Intelligent Digital Banking Technology and Architecture: A Systematic Literature Review

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Abstract—The digital banking sector has made tremendous progress in user-friendly, efficient, and rapid financial transactions, owing to the exponential growth of ICT technologies. Consequently, many new banking products, services, and business opportunities have emerged. This paper presents a comprehensive analysis of new emerging technologies and architecture that can support the development of intelligent digital banking platforms. This study aims to explore the latest relevant technology to enhance customer experience and minimize human interaction to prevent the spread of COVID-19. The study follows Kitchenham's SLR principles and goes into great depth regarding the process of choosing and analyzing relevant research papers. This research promoted 40 articles that discuss potential emerging technologies, such as artificial intelligence, blockchain, big data, biometrics, and cloud computing. Some key areas of literature were examined, such as technological trends, potential features, and technical solutions. The articles selected were based on specific criteria and used high-quality databases, including IEEE Xplore, Elsevier, SpringerLink, ACM, and AIS. This study considered recent papers published between 2015 and 2021. The study's main contribution is identifying state-of-art digital banking technology trends and proposing digital banking architecture based on the latest technologies. The researcher can use it to reference future research on digital banking, smart banking, and intelligence banking. The findings and recommendations will help foster different approaches to decisions and implications for the bank's management and policymakers in the future development of digital banking.

Keywords—digital banking, artificial intelligence, intelligent banking, smart banking, digital transformation, digital architecture, digital innovation

1 Introduction

The banking industry plays a critical role in the daily life of modern societies worldwide. The emergence of the internet, smartphones, and new technologies such as artificial intelligence, blockchain, cloud computing, and open API have contributed to the growth of digital banking [1]. In a broad sense, digital banking refers to emerging technological trends that enable effective, fast, and user-friendly banking transactions. The digitalization phenomenon has changed across industries and countries the world over.

During the early stages of the COVID-19 pandemic, lockdowns in many countries increased the domestic use of digital banking as a potential solution to conducting banking transactions. Shen et al. investigated the increased financial literacy and digital technology levels in China [2]. In Indonesia, the increase in digital banking transactions also aligns with the increase in new e-commerce customers, which increased by 51% during lockdown (PSBB) periods. The partnership between banks and digital ecosystems, such as the e-marketplace, e-government, and fintech, also contributed to economic recovery and growth during the pandemic in Indonesia. Digital banking thus plays an essential role in the pandemic by minimizing face-to-face contact among bank employees and customers, reducing cash transactions [3], and distributing funds from the government to the people affected by the pandemic.

The banking sector has developed its business from lending and savings to investments, portfolio management, intermediation, and lifestyle. Implement new technologies such as Robo-advisor, biometrics (voice, iris, finger), and blockchain (KYC, smart contract, cryptocurrency). The open API creates a digital ecosystem that boosts the digital sharing economy. Virtual ecosystems, such as metaverse, can be an opportunity for banking businesses. Owing to the trend of intelligent systems, the banking industry has implemented many R&D initiatives to develop new systems that are efficient and convenient for customers [4]. To avoid failure in implementation, practitioners require a complete analysis of emerging technologies to establish an intelligent digital banking platform, whereas scholars require comprehensive mapping for future research. Specifically, this study utilizes *Kitchenham's* systematic literature review (SLR) approach [5]. This SLR-based study attempted to answer the following research questions (RQ):

- RQ1: How do the banks implement the relevant technologies for developing intelligent digital banking features?
- RQ2: How do the banks design the architecture of intelligent digital banking?

2 Methodology

A systematic literature review identified, assessed, and interpreted all relevant research on a specific research question, topic area, or phenomenon of interest [6]. Using Kitchenham's SLR guidelines [5], SLR was used to explore the most recent research articles on digital banking. The steps to review protocols are as follows:

2.1 Step 1: The search process

The first step of the protocol defines search and selection. Five reputable databases were selected as data sources for the search process: ACM, AIS, IEEE Xplore, Elsevier, and SpringerLink. Search terms used were ("digital banking" OR "intelligent banking" or "smart banking"). Papers were selected based on abstract and title, and an automated citation-based search (forward snowballing) was performed. Inclusion and exclusion criteria were used to justify the candidate paper, accepted or rejected. DBS Bank has used digital Banking terminology since launching DigiBank in 2015. Previously, The

bankers used personal computer banking, internet banking, and electronic banking terminology [7]. Based on the history of digibank launching in 2015, the authors specify the inclusion, exclusion, and reasoning variables are described in Table 1.

