Economics and Financial Policymaking

Journal Homepage: *www.journalefp.com*

Economics and Financial Policymaking

ORGINAL RESEARCH PAPER

Digital Banking Products and Services: Transformation, Security Challenges, and Customer Experience

Seyyed Ali Taghavi [a,*]

Department of Financial Management, Semnan Branch, Islamic Azad University, Semnan, Iran.

**. Corresponding Author's Email: a.taghavi@isu.ac.ir*

P A P E R I N F O

Handling Editor: Dr Mahdi Khazaei

Paper history:
Received: 13 Jun 2026
Revised: 09 Aug 2026
Accepted in revised form: 07 Sep 2026
Published: 20 Jan 2027

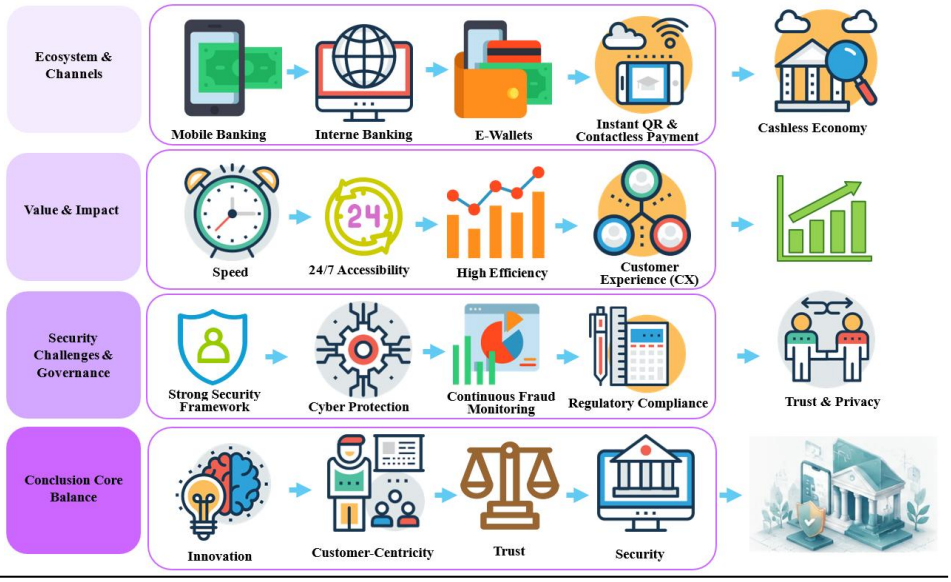
***Keywords*:**
Digital Banking,;
customer Experience;
Cybersecurity;
Financial Innovation.

This article is part of a Special Issue entitled: Artificial Intelligence and Data-Driven Financial Policy in Economics and Financial Policymaking.

How to cite: Taghavi, S. A., (2026). Digital Banking Products and Services: Transformation, Security Challenges, and Customer Experience, *Economics and Financial Policymaking*, *3*(4), 429-434.

A B S T R A C T

Digital banking has become a fundamental component of the transformation of the financial system, extending beyond the digitization of traditional banking transactions toward an integrated ecosystem of technology, financial services, customer interaction, and cybersecurity. This study aims to examine the major products and services of digital banking and analyze their implications for customer experience, service efficiency, payment modernization, and banking business models. The study employs an applied, descriptive–analytical research design based on a systematic documentary review and thematic analysis. Relevant peer-reviewed studies, international reports, and professional documents published primarily during 2015–2025 were systematically reviewed and analyzed using a structured screening and evidence-synthesis process. The findings show that internet banking, mobile banking, digital wallets, digital payments, instant payments, QR-based payments, and contactless technologies have expanded the accessibility, convenience, speed, and flexibility of financial services. Comparative analysis indicates that mobile banking provides greater portability, real-time access, and continuous service availability, while internet banking remains more appropriate for comprehensive and complex financial operations. The findings also demonstrate that the rapid expansion of digital payment and contactless technologies is accelerating the transition toward cashless financial ecosystems. However, cybersecurity, fraud, privacy, and trust remain critical challenges, particularly for mobile banking channels. The results further indicate that technological innovation alone cannot ensure the sustainable development of digital banking; effective authentication, continuous fraud monitoring, user awareness, regulatory oversight, and institutional readiness are essential. Overall, the study concludes that the future of digital banking depends on achieving a balance among innovation, efficiency, security, trust, and customer-centricity.



