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影響馬來西亞企業客戶在商業銀行採用人工智慧驅動的多通路銀行服務意願的因素

Factors Affecting the Intention of Corporate Customers in Malaysia to Adopt AI-Driven Multichannel Banking Services in Commercial Banks

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Abstract

This study investigates the factors influencing the adoption of banking chatbots by Malaysian firms, their preferred chatbot characteristics, and the banking chatbot functionalities they are willing to adopt. A quantitative approach was employed, using a structured questionnaire to collect data from Malaysian firms that primarily interact with banks through relationship managers. A total of 32 completed questionnaires were received and data were analyzed using descriptive analysis (i.e.; frequency and mean). The findings suggest that concerns about security and data protection outweigh the potential benefits of adopting banking chatbots, emphasizing the critical role of security and risk mitigation in the adoption of financial technologies. To alleviate these concerns, Malaysian firms believe regulators should ensure banks adhere to strong cyber risk governance and management practices, and expect banks to regularly deploy advanced security mechanisms for their chatbots. The study also reveals that Malaysian firms prioritize reliable, timely, clear, and understandable information from chatbots, while personalized recommendations are less valued. They prefer chatbot functionalities that provide information and support routine tasks over those involving sensitive financial transactions. The results contribute to the limited knowledge on chatbot adoption in the organizational context and provide valuable insights for banks seeking to implement chatbot solutions for their business clients. The findings offer guidance for banks to customize their chatbot offerings to meet Malaysian firms' specific needs and concerns.

Keywords: banking chatbot, organization, corporate banking, banking

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List of Abbreviations

AFC	Asian Financial Crisis 1997 - 2000
AI	Artificial Intelligence
Alliance Bank	Alliance Bank Berhad
BNM	Bank Negara Malaysia; The Central Bank of Malaysia
BoFA	Bank of America
CIMB	CIMB Bank Berhad
DBS	DBS Bank Limited
GFC	Global Financial Crisis 2008 - 2010
ML	Machine Learning
MYR	Malaysian ringgit
NLP	Natural Language Processing
NPL	Non-performing Loan
SME	Small and Medium Enterprise

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1. Background

In recent years, banking chatbots have gained attention as AI-driven tools for enhancing customer service in the banking industry. However, research on adoption of banking chatbots has primarily focused on the consumer perspective, with little attention given to the viewpoint of organizations. This study aims to bridge this gap by investigating the factors influencing the adoption of banking chatbots by Malaysian firms, their preferred chatbot characteristics, and the banking chatbot functionalities they are willing to adopt

This chapter begins by providing an overview of the traditional relationship management practices in banks and briefly discusses how and why relationship marketing will be disrupted by the proliferation of technology in banking. The chapter then narrows its focus to the use of banking chatbots, benefits and the current shortcomings of banking chatbots.

1.1 Introduction

Banking is a highly regulated industry that can limit product differentiation and make product offerings seem homogenous across banks. Relationship marketing, a customer-centric approach emphasizing personalized interactions and tailored services, has been a key strategy for banks since the late 1970s to gain a competitive advantage in the highly regulated and increasingly globalized financial industry (Moriarty et al., 1983). McKinsey & Company (2015) has highlighted that corporate banking focuses on relationship managers as the primary sales channel, with minimal emphasis on multichannel support.

With this approach, the banks aim to drive higher customer satisfaction, loyalty and retention to maximize profit. This approach also facilitates the flow of soft information from borrowers to banks, mitigating information asymmetries and assisting in the credit evaluation process, particularly for Small and Medium Enterprise (SME) (Idrissi & Bennis, 2018).

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Customers build relationships with banks to receive personalized services, enjoy competitive financing rates, ensure the availability of credit sources and reduce the risks of investing in products that do not fit their requirements (Tambe & Mehta, 2014) .

Advances in technology and the emergence of Fintech companies are disrupting traditional relationship marketing, with customers seeking readily available, affordable and; customized services through multiple channels (Jakšič & Marinč, 2018). Surveys suggested that firms are interested in engaging with their relationship managers remotely and using a multichannel model for different activities (The Boston Consulting Group, 2015; McKinsey & Company, 2015). While these studies agreed that relationship marketing remains important, the rise of digital channels necessitates banks to reevaluate and adapt by integrating technology with relationship marketing (Jakšič & Marinč, 2018; Fasano & La Rocca, 2023).

