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Exploring Digital-Only Banking in Malaysia: Technological Advancements, Regulatory Landscape, and Business Implications

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Abstract

Digital banking in Malaysia is undergoing rapid transformation, driven by technological advancements, regulatory frameworks, and evolving consumer preferences. This shift is marked by the adoption of critical technologies such as Application Programming Interfaces (APIs), low-code technology, cloud computing and artificial intelligence (AI) which are redefining how financial services are delivered. These innovations enhance operational efficiency, enable seamless integrations, and offer personalized customer experiences, positioning digital banking as a cornerstone of Malaysia's financial ecosystem. Concurrently, regulatory measures introduced by Bank Negara Malaysia (BNM), including digital banking licenses and consumer protection policies, have facilitated a conducive environment for growth while ensuring financial inclusion and stability. Despite these advancements, the transition to digital-only banking is not without challenges. Cybersecurity threats, compliance complexities and technological dependency pose significant risks to both financial institutions and consumers. Addressing these issues requires a robust cybersecurity framework, continuous innovation and collaborative efforts among policymakers, industry players and technology developers. This paper reviews critical technologies shaping the industry, explores the regulatory landscape, evaluates security concerns, and examines the business implications and opportunities. The findings provide insights into the future of digital banking in Malaysia, focusing on innovations, challenges and potential growth areas.

Keywords: digital-only banking, Application Programming Interfaces (APIs), low-code technology, cloud computing, cybersecurity

1. Introduction

Digital-only banks provide financial services solely through remote, internet-based, and mobile platforms, including ATMs and call centers without the need for physical branch locations (Siang & Megargel, 2024). Digital banking has seen transformative global growth, driven by advancements in technologies like AI, blockchain, and mobile banking, which have enhanced customer experience and operational efficiency. Developed markets such as the U.S. and Europe lead in adopting secure and seamless solutions like biometric authentication and AI-powered chatbots (Shaimerdenova et al., 2023). Emerging markets like Africa and India utilize innovations such as mobile money and UPI-based systems to expand financial inclusion (Jejeniwa & Mhlongo 2024). A comparative study emphasizes how regulatory frameworks such as open banking initiatives facilitate collaboration between fintech companies and traditional banks, creating an integrated ecosystem that benefits consumers and enhances market competition (Dhavaleshwar, 2024). Meanwhile, the adoption of blockchain technology by financial institutions in China has improved transparency and security in transactions, setting a benchmark for other countries to follow (Zhou, 2024). However, global studies reveal challenges in digital banking adoption such as regulatory barriers, cybersecurity risks and disparities in digital literacy. Research on German banks highlights how entrenched legacy systems slow digital transformation, a concern mirrored in many traditional financial institutions worldwide (Ulrich-Diener et al., 2023). Moreover, addressing these challenges requires strategic investments in technology, human capital and robust regulatory frameworks to ensure security and build consumer trust (Hasan et al., 2024). As global digital banking ecosystems continue to evolve, the lessons learned from diverse markets underscore the importance of innovation, inclusivity, and resilience in shaping the future of finance.

The rapid growth of digital banking in Malaysia is attributed to increased smartphone adoption, enhanced internet connectivity, and a consumer preference for secure and convenient financial services. These trends have led to the introduction of innovative products and services by financial institutions and fintech companies, significantly impacting the national economy. According to insights from GMO Research (2024), the country is witnessing an accelerated shift towards cashless transactions, spurred by government initiatives like the eTunai Rakyat program and Bank Negara Malaysia's support for digital banking licenses. These developments underscore Malaysia's ambition to establish itself as a digital banking hub in Southeast Asia. Dwivedi et al. (2020) highlight that the rapid advancements in communication, media and information technologies, coupled with the global proliferation of information have significantly transformed business practices, including those within the banking sector. FinTech innovations, including biometric authentication and AI-based credit scoring are reshaping traditional banking models to offer seamless and personalized experiences (Rahmalia et al., 2024). This transformation is facilitated by a robust technological ecosystem with innovations such as Application Programming Interfaces (APIs), low-code technology and artificial intelligence (AI) redefining how financial services are delivered. These technologies streamline integration, automate processes and offer personalized services,

significantly improving efficiency and user experiences (Shaimerdenova et al., 2023). Furthermore, advancements in cloud computing and cybersecurity have become integral to addressing the scalability and security demands of a predominantly online banking ecosystem, ensuring that digital banking is both resilient and adaptive (Rahmalia et al., 2024).

