



Journal of Banks and Financial Institutions

e-ISSN: 3089-9761

Vol 01 (2) 2025 p. 59-71

© Nova Atmalisa Nurhaliza, 2025

Corresponding author:

Nova Atmalisa Nurhaliza

Email:

novaamalisnurha@gmail.com

Received 17 September 2025;

Accepted 29 September 2025;

Published 30 September 2025.

This is an Open Access article distributed under the terms of the [Creative Commons Attribution 4.0 International license](#), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited.



Conflict of interest statement:

The author (s) reported no conflict of interest

DOI: [http://doi.org/10.70764/gdpu-jbfi.2025.1\(2\)-06](http://doi.org/10.70764/gdpu-jbfi.2025.1(2)-06)

E-BANKING AS A COMPETITIVE ADVANTAGE DRIVER IN COMMERCIAL BANKS: A SYSTEMATIC LITERATURE REVIEW

Nova Atmalisa Nurhaliza¹

¹*Universitas Tidar, Indonesia*

ABSTRACT

Objective: This study aims to provide a comprehensive overview of how e-banking contributes to the competitive advantage of commercial banks in the digital era.

Research Design & Methods: A systematic literature review was conducted using the PRISMA approach, focusing on peer-reviewed articles published between 2020 and 2024. Of the 949 articles screened, 10 studies met the inclusion criteria and were analysed in depth.

Findings: The findings reveal that e-banking plays a strategic role in improving operational efficiency, reducing transaction costs, and increasing the speed of service delivery. It also increases customer satisfaction through convenience, accessibility, and 24/7 service availability. Furthermore, e-banking enables market expansion by reaching out to underserved populations. However, limited digital infrastructure, cybersecurity threats, and low user literacy remain critical challenges.

Implications & Recommendations: Commercial banks should adopt a holistic e-banking strategy that includes robust cybersecurity measures, transparent customer communication, and continuous innovation. Addressing these areas will help maximise the long-term benefits of e-banking and ensure resilience in a dynamic digital environment.

Contribution & Value Added: This study summarizes current insights from international literature and offers strategic guidance for banks looking to leverage e-banking as a sustainable competitive advantage in the financial services sector.

Keywords: E-banking, Competitive Advantage, Commercial Banks

JEL codes: G21, O33, L86

Article type: research paper

INTRODUCTION

In this digital era, all aspects of life are undergoing significant transformation, including the economy and the financial services sector. Information technology advances have changed how individuals and institutions carry out their daily activities, from communication to education to financial transactions. In financial services, digitalisation has led to the emergence of electronic banking systems (e-banking) that bring various innovations and conveniences to the public. The rapid advancement of e-banking in the digital era has revolutionised the banking sector with huge impacts on growth opportunities and complex challenges. Banking digitalisation, which relies on information and communication technology (ICT), has transformed how banks serve customers by providing faster, more efficient and highly secure transactions. Technological innovations such as artificial intelligence (AI), blockchain, big data analytics, biometric technology, and cloud computing have further expanded the scope of e-banking services and opened up new potential for operational improvement and service personalisation (Indriasari et al., 2022).

The digital transformation of the banking sector worldwide has been triggered by the increasing need for more inclusive, accessible and efficient access to finance. This digitalization plays a vital role in expanding the reach of banking services, especially for individuals who previously did not have access to formal financial institutions. By reducing reliance on cash transactions and introducing the concept of banking without physical branches, the system can cut operational costs and speed up the financial service process. In addition, global situations such as health crises and social restrictions are also driving the accelerated adoption of digital solutions in banking, as people need services that can be accessed securely and flexibly remotely (Boufounou et al., 2022; Nahar et al., 2025).

The rapid advancement of the digital banking sector poses major challenges that cannot be ignored, particularly in the aspect of cybersecurity. As the use of digital platforms and the integration of financial technology (fintech) increases, the risks to data security and economic systems have also increased significantly. Attacks such as phishing, ransomware, data breaches, and digital fraud are the main threats targeting weaknesses in banking technology infrastructure. Studies show that phishing and ransomware are the most financially damaging attacks, with average losses per incident reaching millions of dollars (Metibemu, 2025). Fintech companies are considered more vulnerable to these attacks because their entire operations are digitally based, with much reliance on third-party integrations and open systems (Olaiya et al., 2024).

In addition to facing significant challenges such as cybersecurity, uneven technological readiness and digital infrastructure (Najaf et al., 2021), dynamic changes in consumer behavior (Waliullah et al., 2025), dynamic changes in consumer behavior (Khan & Malaika, 2021), commercial banks are also faced with an urgent need to develop a comprehensive strategy to deal with the dynamics of digitalization. This strategy does not simply rely on adopting the latest technology, but must also include proactive risk management, including early detection systems against cyber threats and real-time incident countermeasures (Metibemu, 2025). Moreover, the involvement of competent human resources, an organizational culture that supports innovation, and strategic collaboration with technology providers and regulators are key factors to ensure digital resilience that is not only reactive, but also proactive and highly competitive. This is important so that banks cannot only survive in the midst of digital disruption, but also excel in creating added value for customers and strengthening their competitive position in an increasingly complex and digitized financial services industry.