1. Introduction

Digital banking has become a central force in the transformation of financial services, extending far beyond the simple provision of online banking functions. It represents the integration of technology, data, and customer behavior to create a faster, more accurate, and more personalized banking experience. Since its emergence as part of the broader digital transformation of the global financial system in the 1990s, digital banking has evolved into one of the main pillars of competition among banks worldwide. The rapid advancement of digital technologies has not only changed the way financial institutions deliver services, but also redefined the nature of banking products, customer expectations, and business models. Unlike traditional banking, which relied heavily on physical branches and face-to-face interaction, digital banking enables customers to access a wide range of

services through internet-based and mobile platforms. (Gomber et al , 2018; Arner et al., 2016). This shift has significantly improved convenience, reduced operational costs, and expanded financial access for different segments of society. In this context, digital banking is no longer limited to electronic transactions; rather, it has become a comprehensive ecosystem shaped by data-driven decision-making, technological innovation, and customer-centric service design. One of the most important features of digital banking is its reliance on emerging technologies such as artificial intelligence, machine learning, the Internet of Things, and blockchain. These technologies have made it possible for banks to offer more intelligent, secure, and personalized services. Artificial intelligence and machine learning support customer profiling, fraud detection, and predictive analytics, while blockchain enhances transparency and transaction security. In addition, the Internet of Things opens new opportunities for connectivity between financial services and everyday digital environments. Together, these technologies are reshaping how banks operate and interact with their customers. Among the earliest and most influential steps in the digitalization of banking were internet banking and mobile banking. Internet banking first provided customers with the ability to perform essential financial activities such as transferring money, paying bills, and checking account balances without visiting a branch. With the spread of smartphones and mobile internet access, mobile banking rapidly emerged as one of the most widely used tools for financial interaction. Today, mobile banking applications have become a primary channel for service delivery, offering users real-time access to a variety of functions and enhancing the overall customer experience. (Apau et al , 2025; Riasat et al , 2025). The growth of digital payments and e-wallets has further accelerated this transformation. Global trends show that the share of transactions and revenues associated with digital payment systems continues to rise sharply, prompting banks and payment providers to redesign their business models in order to capture new opportunities. Digital payment solutions not only facilitate faster and more efficient transactions, but also support financial inclusion by reaching users who may have limited access to traditional banking services. As a result, digital banking has become an essential part of the modern financial ecosystem, linking convenience, innovation, and accessibility. At the same time, the expansion of digital banking brings important challenges, particularly in the areas of cybersecurity, data privacy, and regulatory compliance. As banking services become increasingly digital and interconnected, the risk of cyberattacks and data breaches grows accordingly (Arner et al , 2016; Baker & Dellaert, 2017). Therefore, while digital banking creates substantial value through innovation and customer convenience, it also requires strong governance, advanced security infrastructure, and effective regulatory oversight.

This study examines the main products and services of digital banking and explores their role in reshaping customer experience and banking business models. By focusing on the evolution of internet banking, mobile banking, digital payments, and e-wallets, the paper highlights both the opportunities and the risks associated with digital transformation in the financial sector. In doing so, it seeks to provide a clearer understanding of how digital banking is influencing the future of financial services in an increasingly digital economy.

The literature on digital banking consistently presents it as a major shift in the financial services industry, moving beyond the digitization of transactions toward a broader restructuring of banking products, service delivery, and customer engagement. Digital banking is increasingly understood as an integrated system in which technology, data, and customer behavior are combined to deliver faster, more secure, and more personalized financial services. This shift is not merely operational; it reflects a deeper transformation in the way banks create value and interact with their users (Gomber et al , 2018; Arner et al , 2016).

A central theme in the literature is the role of customer relationship management and personalization in digital banking. As financial institutions compete in a highly digitalized environment, they rely more heavily on customer data to tailor services, improve satisfaction, and build loyalty. Previous studies have shown that effective CRM strategies can enhance customer retention and service performance in banking contexts (Abdela et al, 2023; Acheampong et al, 2023; Demirbaş, 2023). In this sense, digital banking is not only a technological innovation but also a managerial strategy aimed at improving customer experience and long-term engagement.

Another major stream of research focuses on mobile banking adoption. Mobile banking has become one of the most widely used digital channels because it offers convenience, speed, and constant accessibility. Recent evidence suggests that adoption is influenced not only by usability, but also by users' perceptions of security, risk, and trust. In particular, Apau et al (2025) emphasize that trust and security are essential determinants of mobile banking app adoption and continued use. This finding is highly relevant, as mobile banking applications now serve as one of the primary interfaces between customers and financial institutions.

The security dimension of digital banking has also received significant attention in the literature. As banking services increasingly move to digital platforms, cyber threats have become more frequent and more complex. The report specifically cites Kaspersky (2024), noting that 38 percent of financial cyberattacks are concentrated on mobile banking applications. This statistic underscores the vulnerability of mobile financial channels and the need for strong security infrastructure, including multi-factor authentication, encryption, and continuous fraud monitoring. The report also notes that the development of multi-stage authentication systems has improved security, reflecting the growing importance of cybersecurity in digital banking systems (Bank Markazi ,2024).

In parallel, the literature highlights the role of fintech innovation in reshaping banking competition and service models. Fintech has introduced new forms of financial intermediation, reduced transaction costs, and increased the speed and flexibility of service delivery. Gomber et al (2018) argue that fintech represents a broader innovation process that is transforming financial services through disruption and digitalization. Similarly, Arner et al (2016) show that the emergence of fintech and regtech has altered the regulatory and operational environment of modern financial institutions. These perspectives help explain why banks are increasingly investing in digital infrastructure and adopting more agile service models.

