



Digital Banking: Challenges, Emerging Technology Trends, and Future Research Agenda

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ABSTRACT

Due to the exponential growth of the internet, smartphones, and communication technologies during the last two decades, the digital banking sector has enormously advanced in terms of user-friendly, efficient, and fast financial transactions. Digital banking also plays a significant role as an enabler of cashless transactions in the economic crisis caused by the COVID-19 pandemic. The study investigates the challenges, technology, and future research agenda of digital banking. The paper follows the manifestation of Kitchenham's SLR protocol. Six databases were used to determine articles that match the criteria. The study considers recent articles, which have been published from 2015 to 2021. Sixty-seven papers have been selected, extracted, and analyzed. The result highlights issues related to technology, organization, people, process, environment, customers, security, and risk, which become challenges in digital banking innovation. This research presents suggestions for future research directions, which will be beneficial to practitioners and scholars around the globe.

KEYWORDS

Digital Banking, Digital Ecosystem, Digital Innovation, FinTech Disruption, Open Banking

INTRODUCTION

The banking industry plays an essential role in the daily life of modern society worldwide. From its inception, innovation is not new to the global banking system, evolving from the utilization of coins, banknotes, ATMs, and the lending system. Likewise, technology and innovation in the banking sector have transformed from time to time (Scardovi, 2017). Disruptive innovation, digitalization, and new technology are transforming traditional business models and processes. As a result, banks should modify their business strategies to change how they interact with customers, handle middle and back-office operations, be competitive, and be prepared for the future (Kitsios & et al., 2021).

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New banking and financial payment methods have emerged due to the widespread adoption of the internet and mobile devices worldwide. Digital banking was established as a cutting-edge, practical, and effective method of financial transactions. There are numerous types of digital banking available right now, including mobile wallets, online banking, internet banking, and electronic banking (Alkhowaiter, 2020). Typical functions include viewing balance inquiries, transferring funds, and payment. When the economic crisis rose caused by the global COVID-19 pandemic, digital banking became an enabler in facilitating the business transaction. The digital ecosystem linked banks to entrepreneurs, suppliers, employees, and new markets. Governments attempt to promptly and effectively dispense assistance to those in need. Simultaneously, digital banking allows for social distancing and helps foster financial inclusion in remote or impoverished places where financial institutions are not physically present.

The banking industry invests in digital banking to obtain substantial benefits and remain competitive with the challenges of digitalization during and beyond the pandemic. For practitioners, this study will provide practical guidance based on a detailed analysis of challenges and technology that could be used to develop strategies that help improve the adoption and performance of digital banking. For academics, understanding the literature gap will set the agenda for future research directions. In particular, this systematic literature review (SLR) -based study attempts to achieve the following three objectives:

1. Determine the definition and state-of-the-art digital banking research.
2. Investigate the challenges of digital banking.
3. Identify future research agenda.

This paper is organized as follows: The Methodology section describes the methodology of SLR. In the Results and Discussion section, The authors discuss various results of the SLR and recommendations for future digital banking research. Finally, the Practical and Managerial section presents practical and managerial implications, and the Conclusion section presents the conclusion.

METHODOLOGY

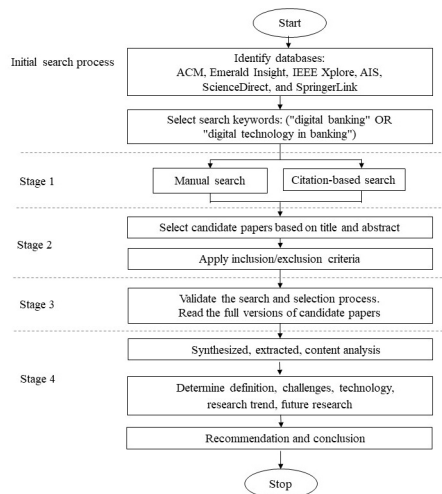
The methodology used in this research is SLR. Kitchenham procedure was selected as a “standardized method” for literature reviews that is replicable, transparent, and objective (Boell & Cecez-Kecmanovic, 2016). The SLR method enables finding out the trends of research topics that are of great interest to previous researchers so that this can be used as a reference for further research. The stages of this SLR-based research are described as follows (Kitchenham & Brereton, 2013):

