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Fintech Adoption in Islamic Banks: Comparative Insights from Asean-5 Countries

Penerimaan Fintech dalam Perbankan Islam: Analisis Perbandingan dari Negara-negara ASEAN-5

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ABSTRACT

FinTech is reshaping Islamic banking as banks respond to changing customer expectations while maintaining Shariah compliance. This study aims to identify prominent FinTech-related themes in Islamic banks' annual reports, compare disclosure patterns across Malaysia, Indonesia, Brunei, Thailand and the Philippines, and examine changes between 2020 and 2023. The study applies content analysis using 20 FinTech-related keywords to annual reports from ten Islamic banks, comprising 40 bank-year observations. Descriptive statistics and multivariate analysis of variance (MANOVA) are used to examine country and year differences. "Digital," "Big Data" and "Online Payment" feature prominently, suggesting an emphasis on technologies associated with operational efficiency and financial accessibility. References to "Blockchain" and "Cryptocurrency" are less frequent, potentially reflecting regulatory uncertainty and Shariah-related concerns, although keyword frequencies alone cannot establish these explanations. Malaysian and Indonesian banks show greater reported engagement with artificial intelligence, cloud computing and mobile payments. Bruneian banks also give considerable attention to digital initiatives, while banks in Thailand and the Philippines make fewer references to the selected themes. Discussions of artificial intelligence, big data and robo-advisors increase over the study period, and MANOVA results indicate statistically significant country-level differences in FinTech discourse. The study contributes comparative and longitudinal institutional evidence that complements customer-focused research and provides a descriptive benchmark of reported FinTech priorities across the five selected ASEAN countries. These disclosures reflect reported engagement with FinTech rather than independently verified technology implementation.

Keywords: Fintech, Islamic Bank, AI, ASEAN, Digital

ABSTRAK

Teknologi kewangan (FinTech) sedang mengubah landskap perbankan Islam apabila bank menyesuaikan perkhidmatan mereka dengan perubahan jangkaan pelanggan sambil mengekalkan pematuhan Syariah. Kajian ini bertujuan mengenal pasti tema utama berkaitan FinTech dalam laporan tahunan bank Islam, membandingkan corak pendedahan antara Malaysia, Indonesia, Brunei, Thailand dan Filipina, serta meneliti perubahan sepanjang tahun 2020 hingga 2023. Kajian ini menggunakan analisis kandungan berdasarkan 20 kata kunci berkaitan FinTech dalam laporan tahunan sepuluh bank Islam, melibatkan 40 pemerhatian bank-tahun. Statistik deskriptif dan analisis varians multivariat (MANOVA) digunakan untuk meneliti perbezaan antara negara dan tahun. Istilah "Digital", "Big Data" dan "Online Payment" kerap disebut, menunjukkan penekanan terhadap teknologi yang dikaitkan dengan kecekapan operasi dan peluasan akses kepada perkhidmatan kewangan. Sebaliknya, istilah "Blockchain" dan "Cryptocurrency" kurang disebut, yang mungkin mencerminkan ketidakpastian kawal selia dan pertimbangan pematuhan Syariah, walaupun kekerapan kata kunci sahaja tidak dapat mengesahkan penjelasan tersebut. Bank di Malaysia dan Indonesia menunjukkan penglibatan yang lebih tinggi dalam pelaporan berkaitan kecerdasan buatan, pengkomputeran awan dan pembayaran mudah alih. Bank di Brunei turut memberikan perhatian yang ketara kepada inisiatif digital, manakala bank di Thailand dan Filipina mencatatkan lebih sedikit rujukan kepada tema yang dikaji. Perbincangan tentang kecerdasan buatan, data raya dan penasihat robo meningkat sepanjang tempoh kajian, sementara keputusan MANOVA menunjukkan perbezaan yang signifikan secara statistik antara negara dalam wacana FinTech. Kajian ini menyumbang bukti perbandingan dan longitudinal pada peringkat institusi yang melengkapi

penyelidikan berfokuskan pelanggan serta menyediakan penanda aras deskriptif tentang keutamaan FinTech yang dilaporkan di lima negara ASEAN terpilih. Pendedahan ini mencerminkan penglibatan berkaitan FinTech yang dilaporkan, bukannya pelaksanaan teknologi yang telah disahkan secara bebas.

Kata Kunci: Fintech, Perbankan Islam, AI, ASEAN, Digital

INTRODUCTION

The global FinTech landscape has changed a lot during the last decade. Rapid technological advancement and changing consumer expectations have changed the way people obtain and use financial services. Digital financial services are becoming more popular as they are faster, more convenient and easier to access. The COVID-19 pandemic clearly shifted people towards digital financial services and businesses and consumers into online financial services. FinTech development has been quite uneven. Some countries have seen these innovations much faster than others. FinTech companies are now working with traditional banks in a very strategic way. And now banks are integrating digital technology into products and services and everyday operations.

By 2020, many FinTech companies use artificial intelligence (AI), blockchain, and big data analytics to improve financial services and make them more efficient and accessible (Litimi et al., 2023; Dutta et al., 2023). Consumers are also more comfortable using digital financial services, as the COVID-19 pandemic showed the importance of remote and contactless transactions (Hassan et al., 2022). In many ways the pandemic was a turning point in the digital transformation, and the public can trust digital financial solutions (Fu & Mishra, 2022; Sharma et al., 2024). However, FinTech adoption varies across countries. India's adoption rate stands at approximately 87%, compared with the global average of 64%, highlighting the uneven pace of the transition to digital finance.

Those developments have implications for the Islamic banking industry. Islamic banks are increasingly adopting FinTech technologies to enhance their products, services and operational processes, in line with Shariah principles. The introduction of FinTech to Islamic finance has not only opened many new opportunities but also presents new challenges that cannot be ignored. Thus, understanding that FinTech is transforming Islamic banking has become more important to understand how it is transforming the market, and the scope of the opportunities offered by technology innovation, the challenges of digital transformation as well as the needed strategies of long-term sustainability and competitiveness is becoming more important.