Digital payment systems and e-wallets are another major focus of the literature. The report points to the rapid growth of digital payment methods, including contactless payments, digital wallets, instant payments, QR-based payments, and cryptocurrencies. According to the Global Payments Report, more than half of global retail payments are expected to be conducted through contactless methods and digital wallets by 2025,This trend reflects a major shift in consumer payment behavior and suggests that digital payment ecosystems are becoming central to the future of retail finance (Global Payments Report, as cited in the report).

Research also emphasizes the relationship between digital banking and financial inclusion. Digital channels can significantly reduce barriers to financial access by enabling individuals in remote or underserved areas to participate in formal financial systems. The report identifies M-Pesa in Kenya as a major example of how mobile-based financial services can expand access to payments, transfers, and basic financial operations. Such cases illustrate how digital banking can support inclusion by lowering costs and improving access for populations that are traditionally excluded from banking services.

Overall, the literature indicates that digital banking is a multidimensional phenomenon shaped by technological innovation, customer-centric design, security requirements, and financial inclusion goals. While its benefits are substantial, the literature also makes clear that adoption depends on trust, regulatory support, and the ability of financial institutions to manage cybersecurity risks effectively. Studies such as those by Apau et al (2025), Gomber et al (2018), and Arner et al (2016), along with the security findings reported by Kaspersky (2024), collectively suggest that the future of digital banking will depend on balancing innovation with resilience and trust.

2. Methods

Digital transformation in the banking industry extends far beyond the adoption of electronic banking channels. Rather, it represents a fundamental transformation in business models, financial service architecture, customer interaction, risk management practices, information security, and value creation within the financial ecosystem. Consequently, investigating digital banking products and services requires a methodological approach capable of not only systematically collecting scientific evidence but also identifying and interpreting the interrelationships among emerging technologies, service innovations, institutional requirements, and managerial implications. Accordingly, the present study adopts a Systematic Documentary Review combined with Thematic Analysis to provide a comprehensive, coherent, and evidence-based understanding of the evolution of digital banking products and services.

From the perspective of research objectives, this study is classified as applied research, since its findings can support banking executives, policymakers, researchers, and financial technology developers in designing innovative financial products, enhancing customer experience, improving cybersecurity, and formulating digital transformation strategies. In terms of research nature, the study is descriptive–analytical, as it not only describes global trends in digital banking and introduces its major products and services but also analyzes the relationships among emerging technologies, customer expectations, regulatory requirements, and transformations in banking business models. The research is grounded in the interpretivist paradigm, which assumes that digital banking is not merely a technological phenomenon but rather a socio-technical system shaped by the interaction of technological innovations, customer behavior, regulatory frameworks, information infrastructures, and competitive market dynamics. Consequently, understanding this phenomenon requires a systematic interpretation of evidence derived from scientific publications, industry reports, and authoritative international documents, rather than relying exclusively on quantitative analyses. Based on this philosophical foundation, the study employs a Systematic Documentary Review as its primary research strategy. During the past decade, an extensive body of literature has emerged on digital banking, financial technology (FinTech), open banking, artificial intelligence, blockchain, cloud computing, mobile banking, digital identity verification, and cybersecurity. Nevertheless, most previous studies have examined only isolated aspects of the digital banking ecosystem, while

relatively few have attempted to integrate these dimensions into a comprehensive analytical framework. A systematic documentary review enables the identification, critical evaluation, comparison, and synthesis of dispersed scientific evidence, thereby facilitating the development of an integrated conceptual understanding of digital banking products, services, enabling technologies, and their managerial implications.

To enhance methodological rigor, the research process was designed according to the principles of transparency, reproducibility, and traceability. Accordingly, every stage of the research (from defining the research problem and formulating the search strategy to study screening, data extraction, thematic analysis, and conceptual synthesis) was systematically documented. Furthermore, the overall methodological framework was developed in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a transparent, systematic, and reproducible study selection process (Snyder, 2019).

Data analysis was conducted using Thematic Analysis, an approach that facilitates the identification of recurring patterns, categorization of concepts, extraction of major themes, and interpretation of relationships among technologies, banking products, financial services, and the broader implications of digital transformation. Consequently, the outcome of this research extends beyond merely describing digital banking technologies; instead, it provides an integrated analytical framework for understanding the evolution of banking services in the era of digital transformation.