1. **Initial Stage:** The authors explored six databases as data sources in the search process, including ACM, Emerald Insight, IEEE Xplore, AIS, ScienceDirect, and SpringerLink. For this purpose, the search terms used were (“digital banking” OR “digital technology in banking”).
2. **Stage 1 – Selection Process:** In this stage, all the research articles produced from the automated and manual searches were individually evaluated after investigating their titles and abstracts. Subsequently, the authors discarded all the irrelevant articles.
3. **Stage 2 – Apply Inclusions/Exclusion Criteria:** All the research articles were evaluated by applying inclusions/exclusion criteria. The review has included only those research articles which have been published from 2015 to 2021.
4. **Stage 3 – Validate the Search and Selection Process:** The authors evaluated duplication, quality, and content relationship to the objective of research. After reading their full texts at this stage, they excluded several articles and rendered them ineligible for the SLR. If the article was still relevant, its methodology and discussion sections were examined and summarized.

5. **Stage 4** – Synthesized, Extracted, and Summarized: The final stage of this SLR process is to extract data (or information) from the selected articles for further evaluation and analysis. The authors synthesized the results in figures and tables and performed content analysis using VOSviewer software. Furthermore, they summarized search results and propose recommendation.

Figure 1 illustrates the steps used in the systematic literature review.

Figure 1. The steps used in systematic literature review (SLR)



RESULTS AND DISCUSSION

This section will explain the article selection process results based on the mechanism of SLR. Furthermore, it will discuss the recommendation for the direction of digital banking research.

DESCRIPTIVE STATISTICS

The SLR method identifies 67 papers in the topic of research on digital banking. The research findings used to create the analyzed publications were disseminated through international journals and proceedings. Figure 2 depicts the distribution of the number of digital banking papers published between 2015 and 2021 in six databases.

Figure 2. The selection process for final papers

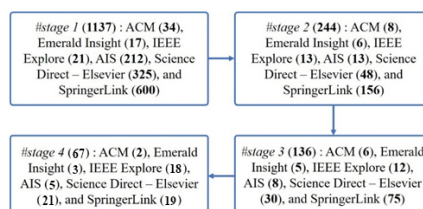
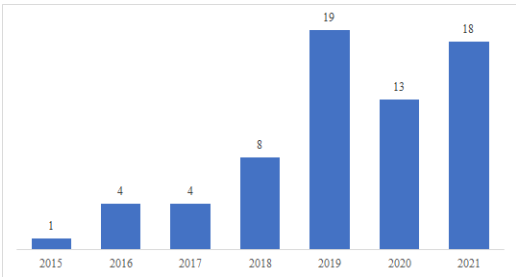


Figure 2 presents the SLR framework, describing the selection process for the articles from the databases. In Stage 1, the study identified 1,137 papers (*i.e.*, ACM, 34; Emerald insight, 17; IEEE Explore, 21; AIS, 212; Elsevier, 325; and SpringerLink, 600). In Stage 2, 893 articles were considered irrelevant to this study and thus excluded from the sample. In Stage 3, the abstracts of the 244 remaining articles were assessed to detect any articles that should not be included, eliminating an additional 108 articles. One hundred thirty-six articles remain in stage 3. In Step 4, after reading the full text of each article and checking comprehensively against the inclusion criteria, another 41 articles were eliminated. Finally, the remaining 67 articles entirely corresponding to the inclusion criteria were selected.

Figure 3. Number of studies across the year



From SLR, the authors found that the phrase “digital banking” has been used in scientific journals since 2015. Before 2015, the banks used online banking, mobile banking, and electronic banking terminology. This terminology was used to describe banking that relied on the internet as a remote delivery channel for providing services (Alkhowaiter, 2020). From 2015 to 2019, the digital banking research trend grew significantly. Then, from 2020 to 2021, the research starts to slow down. The rise of fintech and startups that challenge incumbent financial institutions become more appealing issues when compared to digital banking. As a result, there are shifts in the research trend. The number of digital banking studies during 2015-2021 is depicted in Figure 3.

