationships. Controlling for their direct effects allows for a clearer assessment of the net influence of perceived usefulness, perceived ease of use, trust, service quality, and environmental factors on e-banking success.

Methodologically, demographic variables function as exogenous control variables, helping to isolate the explanatory power of the latent constructs derived from TAM, UTAUT, and SERVQUAL. In developing economies, disparities in education, income, and employment status often translate into unequal digital access and usage patterns. Similarly, urban–rural differences in infrastructure and connectivity can independently affect e-banking adoption and satisfaction, irrespective of service quality or system design. By incorporating these variables as controls, the model mitigates omitted variable bias and enhances internal validity.

Empirical evidence from e-banking studies conducted between 2018 and 2024 demonstrates that demographic effects, although not always dominant, remain statistically relevant and context-dependent. Age and education frequently emerge as significant predictors of digital banking usage and satisfaction, while income and employment status influence frequency of use and perceived value. Gender effects tend to be mixed across regions, reinforcing the importance of controlling rather than theorizing them as core drivers. Residential area remains particularly relevant in economies where digital infrastructure development is uneven.

From a managerial standpoint, controlling for demographic characteristics strengthens the decision-support value of the proposed instrument. It ensures that managerial conclusions regarding service quality improvements, security investments, or digital literacy initiatives are not confounded by structural population differences. Consequently, banks can base strategic decisions on factors they can actively influence, while acknowledging demographic constraints that require differentiated policy responses.

In summary, the inclusion of demographic variables as control factors enhances the robustness, credibility, and comparability of the proposed SEM framework. It aligns the study with established methodological practices in digital banking research and supports more accurate theory testing and evidence-based managerial decision-making.

Including the moderating effects of demographic factors makes the Structural Equation significantly more complex, yet more accurate, as it accounts for customer segmentation.

4.4 Instrument Development

The study uses a structured questionnaire for data collection developed based on TAM, UTAUT, and SERVQUAL dimensions. Each latent construct is measured using multiple items, with all items rated on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The items for each construct are based on previous studies and adapted to the context of second-tier banks in developing economies.

The measurement items are categorized into the following sections:

A. Bank-Related Factors

A1. Digital Service Quality

A11. The e-banking platform operates without technical problems.

A12. Transactions are processed quickly and accurately.

A13. The user interface is simple and intuitive.

A2. Security and Reliability

A21. I feel safe when conducting transactions through e-banking.

A22. The bank offers clear mechanisms for protecting personal data.

A23. The bank reacts quickly in case of security problems.

A3. Support and Communication

A31 The bank provides clear instructions for using e-banking.

A32 Technical support is easy to contact.

A33 The bank regularly communicates about improvements in the e-banking service.

B. External / Environmental Factors

B1. Digital Infrastructure

B11 Internet access is stable for the use of e-banking.

B12 Digital devices (phone, computer) are easily available.

B2. Institutional and Regulatory Framework

B21 The legal framework supports the use of digital banking services.

B22 I feel protected by institutions in case of misuse.
B3. Social and Cultural Factors
B31 My society widely uses e-banking services.
B32 The use of technology is accepted and encouraged
C. Consumer-Related Factors
C1. Digital Skills
C11. I have sufficient knowledge to use e-banking services.
C12. I easily learn new digital functions.
C2. Perception of Usefulness and Convenience
C21. E-banking saves me time.
C22. E-banking makes financial management easier.
C3. Attitude and Trust
C31 I have confidence in digital banking technologies.
C32. I prefer e-banking compared to traditional over-the-counter services

4.5 Dependent Variable - E-banking Success

The success of e-banking services is currently not measured simply and only by transaction volume. Success in the modern digital context is measured as a multifaceted construct, which includes User Satisfaction, Intention to Continue Use, Loyalty and Recommendation (Word-of-Mouth). User satisfaction is a critical precursor to organizational net benefits and long-term success. High satisfaction leads directly to customer loyalty and continued use of the digital platform. Recommending e-banking services to others serves as a powerful measure of success, reflecting deep trust and perceived value of the service. Consequently, measuring success in e-banking services is done by referring to the values of the following indicators:

v1 I am satisfied with my bank's e-banking services.
v2. I will continue to use e-banking in the future.
v3 I would recommend e-banking to others.
v4 E-banking has improved my overall banking experience.