Table 1. Overall Research Methodology Framework

Research Objective	Applied Research	To develop a comprehensive framework for improving digital banking products and services and supporting strategic decision-making
Research Nature	Descriptive–Analytical	To analyze the evolution of digital banking and explain the relationships among technology, services, and customer value
Research Approach	Qualitative Documentary Research	Appropriate for synthesizing multidisciplinary knowledge and interpreting complex phenomena
Research Strategy	Systematic Documentary Review	To systematically identify, evaluate, and synthesize scientific evidence
Data Analysis Method	Thematic Analysis	To identify major themes and construct an integrated conceptual framework
Research Paradigm	Interpretivism	To explain the interaction among technology, organizations, customers, and institutional environments
Unit of Analysis	Peer-reviewed articles, international reports, and professional documents	To obtain a comprehensive understanding of the digital banking ecosystem
Research Output	Conceptual Framework of Digital Banking Products and Services	To integrate existing knowledge into a coherent analytical model

Source: Research Findings

Table 1 summarizes the overall methodological framework adopted in this research and demonstrates the logical alignment among the study's objective, research paradigm, methodological approach, research strategy, and analytical techniques. The selection of a qualitative documentary approach, combined with a systematic review and thematic analysis, is consistent with the multidisciplinary nature of digital banking and the study's objective of providing a comprehensive understanding of digital banking products and services. Moreover, the table illustrates that the study goes beyond information collection by emphasizing the interpretation, synthesis, and conceptual integration of scientific evidence into a coherent analytical framework.

2.1. Research Architecture and Workflow

To ensure methodological rigor, transparency, and reproducibility, the research was designed as a structured multi-stage process. The workflow begins with defining the research problem and objectives, followed by developing a systematic search strategy, identifying relevant studies, screening and quality assessment, data extraction, thematic analysis, conceptual synthesis, and finally developing the proposed conceptual framework. Organizing the research into sequential and interconnected stages ensures that every methodological decision is documented and that the entire research process can be independently evaluated and replicated by future researchers.

Figure 1 illustrates the overall methodological workflow of the present study. As shown, each stage is logically linked to the subsequent stage, ensuring a systematic progression from problem identification to the development of the final conceptual framework. The outputs generated at each stage constitute the inputs for the following stage, thereby enhancing methodological consistency, transparency, and reproducibility. This structured workflow also facilitates independent verification of the research process and strengthens the credibility of the study's findings.

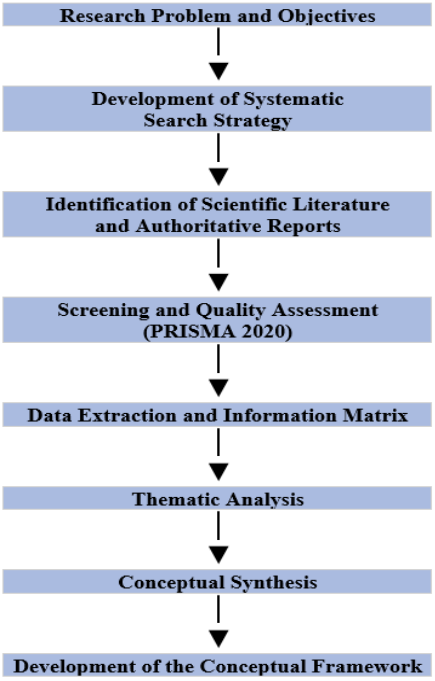


Figure.1. Overall Research Workflow

Source: Research Findings

2.2. Systematic Search Strategy

Following the definition of the research objectives, scope, and research questions, the next stage involved developing a systematic search strategy to identify the relevant literature. In systematic review studies, the quality and comprehensiveness of the findings largely depend on the rigor of the literature search process. Therefore, the search strategy was carefully designed to maximize the retrieval of relevant studies while minimizing the inclusion of irrelevant or low-quality publications.

To achieve this objective, the literature search was conducted across internationally recognized scientific databases that are widely acknowledged for their high-quality indexing, peer-review standards, and comprehensive coverage of banking, finance, information systems, and digital technologies. In addition to peer-reviewed journal articles, reports published by international organizations and financial regulatory institutions were also included as supplementary sources. These reports were considered particularly valuable because many emerging trends and technological developments in digital banking are initially documented in policy reports and industry analyses before appearing in academic publications.

The search strategy was constructed using combinations of primary keywords and their related synonyms. Boolean operators (AND and OR) were employed to broaden and refine the search process by combining different concepts associated with digital banking, banking products and services, financial technology (FinTech), customer experience, cybersecurity, artificial intelligence, open banking, and digital payment systems. To ensure that the review reflects the most recent developments in the field, the search was limited to studies published between 2015 and 2025.

To minimize selection bias, the same search protocol was consistently applied across all databases. Following the retrieval process, all identified records were merged into a single database, duplicate records were removed, and the remaining studies were transferred to the screening stage. This systematic procedure ensured that the final pool of studies was comprehensive, up-to-date, and scientifically reliable.(Apau et al, 2025; Riasat et al, 2025).