Following the recent financial crisis, banks are grappling with heightened regulatory requirements. Keeping up with, understanding, and monitoring to these regulations poses a significant challenge for banks, especially since compliance processes are still largely manually done. According to McKinsey & Company (2015), relationship managers spend less than 30% of their time on client facing activities. To address this, the consultant suggested a multi-channel approach for corporate customers where customers can perform certain tasks online and contact the relationship managers for more complex queries. For the banks, it can reduce the cost to serve per customer and for the customers, it gives flexibility, tailored responses and faster response time. This suggestion highlights the potential benefits of providing alternative channels for corporate customers to interact with their banks, which could include chatbots as one of the possible solutions.

In recent years, one of the most widely discussed and prominent Artificial Intelligence

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(AI) tools for enhancing and scaling customer engagement in the banking industry has been the AI-driven chatbot. A chatbot application is a computer program that utilizes AI techniques such as Natural Language Processing (NLP), image, video processing, and audio analysis to simulate human conversations in their natural format i.e.; text or spoken language (Bala et at.,2017). Depending on the context, chatbot is also termed talkbots, chatterbots, IM bots, interactive agents, conversation agents, artificial conversational entities (Ng et al., 2020), robots, virtual assistants, agents or conversational bots (Dewasiri et al., 2024).

Banking chatbots differ from those in other industries such as hospitality, tourism, healthcare, and education (Qureshi et al., 2024) as they handle more complex, sensitive, and confidential financial transactions, such as money transfers, which require integration with existing banking systems. In contrast, chatbots in other industries often handle simpler tasks such as product inquiries and booking appointments.

In the U.S., about 37% of the population interacted with bank's consumer chatbots in 2022, with all top 10 largest commercial banks using chatbots for customer engagement. The number of the U.S. users utilizing bank chatbots is expected to reach 110 million by 2026 (Consumer Financial Protection Bureau, 2023). However, the adoption of banking chatbots varies significantly across different economies, with countries like the U.S. seeing higher usage compared to others, such as Malaysia.

Banking chatbots specifically designed for business customer are not widely available yet. Bank of America (BoFA)'s CashPro Chat, launched in September 2023, is one of the most well-known examples. BoFA (2023) stated in its website that CashPro Chat allows users to view transactions, retrieve account information and navigate various features of CashPro platform. It routes complex inquiries to live agents when necessary. Since its launch, chat volume has grown

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by 41%, while chats with live agents have reduced by 16%.

In Malaysia, only two out of eight domestic banks, CIMB Bank Berhad (CIMB) and Alliance Bank Berhad (Alliance Bank), have introduced banking chatbots catered for businesses. These chatbots primarily offer operational and basic services such as account inquiries, remittances, set up payment reminders and product suggestions.

One of the primary reasons for the banks to deploy chatbots is to enhance customers' experience. Chatbots and robo-advisors offer customers instant and round-the-clock assistance. The availability of banking chatbots (24/7) is a significant advantage for customers, as it allows them to access information and support at any time, day at night (Lazo & Ebardo, 2023).

People initially had high expectations for AI and chatbots, believing that these technologies are highly intelligent. However, their perception changed significantly after actually interacting with these technologies, realizing that they may not be as advanced or capable as initially thought (Qureshi et al., 2024). In reality, most of the current banking chatbots offer rudimentary services such as information on account details and balances and route complex queries to human bankers.

Security breaches in banking chatbots can severely erode trust, as they face evolving threats like malicious input, user profiling, contextual attacks, and data breaches. Addressing these issues is challenging due to the dynamic nature of threats, the need for unencrypted data during training, domain-specific security requirements and the necessity of a multidisciplinary approach covering trust, privacy, and ethics (Yang et al., 2023).

According Unisys (2018) which surveyed 13 countries, Malaysia ranked third in terms of their concern for security, with an upward trend observed over the past decade. Unisys (2018) found that “Malaysians are very comfortable using digital identities to engage with government

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but not for accessing open banking financial services from multiple providers or authorizing payments from mobile devices, citing data security concerns as the top barrier." (p.2).