Figure 4. Digital banking technology research

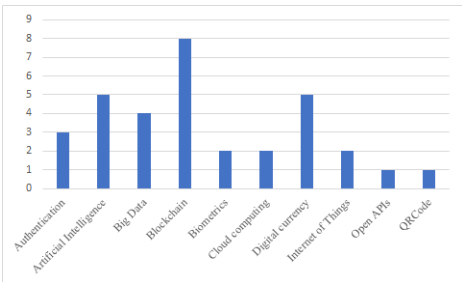


Figure 4 illustrates technology trends in digital banking identified from SLR in terms of the quantity of the paper. The technology trends categorized included blockchain (8 articles); Artificial Intelligence and digital currency (5 articles); Big data (4 articles); Authentication (3 articles); biometrics, cloud computing, internet of things (2 articles); open APIs, and QR code (1).

DEFINITION OF DIGITAL BANKING

After reviewing the literature-based definition of digital banking, the authors compiled it in Table 1 to serve as a summary.

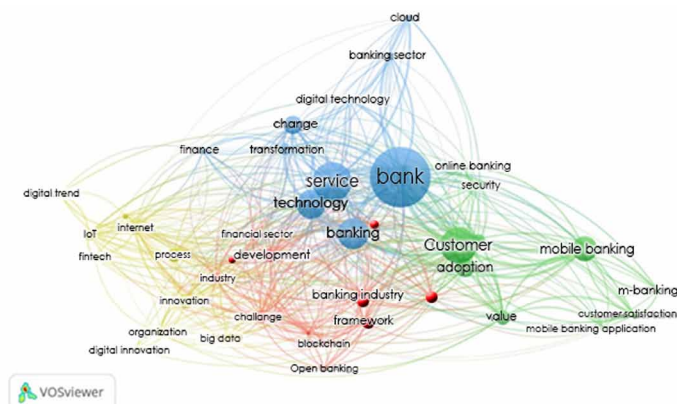
Table 1. Definition of digital banking

Definition	Reference
Digital banking refers to employing technology to conduct banking transactions, including online banking, electronic banking, and mobile banking. Contrary to traditional banking, digital banks aim at developing adaptable digital products and services to meet the needs of digital customers.	(Sardana & Singhania, 2018)
Digital banking refers to the use of technology to conduct banking transactions smoothly. It includes commonly used terms such as electronic banking, internet banking, and online banking.	(Wassan Abdullah, 2020)
Digital banking refers to interactive financial services online, including web and mobile apps.	(Megargel & Shankarararman, 2021)

Figure 5 illustrates how this study used VOSviewer for content analysis to arrive at the definition of digital banking compared to the prior investigations in Table 1. The software was used to cluster publications based on direct citation relations and analyze the resulting clustering solutions. The authors explored the keywords frequently appearing in content analysis results based on 67 articles. These keywords include bank, service, customer, customer satisfaction, value, technology, digital technology, online banking, mobile banking, development, process, innovation, artificial intelligence, big data, blockchain, cloud, and IoT. Subsequently, the authors develop the following definition of digital banking:

“Digital banking is the banking service that enables customers to conduct transactions using internet and mobile technology to create customer value and improve customer satisfaction. The innovation in digital banking is supported by adopting potential digital technology such as artificial intelligence, big data, blockchain, cloud, and internet of things for process automation and more intelligent banking services. It is also supported by open APIs that facilitate transactions cross-institutional in the digital ecosystem via integrated bank channels.”

Figure 5. The patterns of content analysis



STATE OF THE ART DIGITAL BANKING RESEARCH

After reading the full of selected 67 articles, the authors synthesized, extracted, and summarized the information into figures and tables as stage 4 of Kitchenham's SLR procedure. Table 2 depicts key themes of digital banking literature. Seven categories have been established for the literature: technology, organization, process, people, customer, environment, risk and security.