In this context, commercial banks must adopt technology and make it a sustainable competitive advantage through service differentiation, continuous innovation, and adaptive technology governance. This literature review aims to provide a complete picture of how e-banking becomes a driving factor for commercial banks' competitive advantage by looking at the findings of various academics and experts. In the era of rapid digital transformation, e-banking is seen as a financial service support tool and a key strategy in improving operational efficiency, expanding market reach, and strengthening customer loyalty. Using technologies such as mobile banking, internet banking, and other digital innovations, banks can offer more responsive, secure, and in line with evolving customer needs. Therefore, this review aims to identify the various approaches, strategies, and challenges that banks face in implementing e-banking to build sustainable competitive advantage.

LITERATURE REVIEW

E-Banking

E-banking, also known as electronic banking or online banking, is the result of information and communication technology advances that revolutionized how financial institutions serve their customers. E-banking is the process of providing banking services through electronic channels such as the internet, mobile devices, and other computer networks without the customer's physical presence at a bank office. These services include various activities such as checking balances, transferring funds, paying bills, and applying for loans online. E-banking makes it easy for customers to access financial services through the internet platform, with benefits such as efficiency, ease of access, and reduced operational costs. In addition, e-banking also serves as an efficient marketing

tool and a strategy to increase public participation in formal banking services more economically (Daka & Phiri, 2019).

Electronic banking (e-banking) is an integral part of the digital transformation in the retail banking sector that significantly changes how customers interact with financial institutions. A critical study by Loonam and O'Loughlin (2008) shows that service quality in e-banking is strongly influenced by several key dimensions, namely usability, trust, accessibility, information quality, and service recovery. These dimensions are crucial because interactions in e-banking are indirect and rely on digital interfaces. Intuitive interface design, clarity of information conveyed, and system reliability in responding to user disruptions or complaints are key factors in creating a good user experience.

In his research, Jayawardhena (2004) defined e-banking as an internet-based banking service system that provides convenience for customers to access and manage their accounts flexibly, anytime and anywhere through a digital platform. This study aims to measure the quality of e-banking services by constructing a set of evaluation instruments covering five main dimensions: access (ease of reaching the service), web presence (attractive and easy-to-use user interface design), trust (the level of customer confidence in the security and integrity of the system), attentiveness (responsiveness to user needs and problems), and credibility (the bank's reputation and reliability in providing online services). These dimensions are considered crucial as they directly affect customer satisfaction and the long-term success of e-banking implementation in the banking industry.

Stalin and Al-Manayseh (2020) point out that e-banking is not just a technological innovation, but also a strategic tool capable of driving operational efficiency and transformation in the banking industry. E-banking provides various conveniences for customers, such as the ability to conduct financial transactions without time and place restrictions, directly increasing user convenience and satisfaction. On the other hand, from the perspective of financial institutions, the implementation of e-banking enables significant operational cost reductions, as it lowers the dependency on face-to-face services and physical infrastructure such as branch offices. In addition, automating transaction processes through digital platforms also speeds up services, improves accuracy, and reduces the possibility of human error. The researchers also emphasized that the positive impact of e-banking is particularly pronounced in developing countries, where adopting this technology can accelerate financial inclusion, expand the reach of banking services, and drive digital economic growth more broadly.

E-banking has become an essential component in the economic development of developing countries, including Indonesia, due to its ability to promote financial inclusion and improve financial sector performance (Guerra-Leal et al., 2023; Veluthedan & Kiran, 2023). A study by Widarwati et al., (2022) shows that using digital finance, such as internet banking and mobile banking, has a strategic role in increasing financial inclusion in the Indonesian banking sector. Through the digitization of financial services, people who previously had difficulty accessing banking services can now be directly connected to the formal financial system for transaction needs, payments, savings, and access to credit. This increased financial inclusion expands the banking customer base and encourages increased operational efficiency through reduced service costs and accelerated transaction processes. Their results indicate that the Average Digital Finance (ADF) indicator positively influences the increase in the number of loan transactions as a proxy for financial inclusion. In addition, bank size and characteristics such as age, profitability, and operational efficiency also influence the success of digital finance.

The successful adoption of electronic banking innovations is strongly influenced by how consumers perceive the systems' ease of use and security (Sandhu & Arora, 2022). In a research by Ahammad and Reddy (2024), it was found that three main factors- perceived ease of use, perceived usefulness, and perceived privacy and security- significantly influence consumer attitudes and intentions in using e-banking services. These factors form the main basis of consumers' decisions to adopt digital banking services on an ongoing basis. Moreover, perceived security is closely related to the level of user trust in the e-banking system, given the high sensitivity of personal financial data and transactions. Therefore, the success of electronic

banking depends not only on technological advancements but also on consumers' positive perceptions of the security and convenience of the service.

Bank Umum

Commercial banks, also known as “public banks” in Indonesian, play a pivotal role in the financial sector by offering a wide range of financial services. The main services provided by commercial banks include accepting deposits from the public, disbursing loans to individuals, businesses, and government agencies, as well as providing other financial services such as fund transfers, bill payments, and foreign exchange transactions. The strategic role of commercial banks in lending not only serves as a source of financing, but is also a key driver of real sector growth, especially in supporting small and medium enterprises (SMEs), which are the backbone of the economy. In addition, commercial banks help maintain financial system stability through their ability to manage liquidity and credit risks, as well as provide reliable and efficient payment services (Boot & Thakor, 1997; Shanmugam & Chandran, 2022).