Islamic FinTech looks very promising. Transaction volumes in the Islamic FinTech market are expected to grow from USD 79 billion in 2021 to approximately USD 179 billion by 2026, at an annual rate of approximately 18% (Amalia et al., 2024). This is mainly due to innovations that make financial services more accessible to underserved and economically disadvantaged communities (Judijanto et al., 2024). FinTech solutions will also have the advantage of benefiting micro, small and medium enterprises (MSMEs), who often have difficulty accessing finance. By streamlining the financial process and eliminating operational barriers, FinTech will make Islamic financial institutions able to do more to support these important parts of the economy (Astuti, 2022).

Blockchain and artificial intelligence can help Islamic banks improve efficiency and support Shariah compliance. Smart contracts, for example, can make transactions more transparent and easier to track while automating agreed contractual terms. These features can support Islamic finance principles such as fair risk sharing and reducing uncertainty and ambiguity, provided the contracts are structured in accordance with Shariah requirements (Antova & Tayachi, 2020). In

practice, these technologies can streamline banking processes and improve customer service, with appropriate oversight to ensure that their use meets Shariah and regulatory requirements.

The integration of FinTech into Islamic finance creates opportunities to develop new Shariah-compliant financial products and reach communities that have traditionally had limited access to financial services (Qudah et al., 2023). For Islamic banks, adopting FinTech is becoming a strategic consideration, with implications for operational efficiency, customer service, financial inclusion and profitability. Realising these benefits requires banks to integrate technology in ways that remain consistent with their ethical commitments and Shariah principles.

These potential benefits, however, offer limited insight into which technologies Islamic banks prioritise or how their reported engagement with FinTech varies across countries and over time. Previous studies have examined customer acceptance (Ali et al., 2021; Oladapo et al., 2021) and broader research trends (Qudah et al., 2023), but comparative evidence tracking institutional FinTech disclosures across ASEAN remains limited. Examining these disclosures can help managers and policymakers understand the technological priorities communicated by Islamic banks and how those priorities evolve across the region.

Malaysia, Indonesia, Brunei, Thailand and the Philippines offer contrasting settings for addressing this gap. Malaysia and Indonesia represent larger regional markets, Brunei has a substantial domestic Islamic banking presence, and Thailand has a smaller Islamic banking sector (IFSB, 2023). The Philippines provides a developing market supported by regulatory initiatives (Bangko Sentral ng Pilipinas, 2020). These differences justify comparing banks reported technological priorities across the five countries.

The study analyses 20 FinTech-related keywords in annual reports covering 40 bank-year observations from ten Islamic banks during 2020–2023. Its objectives are to identify prominent FinTech-related themes, compare disclosure patterns across countries, and examine changes over time. The study contributes comparative and longitudinal institutional evidence that complements customer-focused research and provides banks and policymakers with a benchmark of reported technological priorities across five ASEAN countries.

LITERATURE REVIEW

Islamic FinTech in Islamic banking institutions is heavily influenced by the Technology Acceptance Model (TAM), especially considering Shariah matters. The two main factors that influence adoption of technology in the context of TAM are perceived usefulness and ease of use of the technology. It is known that these two factors are strongly related to the intent to use FinTech services in the Islamic environment (Maniam, 2024; Usman et al., 2021; Wijayanti & Yandra, 2021). Perceived usefulness is one of the most reliable predictors of the adoption of FinTech technology within Islamic FinTech domains such as mobile banking and peer-to-peer lending (Maniam, 2024; Wijayanti & Yandra, 2021). It is easier for people to adopt FinTech technologies if they can see the benefits of such technology, as well as are assured that it will be compliant with Shariah rules, and that they can trust that the Islamic financial system will be able to function (Ali et al., 2021). Moreover, it's been shown empirically that concepts like perceived risk, perceived benefit, and trust are important in creating people's intention of adopting FinTech technologies (Ali et al., 2021; Shaikh et al., 2020).

The inclusion of Shariah compliance in the TAM model highlights the specialities of Islamic banking because it is religion that is the key factor in the acceptance of technology for this sector (Ramadhan, 2022; Muryanto, 2022). For countries like Indonesia and Malaysia, the regulatory system must be flexible enough that FinTech applications can be Shariah compliant while enabling technological innovation in the banking industry (Ramadhan, 2022). The implementation of Shariah-compliant FinTech regulations is necessary for the establishment of an enabling environment for customers' acceptance. The issue of subjective norms and social influence is not lost in considering the impact of behavioral intentions on the adoption of FinTech products by Islamic banks (Oladapo et al., 2021; Khan et al., 2023). In the community, customers' decisions about the adoption of innovations often come from the opinions of many people, friends, and families, among others. In this way, Islamic banks must take advantage of this to promote their innovations in the context of diverse socio-religious conditions of Islamic finance (Maniam, 2024; Oladapo et al., 2021). By combining TAM and Shariah extensions, we cover full Islamic fintech applications in Islamic banking. The combination of such aspects as usefulness, ease of use, trust, subjective norms, and adherence to Sharia provides an attractive argument that makes it easy for the user to adopt Islamic fintech technology.

FINTECH ADOPTION IN ASEAN-5 COUNTRIES

In ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore, Thailand), FinTech adoption is growing rapidly, and the many opportunities to increase access to financial services are very large. The ASEAN region has one of the fastest growing FinTech sectors due to the widespread use of mobile internet and strong government support (Wu & Kao, 2022). For the year 2020, investors had put $3.5 billion into Southeast Asian FinTech companies. That suggests that local and international investors are paying more attention to the industry. A major reason for this growth of FinTech in these countries is that many people are still financially excluded at a high level of income for their entire society.