The primary objective of a firm, rooted in economic theories, is to achieve and maintain positive operational profit and profit margins for the survival and success of the firm (Dvorský & Slintak, 2019). Banking chatbot, although, currently, reportedly offers rudimentary service that is below the expectation of the users, there are promises that as it evolves, more beneficial to the users.

Corporate customers have much higher trading values, therefore provide greater profit opportunities for banks. They also have more complex banking and risk management risks which until now, have been met through relationship marketing which emphasizes personal interactions. This is especially prevalent in Southeast Asia, where relationship-oriented communication is preferred (Rotchanakitumnuai & Speece, 2003).

1.2 Research Problem

Existing literature on banking chatbots primarily focuses on consumer-level adoption, while the perspective of the firms remains under-researched. This gap limits our understanding of firms' specific needs, preferences and concerns regarding banking chatbot adoption.

This study aims to investigate the factors determining the intention of Malaysia firms to adopt AI-driven banking chatbots.

1.3 Research Aims and Objective

This study aims to investigate the factors that affect the intention of Malaysian firms to adopt AI-driven banking chatbots. The following research questions are proposed for this study:

1) What factors affect the Malaysian firms' intention to adopt AI-driven banking chatbots?
2) What are the characteristics of AI-driven banking chatbots, and what security and data

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protection features do Malaysian firms prioritize and expect from these chatbots?

3) Which banking chatbot functionalities are Malaysian firms prepared to adopt?

1.4 Research Methodology

This study begins with defining the research problems, objectives, and questions. To address the research questions, a comprehensive literature review is conducted.

From the literature review, a survey questionnaire is developed. Purposive sampling is used to select the target respondents, who include owner, major shareholder, chief executive officer, chief operating officer, managing director, general manager, director, chief financial officer, financial controller, accountant, finance manager, treasury manager, and other finance-related management position of firms that primarily interact with banks through relationship managers. The questionnaire is distributed to the researcher's professional network. Responses to the questionnaire are then collected and analyzed using descriptive statistics such as frequency and mean.

1.5 Importance and Significance of the Study

This study contributes to the limited body of knowledge on the adoption of banking chatbot by firms. By investigating the factors that determine the firm’s intention to adopt banking chatbot, this study contributes new and valuable insights into the rare study of organization adoption of new banking technology. The findings from the study can be used to assist in the design and implementation of chatbot solutions tailored for firms, potentially improving the intention to adopt and implementation of this technology in the future.

1.6 Structure of the Thesis

This study comprises seven chapters. Chapter 1 provides a broad overview of the background of the study, research problem, aims, objectives, research methodology and

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significance of the study.

Chapter 2 focuses primarily on identification of factors that affect intention of Malaysian firms to adopt banking chatbot, characteristics and security features of banking chatbots prioritized by the firms and the functionalities of the banking chatbots.

Chapter 3 discusses the research design and research instrument, sampling unit and location, respondents of the survey and data collection method.

Chapter 4 describes the development of the questionnaire and method of data analysis.

Chapter 5 presents the results from the data analysis.

Chapter 6 discusses the key findings of the study.

Lastly, Chapter 7 summarizes the key research findings of the study. It demonstrates the theoretical and practical implications and identifies and explains the limitations of the research. Finally, possible future research directions are identified.

The study concludes with the References and Appendix. The Appendix comprise the survey questionnaire.

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2. Literature Review

This chapter comprises 7 sections. Section 1 gives an overview of the Malaysian banking system post Asian Financial Crisis 1997 – 2000 (AFC). Section 2 delves into banking chatbot where the current functionalities of banking chatbot are identified to answer research question 3. Section 3 lays out the state of digitalization of the banking system in Malaysia. Section 4 reviews the concept of traditional relationship marketing and quality of service expected by corporate customers from their banks. The fifth section discusses the past study of adoption of Internet banking by firms in Malaysia, Indonesia and Thailand. The sixth section discusses the factors that affect Malaysian firms' intention to adopt banking chatbot and a conceptual model will be derived from thereon. The final section examines the characteristics and security features of banking chatbots prioritized by the firms

2.1 Malaysian Banking System

The banking sector is a crucial pillar of a nation's financial system. By promoting stability within the banking sector, countries can facilitate the efficient allocation of resources throughout their economies, thereby fostering economic growth (Cheng & Degryse, 2010; Balcilar et al., 2018). A strong banking system acts as a bulwark for an economy, enabling it to weather shocks from both domestic and external shocks (Athari et al., 2023). Malaysia serves as a prime example of the importance of a resilient banking sector.