Commercial banks are defined as institutions that are legally authorized to receive funds from the public and redistribute them through loans to individuals and business entities. This role makes commercial banks the main link between fund owners and fund users in the financial system (Sajan et al., 2023). Meanwhile, Subramanian and Kattumannil (2022) emphasized that commercial banks are not only financial intermediaries, but also institutions that must be able to manage various risks, such as market, credit, and liquidity risks, holistically. They emphasized the importance of an enterprise-based risk management approach to ensure optimal capital allocation and sustainability of the bank's business. In a study conducted by Peng (2015), it was explained that commercial banks are financial institutions with a very broad economic influence because their activities cover almost all sectors and layers of society.

Commercial banks are an important pillar in maintaining economic stability through efficient financial intermediation mechanisms and targeted resource allocation. This efficiency is achieved through careful risk analysis and diversified loan portfolios that balance profitability and safety of customer funds (Posnaya et al., 2024). The main function of commercial banks as managers and distributors of public deposits is to play a key role in promoting sustainable economic development. By collecting funds from the public in the form of deposits such as savings, deposits, and current accounts, commercial banks convert idle funds into productive capital through lending to various sectors, ranging from micro businesses to large corporations. This distribution not only supports economic activity but also creates jobs, increases people's purchasing power, and encourages the growth of productive sectors. If the intermediation system works well, banks are able to maintain market liquidity and stabilize economic fluctuations, especially during times of turmoil such as financial crises or high inflation.

Commercial banks can be classified into several types based on ownership and the markets they serve, and each has different characteristics and strategic roles in the national banking system, including the following (Shanmugam & Chandran, 2022):

1. Public sector banks

These are financial institutions that are owned by the government. The main objective of this type of bank is not solely to pursue profit, but to provide inclusive and affordable banking services, especially for people in rural and semi-urban areas who are often underserved by private banks. In addition to performing economic functions, public sector banks also play a role in supporting social development agendas, such as economic empowerment of small communities, provision of micro-enterprise credit, and reducing disparities in access to financial services. As such, the operational philosophy of these banks emphasizes the welfare of society at large rather than a purely business orientation.

2. Private sector bank

Financial institutions that are owned and managed by non-government entities or private businesses. Their primary focus is to make profits by attracting and retaining customers through the provision of superior and competitive banking services. These banks are known to have a more flexible operational structure, allowing them to innovate banking products

and technology quickly. They also tend to offer services that are more personalized and tailored to the specific needs of customers, including narrower market segments (niche markets). Efficiency in service, ease of access, and the use of sophisticated digital technology are the main advantages of private sector banks when competing in the banking industry.

3. Foreign banks

They are financial institutions that operate within a country but are owned and headquartered in another country. Their presence in the domestic market is generally aimed at supporting cross-border economic activities, such as financing international trade, foreign investment, and banking services for multinational companies and expatriates. These banks often offer specialized services tailored to the needs of global businesses, including foreign exchange transactions, import-export credit, and international cash management. However, their operational strategies and policies are influenced not only by the regulatory and economic conditions of the countries in which they operate, but also by the policy direction and economic stability of their home countries.

Commercial banks play a fundamental role in the modern financial system, especially in the digital era, due to their ability to create credit, provide liquidity, and facilitate investment flows that support economic growth. Through their fundraising and lending activities, commercial banks not only help individuals and businesses manage their finances but also encourage innovation, business expansion, and job creation. In the context of economic development, commercial banks serve as a link between surplus and deficit funds, ensuring that available funds are productively utilized across various sectors of the economy. In addition to their traditional functions, commercial banks are now also transforming into technology-based institutions that integrate digital services such as internet banking, mobile banking, and electronic payment systems. This digital transformation not only improves operational efficiency but also changes consumer behavior in accessing and using banking services (Alshehadeh et al., 2023).

METHODS

This study uses a literature review method described by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach. PRISMA is a guide designed to improve the quality of reporting in systematic studies and meta-analyses, by emphasizing transparency, completeness, and repeatability of the literature review process (Page et al., 2021; Page et al., 2022; Parums, 2021), specifically addressing the literature search component, providing a more detailed checklist for reporting search methods and information sources in a clear and reproducible manner (Rethlefsen et al., 2021).

This research specifically focused on reviewing articles published within the time span of 2020 to 2024. This five-year span ensures that the literature analyzed reflects the most recent developments in e-banking implementation by commercial banks. This period also represents an important phase in the digital transformation of banking, particularly in the aftermath of the COVID-19 pandemic that drove the accelerated adoption of digital technologies in the financial sector. By limiting the scope of the study to the most recent years, this research aims to compile a relevant, up-to-date, and applicable overview of how e-banking contributes to enhancing commercial banks' competitive advantage in the digital era. This approach also helps capture technological innovations, changes in customer behaviour, and digitalization strategies adopted by banking institutions in response to market dynamics and customer needs.

The selection stages are carried out in stages according to the PRISMA flow, including:



Figure 1. PRISMA Flow Step

The initial step in this process began with a literature search through various trusted scientific databases, such as Scopus, ScienceDirect, and Google Scholar, using keywords that match the focus of the research, namely “e-banking” and “commercial banks”. Next, the articles found

were checked to remove duplicates and evaluated for relevance based on their titles and abstracts a result of 949 articles. Articles that passed the initial selection were then further analyzed thoroughly to ensure that their content met the inclusion criteria, such as topic suitability, relevant year of publication, application of sound scientific methods, and publication in reputable journals. Only articles that met all these requirements were included in the final synthesis stage, which resulted in 10 articles to be reviewed. The entire selection process is presented concisely in the form of a PRISMA flowchart, which makes it easy to monitor the stages of article selection systematically and transparently.