The inclusion of demographic variables aligns with prior empirical studies in e-banking research, which emphasize the importance of controlling for age, education, and employment status when modeling digital service adoption and satisfaction

4.6 Proposed Data Collection and Sample

As this paper presents a conceptual and methodological framework rather than an empirical study, no primary data were collected or analyzed. Instead, this section outlines the proposed data collection strategy for the future empirical validation of the managerial decision-making instrument.

The proposed target population comprises active users of e-banking services provided by second-tier banks. For the empirical implementation of the proposed methodology, data should be collected through a structured questionnaire developed from the measurement items presented in Section 4.3. The questionnaire is intended to capture respondents' perceptions of bank-related factors, environmental and institutional conditions, consumer-related characteristics, and the indicators of e-banking success.

A probability-based sampling strategy, such as simple random sampling or stratified random sampling, is recommended whenever access to customer databases is available. Where probability sampling is not feasible, an appropriately designed non-probability sampling approach may be adopted, provided that its limitations are acknowledged. The sample size should be determined according to established guidelines for Structural Equation Modeling (SEM) to ensure adequate statistical power and reliable estimation of the measurement and structural models (Kline, 2011).. In general, a minimum sample of approximately 300 respondents is recommended for the proposed model, although the final sample size should be determined based on the complexity of the model and the estimation technique employed.

The questionnaire may be administered through online survey platforms or other appropriate data collection methods, ensuring respondents' voluntary participation, anonymity, confidentiality, and compliance with relevant ethical research standards. The empirical application of the proposed methodology should subsequently assess the reliability and validity of the measurement instrument before estimating the structural relationships specified in the conceptual model.

4.7 Proposed Measurement Model Assessment

The proposed measurement model provides the methodological framework for assessing the psychometric properties of the managerial decision-making instrument during its future empirical implementation. Before testing the structural relationships among the latent constructs, the reliability and validity of the measurement model should be evaluated following established SEM procedures.

Internal consistency should be assessed using Cronbach's Alpha and Composite Reliability (CR), with values of 0.70 or higher considered acceptable. Convergent validity should be examined through the Average Variance Extracted (AVE), where values above 0.50 indicate that the latent construct explains the majority of the variance of its indicators. In addition, discriminant validity should be evaluated using appropriate criteria, such as the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio, to ensure that each construct measures a concept distinct from the others.

Demographic variables included in the proposed framework are not treated as latent constructs and therefore are not subject to reliability or validity assessment. Instead, they serve as observed control or moderating variables in the subsequent structural model.

4.8 Proposed Structural Model Assessment

Following the validation of the measurement model, the proposed methodology recommends estimating the structural relationships using Structural Equation Modeling (SEM). The structural model is intended to evaluate the direct, indirect, and moderating effects among the latent constructs representing bank-related factors, environmental conditions, consumer-related characteristics, and e-banking success.

The empirical implementation of the model should estimate standardized path coefficients, coefficients of determination (R^2), effect sizes (f^2), and predictive relevance where appropriate. Particular attention should be given to the moderating influence of demographic characteristics and the mediating role of customer satisfaction in explaining e-banking success.

The proposed analytical procedure enables researchers to identify the relative importance of each determinant and to assess the explanatory power of the integrated framework. Consequently, the structural model constitutes the analytical foundation of the proposed managerial decision-making instrument.

5. Proposed Managerial Decision-Making Instrument

The principal outcome of this study is the development of a methodological framework for constructing a managerial decision-making instrument designed to evaluate the success of e-banking services. Rather than representing a completed empirical tool, the proposed instrument provides a structured methodology that can be implemented and validated through future empirical research.

The framework integrates the theoretical constructs derived from TAM, UTAUT, and E-SERVQUAL within a Structural Equation Modeling (SEM) environment. The proposed structural equation is expressed as:

$$\mathbf{V = \beta_1 A + \beta_2 B + \beta_3 C + \beta_4 M + \beta_5 (A \times M) + \beta_6 (B \times M) + \beta_7 (C \times M) + \zeta}$$

where:

V - represents the latent construct of e-banking success;
A - denotes bank-related factors;
B - denotes environmental and institutional factors;
C - denotes consumer-related factors;
M - represents demographic characteristics included as control and moderating variables;
β - coefficients represent the structural relationships to be estimated empirically;
ζ - denotes the unexplained variance.