In many cases, millions of households do not have access to basic financial services, so FinTech is a promising solution to resolve this gap by providing financial products and services via mobile apps and digital channels (Morgan, 2022). Because of smartphone use and digital literacy, many people (such as those in the unbanked or underbanked community) have access to financial activities that they could not previously access (Parvez et al., 2023). FinTech platforms will not only assist in saving and investing but are also vital to economic activity, especially for small and medium-sized enterprises (SMEs).

The COVID-19 pandemic has increased the adoption of digital financial services in ASEAN-5 countries, with consumers and businesses increasingly turning to online platforms for transactions, payments, and investments (Tran et al., 2022). This shift underscores how digital transformation is not only key to the survival of the economy during times of disruption but is also a driver of innovation to bring about a new type of financial system, which is needed to address the post-pandemic world. The rise in digital financial inclusion has great implications for the financial system as it relieves liquidity problems and reduces the risk of non-performing loans in the traditional banking system (Banna & Alam, 2021). But gender differences and heterogeneous technology adoption are not the only factors that affect women in the ASEAN region. They face barriers to accessing the digital payment system as they are more likely to face poverty in society (Imam et al., 2022). Older adults seem reluctant to adopt new technology, as it is difficult to use new technologies due to usability and lack of digital skills, so targeted interventions can be

implemented to promote digital literacy and foster inclusion in all aspects of society (Kodama et al., 2024).

FinTech is thus very much an opportunity that can help to increase economic growth and promote financial inclusion in ASEAN-5 countries. But this would take a systematic approach to addressing the challenges of digital literacy, gender inequality, and regulatory frameworks, among other things, the need for the latter. ASEAN economies can benefit from an inclusive digital financial ecosystem to better withstand crises in a more resilient way and to enable the benefits of technological innovation to be shared more equally in the economy of the whole society.

FINTECH ADOPTION IN THE ISLAMIC BANKING SECTOR

The convergence of FinTech and Islamic banking is an important development in the financial sector today and it is the process of bringing in new-generation technologies in a manner that is in line with Shariah. It will not only enhance the efficiency, accessibility and competitiveness of traditional banking service but also open new areas to develop products and the market in the Islamic financial architecture. Technology is not only about efficiency but it is also about morality and the ethics of Islamic jurisprudence: with AI, blockchain, big data analytics and mobile banking, Islamic financial institutions will be able to sell to various customers in a particular category (unserved and unbanked people) and this is the same idea as the traditional banking service. But to meet the demands of Islamic jurisprudence, we need to be closely monitored and follow Sharia policies and Sharia advisory boards. Islamic banks can also face the challenges of changing regulatory environment, cybersecurity risk and digital literacy of their customers. Despite such challenges, the strategic application of FinTech in Islamic banking will help build financial participation, increase economic growth and make Islamic finance an agile and dynamic component of the global financial system.

Islamic FinTech is the latest development in Islamic finance, where digital financial solutions are based on Sharia. Sharia compliant digital banking services and Islamic crowdfunding systems (Kılıç, 2022) indicate the Islamic finance industry's flexible nature in the face of financial demands as well as the need to keep their faith. Digital platforms enable the use of advanced technology (e.g., Artificial Intelligence, Machine Learning) to optimize the process of risk assessment, credit scoring and investment. In a similar vein, Ramadhan (2022) highlights the development of FinTech in Islamic Finance and the integration of the technology into a traditional Islamic finance system and the development of peer-to-peer (P2P) lending and digital payment that are facilitating access to ethical financial services. All of this is indicative of the development of Islamic FinTech in a world of technology where the sector is becoming more digitized, a better way of doing business and a better way to create a good business environment and to become part of the world market.

Also, the integration of FinTech in Islamic banking is increasingly seen as a strategic necessity to maintain competitiveness in an era defined by fast digital transformation. Islamic banks must be innovative in financial engineering and service delivery to survive under digital financial disruption (Aisyah, 2018) as FinTech solutions have disrupted traditional banking models and consumer conditions in countries like Indonesia. In Pakistan, financial technology is essential for operational efficiency and customer service at Islamic financial institutions (Ilyas et al., 2024). The increasingly competitive market pressure pushes Islamic banks to be innovative in their technology and modernize to increase market share and profit (Yudaruddin, 2022).

There is growing evidence that FinTech adoption not only addresses the changing consumer needs but also contributes positively to the operational performance of Islamic banks. As a result, institutions that incorporate FinTech solutions have more customer retention and satisfaction and thus more competitive in a competitive market with non-bank FinTech providers (Ilyas et al., 2024; Zuhroh, 2021). In addition, a positive correlation between the adoption of FinTech and banking profitability has been established amongst the literature showing that the usage of advanced digital infrastructure can increase profitability and offer long-term investment opportunities for Islamic banks (Astuti, 2022; Alghadi, 2024; Iqbal et al., 2022). These findings highlight the strategic importance of digital transformation as a catalyst for operational resilience and sustainable growth in the Islamic banking sector.

On the other hand, there are many studies about the threats of FinTech to the mainstream Islamic banking model. Evidence in Malaysia and Brunei indicates that growth of FinTech would have a serious impact on traditional Islamic banking and suggests that such institutions need to be innovative and more proactive in their response to the growing presence of non-bank FinTech competitors (Thahirah & Kasri, 2023; Panjwani & Shili, 2020). The simultaneous presence of both opportunities and threats requires a strategic approach that Islamic banks must drive digital transformation and continue to adhere to core Islamic finance principles.

Thus, Islamic banking's FinTech adoption is complex and has to do with innovative financial solutions that are guaranteed to improve the service delivery yet also pose strategic risks. The evidence is clear that Islamic financial institutions should leverage their FinTech capabilities to stay competitive and remain relevant in today's digital financial industry. In this world, technological innovation must be accompanied by Shariah-based innovation, as Islamic banking is a secular enterprise.