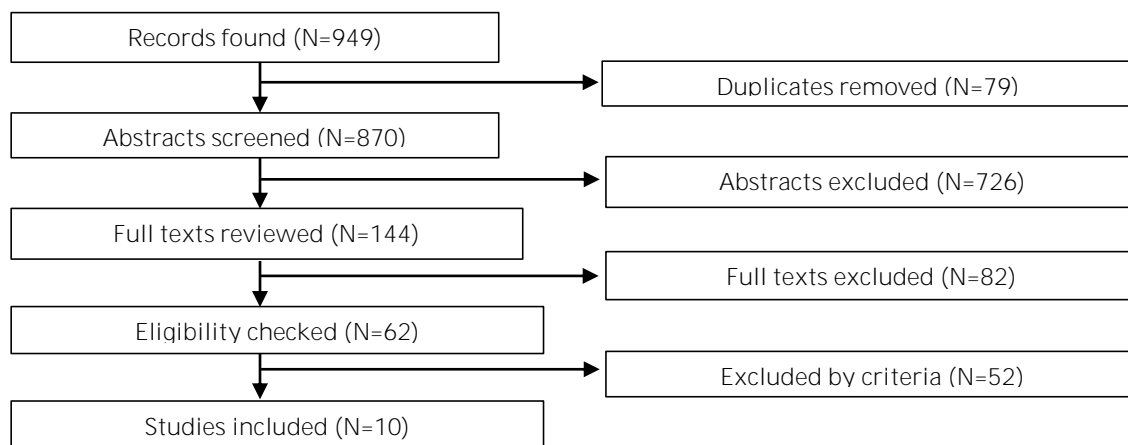


Figure 2. Diagram of Article Selection in PRISMA Form

The article selection process in this study was conducted using the PRISMA flow approach, which includes four main stages: identification, screening, eligibility, and inclusion. During the identification stage, nearly a thousand articles were obtained from trusted databases such as Scopus, ScienceDirect, and Google Scholar. After screening for duplication, title relevance, and abstract relevance, the number of articles was significantly reduced. A full review stage then re-selected the articles based on content and methodology suitability, resulting in only 10 articles meeting the inclusion criteria: publications between 2020 and 2024, publications in reputable journals, and specifically discussing the role of e-banking in driving competitive advantage in commercial banks. This systematic approach ensures that the analyzed literature is truly relevant, up-to-date, and able to answer the research questions.

RESULT

Within the context of a systematic study on the role of e-banking in driving the competitive advantage of commercial banks, a literature selection process based on the PRISMA approach was conducted on articles published between 2020 and 2024. From a total of 949 articles screened, 10 articles met the inclusion criteria and were considered relevant for further analysis. To provide a more structured and comprehensive overview of the findings of these articles, a summary is presented in the form of a table containing five main aspects: sources, study aims, methodology, key findings, and practical implications. This table aims to help readers understand the contribution of each study to the topic of e-banking and competitive advantage in the banking sector.

In this study, the number of articles analyzed was limited to 10 publications published between 2020 and 2024. This limitation was determined because the literature selection process was conducted using the PRISMA approach, which emphasizes transparency, systematization, and accuracy in source selection. Of all the articles identified in the initial stage, the majority were eliminated because they did not meet the inclusion criteria, either in terms of topic relevance, publication quality, or methodology used. Only articles that explicitly discussed the role of e-banking as a driver of competitive advantage in commercial banks were retained, while articles that focused on other issues such as digital security, general technology adoption, or the context of non-bank financial institutions were excluded from the analysis. The publication period limitation of

2020–2024 was chosen to ensure the reviewed literature was up-to-date and relevant to current developments, particularly the acceleration of digital transformation in the banking sector post-COVID-19 pandemic. Therefore, the 10 selected articles were deemed sufficiently representative to provide a comprehensive, credible, and relevant basis for analysis in explaining the contribution of e-banking to increasing the competitiveness of commercial banks.

Table 1. Analysis of the Chosen Studies' Content

| Sources | Study Aim | Methodology | Key Finding | Practical Implications |
|--|---|---|---|--|
| Atyat et al., (2023) | Assessing the role of e-banking services in the competitive advantage of foreign banks in Jordan | Questionnaire survey, regression analysis | Services such as ATMs and mobile banking have a significant impact on competitive advantage | Banks should expand e-services and use technology to attract customers |
| Hassnaoui and Belkasm, (2022) | Examining the effect of e-banking services on the competitiveness of commercial banks in Aljazair | Quantitative survey through questionnaires; SPSS analysis | Electronic cards have the most influence on competitive advantage | Banks should focus on internet and mobile banking services |
| Odhiambo and Mang'an a (2022) | Examining the adoption of technological innovation on banks' competitive advantage in Kenya | Survey of 215 respondents from 43 banks; SPSS analysis | E-money and internet banking innovations have a significant positive effect | Use mobile technology and authentication systems to expand service access |
| Alkhaibari et al., (2023) | Evaluating e-banking service quality on commercial bank customer satisfaction in the Arab Saudi | Survey of 308 customers; quantitative and qualitative methods | 8 dimensions of e-banking services influence user satisfaction | Banks need to focus on ease of use and security of digital services |
| Fijabi et al., (2024) | Analyzing the relationship of e-payment systems with competitive advantage in Nigeria | Survey with questionnaires and interviews; chi-square analysis | E-payment systems influence competitive advantage through customer satisfaction | Improve the speed, security, and education of bank application use |
| Dhanya B K and Velmurugan (2023) (Goyal, 2024) | Assess customer awareness of e-banking Explaining the growth and future of e-banking in India | Literature-based descriptive study and market trends Literature review | Technology is driving banks to improve services to compete E-banking reduces costs and increases consumer satisfaction | Technology is driving banks to improve services to compete Focus on expanding secure and fast internet banking access |
| Tan (2021) | Assessing the quality of internet banking services in the Philippines | E-SERVQUAL model for some banks | Privacy dimension satisfactory, system availability is less | Banks should strengthen their systems and tools for measuring service quality |
| Mohamud and Farah (2023) | Review of e-banking literature and its impact on commercial banks | Systematic review (10 selected articles) | E-banking improves efficiency, satisfaction and market expansion | Leverage digitalization to respond to customer expectations |
| (Chama et al., 2021) | Examining e-banking adoption factors by customers | State-of-the-art review; synthesis of adoption factors | Trust, convenience, and social influence are key to adoption | Banks must pay attention to social factors and the perceived ease of technology |