Table 2. Research trends on digital banking

Category	Topics	Studies conducted
Technology	Artificial Intelligence	(Min-Yuh, Tun-Kung, & Jheng-Gang, 2018); (A. Singh, Ramasubramanian, & Shivam, 2019); (Indriasari, Gaol, & Matsuo, 2019); (Arjun, Abisek, & Subrabha, 2021); (Climescu, Keitz, Rocholl, & et al, 2021)
	Big Data	(Ravi & Kamaruddin, 2017); (Boumlik & Bahaj, 2018); (Skyrius, Giriūnienė, Katin, Kazimianec, & Žilinskas, 2018); (Prabhu, Aneesh, Mogadala, Rohit, & et al, 2019)
	Blockchain	(Guo & Liang, 2016); (Hu et al., 2019); (Zhang, Zhu, & Qingyang, 2020); (Kirss K.K., 2020); (Dashkevich, Counsell, Destefanis, & et al., 2020); (Wang, Ma, Dai, Imran, & et al, 2020); (Garg et al., 2021)
	Biometrics	(Normalini, Halim, & Ahmad, 2015); (Szczyrko, Czyżewski, & Szczodrak, 2019);
	Cloud computing	(Hon & Millard, 2018); (Indriasari, Wayan, et al., 2019)
	Digital currency	(Opore & Kim, 2020); (Lovell, 2021); (Gowda & Chandrani, 2021); (Sujatha, Mareeswari, Chatterjee, Mousa, & et al, 2021)
	IoT	(Ramalingam & Venkatesan, 2019);
	OpenAPIs	(Premchand & Choudhry, 2019); (Rittweger, Kronibus, & Weiß, 2020);
	QR Code	(Saiteja, Sharma, & Prasad, 2020)
	Authentication	(Sheshasaayee & Sumathy, 2017); (Jama, Güçlüoğlu, & Siraj, 2019); (Velioglu, Bolu, & Yemen, 2019);
	IT Infrastructure	(Megargel & Fan, 2018); (Megargel & Shankarararman, 2021); (Pulparambil, Baghdadi, & Salinesi, 2021);
	IT Governance	(Arkipova, Vaia, DeLone, & Braghin, 2016); (Indriasari, Supangkat, & et al., 2020); (Alansari & Musleh Al-Sartawi, 2021);
People	Digital talent	(Tsai, Wu, Liao, & Yeh, 2019)
Organization	Business Model	(Harjanti et al., 2019); (Ahmed & Sur, 2021)
	Financial performance	(Mbama & Ezepue, 2018)
	Digital transformation	(Filotto, Caratelli, & Fornezza, 2021)
	Innovation Culture	(Jadil, Rana, & Dwivedi, 2021)

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Table 2 continued

Category	Topics	Studies conducted
Process	Digital Innovation	(Aitken et al., 2021)
	User-Centered Design	(Reydet & Carsana, 2017); (Minda Gilces & Fuentes Díaz, 2019);
	Software Development Life Cycle	(Taufiq, Raharjo, & Wahbi, 2020);
	Design Thinking, Agile and Co-creation	(Indriasari, Prabowo, Gaol, & Purwandari, 2021) ;
Risk & Security	Risk & Security	(Chen et al., 2020) ; (Wodo, Blaskiewicz, Stygar, & et al, 2021); (Kurmanova & Nurdavliatova, 2021).
Environment	Digital Ecosystem	(Guibaud, 2016);
	Co-creation	(Casper Ferm & Thaichon, 2021); (Payne, Dahl, & Peltier, 2021)
Customers	Adoption	(Boateng, Adam, Okoe, & Anning-Dorson, 2016); (Shaikh & Karjaluoto, 2016); (Alalwan, Dwivedi, & Rana, 2017); (Choudrie, Junior, McKenna, & et al, 2018); (Sharma, Al-Muharrami, & et al., 2018); (Abhishek, 2019); (Ali, Gallivan, & Sangari, 2019); (Baabdullah, Alalwan, Rana, & et al, 2019); (Hamidi & Safareeyeh, 2019); (Alkhowaiter, 2020); (Ramlall, Hattingh, & Van Deventer, 2020); (Msweli, 2020) ; (Carranza, Díaz, Sánchez-Camacho, & Martín-Consuegra, 2021); (Jebbarajakirthy & Shankar, 2021) (S. Singh & Srivastava, 2020);
	Innovation Resistance	(van Klyton, Tavera-Mesías, & Castaño-Muñoz, 2021);
	Branchless Digital Banking	(Suhaimi & Hassan, 2019);

The study of digital banking is a significant investigation issue in this era of innovation, and many researchers from various theoretical perspectives have studied it. Some of the well-known theoretical models have been investigated in digital banking research, such as UTAUT (Unified theory of acceptance and use of technology, TAM (Technology Acceptance Model), DOI (Diffusion of Innovation), Servqual, and a hybrid model of UTAUT2 and IS success model. Table 3 depicts theories and models used in digital banking research.