Cross-country evidence suggests that findings on Islamic FinTech should be interpreted within their national settings. Oladapo et al. (2021), for example, identify differences in the factors influencing customers' willingness to adopt FinTech in Malaysia and Saudi Arabia. Their findings support examining variation across countries, although customer perceptions do not directly establish banks' technological priorities. Within ASEAN, Malaysia and Indonesia represent larger Islamic banking markets, while Brunei combines a smaller market with a substantial domestic Islamic banking presence. Thailand and the Philippines provide contrasting settings where Islamic banking has a more limited market position (IFSB, 2023; Bangko Sentral ng Pilipinas, 2020). Comparing these five countries allows the study to examine whether similarities in reported FinTech priorities extend across different Islamic banking settings. It also reduces the risk of treating evidence from Malaysia and Indonesia as representative of the other sampled markets.

The reviewed studies offer useful insights into FinTech in Islamic banking, but they do not fully address the comparative focus of this study. Ali et al. (2021) examine users' adoption decisions, while Oladapo et al. (2021) compare customer perceptions across countries. Other studies move beyond customer acceptance: Thahirah and Kasri (2023) explore the relationship between peer-to-peer lending and banking performance in Indonesia, and Qudah et al. (2023) trace broader research trends through bibliometric analysis. What remains unclear is how the emphasis on different FinTech themes in Islamic banks' annual reports varies across the five selected ASEAN countries and changes over successive reporting years. This study addresses that gap by applying a consistent keyword framework to annual reports from 2020 to 2023, bringing together institutional disclosures, cross-country comparison and analysis over time. The findings capture banks' reported engagement with FinTech rather than independently verified technology implementation.

METHODOLOGY

This paper examines the FinTech-related content in the annual reports of Islamic banks operating in the ASEAN region. There are only five ASEAN member countries, namely Malaysia, Indonesia, Brunei, Singapore and Thailand, that maintain active Islamic banking operations. We select full-pledge Islamic Bank operates in ASEAN, where only 10 bank had been identified as full-fledge Islamic banks. The chosen of such banks can be base on argument by Ali et al (2019) that full-fledged Islamic bank had slower adoption of Fintech in operations. This study uses a panel data set consisting of 40 bank-year observations, covering ten Islamic banks for four years from 2020 to 2023. This period was chosen due to the recent trends and developments in FinTech in the Islamic banking sector in ASEAN.

This period also reflects the impact of the COVID-19 pandemic that occurred in 2020 where it acted as a catalyst for digital transformation and reshaped service delivery for most industries including the financial sector worldwide. During this period, every economic sector including the banking sector actively increased the use of digital technology to provide services, as well as more efficient communication to stakeholders, thus ensuring business continuity and meeting consumer needs.

Focusing on these four years, the study aims to observe how Islamic banks are responding to the increasing demand for digital financial solutions, the extent to which FinTech has been incorporated into their strategic reporting, and whether their digitalization strategies or adoption of financial technology are in line with broader regional and global trends in digital finance. This period also coincides with various national digital economy initiatives such as MyDigital, and the development of Islamic finance readiness in technological innovation among ASEAN member countries.

The sample only includes Islamic banks in ASEAN, which have publicly accessible annual reports. FinTech content is measured through content analysis by examining keywords associated with financial technology-related terms. 20 key terms are identified based on the development of the technological landscape and related to current banking activities, namely, fintech, AI, digital, technology, smart, cryptocurrency, robo advisor, QR code, big data, face recognition, phone payment, online loan, online payment, network finance, cloud computing, intelligent, supply chain finance, blockchain, mobile internet, and online insurance. The frequency of these keywords will provide an initial picture of the delivery strategies and services of FinTech among Islamic banks in ASEAN.

The annual reports of Islamic banks will be systematically examined based on the method used by Dicuonzo et al. (2024). NVivo software is used to extract and convert information related to the 20 FinTech terms identified from the annual reports from text form to quantitative data. DiCuonzo et al (2024) measure the frequency of words related to the fintech that occur in bank's annual reports by using different processing software. Therefore, we also using similar method by DiCuonzo et al. (2024) where first we download all Islamic Bank annual reports, then we create nodes that represent 20 key-terms as identified previously. Then, coding the data and assigned to each key-terms. Each fintech related terms base on 20 key terms were calculated base on number of occurences in the annual reports.

The FinTech Index that was built also has the potential to be a detailed measure of Islamic banking strategies in coordinating their banking activities or services to keep pace with the rapid pace of technological advancement.

RESULTS AND ANALYSIS

The following Table 1 shows the detailed overall descriptive statistics regarding the frequency and distribution of FinTech keywords that have been identified in the content analysis of the annual reports of Islamic banks in ASEAN countries from 2020 to 2023.

The average frequency of FinTech-related words mentioned in the annual reports of Islamic banks is 'Network Finance' with 114,225 mentions, where the standard deviation is 73.956 reflecting the diversity of the term used in the reports of Islamic banks in ASEAN. Similarly, the keyword 'Supply Chain Finance' with an average frequency of 112,625 mentions. For words such as Digital, Online Payment, Big Data, Online Loan and Online Insurance, the average frequency of these words mentioned in the annual reports is "mean 79.75, 70.85, 67.12, 61.2 and 57.65" mentions respectively. The words Fintech, Cloud Computing, AI, Intelligent, Blockchain and Cryptocurrency were among the lowest mentioned in the annual report, with mean averages of 2.75, 2075, 1.725, 0.55, 0.3 and 0.05 respectively.

This clearly shows that the basis of FinTech used in the Islamic banking sector in ASEAN is widely covering network-based technology and supply chain, as well as online banking. It also illustrates the priority of Islamic banks that prioritize financial technology in delivering services to stakeholders. The least mentioned fintech terms are technology terms specific to artificial intelligence, cryptocurrency, cloud computing, which shows that the Islamic banking landscape in ASEAN is not yet ready for the use of smart technology in delivering their services.