Based on the analysis of the ten selected studies, it can be concluded that there are consistent findings showing that e-banking plays a strategic role in building competitive advantage for commercial banks in various countries. E-banking is proven to improve operational efficiency by reducing transaction costs and speeding up service processes, while increasing customer satisfaction through easy access, convenience, and availability of banking services without time and location limits. In addition, this technology also opens up wider market expansion opportunities, especially in reaching customer segments that were previously difficult to reach conventionally. However, each study also highlighted challenges that need to be overcome so that the benefits of e-banking can be optimized in a sustainable manner. These include the need to improve digital infrastructure, both in terms of network quality and banking system capacity; improving technological literacy among customers so that they are able to utilize digital services safely and efficiently; and strengthening cybersecurity systems to protect data and transactions from potential digital crime threats. With these factors in mind, e-banking will not only be an operational tool, but also a key pillar in commercial banks' long-term competitive strategies.

DISCUSSION

E-banking today is no longer seen as a competitive advantage, but has become a competitive imperative for commercial banks in the face of the dynamic digital financial industry. Digital transformation through e-banking enables banks to provide faster, more secure and round-the-clock services, directly addressing the efficiency and convenience demands of modern customers (Gan et al., 2006). The adoption of digital technologies in the banking sector has also had a noticeable impact on the underlying performance of commercial banks. Digitalization opens up opportunities to increase commission-based income and drive significant growth in individual transaction volumes. It also enables large banks to maintain their competitive advantage through the utilization of digital maturity, which not only improves operational efficiency but also strengthens their position in the face of increasingly dynamic market competition (Potapova et al., 2022).

E-banking has brought about major changes in the way customers and banks interact, especially in terms of financial accessibility and control. Now, customers can perform almost all banking activities, such as checking balances, transferring funds, and paying bills, from anywhere and anytime as long as they are connected to the internet. This convenience not only increases transaction efficiency but also gives customers greater control over their finances in real-time (Yadav et al., 2024). The use of e-banking has had significant positive impacts on customers, especially in terms of financial planning and managing daily transactions. The ease of access through digital platforms encourages customers, especially the younger generation, to be more active in managing their spending and increase their transaction frequency (Keerthana & Praveen, 2025). The personalization features in these services provide a more relevant and tailored experience to individual needs, thereby increasing the sense of comfort and perceived value of the service, which in turn drives customer engagement and loyalty to the bank (Wang et al., 2017).

According to the findings of Bui and Luong (2023), e-banking has great potential in expanding financial inclusion, particularly by opening up access to banking services for groups that have been marginalized or living in remote areas. One of the most effective forms of e-banking in this context is mobile banking, which enables individuals in developing countries, including the previously unbanked, to perform basic banking activities such as remittances and bill payments independently through mobile devices and digital wallets. This approach not only improves service efficiency but also contributes to the economic empowerment of people who are less accessible to the traditional banking system. Nonetheless, the widespread implementation of e-banking still faces a number of challenges, such as the digital divide, limited access to technological devices, and low levels of digital literacy among users. Therefore, banks and policymakers need to design a comprehensive strategy to overcome these barriers, including through the provision of adequate digital infrastructure, user education, and regulations that support the adoption of financial technology in an inclusive and sustainable manner.

All articles reviewed highlighted the strategic benefits of e-banking for commercial banks. One of the key benefits is cost efficiency, where digitization of transactions enables a reduction in

operational expenditure by automating routine services and reducing reliance on physical branches. This not only improves the profitability of banks but also provides financial benefits to customers through lower service fees. In addition, e-banking strengthens customer engagement and satisfaction by providing flexible access to services anytime and anywhere. The use of technologies such as data analytics and artificial intelligence enables banks to offer personalized services according to individual preferences, thus strengthening customer loyalty and retention. However, behind these benefits, there are significant challenges that cannot be ignored, especially regarding cybersecurity. The digital infrastructure that supports e-banking is vulnerable to threats such as phishing, malware and ransomware attacks, demanding the implementation of robust and sustainable security strategies by financial institutions.