At the forefront of this transformation is the integration of emerging technologies such as biometric authentication and the Internet of Things (IoT). These innovations not only enhance security but also provide consumers with innovative, user-centric touchpoints for banking services, such as wearable devices and seamless financial transactions. Additionally, open banking initiatives further expand the role of digital-only banks, enabling them to act as comprehensive financial hubs through data-sharing frameworks and third-party integrations (Kanapathipillai et al., 2023). Bank Negara Malaysia (BNM) have implemented tailored frameworks to support digital-only banking licenses while addressing compliance challenges in anti-money laundering (AML) and customer verification (Pradipta & Abdullah, 2023). This paper aims to analyze the key technologies driving digital banking in Malaysia, examine the regulatory landscape, evaluate associated security risks and identify business implications and opportunities. The study is based on a review of current literature, industry reports, and case studies, with a focus on the Malaysian context and its global relevance. Through a detailed examination of Malaysia's digital banking landscape, the study highlights key opportunities, such as reaching underserved populations with tailored services and challenges, such as technological dependency and cybersecurity vulnerabilities. The findings aim to inform policymakers, financial institutions and technology developers about the strategies required to sustain growth, mitigate risks, and ensure digital banking's equitable integration into Malaysia's economy.

2. Critical Technologies Powering Digital Banking

Digital banking in Malaysia leverages various advanced technologies that enable innovation and efficiency. These technologies including APIs, low-code technology, cloud computing, data analytics and AI and cybersecurity solutions enable financial institutions to deliver seamless, secure and personalized services to meet the evolving demands of consumers:

2.1 Application Programming Interfaces (APIs)

APIs serve as critical technological enablers in digital banking, facilitating seamless integration between banking systems and third-party services (Abiona et al., 2024). It offers a secure integration method enabling third parties to access users' financial information, such as account balances, customer data, transaction and cash flow (Hefny et al., 2023). APIs allow banks to offer a wide range of services, such as payment processing, loan management, and personalized financial advice without the need for extensive infrastructure development (Adewusi et al., 2024). Omotoye et al. (2024) stated that the use of APIs enhances financial inclusion by lowering entry barriers for emerging financial service providers. Startups and smaller fintech companies can utilize APIs to access existing banking infrastructure and

financial data, eliminating the need to develop proprietary systems. As digital banking evolves, APIs continue to play a pivotal role in supporting the interconnectedness of services and improving customer experiences through greater accessibility and real-time updates (Bakare et al., 2024).

2.2 Low-Code Technology

Low-code platforms facilitate rapid automation and digitization, reducing development time and costs. Low-code technology supports API-driven digital banking, where seamless integration of third-party services enhances the customer experience. Studies show that low-code platforms are highly effective in streamlining banking operations, enabling financial institutions to innovate quickly and deliver user-centric applications (Ajish, 2024). By reducing dependency on traditional software development cycles, banks can achieve faster time-to-market for new services. Further, low-code technology enhances flexibility in digital banking environments, as hybrid models combining low-code and traditional programming can address scalability and customization needs. An empirical study highlights the merits of such integration, showing improved agility and cost-effectiveness in developing retail banking applications (Siang & Megargel, 2024). Moreover, in business process management (BPM), low-code platforms are recognized for automating complex workflows, optimizing operational efficiency, and minimizing human intervention (Sadovnikov et al., 2023). Low-code platforms are also key enablers of financial inclusion. Research highlights their role in creating cost-effective digital solutions, enabling banks to reach underserved populations with tailored services and digital wallets (Domański et al., 2023). Overall, low-code platforms foster innovation and accelerate digital transformation in banking, positioning financial institutions to compete effectively in an evolving technological landscape.