Table 3. Theories and models used in digital banking

Author	Theory	Data collection and scope	Main Findings
(Alkhaldi, 2017)	UTAUT	Data collection: survey. Total sample: 389. Scope: Saudi Arabia. Participants: customers	Service awareness directly impacts performance and effort expectancy, but not perceived risk.
(Sharma & et al., 2017)	TAM	Data collection: survey Total sample: 208 Scope: Omani Participants: customers	Perceived ease of use and demographic variables were insignificant.
(Baabdullah et al., 2019)	Combine UTAUT2 and IS success model	Data collection: survey Total sample: 429 Scope: Saudi Arabia Participants: customers	Performance Expectancy, Facilitating Condition, Price Value, Hedonic Motivation, Habit, System Quality, and Service Quality affect the usage behavior.
(Choudrie et al., 2018);	Combine TAM, UTAUT, Diffusion of Innovation.	Data collection: SLR	Globally, the aging population is growing, and mobile banking is being deployed. The study supports the recommended model for the spread of mobile banking among older persons.
(Mbama & Ezepue, 2018)	Servqual	Data collection: Semi-structured interview, Scope: UK. Participants: banks managers	The variables of digital banking include service quality, perceived value, functional quality, service customization, employee-customer engagement, service speed, brand trust, perceived usability, and perceived risk, DB innovation,
(Carranza et al., 2021)	TAM	Data collection: survey Total sample: 105. Scope: Spain Participants: customers	The most fundamental relationship in the proposed model is the correlation between perceived usefulness and perceived ease of use.
(Indriasari et al., 2021)	Combine TOE & DOI	Data collection: Semi-structure interviews. Scope: Indonesia. Participants: IT Executives	Digital banking innovation process using integration concepts of design thinking (DT), agile software development (ASD), and co-creation.

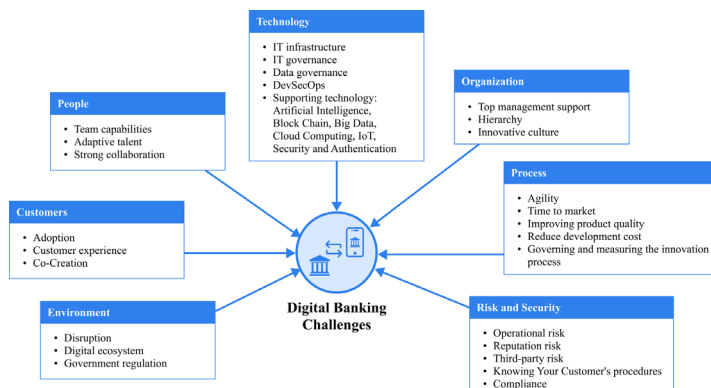
CHALLENGES

The challenges of digital banking were concluded after obtaining the content analysis pattern based on categorization in Table 2. The results show the item clustering and appropriate keywords for further discussion. Classification of seven categories based on various digital banking challenges is illustrated in Figure 6.

1. **Technology:** Digitalization challenges the banks' sector to adopt new technologies to enable significant business advancements such as augmenting customer experience and engagement, streamlining operations, and constructing new business models (Khin & Ho, 2019). From the SLR, the authors conclude the technology supported digital banking, includes: artificial intelligence, big data, cloud computing, IoT, security, and authentication. Other important technologies issues in digital banking, include: IT Infrastructure, IT governance, data governance, and DevSecOps implementation.
2. **Organization:** The transformation into digital technologies is coupled with a wide array of issues on an organizational level. These issues include top management support, hierarchy, innovation culture, and risk management (Pourebrahimi & Kordnaeij, 2018).