Malaysia was severely affected by the AFC. Prior to the crisis, the Malaysian economy was overheated and the banking system was weak – overbanked with poorly capitalized and under-supervised banks. As a result, Malaysia experienced its biggest contraction in GDP growth of -7.4% in 1998. Fast forward to eight years later, Malaysian economy was also affected by the Global Financial Crisis 2008-2010 (GFC) where Malaysia only experienced GDP contraction of -

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1.5% in 2008. The impact from GFC was less significant than AFC; in the aftermath of AFC, Malaysia implemented massive banking sector reforms which was one of the main reasons that shielded Malaysian banking system from the shock of the GFC. Similarly, prior to the outbreak of Covid-19 in 2020, the Malaysian banking system has gone from strength to strength and the country GDP only shrunk to -5.5% in 2020 and it rebounded rapidly to 3.3% in 2021 and 8.8% in 2022 (Ministry of Economy, Department of Statistics Malaysia, n.d.).

The Malaysian banking system comprises commercial banks, investment banks and Islamic banks. Malaysia practices a dual banking system where the conventional banking system operates in parallel basis with the Islamic banking system (Ismail et al., 2013).

There are presently 26 licensed commercial banks in Malaysia of which eight are local commercial banks and the remaining 18 are foreign-owned commercial banks. There are 17 Islamic banks in Malaysia. Five digital bank licenses have been issued since April 2022 ("Five Successful Applicants for the Digital Bank Licences*"*, 2022). To date, three digital banks have been allowed to operate after passing further screening from the regulators.

Bank Negara Malaysia or The Central Bank of Malaysia (BNM) was established in 1959, two years after the nation gained its independence from the British. Its responsibilities, include the issuance of bank notes, formulation of monetary policies, supervision and examination of financial institutions, management of foreign exchange rates and support for payment system (Chung & Mohd, 2018).

Malaysia's economy thrived between 1987 to 1997, with an average annual growth rate approximately of 9.0% (The World Bank, n.d.) primarily due to low labor costs that attracted significant foreign direct investments (Chung & Mohd, 2018). However, the Malaysian banking system was fragmented, overbanked and under-capitalized with unsatisfactory banking

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supervision. Easy credit fueled a speculative property market and the stock market was overheated due to the influx of foreign funds (Randhawa, 2011).

During the AFC, the Malaysian ringgit (MYR) depreciated significantly, almost 50% against the United States Dollar and capital flight caused the Malaysian stock market to plummet. Non-performing loan (NPL) ratio escalated from 6% in 1997 to 20% by the end of 1999 (Nambiar, 2006; Ariff & Abubakar, 1999). The decline in real estate and equity values, coupled with sluggish economic growth, led to substantial erosion of wealth and revenue for Malaysian corporations, rendering some unable to meet their debt obligations (Leruth et al., 2002).

The AFC led BNM to propose the consolidation of Malaysian banking institutions on July 29, 1999. The plan included the establishment of 10 domestic anchor banks with a minimum shareholders fund of MYR2 billion and an asset base of at least MYR25 billion (Bank Negara Malaysia, 2000; Bank Negara Malaysia, 2001). The consolidation, completed in 2004, enhanced the resilience of Malaysia's banking sector, and since then, no bank failures have occurred.

Despite several bank collapsed in the advanced economies during the GFC, the Malaysian banking system remained resilient due to limited exposure to subprime loans and major restructuring of banking groups post AFC. By 2008, Malaysian banks were well-capitalized with a risk-weighted capital ratio of 12.6% and low net NPL of 2.2% (Bank Negara Malaysia, 2010).

Nonetheless, as an export-oriented country, Malaysia experienced drop in domestic demand during GFC. BNM took proactive measures to support liquidity, including reducing Overnight Policy Rate and Statutory Reserve Requirements, launching special funds and establishing Financial Guarantee Institutions to provide credit enhancement for corporate fund raising in the domestic markets (Bank Negara Malaysia, 2009; Bank Negara Malaysia, 2010). In the ten years following the AFC, Malaysian also corporates took steps to reduce their debt levels

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to more sustainable positions. Banks proactively worked with borrowers to restructure their loan facilities. Although Malaysia experienced shock during the GFC, BNM's monetary policy measures cushioned the impact, preventing a more severe downturn (Elekdag et al., 2012). By 2009, Malaysian banks' risk-weighted capital ratio increased to 14.7%, with a lower net NPL of 1.8% (Bank Negara Malaysia, 2010).