In the era of digital banking or e-banking, maintaining customer trust and a good image of the institution is crucial for commercial banks. Data leaks or security breaches not only cause financial losses but also have a serious impact on reputation and customer loyalty. As explained by [Mohamad \(2022\)](#), data breaches are one of the most significant risks facing banks today, with indirect consequences such as loss of trust and reputational damage that are difficult to measure quantitatively but have very high costs. [Inegbedion et al., \(2019\)](#) stated that data leaks can damage a bank's reputation and reduce customer trust. As a result, customers become more cautious in storing their funds and personal information. To maintain this trust, private banks need to implement a strong security system and prioritize transparency and accountability in data management.

The implementation of a comprehensive and sustainable data protection strategy is essential for banks in the face of evolving digital security threats. This strategy should include end-to-end encryption technology, access restrictions based on authorization, and regular cybersecurity training for all staff to ensure the protection of sensitive data from potential cyberattacks ([Thakur & Birlay, 2025](#)). The implementation of a comprehensive and sustainable data protection strategy is essential for banks in the face of evolving digital security threats. This strategy should include end-to-end encryption technology, access restrictions based on authorization, and regular cybersecurity training for all staff to ensure the protection of sensitive data from potential cyberattacks ([Farrun & Purwanto, 2024](#)). Open and transparent communication to customers also plays a crucial role. Banks must be able to clearly explain to customers the security policies implemented, personal data protection procedures, and steps that will be taken in the event of a breach. This transparency will help build trust and create the perception that the bank is highly committed to information security. The combination of a solid security infrastructure and an honest communication approach is an important foundation in maintaining customer loyalty and preserving the bank's reputation amidst increasingly complex competition and digital risks.

CONCLUSION

E-banking is now a central element in strengthening the competitiveness of commercial banks amid the ongoing digital transformation. It enables the provision of faster, safer and more accessible banking services, in line with the efficiency and convenience needs of modern customers. This transformation not only improves user experience but also gives customers greater control over their personal finances through real-time access to various services. On the other hand, e-banking promotes the expansion of financial inclusion by opening up access to banking services to underserved groups, including those living in remote areas. The articles reviewed show that e-banking brings strategic benefits, such as operational cost efficiency, increased customer loyalty and satisfaction, and more personalized and responsive services.

Behind these benefits, e-banking also presents challenges that cannot be ignored, especially in the aspect of digital security. The infrastructure that supports this system is highly vulnerable to threats such as cyberattacks, data theft, malware, and ransomware. Reputation and trust are priceless assets in the world of digital banking; once a data breach occurs, the consequences can significantly damage the institution's image. Therefore, commercial banks must proactively develop and implement a comprehensive and sustainable cybersecurity policy. This includes the use of advanced encryption technologies, strict access restrictions and regular training for employees on information security practices. In addition, openness and transparency in communication to

customers about security policies are also important to strengthen public perception that the bank is highly committed to data protection and service integrity.

REFERENCE

- Ahammad, M. I., & Reddy, C. V. (2024). Customer Attitude Towards E-Banking and its Adptions: A Study. *International Journal of Advanced Research in Commerce, Management & Social Science*, 07(04(I)), 65–73. [https://doi.org/10.62823/IJARCMS/7.4\(I\).7021](https://doi.org/10.62823/IJARCMS/7.4(I).7021)
- Alkhaibari, M., Albarq, A. N., Elrayah, M., Moustafa, M. A., Ghaleb, M. M. S., & Abba, A. (2023). The Impact of E-banking Service Quality on the Sustainable Customer Satisfaction: Evidence from the Saudi Arabia Commercial Banking Sector. *International Journal of Data and Network Science*, 7(3), 1153–1164. <https://doi.org/10.5267/j.ijdns.2023.5.008>
- Alshehadeh, A. R., Al-Khawaja, H. A., Yamin, I., & Jebiril, I. (2023). The Impact of Financial Technology on Customer Behavior in the Jordanian Commercial Banks. *WSEAS Transactions on Business and Economics*, 20, 2263–2275. <https://doi.org/10.37394/23207.2023.20.195>
- Atyat, Z. A., Karaki, B. S. A., Maharmah, M. H., & Lozi, B. (2023). The Role of E-Banking Services in Achieving Competitive Advantage - Foreign Banks in Jordan. *WSEAS Transactions on Computer Research*, 11, 362–375. <https://doi.org/10.37394/232018.2023.11.33>
- Boot, A. W. A., & Thakor, A. V. (1997). Banking Scope and Financial Innovation. *Review of Financial Studies*, 10(4), 1099–1131. <https://doi.org/10.1093/rfs/10.4.1099>
- Boufounou, P., Mavroudi, M., Toudas, K., & Georgakopoulos, G. (2022). Digital Transformation of the Greek Banking Sector in the COVID Era. *Sustainability*, 14(19), 11855. <https://doi.org/10.3390/su141911855>
- Bui, M. T., & Luong, T. N. O. (2023). Financial Inclusion for the Elderly in Thailand and the Role of Information Communication Technology. *Borsa Istanbul Review*, 23(4), 818–833. <https://doi.org/10.1016/j.bir.2023.02.003>
- Chama, J., Ahmed, T., & Amine, E. H. M. (2021). Understanding Customer Adoption of E-banking. In *Lecture Notes in Networks and Systems*, vol 211. Springer, Cham. (pp. 741–747). https://doi.org/10.1007/978-3-030-73882-2_67
- Daka, G. C., & Phiri, J. (2019). Factors Driving the Adoption of E-banking Services Based on the UTAUT Model. *International Journal of Business and Management*, 14(6), 43–51. <https://doi.org/10.5539/ijbm.v14n6p43>
- Dhanya B K, & Velmurugan, V. P. (2023). Customer Awareness Towards e-Banking Management for Maintaining a Sustainable Environment. *Revista de Gestão Social e Ambiental*, 17(6), e03398. <https://doi.org/10.24857/rgsa.v17n6-017>
- Farrun, R. I., & Purwanto, A. M. D. C. (2024). Prinsip Kerahasiaan dan Prinsip Kehati-Hatian dalam Perlindungan Data Nasabah Bank Syariah. *Wajah Hukum*, 8(2), 744–756. <https://doi.org/10.33087/wjh.v8i2.1542>
- Fijabi, K. L., Oladapo, J. T., & Kareem, O. B. (2024). E-Payment Systems, Competitive Advantage, and Customer Satisfaction in Nigerian Banking Industry. *International Journal of Research and Innovation in Social Science*, VIII(VII), 1451–1468. <https://doi.org/10.47772/IJRISS.2024.807119>
- Gan, C., Clemes, M., Limsombunchai, V., & Weng, A. (2006). A Logit Analysis of Electronic Banking in New Zealand. *International Journal of Bank Marketing*, 24(6), 360–383. <https://doi.org/10.1108/02652320610701717>
- Goyal, S. (2024). E-Banking, its Growth & Future in India. *Interantional Journal of Scientific Research in Engineering and Management*, 08(04), 1–5. <https://doi.org/10.55041/IJSREM32541>
- Guerra-Leal, E. M., Arredondo-Trapero, F. G., & Vázquez-Parra, J. C. (2023). Financial Inclusion and Digital Banking on an Emergent Economy. *Review of Behavioral Finance*, 15(2), 257–272. <https://doi.org/10.1108/RBF-08-2021-0150>