3. **People:** In the current technology transformation environment, the banks battle for recruiting competent talent with conventional sector rivals as well as a new wave of competition from technology giants and start-ups (Dang & Nguyen, 2020). As the workforce evolves and new talents become increasingly vital, bank executives have been compelled to reconsider how talent fits into their overall strategy. For developing digital banking, the bank's challenges include team capabilities, adaptive talent, and strong collaboration.
4. **Process:** The challenges in the process of digital banking development include agility, time to market, improving product quality, reducing development cost, governing, and measuring the innovation process. Under the current exponential growth in technology, agility is becoming a severe concern for the banking industry, as it is tough to stay competitive through product and process modifications. As a result, institutions have started to adopt many concepts for creating new digital banking platforms. Currently, the banks start adopting a modern approach for developing digital banking. These concepts include design thinking, agile software development, co-creation, and many more (Indriasari et al., 2021). However, the real challenge for banks in the development and innovation process is adopting potential concepts, which can improve the performance of digital banking platforms.
5. **Environment:** The challenges in the business environment come from the banking sector and other competitors such as start-up and bigtech. Three key constitutive elements become challenges for the banks, which are disruption, digital ecosystem, and government regulation. The development of banking technology raises financial supervision and regulation issues, including how authorities and society prepare for the digital revolution, and how to prevent risk (Suseendran, Chandrasekaran, Akila, & et al, 2020).
6. **Customers:** The traditional banking system provides a personal touch between customers and bank officials through face-to-face interactions, while digital banking relies on the quality of digital banking applications. The challenge faced by banks is to identify the customer's expectations and understand their motivations for adopting (or not adopting) virtual interaction with their bank (Filotto et al., 2021)
7. **Risk and Security:** Given huge potential financial loss caused by vulnerabilities, the banks face the challenge of security risks of digital banking apps (Chen et al., 2020). The banks need to identify risk and security issues such as: operational risk, reputational risk, third party risk, knowing your customer procedure and compliance.

Figure 6. Digital banking challenges



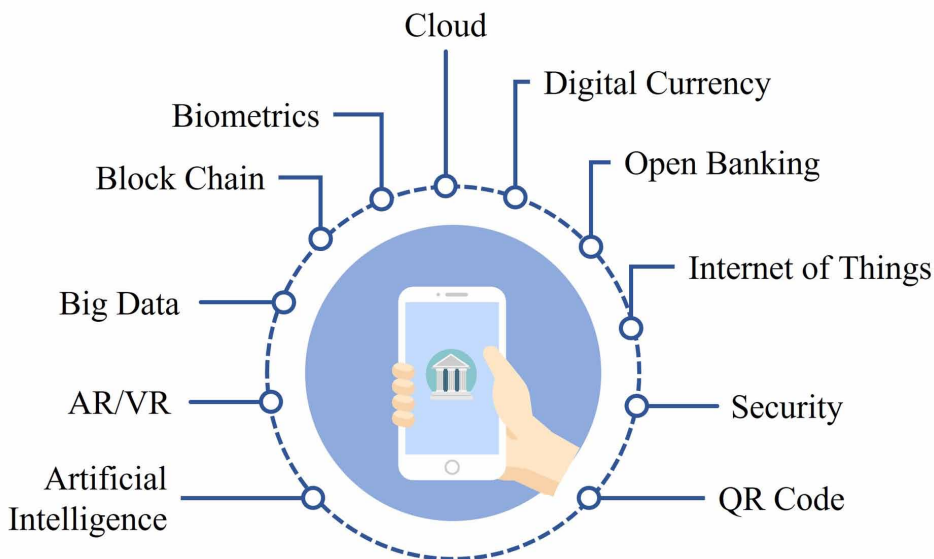
FUTURE RESEARCH AGENDA

After conducting a comprehensive literature review, the authors highlighted a future research agenda for digital banking research.

TECHNOLOGY

Eleven emerging technology trends can be adopted for more sophisticated digital banking (Figure 7), which include: (a) Artificial intelligence, (b) Big Data, (c) Blockchain, (d) Biometrics, (e) Cloud, (f) Digital currency, (g) Open banking, (h) IoT, (i) Authentication, (j) QR code, (k) AR/VR

Figure 7. Digital banking technology trends



Therefore, the essential research topics will be related to the following research questions:

- How can artificial intelligence technology develop more interactive banking channels such as chatbots, Robo-advisory, fraud detection, and intelligent assistance?
- How can Big Data Analytics be utilized for improving customer experience?
- How can banks utilize blockchain technology for performing “Knowing Your Customers”?
- How can banks improve digital banking security using the latest technology for transaction verification such as biometrics (fingerprints, iris face) and blockchain, and data security?
- How can banks overhaul the traditional to modern digital banking architecture and implement the open banking concept?
- How can IoT be implemented and adopted for digital banking platforms?
- How can QR code technology develop to support e-wallets?
- How will the rise of the metaverse affect digital banking?