TABLE 1. Descriptive Statistics (all FinTech keyword)

Variable	Obs	Mean	Std. Dev.	Min	Max
Network Finance	40	114.225	73.956	0	319
Supply Chain Finance	40	112.625	80.741	0	392
Digital	40	79.75	65.897	0	324
Online Payment	40	70.85	66.963	0	335
Big Data	40	67.125	50.154	0	169
Online Loan	40	61.2	66.991	0	254
Online Insurance	40	57.65	63.552	0	337
Technology	40	47.775	38.314	0	140
Phone Payment	40	36.95	31.896	0	120
Mobile Internet	40	29.7	22.587	0	74
Face Recognition	40	27.3	18.117	0	59
QR code	40	22.1	18.253	2	78
Smart	40	4.825	5.795	0	21
Robo Advisor	40	4.45	4.07	0	16
Fintech	40	2.75	3.256	0	12
Cloud Computing	40	2.075	3.826	0	20
AI	40	1.725	3.397	0	16
Intelligent	40	0.55	1.085	0	6
Blockchain	40	0.3	0.608	0	3
Cryptocurrency	40	0.05	0.221	0	1

Following Table 2 shows the distribution of ASEAN countries selected as a sample, where only five countries have Islamic banks, namely the Philippines, Brunei, Indonesia, Malaysia and Thailand. Indonesia and Malaysia have the highest number of Islamic banks, namely 16 and 12 banks respectively, which comprise 30-40 percent of the distribution. Meanwhile, ASEAN countries such as the Philippines, Brunei and Thailand each have only 4 Islamic banks operating with 10 percent of the distribution. This distribution also clearly shows that only Muslim-majority countries, namely Indonesia and Malaysia, which are also among the Islamic countries in the

ASEAN region, have the highest number of Islamic banks. This gives the impression that the market and demand for Islamic banking services is widespread in these two countries. Although Brunei is one of the Islamic countries in the ASEAN region, the small number of Islamic banks is also due to geographical factors, the number of population and the size of its small border, which in turn causes a limited Islamic banking sector market in the country.

TABLE 2. Tabulation of the country

COUNTRY	Freq.	Percent	Cum.
Phillipines	4	10.00	10.00
Brunei	4	10.00	20.00
Indonesia	16	40.00	60.00
Malaysia	12	30.00	90.00
Thailand	4	10.00	100.00

Following Table 3 shows the lists of full-fledge Islamic bank that operate in ASEAN countries. Malaysia had 3 banks which is Bank Islam, MBSB and Bank Muamalat, Indonesia had four Islamic banks which is Bank Mega, Bank Panin Dubai Syariah, Bank Syariah Indonesia and BCA Syariah. Meanwhile for The Phillipines, Brunei and Thailand, only had 1 full-pledge Islamic Bank which is AIIB Phillipines, BIBD Brunei and IBT Thailand.

TABLE 3. List of Full fledge Islamic bank in ASEAN

No	Bank Name	Country
1	AIIB Philipines	Phillipines
2	BIBD Brunei	Brunei
3	Bank Islam	Malaysia
4	Bank Muamalat	Malaysia
5	MBSB	Malaysia
6	Bank Mega	Indonesia
7	Bank Panin Dubai Syariah	Indonesia
8	Bank Syariah indonesia	Indonesia
9	BCA Syariah	Indonesia
10	IBT Thailand	Thailand

Table 4 shows the average frequency of use of FinTech-related keywords in the annual reports of Islamic banks in ASEAN countries. It illustrates the approach and level of digital transformation and readiness to use technology in the Islamic banking sector. First, the trend towards the use of financial technology is in line with the findings in Table 2. where overall, terms related to network, online, supply chain is among the FinTech terms that have the highest frequency among, especially in Brunei, Indonesia and Malaysia. The word 'digital' is mentioned on average 116.500 times by Islamic banks in Brunei, 99.563 times by Islamic banks in Indonesia and 90.417 times in Malaysia. Words such as Network Finance are mentioned on average 159.750 times in Brunei, 108.625 times in Indonesia and 159.333 times in Malaysia.

Overall, Islamic banking in Malaysia more prominently featured FinTech terms related to the latest technology in the 3-year period, where the word AI with an average of 4.917 mentions, Cloud Computing with 4.583, Cryptocurrency (0.167), Face Recognition (45.417), QR Code (28.833), Robo Advisor (6.083), and Technology (64.333). This shows that among Asean countries, the Islamic banking sector in Malaysia has begun to adopt technology related to artificial intelligence, as well as smart technology in their financial services.

The banking sector in Indonesia also more prominently featured online services such as Big Data (109.250 mentions), Blockchain (0.375), Mobile internet (47.063), Online insurance

(94.313), online loan, online payment and phone payment with 104.188, 103.688, 50.375 mentions respectively. The result for both Indonesia and Malaysia inline with study by Karyani et al. (2023), and Safira et al (2025), where they found that Islamic bank in both country are performed well when disclosing technology related information.

Brunei, with a smaller market size, is more prominent in digital (116.500), fintech (5.250), intelligent (1.00) and network finance (159.750), which indicates that the Islamic banking sector in Brunei is more focused on technology in their financial services.

In contrast, Thailand and the Philippines only show lower frequencies, of most FinTech-related keywords. For example, Thailand shows some use of FinTech terms such as "Facial Recognition" (2) and "Robo-Advisor" (8), while the Philippines shows relatively low engagement, with few mentions across most categories, such as "Big Data" (4.25) and "Online Lending" (27). This pattern may reflect the smaller, slower growth of the Islamic banking sector among ASEAN countries.

The comparison shows that Islamic Bank in Malaysia, Indonesia and Brunei led the Fintech adoptions in their operations, which alligned with (Susilowati et al., 2022). Overall, in line with the scope of the study focusing on the Islamic banking sector, the use of financial technology in Islamic financial services is more prominent among Islamic banks within Islamic countries themselves such as Indonesia, Malaysia and Brunei. This shows Islamic Bank in those countries have higher market penetration due to majority muslim populations, thus had the advantages to enhance economic growth through financial technology (Alshater et al., 2022; Maniam, 2024; Usman et al., 2021). The lack of use of financial technology in Islamic banking in countries such as the Philippines and Thailand can be said to not reflect the comprehensive use of financial technology in those countries, as it does not involve conventional banks.