Table 2. Scientific Databases and Information Sources Used in the Study

Database / Source	Type of Source	Rationale for Selection
Scopus	Peer-reviewed journal articles	Comprehensive coverage of finance, management, and information technology

Web of Science	Peer-reviewed journal articles	Indexing of high-impact international journals
ScienceDirect	Journals and books	Extensive publications in banking, economics, and digital technologies
SpringerLink	Journals and books	Research on digital transformation and information systems
IEEE Xplore	Technical papers	Artificial intelligence, blockchain, cybersecurity, and digital technologies
Emerald Insight	Academic journals	Banking, financial services, customer experience, and management
BIS, IMF, World Bank, ECB Reports	International policy reports	Global developments in digital banking and financial regulation
McKinsey, Deloitte, Accenture, PwC Reports	Industry reports	Technological trends, innovation, and banking business models

Source: Research Findings

Table 2 presents the principal scientific databases and supplementary information sources used in this study. The literature collection process was not limited to peer-reviewed academic publications but also incorporated reports from internationally recognized financial institutions and consulting organizations. Integrating multiple categories of evidence enhances the comprehensiveness of the review by capturing academic, technological, managerial, and policy perspectives on digital banking. Furthermore, the use of diversified information sources reduces potential publication bias and provides a more holistic understanding of current developments within the digital banking ecosystem.

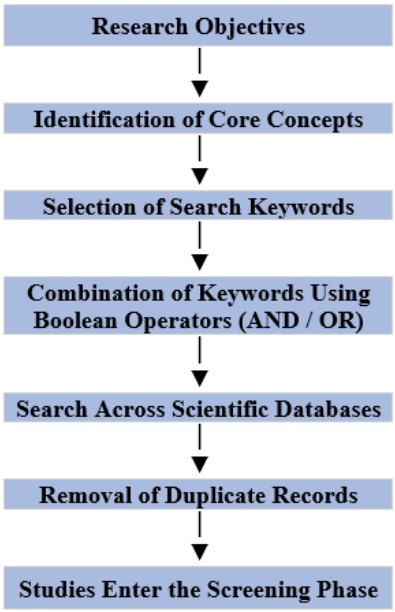


Figure 2. Systematic Literature Search Process

Source: Research Findings

Figure 2 illustrates the overall workflow of the systematic literature search. As shown, the process begins with the identification of the research objectives, followed by extracting the core concepts and selecting the corresponding search keywords. These keywords are then combined using Boolean operators to retrieve relevant studies from multiple scientific databases. After duplicate records are removed, the remaining studies proceed to the screening stage. This structured procedure minimizes the possibility of overlooking relevant literature while reducing the inclusion of irrelevant publications, thereby improving the transparency and reproducibility of the review process.

2.5. Study Screening Process Based on the PRISMA 2020 Framework

After implementing the systematic search strategy, a substantial number of potentially relevant publications were retrieved from the selected scientific databases and supplementary information sources. Considering the possibility of duplicate records, irrelevant publications, and studies with insufficient methodological quality, the screening procedure was conducted in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Adopting this internationally recognized framework enhances the transparency, reproducibility, and methodological rigor of systematic literature reviews by providing a structured approach to study selection.

The screening procedure consisted of four sequential stages. First, all retrieved records were imported into a unified reference database, where duplicate entries originating from multiple databases were identified and removed. Second, the titles and abstracts of the remaining publications were independently examined to determine their relevance to the research topic. Publications unrelated to digital banking products, services, or enabling technologies were excluded at this stage.

In the third stage, the full texts of the remaining studies were carefully assessed against the predefined inclusion and exclusion criteria. This evaluation focused on the methodological quality, topical relevance, completeness of information, and scientific contribution of each publication. Finally, only those studies that satisfied all selection criteria and demonstrated adequate methodological rigor were included in the data extraction and thematic synthesis stages.

This structured multi-stage screening procedure substantially reduced selection bias, improved the transparency of the review process, and ensured that the final evidence base consisted exclusively of scientifically credible and thematically relevant studies.

Table 3. PRISMA 2020 Screening Process

PRISMA Stage	Screening Activity	Objective
Identification	Retrieval of records from scientific databases and supplementary information sources	Comprehensive identification of potentially relevant studies
Screening	Removal of duplicate records and title/abstract screening	Elimination of irrelevant publications
Eligibility	Full-text assessment against predefined inclusion and exclusion criteria	Evaluation of methodological quality and topical relevance
Included	Selection of eligible studies for qualitative synthesis	Development of the final evidence base

Source: Research Findings

Table 3 summarizes the four stages of the study selection process following the PRISMA 2020 reporting framework. Dividing the screening procedure into sequential stages enhances methodological transparency by documenting every decision made during study selection. Moreover, this structured approach minimizes the risk of including low-quality or irrelevant studies and strengthens the scientific robustness of the systematic review.