3 ORGANIZATION

The increasing turbulence in the external business environment has focused on resources and organizational capabilities as the principal source of competitive advantage (Dasgupta & Gupta, 2015). By analyzing the literature, four issues related to the organization were highlighted which are (a) adequate financial resources, (b) strong leadership in each layer of the organization, (c) hierarchy that was enabling cross-collaboration (Sajić et al., 2018), and (d) innovative culture. Therefore, essential research topics will be related to the following research questions:

- What is the impact of digitalization on the changing roles among the banks, customers, and competitors?
- What are organizational structures most effective for digital banking innovation?
- What strategic frameworks can improve banks' innovation process in adopting digital banking technology to gain a competitive advantage in the agile business environment?
- What is the impact of digital innovation on the new competitive strategies and envisioning new IT roles in shaping those strategies?

PROCESS

Bankers are exploring opportunities to adopt the potential concepts and methods for improving the innovation process. By analyzing the literature, three issues related to the innovation process highlighted included (a) collaboration among designers, product owners, and users by adopting agile software development and design thinking (Cesar & Russo, 2018), (b) The prototyping tools and the application of the User-Centered Design methodology to test usability (Minda Gilces & Fuentes Díaz, 2019), and (c) integration of design thinking and co-creation for enhancing the process innovation (Plattner et al., 2012).

Future research is required to answer the research gaps related to the following research questions:

- How do banks adopt modern concepts to generate digital banking innovation?
- How to govern and improve process quality or products with digital banking technology?
- How do banks measure the digital banking innovation processes to produce more high-quality outcomes?

PEOPLE

People become an asset to the organization. By analyzing the literature, four issues related to people were highlighted. To successfully adopt the digital banking innovation technologies, banking institutions must equip their developers and project managers with the following digital knowledge: (a) technical knowledge and expertise such as programming and technological stack, (b) digital mindset (Holotiuk & Beimborn, 2017), (c) agility capabilities to compete in a digital world (Nylén & Holmström, 2015; Vial, 2019), (d) great motivation and commitment (Stankovic et al., 2013). Therefore, the essential research topics will be related to the following research questions:

- Who are the actors in digital banking innovation, and what are the roles of each actor in the process of digital banking innovation?
- How can banks develop specific digital talent capabilities to support digital banking innovation?
- How can digital talent facilitate digital banking innovation?
- How to measure and evaluate digital talent capabilities and performance? And how can banks develop digital talent?

- What is the relative impact of digital talent capabilities on digital banking innovation and its performance?

ENVIRONMENT

By analysing the literature, several issues related to the environment were highlighted, such as: (a) industry structure, (b) competitive pressure, (c) digital ecosystem, (d) FinTech systems, (e) government support, (f) government regulations, and (g) supporting infrastructure. Future research is required for answering the research gaps related to the following research questions:

- How do banks perform business models by adopting new cooperation strategy partnerships with FinTech and e-market marketplace?
- What is the impact of government regulation on digital banking and its digital ecosystem?
- Why is a digital ecosystem important?
- How to develop concept co-creation of value in the digital banking ecosystem?

RISK AND SECURITY

The implementation of digital banking innovation is always associated with multiple risks. By analyzing the literature, various risk factors in digital banking were identified, such as (a) operational risk, (b) reputation risk, (c) third-party risk, (d) Knowing Your Customer's procedures, and (e) compliance.

Future research is required for answering the research gaps related to the following research questions:

- How do banks assess the risk of digital banking?
- What are the efficient procedures for "Knowing Your Customers" (KYC) in digital banking?
- How do banks ensure security?
- How does changing technology affect the security of digital banking?