TABLE 4. Mean estimation by Asean Country

	Phillipines	**Brunei**	**Indonesia**	**Malaysia**	**Thailand**
			AI		
Mean	0.000	1.250	0.188	4.917	0.500
Std.Err.	(omitted)	0.479	0.136	1.406	0.500
			Big_Data		
Mean	4.250	32.000	**109.250**	61.750	12.750
Std.Err.	0.250	8.727	8.846	11.307	4.270
			Blockchain		
Mean	0.000	0.250	0.375	0.333	0.250
Std.Err.	(omitted)	0.250	0.202	0.142	0.250
			Cloud_Computing		
Mean	0.000	2.000	0.813	4.583	1.750
Std.Err.	(omitted)	0.816	0.319	1.703	1.750
			Cryptocurrency		
Mean	0.000	0.000	0.000	0.167	0.000
Std.Err.	(omitted)	(omitted)	(omitted)	0.112	(omitted)
			Digital		
Mean	1.250	**116.500**	**99.563**	**90.417**	10.250
Std.Err.	0.629	11.694	19.665	11.564	4.366
			Face_Recognition		
Mean	15.250	23.000	24.125	45.417	2.000
Std.Err.	4.679	4.813	4.165	2.404	1.225
			Fintech		
Mean	0.500	5.250	2.500	3.917	0.000
Std.Err.	0.500	1.843	0.769	1.011	(omitted)
			Intelligent		
Mean	0.000	1.000	0.625	0.333	1.000

Std.Err.	(omitted)	0.408	0.386	0.142	0.408
			Mobile_Internet		
Mean	0.500	9.750	47.063	32.000	2.500
Std.Err.	0.500	1.436	4.291	4.423	1.258
			Network_Finance		
Mean	20.000	**159.750**	**108.625**	**159.333**	50.000
Std.Err.	1.958	9.473	17.761	19.048	16.753
			Online_Insurance		
Mean	14.750	32.750	94.313	48.750	5.500
Std.Err.	4.608	3.351	21.498	4.756	1.936
			Online_Loan		
Mean	27.000	29.500	**104.188**	41.333	14.750
Std.Err.	7.083	3.403	22.287	4.618	7.238
			Online_Payment		
Mean	13.000	47.000	**103.688**	76.417	4.500
Std.Err.	2.858	6.351	22.095	6.852	1.848
			Phone_Payment		
Mean	11.750	17.750	50.375	44.667	4.500
Std.Err.	2.720	5.006	10.133	4.585	1.936
			QR_code		
Mean	3.000	11.750	27.438	28.833	10.000
Std.Err.	0.000	2.462	5.717	3.397	2.582
			Robo_Advisor		
Mean	1.500	3.750	3.250	6.083	8.000
Std.Err.	0.289	0.479	0.819	1.384	2.677
			Smart		
Mean	0.000	11.000	4.125	6.917	0.000
Std.Err.	(omitted)	1.780	1.268	1.921	(omitted)
			Supply_Chain_Finance		
Mean	21.750	**156.500**	**92.313**	**176.333**	49.750
Std.Err.	2.394	8.986	15.487	24.686	16.710
			Technology		
Mean	5.250	20.000	57.188	64.333	30.750
Std.Err.	0.250	5.759	11.414	7.842	10.347

Table 5 shows the frequency of FinTech-related terms in the annual reports of Islamic banks in ASEAN by year from 2020 to 2023. Based on the table, several keywords were found to have increased in usage from the period, such as AI (mean 0.80 to 2.80 in 2023), Big Data (mean 62 to 86.0), Blockchain (mean 0.2 to 0.6), Cloud_Computing (mean 1.5 to 3.4); Mobile Internet (19.80 to 36.50); The increase in keywords such as AI and cryptocurrency, Robo Advisor shows that Islamic banks are slowly starting to use AI in their daily operations and transactions in line with the development of AI globally (Shehadeh, 2025). It can also be seen as helping banks in improving their networks and networks through the adaptation of financial technology and artificial intelligence.

There are terms that appear more frequently and earlier, such as Digital which increased by an average of 58.50 in 2020 to 76.90 in 2021 to 93.40 in 2022. While terms such as Fintech increased from 1.90 (2020) to 4.50 (2021); Mobile Internet from 19.80 (2020) to 31.20 (2021); Online Insurance from 48.10 (2020) to 72.30 (2021); Online Loan from 53.50 (2020) to 69.50 (2021); Online Payment 60.60 (2020) to 87.20 (2021); Phone Payment 31.90 (2020) to 44.30 (2021); and QR Code (16.40 in 2020 to 24.40 in 2021). This shows the trend of Islamic banks in ASEAN prioritizing financial technology in improving service quality, as well as online financial transactions, in early 2021 and beyond. This reflects the increased demand for online transactions due to the covid-19 pandemic (AlMomani et al., 2024; Sharma et al., 2024). that occurred between 2019-2021 which limited the movement of users or customers to deal with banks.

Meanwhile, there are terms with high frequency that appeared in early 2020 such as Face Recognition (average 30 in 2020) and Smart (average 0.90 in 2020) which indicate the need for increased security in financial transactions. Smarter facial recognition methods can help banks identify identity verification before transactions are confirmed. The use of such technology also illustrates the need for facial recognition, especially for physical safety factors for customers or staff who physically interact with banks during the pandemic.

In short, these findings indicate that topics related to digital technology and fintech are increasingly discussed in ASEAN Islamic banking every year (Karyani et al., 2023; Shehadeh, 2025), further illustrating the increasing digital transformation of financial services by Islamic banks in ASEAN.