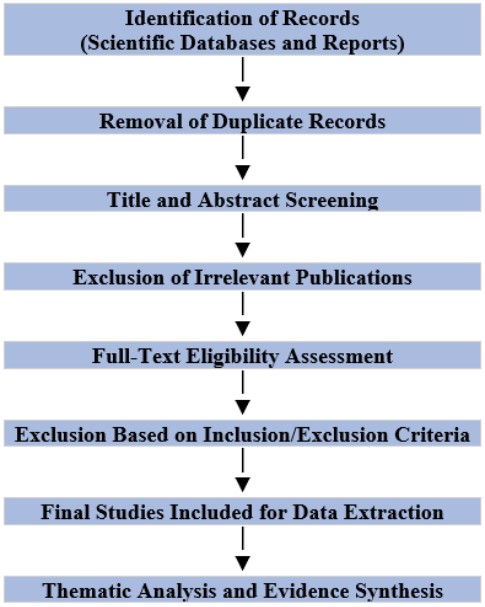


Figure 3. PRISMA 2020 Study Selection Flow Diagram

Source: Research Findings

Figure 3 illustrates the sequential study selection process based on the PRISMA 2020 reporting framework. The diagram demonstrates that inclusion decisions were not solely based on the initial search results but rather followed a rigorous multi-stage evaluation process involving duplicate removal, relevance assessment, full-text eligibility evaluation, and methodological quality appraisal. Such a structured procedure substantially improves the transparency, reproducibility, and scientific credibility of the systematic review.

3. Results and Discussion

The findings of this study indicate that digital banking is no longer limited to the electronic replication of traditional banking activities; rather, it has become a multi-layered ecosystem in which service delivery, payment infrastructure, cybersecurity, and user experience are deeply interconnected. The results presented in the source report show that the evolution of digital banking products and services is driven by both customer demand and technological

innovation, while at the same time constrained by security risks and trust-related concerns. (Riasat et al, 2025).

3.1. Comparative Advantages of Internet Banking and Mobile Banking

As shown in Table 1, both internet banking and mobile banking deliver significant value to users and financial institutions, but they differ in terms of accessibility, convenience, and user engagement. Internet banking remains highly suitable for comprehensive financial management, larger transactions, and desktop-based services, whereas mobile banking offers stronger advantages in terms of portability, real-time access, and continuous service availability.

Table 4. Comparative benefits of stakeholders in internet banking and mobile banking

Stakeholder	Internet Banking	Mobile Banking
Customer	24/7 access via any web browser; suitable for more complex operations (e.g, loan applications or multi-account management)	Constant and fast access; real-time notifications; user-friendly interface; biometric authentication
Bank	Reduced operational costs (fewer in-branch visits); ability to offer online products	Increased daily customer engagement; richer behavioral data
Ecosystem / Regulator	Enhanced financial transparency and easier supervision	Expansion of financial inclusion through mobile services in areas with limited internet connectivity

source: Apau et al, 2025

This distinction is particularly important because the migration from internet-based platforms to mobile-first banking reflects a broader behavioral shift among consumers. Mobile banking applications allow users to conduct transactions anytime and anywhere, reducing dependence on branch visits and desktop systems. From a strategic perspective, this enhances service efficiency, lowers operational costs, and increases customer retention. At the same time, the growing importance of mobile interfaces also increases exposure to cyber threats, which makes security design a central issue in the digital banking landscape. (Arner et al, 2016; Baker & Dellaert, 2017).

The discussion surrounding Table 4 suggests that the two channels should not be viewed as competitors, but rather as complementary service delivery modes. Banks that integrate internet banking and mobile banking within a unified omnichannel strategy are better positioned to improve service quality, broaden access, and increase customer satisfaction.

3.2. Security Threats and Cyber-Risk Exposure in Digital Banking

The evidence summarized in Table 5 highlights that cyber-risk remains one of the most important challenges in digital banking. The report also notes that Kaspersky (2024) found that 38% of financial cyberattacks are concentrated on mobile banking applications, which confirms that mobile platforms are especially vulnerable due to their constant connectivity, device heterogeneity, and dependency on user behavior.

Table 5 . Comparison of security threats in internet banking and mobile banking

Main Threat	Manifestation in Internet Banking	Manifestation in Mobile Banking
Phishing & Social Engineering	Fake web pages and credential theft	Fake SMS/apps, malicious links
Malware & Trojans	Browser infection	Breaking mobile OS security restrictions
Card Data Leakage	Insecure storage in the browser	Compromised payment gateway or unofficial mobile apps
Session & Communication Attacks	Hijacking authentication data	Weak network security, loss of privacy

source: Riasat et al, 2025

The comparative analysis in Table 5 indicates that digital banking channels face diverse security threats, including phishing, malware, credential theft, account takeover, session hijacking, and unauthorized access. These threats are not only technical in nature but also behavioral, because many attacks exploit human error, weak passwords, or unsafe user practices. This means that improving security in digital banking requires more than technical encryption tools; it also requires user awareness, regulatory compliance, and continuous monitoring.

The findings show that mobile banking, although highly convenient, is typically more exposed than internet banking because smartphones are often used in unsecured networks and personal environments. In addition, mobile apps can be targeted through fake applications, malicious links, and social engineering attacks. Consequently, banks must strengthen authentication mechanisms, implement multi-factor verification, and invest in real-time fraud detection systems.

From a policy perspective, these findings support the argument that cybersecurity should be treated as a core component of digital banking strategy rather than as a secondary technical function. The results also align with the broader trend discussed in the literature, where trust, security, and perceived risk are major determinants of adoption.