Table 1. Inclusion and exclusion criteria

Criteria	Justification
Inclusion Criteria	1. English language 2. The article addresses the "digital banking," OR "intelligent banking" or "smart banking". 3. The article addresses the "digital architecture" in banking. 4. Article published in 2015-2021.
Exclusion Criteria	1. Non-scholar articles. 2. Duplicate articles

2.2 Step 2: The selection process

The second step of the protocol was to evaluate the papers by performing duplication, quality assessment, and reading the full version of the publication. The full version of each paper was read to find more implicit and explicit ideas of technology and architecture.

2.3 Step 3: Validate the search process

The third step of the protocol was to validate the search process. Each paper identifies the relationship between the research questions and existing research. Furthermore, the data were synthesized, refined, and extracted to produce figures and tables for publication.

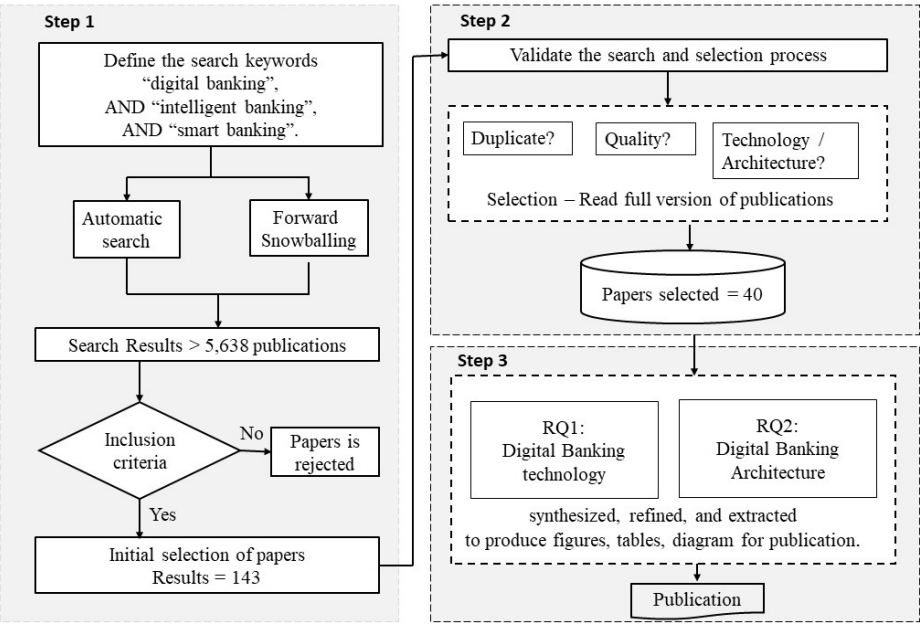

Fig. 1. SLR process [6]

3 Result

The five databases' first search results for an applied search string are significantly high (5,638 first hits). The results of these three steps are listed in Table 2.

Table 2. The selection process for final papers

Source of database	#Step 1	Step #2	Step #3
ACM	218	6	2
AIS	688	8	5
Elsevier	115	30	2
IEEE Explore	267	12	7
SpringerLink	4,350	75	17
Total	5,638	143	40

Figure 2-3 summarizes the publication period and relevant databases used in the search based on these procedures.