TABLE 5. Mean estimation (Over the year)

	2020	2021	2022	2023
AI				
Mean	0.80	1.60	1.70	2.80
Std.Err.	0.51	0.78	1.19	1.58
Big_Data				
Mean	62.00	59.40	61.10	86.00
Std.Err.	14.42	15.85	13.95	19.57
Blockchain				
Mean	0.20	0.10	0.30	0.60
Std.Err.	0.13	0.10	0.15	0.31
Cloud_Computing				
Mean	1.50	1.70	1.70	3.40
Std.Err.	0.70	0.62	1.27	1.89
Cryptocurrency				
Mean	0.00	0.00	0.20	0.00
Std.Err.	(omitted)	(omitted)	0.13	(omitted)
Digital				
Mean	58.50	76.90	93.40	90.20
Std.Err.	15.31	19.46	30.09	16.71
Face_Recognition				
Mean	30.00	28.20	22.50	28.50
Std.Err.	5.78	5.76	6.03	5.96
Fintech				
Mean	1.90	4.50	2.60	2.00
Std.Err.	0.75	1.35	1.13	0.67
Intelligent				
Mean	0.90	0.30	0.50	0.50
Std.Err.	0.59	0.15	0.27	0.22
Mobile_Internet				
Mean	19.80	31.20	31.30	36.50
Std.Err.	4.33	8.04	7.59	7.97
Network_Finance				
Mean	92.10	115.90	109.80	139.10
Std.Err.	13.88	27.89	20.40	29.28
Online_Insurance				
Mean	48.10	72.30	59.50	50.70
Std.Err.	12.33	30.88	20.68	13.32
Online_Loan				
Mean	53.50	69.50	65.00	56.80
Std.Err.	15.84	25.51	23.29	21.96
Online_Payment				
Mean	60.60	87.20	74.30	61.30
Std.Err.	13.11	30.29	23.61	15.61
Phone_Payment				

Mean	31.90	44.30	37.10	34.50
Std.Err.	6.42	12.79	11.06	10.21
QR_code				
Mean	16.40	24.40	22.80	24.80
Std.Err.	4.03	6.51	6.44	6.26
Robo_Advisor				
Mean	3.00	4.20	5.20	5.40
Std.Err.	0.86	1.60	1.32	1.32
Smart				
Mean	4.00	4.60	5.20	5.50
Std.Err.	1.52	1.81	2.06	2.13
Supply_Chain_Finance				
Mean	88.80	111.30	112.80	137.60
Std.Err.	13.31	27.16	24.18	34.54
Technology				
Mean	37.00	40.00	49.80	64.30
Std.Err.	8.78	11.21	11.56	15.79

Table 6 presents the results of the Multivariate Analysis of Variance (MANOVA) examining the key word variables related to fintech in the context of Islamic banking.

For the overall Model, showing the cumulative effect of all predictors related to the term FinTech shows that the keyword variance is explained in the model with Wilks Lambda (Λ) reported at 0.000. The values of Pillai Trace, Lawley-Hotelling and Roy's Largest Root (4.774, 71.218, and 46.825 respectively) with significant p-values ($p < 0.05$) indicate the strength of the keyword in shaping the financial technology landscape in the Islamic banking sector in ASEAN.

The influence of COUNTRY representing ASEAN member countries also shows strong statistical value where the keyword fintech can explain the model by country. The values of Lambda Wilks (0.0001), Pillai's Trace (3.3051), Lawley-Hotelling Trace (64.3593), and Roy's Largest Root (45.9119) all have significant values ($p < 0.05$). This shows that factors such as policies, economic landscapes, and demographics in each different country influence the use of the term fintech in Islamic banking in ASEAN.

However, the Year factor produces mixed results where Lambda Wilks (0.0321), Pillai's Trace (1.9995), and Lawley-Hotelling Trace (6.8589) fail to meet significant values (p-values of 0.1167, 0.0789, and 0.1808 respectively), Only Roy's Largest Root shows a significant p-value ($p = 0.0387$). This shows the possible impact of the chosen period between 2020-2023, illustrating that there are certain technologies or uses of fintech that are in focus compared to other fintech terms which are also due to the development of a trend such as AI, or due to pandemic factors with increased demand for online transactions. It also illustrates policy changes, or economics in the adaptation of technology by ASEAN countries during that period.

TABLE 6. MANOVA

Source	**Statistic**	**df**	**F(df1,**	**df2)**	**=**	**F**	**Prob>F**	
Model	W 0.0000	7	140.0	97.1		3.30	0.0000	a
	P 4.7745		140.0	133.0		2.04	0.0000	a
	L 71.2181		140.0	79.0		5.74	0.0000	a
	R 46.8256		20.0	19.0		44.48	0.0000	u
Residual		32						
COUNTRY_	W 0.0001	4	80.0	53.7		6.09	0.0000	a
	P 3.3051		80.0	64.0		3.80	0.0000	a
	L 64.3593		80.0	46.0		9.25	0.0000	a
	R 45.9119		20.0	16.0		36.73	0.0000	u
year	W 0.0321	3	60.0	39.6		1.43	0.1167	a
	P 1.9995		60.0	45.0		1.50	0.0789	a

	L 6.8589	60.0	35.0	1.33	0.1808	a
	R 3.3091	20.0	15.0	2.48	0.0387	u
Residual	32					
Total	39					

Number of obs = 40
W = Wilks' lambda ; L = Lawley-Hotelling trace; P = Pillai's trace; R = Roy's largest root
e = exact, a = approximate, u = upper bound on F

FinTech adoption in Islamic banks in 5 ASEAN countries from 2020 to 2023 reveals a dynamic and heterogeneous landscape. Content analysis of the annual report shows that Islamic banks in ASEAN are extensively using digital financial technologies in their operations, as well as their financial services.

Keywords such as “Digital,” “Online Payments,” “Big Data,” “Network Financing,” “Online Insurance,” and “Supply Chain Financing” which have high average frequencies indicate the efforts of Islamic banks in ensuring operational efficiency, as well as expanding the access of their financial services to customers.