3.3. Digital Payment Methods: Efficiency, Technology, and Security

Table 6 provides a useful analytical framework for understanding the diversity of digital payment instruments. The comparison shows that payment technologies differ not only in technical architecture but also in transaction speed, usability, scalability, and resilience.

Table 6 . Comparison of digital payment methods in terms of technology, efficiency, and security

Digital Payment Type	Scientific Description and Features	International Examples	Security & Efficiency Level
Physical and Virtual Cards	Use of Near Field Communication (NFC) technology for fast contactless payments without physical contact	Visa Card, MasterCard	High security with tokenization encryption
Digital Wallets	Storage of cards and accounts in a digital environment, enabling payments through mobile devices	Apple Pay, Google Pay, Samsung Pay	High security due to biometric authentication and tokenization
QR Code–Based Payments	Scanning a QR code to transfer funds without the need for a physical card or POS terminal	WeChat Pay, Alipay	Medium security
Instant Account-Based Payments	Direct fund transfers between bank accounts through banking Application Programming Interfaces (APIs)	UPI, SEPA Instant	Very high speed and high security
Cryptocurrencies and Blockchain	Peer-to-peer transactions without intermediaries, conducted on blockchain networks	Bitcoin, Ethereum	High security but with volatility risk and limited regulatory oversight

source: European Central Bank, 2022

The discussion of Table 6 suggests that no single payment method is universally superior; rather, each method offers a different balance between convenience and security. For example, contactless payments are highly efficient for retail transactions, while tokenized payments provide stronger protection for card credentials. Digital wallets simplify user experience and reduce friction in checkout processes, whereas instant payments are particularly valuable for time-sensitive transfers. However, each of these systems also introduces distinct operational and cybersecurity considerations (Gomber et al, 2018; Apau et al, 2025).

The report's emphasis on digital payment evolution is consistent with the broader international trend toward cashless ecosystems. The rising use of wallets, QR-based transactions, and instant payment solutions reflects a structural shift in consumer behavior. According to the report, more than half of global retail payments are expected to be conducted through digital and contactless channels in the near future, which indicates that payment digitization is becoming a foundational element of the modern banking environment.

The implications of Table 6 are significant for banks and policymakers. Financial institutions must choose payment technologies not only based on customer demand but also on infrastructure readiness, regulatory compatibility, and fraud control capabilities. Therefore, the efficiency of digital payment systems should be evaluated alongside their operational resilience and compliance requirements.

3.4. Contactless Payment Innovations and Global Banking Transformation

extends the discussion by focusing specifically on next-generation payment technologies. This table demonstrates that the global banking industry is moving toward increasingly seamless and frictionless payment environments. Technologies such as mobile wallets, NFC-based payments, wearables, QR payments, and tokenized card systems are reshaping how consumers interact with financial services.

Table 7 .Comparison of innovative contactless payment technologies in global banking systems

Payment Type	Technology Used	Leading Country	Key Advantage
Fingerprint Payment	Biometric sensor	India	No need for a physical card
Facial Recognition Payment	Artificial intelligence	China	Very high speed in payment processing

NFC Payment	Near Field Communication	United States & European Union	Payment via mobile phone or smartwatch

source: European Central Bank, 2022

The findings imply that contactless payment innovation is not merely a technological upgrade, but part of a broader transformation in financial behavior and infrastructure design. Contactless systems support faster transactions, reduce physical contact, and improve user convenience, which is especially relevant in retail, transportation, and small-value payment settings. However, their expansion also raises new concerns related to authentication, device security, and transaction traceability.

The discussion around Table 7 also suggests that countries and institutions with stronger digital infrastructure are better able to adopt contactless technologies at scale. In contrast, systems with weaker regulatory frameworks or lower digital readiness may face adoption barriers. This difference reinforces the importance of institutional capacity in shaping digital banking outcomes.

3.5. Overall Interpretation of the Findings

Taken together, the results from Tables 4 to 7 show that digital banking development is shaped by a dynamic interaction between service convenience, technological innovation, and cybersecurity risk. Internet banking and mobile banking each provide distinct benefits, but mobile banking is increasingly becoming the dominant interface due to its flexibility and ubiquity. At the same time, the expansion of digital payment systems and contactless technologies is accelerating the transition toward cashless financial ecosystems.

However, the evidence also makes clear that digital banking cannot be evaluated solely in terms of efficiency gains. Security vulnerabilities, fraud risk, and user trust remain major limiting factors. The finding that a substantial share of cyberattacks target mobile banking applications demonstrates that digital transformation must be accompanied by stronger governance, better authentication, and user education. In this respect, the study contributes to the literature by showing that the future success of digital banking depends on achieving a balance between innovation and security. Banks that succeed in integrating these dimensions are more likely to improve customer experience, expand access, and sustain competitive advantage.