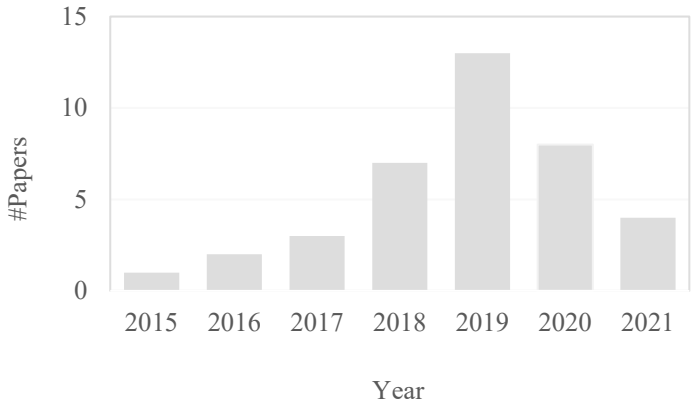

Fig. 2. Selected papers and year of publication

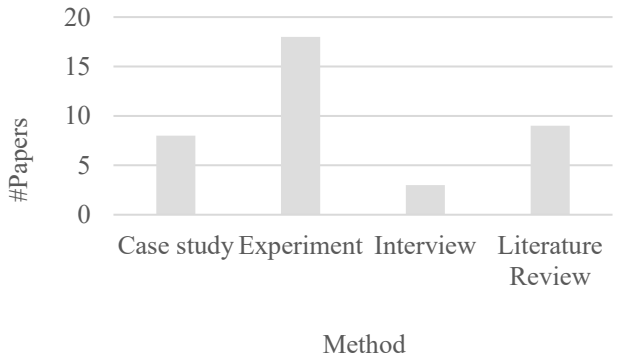

Fig. 3. Research Methodology

The terminology of digital banking become popular in 2015 when DBS Bank launched DigiBank Apps. From 2015 to 2019, the digital banking research trend grew positively and slowed down in 2020 and 2021. Case studies, experiments, and literature reviews are among the research methods employed in digital banking, and experimental research was chosen as the most common method in digital banking research. The comprehensive SLR using the Kitchenham protocol resulted in 40 papers being selected.

3.1 Emerging technologies, potential features, and technical solutions

Intelligent digital banking refers to the interactive digital banking application for providing customer-centric products and services powered by potential technologies such as artificial intelligence, big data, blockchain, cloud, and the internet of things. Electronic banking and home banking used as perfect synonyms for online banking, meaning those banking services that can be used through information technology and internet access. Mobile banking or m-banking can be considered an extension of online

banking since it refers to the access to banking services through mobile phones, smartphones, or electronic tablets, rather than using a laptop or a desktop computer [8]. Intelligent digital banking is as perfect synonyms to smart banking or intelligent banking.The thematic analysis applied to intelligent digital banking was classified based on the following categories: emerging technology, features, and technical solutions, as presented in Table 3.

Table 3. Classification of emerging technologies in digital banking

Emerging Technology	Features and References	Technical Solutions
Artificial Intelligence (AI)	Chatbot [9] [10];	• Chatbot architecture utilizes NLP, NLU, and NLG to build an enterprise chatbot. • Proposes an online assistant for banking by managing the knowledge base using Natural Language Processing (NLP) techniques.
	Robo-Advisor [11] [12] [13]	• Integrate Robo-Advisor into the existing bank model. • The module for customized optimal portfolios is based on investors' preferences.
	Fraud prediction & detection [14] [15];	• The fraud prediction model for predicting applicants fail to pay the loan.
	Automation [16]	• The framework can detect relationships between banking operation records.
	Marketing [17]	• Propose AI-BDA enterprise architecture for leveraging customer experiences.
	Gamification [18]	• Propose the utilization of AI - BDA to gamify financial services.
Big Data Analytics (BDA)	Smart banking [19]; [20]	• Identify opportunities and challenges for full-scale implementation of big data analytics to support smart banking.
	Internet of Things [21]	• Develop Hadoop Distributed File System and MapReduce as an architecture for storing and retrieving information from massive volumes of various IoT data sets.
	Marketing: Customer Churn [22]; Customer Segmentation [23];	• Develop practical application of Big Data methods, including customer churn and segmentation.
Blockchain	Open Banking [24] [25] [26]	• Propose API consensus mechanism ensures that the open API can't maliciously tamper.
	Payment [27];	• Develop NFC-enabled payment gateways on Raspberry-Pis, a mobile wallet application, and mining nodes on off-the-shelf computers.
	Smart contract [28];	• Develop smart contracts to ensure that payments are made automatically at a set time.
	Knowing Your Customer [29];	• Propose the bank's credit information system and regulatory sandbox for developing industry standards.
Digital Currency	Digital currency [30]	• Identify a spectrum of existing blockchain-based use cases for central banks and presented a detailed statistical and thematic analysis of those use-cases and of the overall topic.