Amidst the Covid-19 outbreak in 2020 and temporary movement restrictions, suspension of businesses and borders closure, Malaysia's GDP contracted 5.6%. To ease the financial burden of individuals, SMEs and corporations, BNM announced several measures such as 6 months interest and principal moratorium for repayment of loans, restructuring of existing facilities as well as relaxation of various supervisory prudential measures to enable the banks to channel the excess capital and liquidity reserves to provide financial support and moratorium to borrowers. It also slashed Overnight Policy Rate from 3% to 1.75% in July 2000 to spur spending and protect jobs and income.

Five out of eight domestic anchor banks have also ventured overseas and emerged as key players within the ASEAN region (The Banker, 2023).

2.2 Banking Chatbot

Although AI offers numerous potential advantages for banks, its application in the commercial banking sector has been primarily limited to back-office operations, such as credit scoring. The implementation of AI-powered services that directly interact with clients has been relatively scarce (Königstorfer & Thalmann, 2020; McKinsey & Company, 2015; Deutsche Bank AG, 2019). McKinsey & Company (2015) further observed that the digital transformation in corporate banking has largely focused on back-office processes, while front-office operations have experienced fewer digital innovations, except for cash management.

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In recent years, chatbots have emerged as one of the most widely discussed and prominent AI tools for enhancing and scaling customer engagement in the banking industry. Chatbots are being used in multiple segments within banks, such as customer service and human resource management.

The first chatbot, ELIZA, was introduced in 1966 and 'impersonated' a psychotherapist responding to the user's sentences in question form. ELIZA, fueled by pattern matching and response selection based on templates, was limited in its knowledge and ability to communicate, confined to certain topics only (Adamopoulou & Moussiades, 2020). During that period, chatbots did not take off in a significant way and were not widely applied to daily life due to the absence of high-performance equipment and widespread network infrastructure (Lai et al., 2019). AI was first incorporated into the domain of chatbots in 1998 with the creation of Jabberwacky – a chatterbot created by British programmer Rollo Carpenter, with the aim of simulating natural human chat in an entertaining way (Nicolescu & Tudorache, 2022).

In the front office, chatbots are used as customer-facing customer service representatives (Dewasiri et al., 2024). These chatbots are integrated into various channels such as the bank's website, mobile banking, and social media platforms. They are available 24/7, enabling customers to access banking services at their convenience and potentially reducing the need for human intervention in routine tasks. As a result, chatbots have the potential to alleviate the workload on call centers and allow bank staff to focus on more complex and value-added tasks (De Andrade & Tumelero, 2022). Chatbots can be used to provide information on account balances, bill payments, suggesting ways to save resources, activating cards, collecting feedback,

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facilitating remittances, and providing answers to frequently asked questions (Alt et al., 2021; Dewasiri et al., 2024).

While the specific features and capabilities of banking chatbots can vary depending on the bank and the technology they employ, in general, consumer banking chatbots tend to offer a broader range of functionalities compared to those designed for business customers. For example, BoFA's virtual assistant for its consumer clients, called Erica, which was launched in 2018, has wide range of functionalities. Apart from the ability to view account balances, retrieve past transactions, it can also monitor recurring charges, alert on merchant refunds and duplicate charges, receive bill reminders when payments are scheduled to be made, review weekly updates on monthly spending, notification of important credit score changes through FICO Score insights and personalized insights to explore strategies for the users. As of April 2024, Erica has handled over 800 million queries from more than 42 million customers and offered personalized insights and guidance on more than 1.2 billion occasions (BoFA, 2024). Erica utilized Machine Learning (ML) and deep learning technologies to analyze customers' personal profiles, financial product purchase history, location information, and routine data. This enabled the chatbot to offer accurate and tailored services, including advanced features such as fund product introductions, bank loan applications, interest rate guidance, utility bill payments, and fund management consulting service (Hwang & Kim, 2021).