5. Conclusion

This study examined the transformation of digital banking products and services, with particular attention to the relationship between technological innovation, customer value, payment modernization, and cybersecurity risk. The findings demonstrate that digital banking has evolved into a comprehensive financial ecosystem in which internet banking, mobile banking, digital payments, and contactless technologies play central roles in service delivery and customer engagement. The results show that mobile banking offers strong advantages in terms of accessibility, convenience, and real-time service delivery, while internet banking remains important for more comprehensive and structured financial operations. The analysis also confirms that digital payment systems are rapidly expanding and that contactless and wallet-based payments are becoming increasingly dominant in global banking systems. However, these developments are accompanied by serious security concerns, particularly in mobile environments, where the concentration of cyberattacks remains high. One of the key findings of the study is that cybersecurity must be considered an essential part of digital banking strategy. The evidence that a notable share of financial cyberattacks targets mobile banking applications reinforces the need for stronger authentication, fraud monitoring, encryption, and user awareness initiatives. Without these measures, the expansion of digital services may undermine trust and limit adoption. The study also highlights the importance of aligning technological innovation with regulatory oversight and institutional readiness. Digital banking platforms are most effective when they combine usability, security, and scalability. In this sense, the future of digital banking will depend not only on the adoption of advanced payment technologies, but also on the capacity of banks to maintain trust, protect users, and support inclusive access to financial services. Overall, the findings suggest that digital banking is not a temporary technological trend, but a structural transformation in financial intermediation and customer interaction. For banks, regulators, and policymakers, the challenge is to ensure that this transformation remains secure, efficient, and inclusive. Future research may benefit from empirical testing, cross-country comparison, or user-based surveys to quantify the relative impact of trust, security, and technological readiness on digital banking adoption.

Author Contribution

The author was solely responsible for the conception, preparation, and writing of this manuscript.

Conflict of Interest

The author, while observing publication ethics in the referencing, declares the absence of any conflict of interest.

Acknowledgement

The authors gratefully acknowledge the support provided by the Islamic Azad University of Semnan Branch in conducting this research.

Data availability

This article does not contain any Supplementary Material.

AI Used Statment

The authors retain full responsibility for the accuracy, originality, integrity, legality, and ethical compliance of all text, data, tables, figures, analyses, references, and conclusions, and have verified all AI-assisted outputs. Any fabrication, falsification, manipulation, plagiarism, copyright infringement, or other misuse of AI remains solely the responsibility of the authors and does not transfer or diminish their accountability for the published work.

References

Abdela, M. K., Ahmed, H. M. S., Seman, A. A., Adamu, E., & Yasin, A. A. (2023). The effect of customer relationship management on customer loyalty on banking sector. *International Journal of Management (IJM)*, *14*(5), 20-37.

Acheampong, S., Pimonenko, T., & Lyulyov, O. (2023). Sustainable marketing performance of banks in the digital economy: The role of customer relationship management. *Virtual Economics*, *6*(1), 19-37.

Alvarez-González, P., & Otero-Neira, C. (2023). Mergers and acquisitions success: examining customer loyalty. *Marketing Intelligence & Planning*, *41*(1), 48-61.

Apau, R., Titis, E., & Lallie, H. S. (2025). Towards a Better Understanding of Mobile Banking App Adoption and Use: Integrating Security, *Risk, and Trust into UTAUT2. Computers*, *14*(4), 144.

Arner, D. W., Barberis, J., & Buckey, R. P. (2016). FinTech, RegTech, and the reconceptualization of financial regulation. *Nw. J. Int'l L. & Bus.*, *37*, 371.

Baker, T., & Dellaert, B. (2017). Regulating robo advice across the financial services industry. *Iowa L. Rev.*, *103*, 713.

Demirbaş, E. (2023). Customer relationship management (CRM) importance for banking: Examples from Turkish banks during the years. *In History of Accounting, Management, Business and Economics, Volume I*, 83-100.

European Central Bank. (2022). Study on New Digital Payment Methods (Report). https://www.ecb.europa.eu/euro/digital_euro/timeline/profuse/shared/pdf/ecb.dedocs220330_report.en.pdf.

Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the fintech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. *Journal of management information systems*, *35*(1), 220-265.

Mistrean, L. (2023). Factors influencing customer loyalty in the retail banking sector: A study of financial-banking services in the Republic of Moldova. *Opportunities and Challenges in Sustainability*, *2*(2), 81-92.

Pierluigi, M. (2022). Blockchain and Banking: How Technological Innovations Shape the Banking Industry. Noor Elm.

Riasat, I., Shah, M., & Gonul, M. S. (2025). Strengthening Cybersecurity Resilience: An Investigation of Customers' Adoption of Emerging Security Tools in Mobile Banking Apps. *Computers*, *14*(4), 129 .

Sağlam, M., & El Montaser, S. (2021). The effect of customer relationship marketing in customer retention and customer acquisition.

Singhal, M. (2021). Customer relationship management strategy for customer retention and acquisition. *Pen Acclaims*, *14*, (1.)

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039.

World Payments Report (2023): Where Is the Cash? Accelerate Corporate Cash Management Transformation to Build Value. https://www.capgemini.com/insights/research-library/world-payments-report.