Biometrics	Fingerprint, Iris, voice [31] [32][33]; Face biometry [34]	• Utilize a combination of various biometrics methods to increase the level of security. • Investigate biometric authentication for security, including the opportunity to identify liveness functionality.
Cloud computing	Core banking [35]	• Identify the key drivers and barriers for doing core banking in the cloud • Investigating regulation, critical contractual issues that arise between banks and cloud service providers
	Cloud business intelligence [36]	• Identify challenges and opportunities for adopting cloud BI tools in the financial institution
Internet of things (IoT)	Account management on things [37] [38] [39]; Leasing finance automation [37]; Smart collateral; Automated payment [37]; Risk mitigation [37]; Wallet of things [37];	• Propose IoT application in the digital society. • Propose IoT acts as the critical element to interface in the edge and enable banks to scale customer services and provide seamless service.
Open Banking	Open API [40]	• Propose standard Open API to facilitate the development of new, innovative offerings and allow customers to 'shop around' for better-value, more personalized services.
Authentication	Authentication [41] [42] [43]; Cryptographic hashing [44]; OTP SMS [45]; QR Code [46][47] [48]	• Develop authentication techniques for enhancing digital banking security, including cryptographic technology hashing, OTP SMS, NFC, and QR Code.

Source: Survey by Author

3.2 RQ1: How do the banks implement the relevant technologies for developing intelligent digital banking features?

The authors reveal the relevant technologies and features for developing intelligent digital banking based on SLR, as illustrated in Figure 4.

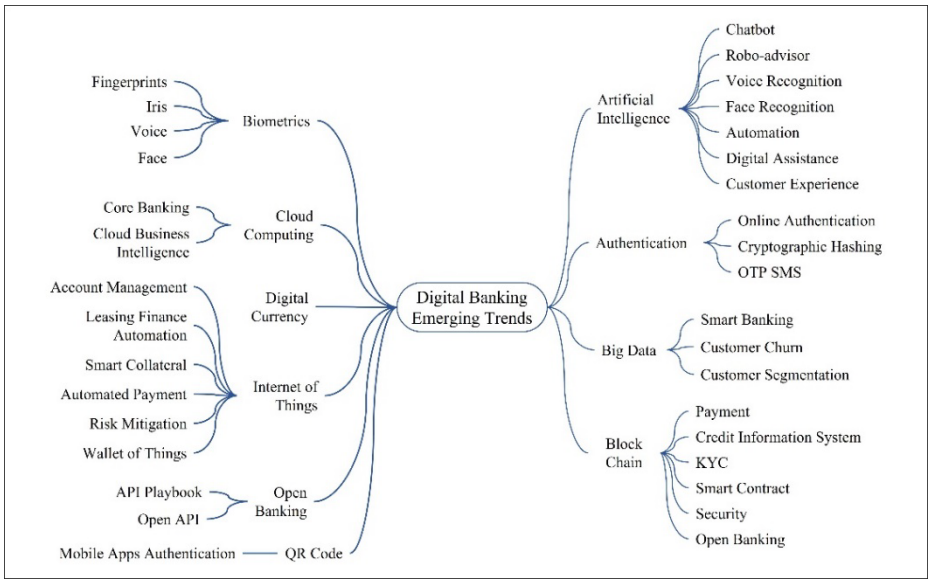

Fig. 4. Mind map of digital banking emerging trends

Artificial intelligence. Artificial intelligence in the banking industry is becoming increasingly significant [20]. Twelve papers were selected under the artificial intelligence theme. AI's appeal in financial services include time and cost savings, data-driven decision-making, and improve risk management. The case studies of AI's in digital banking, include for reducing time and cost saving, the banks implement chatbot that can reduce incoming calls to the CSOs and improve the system's overall efficiency [9] [10] [31][32]. Other innovative idea for improving data-driven for decision-making, the banks develop Robo-advisors [11][12]. A Robo-advisor application guides customers through a self-assessment process and shapes their investment behavior [13]. The modern banking sector employs this application to recommend wealth-management products based on customer preferences. Other breakthrough in AI, by integrating it with big data analytics for developing intelligent automation application, gamification and improve marketing activity in banking [16][17] [18]. For improving risk management, banks develop fraud detection, predict customer retention, and customer churn projections [49] [14] [15].

Big data analytics. Financial services are being transformed by big data analytics (BDA). The large volume of data created by systems [19]. Bank need a 360-degree view in dealing with customers, products, and operations, and all other activity aspects [22].

Globally, every banking system has begun deploying BDA techniques to derive utility across various spheres of functionality. The discussion of BDA themes was highlighted in four articles. The articles describe the use of BDA in digital banking, including (i) customer analytics, (ii) risk analytics, (iii) social analytics, (iv) analysis of customer interaction over multiple channels, (v) sensor data from IoT devices [21], (vi)

regulatory compliance management, (vii) reputation risk management, (viii) financial crime management [19], and (ix) enhancing customer experience [17].