- Hassnaoui, R., & Belkasmi, Z. (2022). Electronic Banking Services as a Mechanism to Build Competitive Advantages of Algerian Banks. *RIMAK International Journal of Humanities and Social Sciences*, 4(6), 329–346. <https://doi.org/10.47832/2717-8293.20.20>
- Indriasari, E., Prabowo, H., Lumban Gaol, F., & Purwandari, B. (2022). Intelligent Digital Banking Technology and Architecture. *International Journal of Interactive Mobile Technologies (IJIM)*, 16(19), 98–117. <https://doi.org/10.3991/ijim.v16i19.30993>
- Inegbedion, H., Inegbedion, E. E., Osifo, S. J., Eze, S. C., Ayeni, A., & Akintimehin, O. (2019). Exposure to and Usage of e-Banking Channels. *Journal of Science and Technology Policy Management*, 11(2), 133–148. <https://doi.org/10.1108/JSTPM-02-2019-0024>
- Jayawardhena, C. (2004). Measurement of Service Quality in Internet Banking: The Development of an Instrument. *Journal of Marketing Management*, 20(1–2), 185–207. <https://doi.org/10.1362/026725704773041177>
- Keerthana, K., & Praveen, S. V. (2025). A Study on Impact of E-Banking on Customer's Financial Behavior in IOB. *International Scientific Journal of Engineering and Management*, 04(03), 1–7. <https://doi.org/10.55041/ISJEM02548>
- Khan, A., & Malaika, M. (2021). Central Bank Risk Management, Fintech, and Cybersecurity. *IMF Working Papers*, 2021(105), 1–75. <https://doi.org/10.5089/9781513582344.001>
- Loonam, M., & O' Loughlin, D. (2008). Exploring E-Service Quality: a Study of Irish Online Banking. *Marketing Intelligence & Planning*, 26(7), 759–780. <https://doi.org/10.1108/02634500810916708>
- Metibemu, O. C. (2025). Financial Risk Management in Digital-Only Banks: Addressing Fraud and Cybersecurity Threats in a Cashless Economy. *Asian Journal of Research in Computer Science*, 18(3), 434–455. <https://doi.org/10.9734/ajrcos/2025/v18i3603>
- Mohamad, A. S. (2022). Data Encryption for Bank Management System. *Wasit Journal of Computer and Mathematics Science*, 1(4), 10–15. <https://doi.org/10.31185/wjcm.83>
- Mohamud, H. A., & Farah, M. A. (2023). The Impact of E-Banking on Commercial Banks: A Literature Review. *International Journal of Membrane Science and Technology*, 10(5), 504–512. <https://doi.org/10.15379/ijmst.v10i5.2535>
- Nahar, K., Megha, A. H., & Sarker, J. U. (2025). Entering the Digital Banking Era: A Mechanism to Change and Accelerate Financial Access in Bangladesh. *International Journal of Innovative Science and Research Technology*, 2750–2761. <https://doi.org/10.38124/ijisrt/25mar1048>
- Najaf, K., Mostafiz, M. I., & Najaf, R. (2021). Fintech Firms and Banks Sustainability: Why Cybersecurity Risk Matters? *International Journal of Financial Engineering*, 08(02), 2150019. <https://doi.org/10.1142/S2424786321500195>
- Odhiambo, O. E., & Mang'ana, R. (2022). Strategic Adoption of Technological Innovations on Competitive Advantage of Commercial Banks in Kenya. *Journal of Business and Strategic Management*, 7(2), 16–36. <https://doi.org/10.47941/jbsm.885>
- Olaiya, O. P., Adesoga, T. O., Ojo, A., Olagunju, O. D., Ajayi, O. O., & Adebayo, Y. O. (2024). Cybersecurity Strategies in Fintech: Safeguarding Financial Data and Assets. *GSC Advanced Research and Reviews*, 20(1), 50–56. <https://doi.org/10.30574/gscarr.2024.20.1.0241>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *International Journal of Surgery*, 88, 1–9. <https://doi.org/10.1016/j.ijsu.2021.105906>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2022). A Declaração PRISMA 2020: Diretriz Atualizada Para Relatar Revisões Sistemáticas. *Revista Panamericana de*