2.3 Cloud Computing

Cloud computing has emerged as a cornerstone of digital banking, offering unparalleled scalability, security, and flexibility to meet evolving consumer demands (Maroju, 2023). By enabling financial institutions to store, manage, and process data on cloud platforms, banks can optimize operations, reduce infrastructure costs, and deliver innovative services to customers. Hybrid cloud solutions, which integrate on-premises systems with public and private cloud environments, allow banks to balance data sensitivity with performance scalability (Rana et al., 2023). Cloud computing ensures business continuity and agility, empowering banks to scale resources on-demand to address fluctuating workloads and customer needs efficiently (Nedaria & Banubakode, 2022). Additionally, advanced cloud technologies integrate with emerging tools like blockchain to enhance security and transparency in financial transactions, ensuring the integrity and trustworthiness of e-banking systems (Rajawat et al., 2024). This technological synergy enables banks to address cybersecurity risks while maintaining compliance with complex regulatory requirements. Overall, cloud solutions are pivotal in transforming digital banking, fostering innovation, operational efficiency, and secure service delivery.

2.4 Data Analytics and Artificial Intelligence (AI)

Data analytics and AI have revolutionized digital banking by enabling the extraction of actionable insights from vast datasets without direct human intervention. AI-driven systems, combined with advanced data analytics, facilitate real-time processing of customer data, uncovering behavior patterns, predicting financial needs, and automating decision-making processes (Badmus et al., 2024). For instance, AI-powered predictive analytics helps banks identify potential credit risks, personalize financial products, and anticipate customer demands, enhancing customer satisfaction and loyalty (Kumar & R, 2024). Additionally, AI algorithms play a significant role in fraud detection by analyzing transaction patterns and immediately flagging anomalies, safeguarding digital banking ecosystems (Devan et al., 2023). Moreover, natural language processing (NLP) allows AI chatbots and virtual assistants to engage with customers seamlessly, offering personalized financial advice and resolving queries efficiently, thereby reducing the dependency on human agents (Madhumita et al., 2024). Through these advancements, AI and data analytics optimize operational efficiency, enhance customer experiences, and provide banks with strategic insights for growth and innovation in a highly competitive digital landscape.

2.5 Cybersecurity Solutions

Cybersecurity has become a critical component of digital banking, particularly as customer interactions occur entirely online, creating potential vulnerabilities to cyber threats (Nuthalapati, 2023). Banks face increasing challenges such as phishing attacks, ransomware, and data breaches that compromise sensitive customer information and erode trust. Robust cybersecurity solutions integrate advanced technologies like AI, blockchain, and encryption protocols to secure digital banking systems. AI-powered tools enhance real-time fraud detection by analyzing user behavior and identifying anomalies indicative of cyberattacks, allowing financial institutions to respond proactively (Farayola, 2024). Blockchain technology further strengthens security by providing immutable and transparent records of transactions, reducing risks of tampering and unauthorized access (Jagadish, 2024). Additionally, multi-layered security frameworks incorporating encryption, secure APIs, and multi-factor authentication (MFA) ensure that customer data remains protected during financial transactions (Oyewole et al., 2024). Continuous risk assessment and cybersecurity training for both employees and customers are also crucial for mitigating threats and fostering a culture of security awareness. Overall, the integration of cutting-edge cybersecurity measures is paramount in safeguarding digital banking operations, protecting customer trust, and ensuring financial stability in an increasingly digital world.

3. Emerging Technologies Shaping the Future

The advent of biometric authentication has revolutionized security in digital banking, offering a robust solution for branchless banking models. Biometric technologies such as fingerprint recognition, facial recognition and iris scans eliminate the need for traditional passwords,

significantly enhancing security and user convenience (Alrawili et al., 2024). These methods rely on unique physiological and behavioral characteristics, reducing the risk of identity theft and fraud. Research highlights the growing adoption of biometric systems in financial institutions with their ability to validate transactions securely and streamline customer experiences (Khan et al., 2023). Additionally, the integration of AI into biometric systems enables predictive fraud detection, creating a proactive layer of security (Sekar et al., 2024). These advancements are critical for branchless banking, where physical infrastructure is minimal, and security is paramount.