Despite the essential benefits of data analytics/BDA in the financial services industry, many challenges remain. These challenges include lack of data quality, well-trained human resources, participation of business users, top executives' support, and mindset of change management [19].

Blockchain. Blockchain technology has received significant attention in the financial technology field (FinTech). It integrates several advanced technologies, including distributed data storage, point-to-point transmission, consensus mechanisms, and encryption algorithms. Banks are particularly interested in rethinking their compliance processes to reduce costs and risk. One of the most crucial compliance processes is the *Know-Your-Customer* (KYC) process. This process ensures that banks evaluate their clients' risk of doing business and adopt appropriate mitigation strategies. However, KYC processes are mandatory, expensive, and reducing customer satisfaction [29]. The utilize of blockchain applications promote the formation of "multi-center, weakly intermediated" scenarios, enhancing the banking industry's efficiency. However, it is worth noting that the problems of regulation, efficiency, and security have always sparked an extensive debate in each new financial innovation process. However, despite these debates, the evolutionary process of technology continues. Therefore, technical, regulatory, and other problems related to blockchain technology will eventually be resolved. Hence, integrating blockchain technology into digital banking will be substantiated soon [28].

Open banking. Digitization in payment systems, access, and network technologies has created opportunities for new entrants, such as FinTech and challenger banks. These phenomena force all players to reconsider their market positions and rethink their value propositions to their customers. Banking institutions can embrace change through opportunities to interact with larger ecosystems of market participants. Alternatively, banks can maintain their position by focusing their efforts on developing competitive solutions for all customers, products, and segments and restricting access to their systems [50].

The concept of open banking is to provide banking services through collaboration with other institutions, and the institutions also share and manage data together. Banks can transform their core systems for innovation using advanced APIs and integrate them with internal and external partners in a more straightforward, secure, and controlled manner [26]. Digital banking platforms can implement an open banking concept to embrace the digital ecosystem and create more value for customers.

Biometrics. Digital banking systems transform their technologies from traditional authentication systems, such as passwords and hardware tokens, to more agile and convenient methods suitable for mobile devices. Hence, biometric technology is replacing passwords and tokens. Banks have adopted biometric technology for several reasons. First, it helps to improve the user experience by providing a simple process for verification. Second, customers can create their own set of biometric credentials and use a combination of these biometrics to log in, verify their accounts, and authenticate transactions. Third, as consumers become more familiar with digital channels, banks will

increasingly need to utilize digital means of customer identification to authenticate customers while complying remotely with regulatory requirements. In the next future, the use of selfie picture will become a more standardized method than the fingerprints on smartphones. Face recognition is more reliable than fingerprinting biometrics, because it can identify liveness functionality. Furthermore, if face recognition is integrated with other common modalities, such as voice, iris, or fingerprint, this process will further enhance confidence in the transactional process in digital banking [51].

Cloud computing. The phrase 'cloud computing' has recently emerged as a critical technological innovation resulting from advances and integration in virtualization, grid computing, and internet-based services [52]. Cloud services provide deployment models: public, private, hybrid, and community clouds, each of which may involve IaaS, PaaS, and SaaS. Cloud computing allows businesses to focus on their primary business activities, thereby resulting in enhanced productivity. Cloud computing eliminates the traditional boundaries between companies. The capacity to seamlessly deliver IT functions as a cloud-based solution has proven viable and cost-effective, as evidenced by its growing adoption [53]. Owing to the scalability, flexibility, and simplicity that cloud computing provides to businesses, it is quickly gaining traction [54]. In addition, the cloud can drive growth by supporting product development and innovation, increasing agility, and shortening time to market [35]. Despite the barriers to adopting cloud-based technology, there is a lack of comprehensive awareness of its various legacy systems and how to migrate it to cloud technology. Many banks have already begun using cloud services and regulations to support their adoption. Many banks have utilized cloud services such as shadow clouds and business intelligence activities [36].