- Salud Pública*, 46, 1–12. <https://doi.org/10.26633/RPSP.2022.112>
- Parums, D. V. (2021). Editorial: Review Articles, Systematic Reviews, Meta-Analysis, and the Updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Guidelines. *Medical Science Monitor*, 27, 1–3. <https://doi.org/10.12659/MSM.934475>
- Peng, X. (2015). Commercial Bank Operations and Management. In *Financial Theory* (pp. 167–203). World Century Publishing Corporation. https://doi.org/10.1142/9781938134326_0008
- Posnaya, E. A., Cherkashina, E. Y., Yurchenko, N. V., & Ditsulenko, O. I. (2024). Resource Management Mechanism of a Commercial Bank. *Вестник Северо-Кавказского Федерального Университета*, 5, 85–95. <https://doi.org/10.37493/2307-907X.2024.5.9>
- Potapova, E. A., Iskoskov, M. O., & Mukhanova, N. V. (2022). The Impact of Digitalization on Performance Indicators of Russian Commercial Banks in 2021. *Journal of Risk and Financial Management*, 15(10), 452. <https://doi.org/10.3390/jrfm15100452>
- Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., Koffel, J. B., & Group, P.-S. (2021). PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews. *Journal of the Medical Library Association*, 109(2), 174–200. <https://doi.org/10.5195/jmla.2021.962>
- Sajan, S., Harshitha, Ramachandran, M., & Raja, C. (2023). The influence of e-banking service quality on Commercial Bank. *Recent Trends in Management and Commerce*, 4(2), 26–34. <https://doi.org/10.46632/rmc/4/2/4>
- Sandhu, S., & Arora, S. (2022). Customers' Usage Behaviour of E-banking Services: Interplay of Electronic Banking and Traditional Banking. *International Journal of Finance & Economics*, 27(2), 2169–2181. <https://doi.org/10.1002/ijfe.2266>
- Shanmugam, R., & Chandran, M. (2022). A Relationship between Service Quality and Customer Satisfaction in e-Banking Services- a Study with Reference to Commercial Banks in Chennai City. *International Journal of Professional Business Review*, 7(3), e0490. <https://doi.org/10.26668/businessreview/2022.v7i3.0490>
- Stalin, D. C., & Al-Manayseh, M. N. (2020). Economic and Financial Implications of E-Banking in India. *Shanlax International Journal of Commerce*, 8(2), 22–29. <https://doi.org/10.34293/commerce.v8i2.2365>
- Subramanian, K. R., & Kattumannil, D. K. S. (2022). Commercial Banks, Banking Systems, and Basel Recommendations. In *Event- and Data-Centric Enterprise Risk-Adjusted Return Management* (pp. 1–84). Apress. https://doi.org/10.1007/978-1-4842-7440-8_1
- Tan, S. B. (2021). Assessing the Internet Banking Services of Selected Banks in the Philippines using E-SERVQUAL Model. *International Journal of Scientific and Research Publications (IJSRP)*, 11(3), 227–231. <https://doi.org/10.29322/IJSRP.11.03.2021.p11130>
- Thakur, M. S., & Birlay, M. I. (2025). Data Security in Banks: Preventing Breaches and Ensuring Customer Trust. *International Journal of Scientific Research in Engineering and Management*, 09(03), 1–9. <https://doi.org/10.55041/IJSREM43135>
- Veluthedan, S. P., & Kiran, K. B. (2023). Digital Financial Services (DFS) and Productivity of Indian Banking Sector - Empirical Evidence Using Malmquist Productivity Index and Panel Data Regression. *Journal of Law and Sustainable Development*, 11(9), e1697. <https://doi.org/10.55908/sdgs.v11i9.1697>
- Waliullah, M., George, M. Z. H., Hasan, M. T., Alam, M. K., Munira, M. S. K., & Siddiqui, N. A. (2025). Assessing the Influence of Cybersecurity Threats and Risks on the Adoption and Growth of Digital Banking: A Systematic Literature Review. *American Journal of Advanced Technology and Engineering Solutions*, 01(01), 226–257. <https://doi.org/10.63125/fh49az18>
- Wang, M., Cho, S., & Denton, T. (2017). The Impact of Personalization and Compatibility with Past Experience on E-banking Usage. *International Journal of Bank Marketing*, 35(1), 45–55. <https://doi.org/10.1108/IJBM-04-2015-0046>

- Widarwati, E., Solihin, A., & Nurmallasari, N. (2022). Digital Finance For Improving Financial Inclusion Indonesians' Banking. *Signifikan: Jurnal Ilmu Ekonomi*, 11(1), 17–30. <https://doi.org/10.15408/sjie.v11i1.17884>
- Yadav, M., Moolchandani, R., & Saini, S. K. (2024). Impact of Technological Progress on Consumer Trust and Adoption of E-Banking. *International Journal for Research in Applied Science and Engineering Technology*, 12(8), 175–179. <https://doi.org/10.22214/ijraset.2024.63849>