This study investigated the adoption of FinTech in Islamic banks within ASEAN-5 countries from 2020 to 2023, utilizing a text-mining approach on annual reports to quantify FinTech-related keyword mentions. The results provide valuable insights into the varying levels and types of FinTech integration across these nations and over time.

In contrast, keywords related to “AI”, “Intelligent”, “Cryptocurrency” and “Blockchain” are among the least mentioned in the annual reports. This clearly indicates that the Islamic banking sector is cautious in using these technologies in their financial services and transactions, to ensure Shariah compliance. This is because the emergence of new technologies, the element of uncertainty requires a specific Shariah governance structure (Ramadhan, 2022).

MANOVA analysis shows that country contexts such as policy, economy, demographic factors, and digital maturity shape the landscape of Fintech adoption in ASEAN countries, especially due to the dominance of Islamic banking in Malaysia and Indonesia. It also illustrates that Islamic banking in ASEAN is also driven by the high use of devices in the region such as smartphones and the perception of confident users regarding the convenience of online transactions (Maniam, 2024; Usman et al., 2021; Wijayanti & Yandra, 2021). However, the analysis shows that these two countries are pioneers in the adaptation of digital technology, but this finding is due to the Islamic banking sector which is the focus of the study. The study findings also do not reflect the actual situation of financial technology adaptation in the Philippines and Thailand, which may be due to the small Islamic banking market, and is dominated by conventional banking. While Brunei is an Islamic country, it is also due to population and demand factors and perhaps a slightly slower adoption of technology.

The annual trend from 2020 to 2023 shows mixed results where there is a particular focus on digital technology used in the Islamic banking sector. For example, the Covid-19 pandemic may have driven the need for online financial services due to the limited mobility of customers during this period (Sharma et al., 2024; Litimi et al., 2023; Dutta et al., 2023). Meanwhile, the rise of artificial intelligence, Big-data, and technology has shown a stable trajectory during this period, which also reflects the adaptation of the use of these technologies by Islamic banking in ASEAN.

Finally, the use of FinTech in Islamic banking in ASEAN is an evolution of the financial market landscape in the region, where the Islamic banking sector is able to compete with the more aggressive conventional banking sector. With the rapid development of technology, the adaptation of AI, cloud computing, it is an opportunity that Islamic banking must seize to improve the quality

of their financial services and networks, as well as ensure that the adaptation of these technologies is in line with the requirements of Sharia compliance.

CONCLUSION AND RECOMMENDATION

This study provides a comprehensive descriptive analysis of FinTech adoption in Islamic banks in five ASEAN countries from 2020 to 2023, namely Malaysia, Indonesia, Brunei, the Philippines, and Thailand. The study uses a content analysis approach to measure FinTech keywords in the annual reports of Islamic banks in these countries. This study contributes to the literature by providing empirical evidence and examining the Islamic banking sector's strategies in digital technology by looking at specific FinTech keywords mentioned in the annual reports. The study also offers on how financial institutions communicate the utilization of technology base on different regulatory, or religious settings. By comparing Islamic Banks in five ASEAN countries, this study also show that how financial technology adaptations being shaped by the context of country regulations and the public preferences.

The country-level effects in the MANOVA analysis indicate that a theoretical model that integrates contextual factors such as economic landscape, demographics, or national policies is necessary to explain the complexity of FinTech adoption in Islamic financial institutions in detail.

For practitioners, these findings underscore the strategic importance of integrating FinTech into Islamic banking services and operations to ensure they remain competitive in the financial market. The frequency of terms such as "Digital," "Online Payments," and "Mobile Internet," clearly indicates that Islamic banks continue to enhance their online services and expand mobile-based services involving financial transactions to meet customer needs. Furthermore, the continued rise in keywords related to AI and Big Data suggests a direction that can be more broadly adopted, thereby improving operational efficiency and investment decision-making.

Given the significant regional diversity revealed by the findings, Islamic banking institutions must adopt strategies tailored to the maturity and demand for their digital services. Islamic banks in key markets such as Malaysia and Indonesia should focus on more sophisticated innovations such as exploring the potential of AI and big data and ensure that they are Sharia-compliant. Conversely, Islamic banks in markets such as Thailand and the Philippines, which have more niche markets than their conventional banking competitors, should prioritize building basic digital infrastructure, developing financial literacy (Banna, 2025), and gradually introducing the concept of Sharia-compliant financial products and services to the local population.

Meanwhile, the widespread skepticism about "Cryptocurrencies" and "Blockchain" across markets clearly indicates that the adoption of these technologies requires specific Sharia-compliant governance and regulation to ensure that the use of technology in Islamic banking is in line with Sharia-compliant requirements.

For regulators, these findings highlight the need to establish clear guidelines and Sharia-compliant governance for new technology applications in the Islamic banking sector through approaches such as establishing a collaborative platform between Islamic banks, technology providers and Sharia advisory councils in the ASEAN region.

Although this study provides many useful inputs, there are some limitations in terms of data sources, scope, and sample size. Because this study only relies on annual reports from 40 Islamic banks over a four-year period, and only 5 ASEAN countries, the data obtained may be more likely to present a narrative or focus on Islamic banking and corporate elements that are not

suitable for generalization as the progress of fintech adoption in ASEAN. It also does not reflect the actual situation in the financial sector landscape in ASEAN countries, or more detailed long-term trends. Furthermore, the focus on only 5 ASEAN countries makes it difficult to align the results of this study with the broader context of financial technology at the global level.

Therefore, future studies are recommended to implement a method of crossing (triangulating) annual report data with other alternative sources such as from media statements, social media, data related to customer satisfaction or interview methods with relevant parties to obtain a clearer picture of the use of financial technology among ASEAN countries. A mixed method study can also be implemented in the future so that the picture of financial technology adaptation is clearer with the support of qualitative and quantitative findings. Finally, future studies are also recommended to implement a comparative method between the two banking sectors, namely Islamic and conventional banking, to ensure that the real situation of digital technology adaptation is not only biased towards Islamic banks.

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