Digital currency. In 2008, Nakamoto proposed Bitcoin, a digital currency. Bitcoin is an anonymous alternative to central banking. Bitcoin has been widely used since then. For example, in July 2017, it had a market value of more than 5 billion [55]. The advent of digital money in cryptocurrencies has reopened the debate on the role of central reserve banks controlled by various governments. While many countries have started to explore the feasibility of the central bank digital currency (CBDC) system, most of the leading cryptocurrency currencies have been introduced by private initiatives, such as Bitcoin, Ethereum, and Libra. In addition, researchers and policymakers have explored the possibility that central reserved banks may also issue digital currencies. Therefore, introducing a CBDC can represent an essential innovation milestone in the history of the financial and banking sectors. In the future, there will be opportunities to proceed with transactions and payments using digital currency and digital banking platforms. However, before they occur, banks should identify their challenges and possibilities. The regulation aspect will become a barrier to be solved before it can be implemented as a feature of digital banking platforms.

Authentication. This authentication process allows privileged users to perform transactions in banking applications. This study highlights seven articles that discuss authentication technologies:

- Online authentication mechanisms for banking systems [41].
- Customer onboarding authentication [42]

- Develop an authentication algorithm that converts data to binary and then matches the red, green, black, alpha (RGB) color values [43].
- Develop near-field communication (NFC), which enables colorful face images to improve the face recognition rate [44].
- Provide a technique to transform the OTP using lightweight cryptography [45].
- Proposing QR-based authentication using watermarking techniques has been used to hide a key in the QR code cover page [56] and the use case of QR code for retail [48][47].

3.3 RQ2: How do the banks design the architecture of intelligent digital banking?

The authors propose a digital banking architecture based on the SLR results (Figure 5). Figure 5 illustrates digital banking architecture, which consists of six components:

Potential digital banking applications. Digital innovation reshapes consumer relationships with banks. Banks can develop potential features for an intelligent digital banking application, including:

a. Onboarding
b. Saving
c. Loan
d. Wealth management
e. Wallet
f. Payment
g. Robo-Advisory
h. Smart contract
i. P2P Lending
j. Lifestyle
k. Gamification
l. Remittance

Core banking. The core banking platforms provide a reliable and secure environment to process the bank's huge volume of financial transactions and operational support services. Despite the fact that the number and kind of basic banking systems utilized by different institutions varies, the key systems depicted are used to support the most typical financial activities.

Channels. Digitalization in banking services reduces traditional branches and ATMs; however, these digital channels do not replace one another but extend how banks interact with their customers [57]. The adoption of emerging technologies has created opportunities for developing new channels. The comprehensive SLR concludes that digital banking channels include intelligence branches, chatbots, the Internet of Things, mobile devices, face recognition payments, biometric recognition, and augmented reality/virtual reality (AR/VR). The rise of virtual ecosystems such as the metaverse will allow banks to develop new services in new virtual ecosystems by developing AR/VR technology [58].

Service-Oriented Architecture (SOA). Traditional banks' biggest roadblock to digital banking is the presence of antiquated core banking systems. The Service-Oriented Architecture (SOA) is a critical enabler for breaking over this barrier. The maturity level of a bank's SOA has an impact on its capacity to deploy new creative digital banking solutions in a timely manner. [59].

Analytics. Digital banking generates a large volume of digital data (big data) from which predictive and prescriptive analytics can obtain meaningful predictions and insights. Analytical techniques are used in six different ways in digital banking: customer analytics, fraud analytics, risk analytics, operational analytics, security analytics, and

HR analytics [19]. The supporting application for data analytics includes business intelligence, CRM, risk management, and operations.