CUSTOMERS

The most popular topic in the study of digital banking is adoption from the customer's perspective. Several issues were highlighted, such as: (a) adoption based on segmentation (Choudrie et al., 2018; Msweli, 2020; Suhaimi & Hassan, 2019), (b) dimensions of digital banking (Jebarajakirthi & Shankar, 2021); (c) intention to use (Hebie, 2017; Singh & Srivastava, 2020); (d) the impact of mobile banking adoption on customer interaction and satisfaction (De Leon et al., 2020; Hamidi & Safareeyeh, 2019); (e) the determinants of internet banking adoption (Boateng et al., 2016); (f) Consumer use in specific countries such as Saudi Arabia (Baabdullah et al., 2019), Iran (Hamidi & Safareeyeh, 2019), Poland (Szopiński, 2016), Rural Colombia (van Klyton et al., 2021), and Gulf countries (Alkhowaiter, 2020), Development countries (Sharma et al., 2018); (g) factors that affect better digital banking rating (Ali et al., 2019); and (h) Omnichannel Customer Behavior in Retail Banking (Abhishek, 2019). Future research is required for answering the research gaps related to the following research questions:

- How to enable collaboration between customers and banks in digital banking innovation?
- How to involve customers in the ideation phase of digital banking innovation?
- How to collect user requirements and customer pain-point for designing more customer-centric products and services?

PRACTICAL AND MANAGERIAL SIGNIFICANCE

This study highlights the research trends in digital banking, including the identification of open questions and issues for continuing research. The authors also identify practical and managerial significance. The results presented in this review article have several important implications:

- Technology adoption is a prominent topic in digital banking literature, it's not surprising that a substantial proportion of the publications analyzed in this study were about digital banking adoption concerns. The adoption models: UTAUT, UTAUT2, TAM, and Diffusion of Innovation, can be adopted by the bank's institution to improve digital banking adoption.
- Digital banking implementation can be challenging for banks, and the research identifies seven challenges: technology, organization, process, people, environment, customers, risk and security. The banks need to identify the challenges before digital banking initiatives to prevent failure in digital banking innovation.
- Financial technology is an innovative and disruptive technology that will continue to impact banking and e-commerce in the future, owing to the macroeconomic risks caused by pandemics, climate change, and the rise of responsible business ethics. The technology trend investigate in this study can be used as foundation for further Research and Development for competing to FinTech company.
- The banks management should anticipate the digital ecosystem growth, particularly on the concept of open banking and new issues such as the rising virtual ecosystem caused by metaverse and AR/VR technology.

CONCLUSION

Digital Banking is a cutting-edge technology that has continued to evolve in recent years. This study aimed to provide a comprehensive literature review for identifying the challenges and state of the art of digital banking research. Based on the SLR results, 1,137 articles were obtained from six well-known databases: ACM, Emerald insight, IEEE Explore, AIS, Elsevier, and SpringerLink. These articles were selected based on evaluating their titles and abstracts. Subsequently, 67 papers were synthesized, extracted, and analyzed. The findings from this research provide several implications for research and practice. Based on this study, researchers can identify the challenges of digital banking. Also, deduce the state-of-the-art and literature gap in digital banking. The study provided the main limitations of the existing research and identified future fruitful directions for further studies. Findings from the studies can be used as references to other researchers for future research. For the practitioners, the findings can be used to identify the future development of digital banking. It also educates them about the following challenges in digital banking innovation: technology, organization, people, process, environment, customers, risk, and security.

Moreover, this study has discovered the state of the art in technology implementations such as Artificial Intelligence (AI), Blockchain, Big Data, cloud computing, and IoT. From the customer's perspective, digital banking adoption can be investigated using models: UTAUT, UTAUT2, TAM, etc. From the bank's perspective, the adoption of digital banking can be studied using a model such as Diffusion of Innovation (DOI), Servqual, IS success, etc. Further research should be conducted using empirical studies on seven digital banking issues discussed in this study: technology, organization, people, process, environment, risk and security. Future studies on digital banking innovation could apply a mixed-method approach based on various contexts. such as region, country, and different types of banks, traditional banks, hybrids, and branchless banks (neo banks).

CONFLICT OF INTEREST

The authors declare no conflict of interest could have influenced the work reported in this paper.

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