6. Proposed Research Hypotheses

Based on the integrated conceptual framework, the following hypotheses are proposed for future empirical testing.

H1. Bank-related factors (service quality, security, and customer support) positively influence e-banking success.

H2. Environmental and institutional factors (digital infrastructure, regulatory support, and social acceptance) positively influence e-banking success.

H3. Consumer-related factors (digital skills, perceived usefulness, trust, and attitudes) positively influence e-

banking success.

H4. Demographic characteristics moderate the relationships between the three groups of determinants and e-banking success.

H5. Customer satisfaction mediates the relationship between bank-related factors and e-banking success.

H6. The integrated TAM–UTAUT–E-SERVQUAL framework provides greater explanatory power than individual theoretical models when evaluating e-banking success.

These hypotheses constitute the theoretical basis for the future empirical validation of the proposed methodological framework through Structural Equation Modeling.

7. Potential Managerial Applications of the Proposed Instrument

Following empirical validation, the proposed managerial decision-making instrument is expected to support evidence-based strategic decision-making in second-tier banks.

First, the estimated path coefficients would enable managers to identify the factors exerting the strongest influence on e-banking success and to prioritize investments accordingly. Rather than allocating resources uniformly across all digital initiatives, managers would be able to focus on those areas expected to generate the greatest impact.

Second, incorporating demographic characteristics would facilitate customer segmentation by identifying differences in the effectiveness of digital banking services across user groups. Such information could support the design of targeted products, communication strategies, and customer experience improvements.

Third, the integrated framework would allow managers to distinguish between internal organizational factors and external environmental constraints, thereby supporting more effective strategic planning and collaboration with regulatory authorities and technology providers where necessary.

Finally, repeated application of the proposed methodology would enable banks to monitor changes in the determinants of e-banking success over time, evaluate the effectiveness of digital transformation initiatives, and support continuous organizational learning through evidence-based performance assessment.

8. Conclusion

This paper proposes a methodological framework for developing a managerial decision-making instrument to evaluate the success of e-banking services. Building upon the complementary theoretical foundations of the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and E-SERVQUAL, the study integrates these perspectives into a unified conceptual framework that captures the multidimensional nature of e-banking success.

The principal contribution of this research is theoretical and methodological rather than empirical. Specifically, the paper develops a structured methodology for constructing a decision-support instrument that enables the systematic evaluation of e-banking success by considering three interrelated dimensions: bank-related factors, environmental and institutional conditions, and consumer-related characteristics, while accounting for the moderating role of demographic variables. The proposed framework demonstrates how Structural Equation Modeling (SEM) can be employed to estimate the relative influence of these factors and translate analytical results into managerial decision support.

From a theoretical perspective, the study contributes to the digital banking literature by extending existing technology adoption and service quality models beyond their traditional application as explanatory frameworks. Instead, it integrates them into a coherent methodological approach that can serve as a foundation for future empirical research on e-banking success. This integrated perspective addresses an important gap in the literature, where previous studies have typically examined isolated determinants rather than providing a comprehensive methodology for evaluating success.

From a practical perspective, the proposed methodology offers bank managers a systematic approach for identifying the critical drivers of e-banking performance, prioritizing strategic investments, and supporting evidence-based decision-making in digital transformation initiatives. The framework is particularly relevant for second-tier banks operating in developing and transition economies, where effective allocation of limited resources is essential for achieving sustainable digital banking success.

As this paper focuses on the development of the conceptual and methodological framework, the proposed instrument has not yet been empirically validated. Future research should implement the methodology using data collected from e-banking users and apply Structural Equation Modeling to test the proposed hypotheses, assess the reliability and validity of the measurement instrument, and evaluate its applicability across different banking environments and national contexts. Such empirical validation will further strengthen the robustness and generalizability of the proposed managerial decision-making instrument.

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