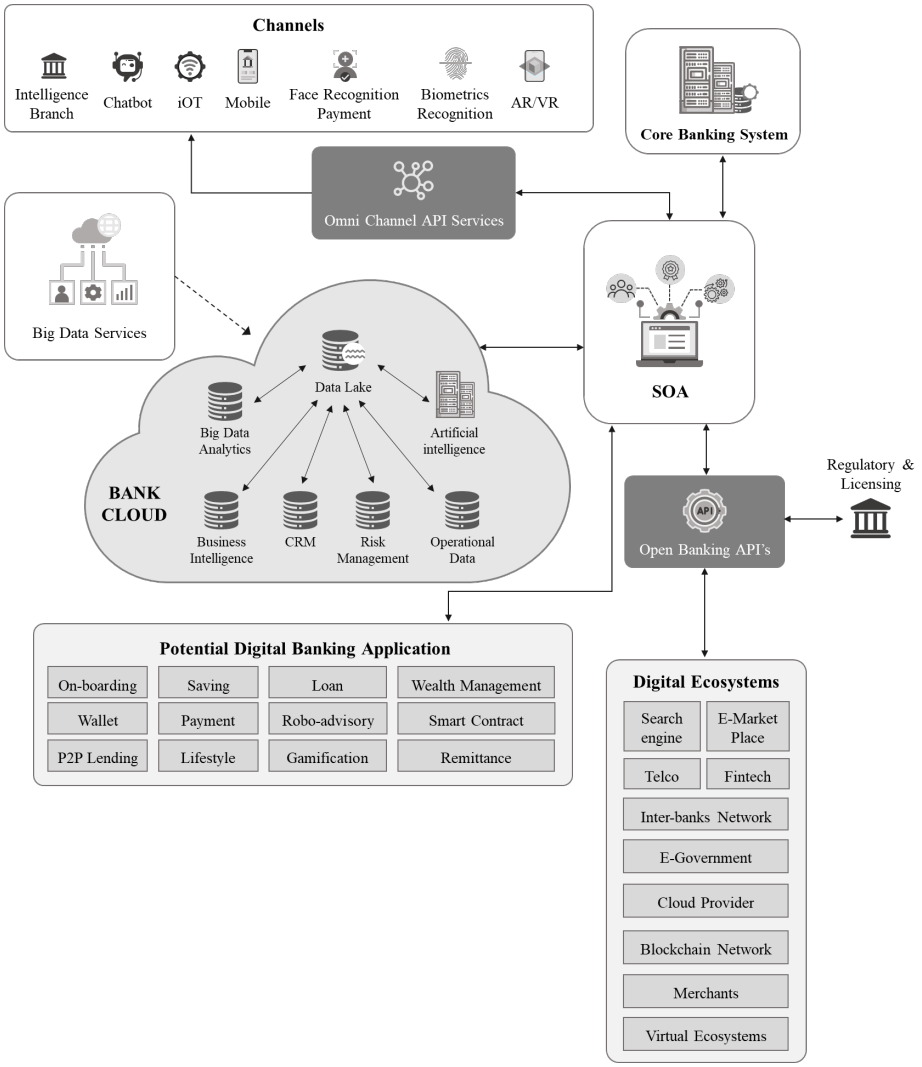

Fig. 5. Digital banking architecture diagram (Source: Author)

Digital ecosystem. The concept of a digital ecosystem is currently supported by application programming interfaces (APIs). This software promotes the open banking concept, which connects applications and datasets integrated securely and simply. The SLR results highlight the digital ecosystem, including search engines, e-marketplaces, telco, fintech, inter-bank networks, e-government, cloud providers, blockchain networks, merchants, and virtual ecosystems. Another issue in the digital ecosystem de-

velopment is the concept of co-creation. The co-creation idea is receiving much attention in the developing ecosystem of digital banking by involving the customers in developing their digital banking journey [60]. Also, the banking needs to maintain the equal opportunity for special needs customers, such as the elderly [61] and deaf customers [62]. And also particular communities such as Islamic banking and finance [63].

4 Discussion

This study aims to explore the latest relevant technology to enhance customer experience and minimize human interaction to prevent the spread of COVID-19 and develop intelligent digital banking. The study follows Kitchenham's SLR principles and goes into great depth regarding the process of choosing and analyzing 40 relevant research papers. The results of SLR include technological trends, potential features, and technical solutions explored in the result section (refer to section 3). The results support findings in the previous studies. Adopting technology, such as mobile/e-banking, chatbot's, robo-advisor, and virtual/augmented reality, can develop many features and solve technical issues. The adoption of technology also can impact customer experience [17] and bank sales performance [7]. The study suggests that digital banking technology can be integrated with conventional banking and others multi-channels for supporting banking business and improving customer experience.

The shifting of the transaction to digital payment minimizes the use of cash, impacting the reduction of ATMs usage and traditional branches. Digital banking technology implemented by the banks affects the interaction between the customers and banks, and at the end, effectively minimizes human interaction and prevents the spread of germs. The authentication technology using biometrics using fingerprint, iris, voice [31] [32][33]; face biometry [34] supported by artificial intelligence technology can be used as technical solutions to be explored and adopted for performing a transaction with minimum contact. These solutions can be used for customer on-boarding, such as taking selfie photos [51], and integrated into the government ID verification system for comparing against Government ID. Other possibilities include using an electronic signature for opening bank accounts and mortgage applications [64].