IoT is another transformative force in digital banking, facilitating innovative customer touch points and personalized banking experiences (Trotta et al., 2023). IoT-enabled devices, such as wearable technology, allow users to interact with banking systems seamlessly, providing real-time updates and convenient access to financial services. For example, wearable devices can integrate with payment systems, allowing contactless transactions while offering insights into spending patterns through connected apps (Gutierrez, 2024). IoT also enables enhanced security by linking with biometric systems and offering multi-factor authentication, safeguarding transactions from cyber threats (Hrytsenko et al., 2024). Furthermore, IoT contributes to operational efficiency by automating routine banking tasks and providing predictive analytics to anticipate customer needs.

Open banking is reshaping the digital banking landscape by promoting interoperability and financial inclusion. By allowing third-party developers access to banking data through APIs, open banking fosters innovation and creates an ecosystem of integrated financial services (Kanapathipillai et al., 2023). This enables digital-only banks to act as comprehensive financial hubs, aggregating services such as loans, insurance, and investment options on a single platform (Indriasari et al., 2022). Open banking not only enhances customer convenience but also drives competition among financial institutions, leading to better pricing and service quality (Shaimerdenova et al., 2023). Additionally, it contributes to financial inclusion by enabling underserved populations to access tailored financial products via fintech partnerships. This collaborative framework is pivotal in transforming digital banking into a more accessible, secure, and customer-centric ecosystem.

4. Regulatory Landscape and Security in Digital Banking

Malaysia's regulatory framework for digital banking has evolved significantly to support the growth of digital-only banks while ensuring stability and security (BNM, 2020). The issuance of digital banking licenses by BNM underscores a strategic move to promote financial inclusion and innovation. These licenses are tailored with specific requirements, such as a focus on underserved populations and compliance with capital adequacy standards, which are initially less stringent to encourage entry into the market (Pradipta & Abdullah, 2023). BNM also imposes limits on business operations during the initial stages, ensuring digital banks can stabilize their models before expanding services. Additionally, the regulator has implemented policies emphasizing consumer protection, particularly in digital transactions to foster trust and

prevent predatory practices (Saif et al., 2022).

Digital-only banks face unique challenges in complying with anti-money laundering (AML) regulations due to the absence of physical branches. Advanced technologies like artificial intelligence and blockchain are deployed for real-time transaction monitoring and identity verification. AI-driven systems detect suspicious activities by analyzing patterns in large datasets, enabling rapid flagging of anomalies (Michalopoulos et al., 2024). Blockchain provides an immutable ledger for secure and transparent transactions, mitigating risks associated with manual oversight. These technologies help digital banks navigate compliance efficiently while minimizing operational overheads (Jamil et al., 2022). Moreover, regulatory enforcement in Malaysia actively monitors digital financial institutions, ensuring adherence to AML standards through stringent reporting requirements.

Despite these advancements, security remains a critical concern in Malaysia's digital banking sector. To mitigate cybersecurity risks, digital banks have adopted frameworks like the E-Banking Security Architecture Framework (SAF) aligned with global standards such as the NIST Cybersecurity Framework (Tan & Tan, 2024). This framework enables the identification and mitigation of vulnerabilities in real-time. Malaysia's commitment to a balanced regulatory approach positions its digital banking sector as a model for other emerging markets (Rahmalia et al., 2024).

5. Business Implications for Digital-Only Banking

The emergence of digital-only banking offers a competitive edge through low-cost operations and scalability compared to traditional banking models (Ojha & Hasan, 2022). Digital banks significantly reduce overhead costs by eliminating the need for physical branches, allowing them to offer competitive rates and innovative financial products. Maroju (2023) stated that scalability, which supported by cloud computing and automation enables digital banks to adapt to customer demands and expand rapidly into new markets. This adaptability is essential in meeting the needs of tech-savvy consumers who prioritize convenience and seamless access to services. Additionally, digital-only banks are better positioned to integrate cutting-edge technologies, such as AI and blockchain, to deliver personalized services and enhance operational efficiency (Saif et al., 2022).