The authors suggest six recommendations for building intelligent digital banking implementation.

1. Modernize core banking systems and digital infrastructure
   The banks need to modernize their core banking systems and digital infrastructure [65]. Adopt a service-oriented architecture (SOA) to anticipate rapidly changing business requirements and high business process flexibility [66].
2. Develop flexible banking architecture
   The banks need to provide flexible architecture by implementing micro-services, whereby new banking processes can be quickly assembled using reusability [59][65].
3. Change paradigm to data analytics-driven

The banks need to change the paradigm to data and analytics-driven banking operations using BDA and AI for business intelligence, CRM, risk management, and operational data. [19].

4. Adopt cloud-based infrastructure
   The banks need to consider adopting cloud computing to cater to time-to-market and scalability issues [35].
5. Improve cybersecurity and risk management
   The banks should improve their digital banking security given the substantial potential financial loss caused by vulnerabilities [67].
6. Accelerate digital ecosystem and co-creation
   The banks need to develop a digital ecosystem by implementing OpenAPI and benefiting from interaction and value co-creation. In the future, the banks need to identify the challenges and opportunities of the virtual ecosystem, such as metaverse, and prepare for implementation strategy and future development [58].

5 Limitations and future research

The findings presented in this review study have the following limitations and threats to validity. The findings of this systematic literature review cannot be generalized because the results are based on a specific set of keywords and the research repositories that were used for the data collection. Therefore, our results could be limited and cannot be applied to particular banking types and size. We cannot guarantee that the systematic literature review selected all relevant primary studies, and there is possibility that relevant papers were not chosen. To mitigate it, we performed the automatic search, and complemented it by performing the manual search to try to collect all primary studies in this field. The primary studies were classified based on our judgment during the data extraction process. To mitigate this threat, the classification process was performed using peer review. Regardless of this fact, the findings presented in this review will enable readers to obtain a clear picture of intelligence digital banking and architecture. Other researchers have extended this SLR study by improving its methodologies. Future research could apply quantitative and qualitative methods, involving more participants and producing more empirical evidence. Future studies should focus on adopting intelligent digital banking technology in different types of banks, such as digital-only and incumbent banks. Additionally, they should explore successful adaptations and failures in specific situations.

6 Implication

While most previous studies focused on understanding customer adoption of digital banking, this study chose to investigate the technical aspects and architecture. The researchers can use it as a reference for future research. From the bank's management perspective, the technical and architecture will cause cost-related expenditures issues for the banks [68]. The six recommendations from this study can be used as guidelines to avoid failure in the implementation. The study has implications for policymakers.

Regulators should develop the regulation and blueprint for digital banking and its ecosystem to anticipate security and risk while creating a conducive environment to support innovation.

7 Conclusions

This study discusses the current digital trends in the banking industry, where several emerging technologies and technical solutions are being used to develop intelligent digital banking. It also covers recommendations on digital banking architecture based on state-of-the-art technologies. SLR using Kitchenham procedures provided 40 selected papers from five databases, and all articles were reviewed and promoted as references for future research on digital banking. This study will help decision-makers in the banking industry improve their services. Findings on emerging technology, technical solutions, and digital banking architectures will help foster different approaches to decisions and implications for the banks' management.

The literature review highlights the impact of COVID-19 on digitalization in banking and reveals the opportunity to adopt new emerging technologies to solve the problems arising during the pandemic and beyond. Banks need to develop a strategy for the latest issues in digital banking, such as artificial intelligence, blockchain, biometrics, cloud computing, open APIs, and virtual ecosystems, triggered by the rise of the metaverse. This study promotes six recommendations to enhance the bank's capabilities for supporting intelligent digital banking implementation: (1) modernize the core banking system and digital infrastructure, (2) develop flexible banking architecture, (3) change the paradigm to data analytics-driven, (4) adopting cloud-based infrastructure, (5) Improving cybersecurity and risk management, (6) accelerate digital ecosystem.

This study can be used as a reference for future research on digital banking, smart banking, or intelligent banking, particularly in the domain of Information System and Computer Science research. This study's main contribution is identifying state-of-art digital banking technology trends and proposing a digital banking architecture based on the latest technologies. The proposed digital banking architecture and recommendations contribute to theory and future intelligent digital banking implementation.

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