However, dependency on technology and cybersecurity remains a significant challenge for digital-only banks. Hassan et al. (2024) mentioned that as digital banking ecosystems rely heavily on digital infrastructure, they are vulnerable to technological failures, cyberattacks and data breaches (Hassan et al., 2024). These risks necessitate robust cybersecurity frameworks and continuous monitoring to ensure system integrity and protect customer data. Research highlights that cybersecurity threats, such as identity theft and phishing attacks, deter customers from fully embracing digital banking solutions, emphasizing the importance of secure digital platforms (Cele & Kwenda, 2024). Moreover, digital-only banks must navigate the complexities of regulatory compliance while balancing innovation and risk management to

maintain customer trust and avoid reputational damage (Ahuchogu et al., 2024).

Despite these challenges, digital-only banking presents opportunities to target underserved demographics with tailored financial services. Digital banks can analyze consumer behavior and design products that cater to the unique needs of specific segments, such as low-income groups and rural populations by leveraging data analytics and AI (Adeoye et al., 2024). Open banking further enhances this potential by enabling collaboration with fintech firms to offer comprehensive financial solutions. This approach fosters financial inclusion, ensuring that previously marginalized communities can access essential banking services (Lugun, 2024). Additionally, digital banks' ability to innovate and scale rapidly makes them valuable players in shaping the future of finance by promoting economic growth and addressing systemic inequalities (Zhai, 2024).

6. Case Study: GX Bank's Digital-only Banking Initiatives

GX Bank is one of Malaysia's first fully licensed digital-only banks, exemplifies innovative strategies that cater to a tech-savvy and evolving customer base. By leveraging a branchless banking model, GX Bank has minimized operational costs while maximizing service accessibility. Their seamless customer onboarding process, allowing account setups within minutes is a cornerstone of their competitive edge. This rapid onboarding utilizes advanced identity verification technologies to ensure compliance with regulatory requirements without compromising user experience. Additionally, GX Bank employs AI chatbots (Alni) to provide 24/7 customer support, addressing inquiries and resolving issues efficiently (Chua, 2024). This approach not only enhances customer satisfaction but also reduces dependency on human resources, streamlining operations and cutting costs. GX Bank has unveiled gig-economy platform (Impian GIGih) to drive financial inclusion and literacy to underserved demographics. These partnerships focus on gig workers and Malaysia's B40 segment, GX Bank leverage the power of tech and data to enhance financial wellbeing, education accessibility and promote financial literacy (FMT, 2024).

GX Bank's success highlights the transformative potential of AI and digital tools in banking. Their emphasis on customer-centric design, operational efficiency, and technological innovation positions them as a benchmark for other financial institutions aiming to adopt digital-only models. The bank's focus on inclusivity, supported by its integration of AI-driven tools and customer-centric policies, not only enhances its market position but also contributes to broader financial stability and inclusion goals. As the digital banking landscape evolves, GX Bank's model offers valuable insights into the future of banking.

7. Conclusion

Malaysia's digital banking landscape has been profoundly transformed by the integration of advanced technologies, progressive regulatory frameworks, and evolving consumer preferences. With innovations such as APIs, low-code platforms, cloud computing and AI, digital-only banks have redefined how financial services are delivered. These technologies

streamline operations, enhance customer experiences and foster financial inclusion. The regulatory measures introduced by BNM have provided a solid foundation for the growth of digital banking. Simultaneously, consumer demand for convenience, accessibility, and personalization has accelerated the adoption of digital banking across various segments of society.

The implications of these developments are far-reaching. Policymakers and industry players must balance the need for technological innovation with robust consumer protection measures. As the banking ecosystem becomes increasingly digitized, it is critical to ensure inclusivity by addressing the needs of marginalized populations and promoting secure, accessible financial services. Besides, digital-only banks must navigate challenges such as cybersecurity risks, regulatory compliance, and the complexities of data privacy to maintain customer trust and safeguard operations. Future research should focus on exploring the broader implications of digital banking. Key areas of interest include enhancing financial inclusion through targeted solutions for underserved populations and assessing the economic impacts of digital banking on Malaysia's financial ecosystem. Moreover, studies on consumer behavior and technology adoption can offer valuable insights into optimizing digital banking strategies to meet diverse needs.

Authors contributions

Dr. Poh-Chuin Teo was responsible for study design, writing, reviewing and revising the manuscript.

Competing interests

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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