While chatbots are used in consumer banking, their adoption in business banking has been slower, and the range of functionalities offered by business banking chatbots is not as extensive as those provided by their consumer banking counterparts. Business customers can use BoFA's CashPro Chat to find information about their accounts, retrieve transactions from potentially hundreds of bank accounts, answer FAQs, quickly view transactions and navigate its

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Internet banking platform (Bank of America, 2023). DBS Bank Limited (DBS)' business chatbot called Joy, allowed users to check account balance, retrieve transactions, check the status of issued cheques, perform trade applications and guide users through its business banking Internet platform (DBS Bank, n.d.). There are a handful of chatbots for foreign exchange, such as BNP Paribas FX Trade Bot. This bot, powered by NLP, provides live forex prices (including Spot, Forwards, Swaps, and NDF) as well as the ability to execute trades (BNP Paribas,2022).

In the wealth management segment, chatbots are being used as robo-advisors. The use of robo-advisors reduces management fees and provides 24/7 access to financial services and wider investment options based on systematic and quantitative analyses without ulterior motives (Belanche et al., 2019).

In a study of the use of banking chatbots in Korea, Hwang and Kim (2021) found that sales of new products such as housing loans are more effective through customer service rather than chatbots, but chatbots are more suitable for handling existing products such as interest payments and bill payments.

A recent study by Xu et al., (2020) found that consumers perceive AI chatbots as having a higher problem-solving capability for low complexity tasks, making them more likely to opt for AI chatbot assistance in such situations. On the other hand, when faced with high complexity tasks, consumers tend to regard human customer service as more competent and consumers show a greater inclination to seek help from human agents rather than AI chatbots.

In a study of a Brazilian bank, chatbots were implemented as the first service layer to handle simple requests like credit card inquiries and FAQs. Advanced features were added later, enabling the bank to predict customer intentions, understand demand, and enhance customer

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service. This led to substantial improvements in operational and organizational efficiency (De Andrade & Tumelero, 2022).

Presently, to the best knowledge of the researcher, there is no study on the benefits of banking chatbots deployed at the corporate customer level, although BoFA (2023) has stated in its website that CashPro Chat has seen chat volume grow by 41% compared to the 2023 weekly average since its launch, while chats with live agents reduced by 16%.

Chatbots fall into two broad categories – the retrieval model and the generative model. The retrieval model does not generate original text but is a rule-based model, leveraging a set of pre-established responses and employing a heuristic method to select the most suitable response based on the input and context (Tammewar et al., 2017). Most of the earlier versions of banking chatbots are rule-based (Hwang & Kim, 2021).

In contrast, generative model chatbots leverage machine learning and deep learning and therefore can create new dialogue (Kambur & Yildirim, 2022). They can understand users' intent, generate suitable responses, and provide product suggestions personalized for each customer (Hwang & Kim, 2021). The accuracy of generative model chatbots improves with more user interactions and data. However, this data dependency translates to higher computational costs.

Initially, people had high expectations for AI and chatbots, believing that these technologies were highly intelligent. However, their perception changed significantly after using the chatbot, realizing that they may not be as advanced or capable as initially thought (Qureshi et al., 2024; Riikkinen et al., 2018). In reality, most current banking chatbots offer rudimentary services such as providing information on account details and balances and routing complex queries to human bankers (Riikkinen et al., 2018).

Consumers in the US complained that consumer chatbots lack the ability to understand

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them, generating inaccurate, unreliable, or insufficient information and failing to furnish meaningful customer assistance. Some also complained that some banking chatbots hinder timely human intervention. Consumers feel that they wasted their time and feel stuck and frustrated when dealing with banking chatbots. They are also concerned with the reliability of the system, security risks, and data protection (Consumer Financial Protection Bureau, 2023).

A study in Singapore found that 76% of millennials interviewed were dissatisfied with banking chatbots due to their inability to provide specific and immediate answers to queries about interest rates, savings accounts, and investment funds. The chatbot technology merely matched keywords provided by the customers and offered the most relevant links, failing to deliver precise and targeted information. Although the chatbots were easy to use and responsive, their lack of informative content overshadowed these benefits, leading to a reluctance to continue using or recommending them (Quah & Chua, 2019).

Riikkinen et al., (2018) suggested that insurance chatbots can create value for customers by providing them with relevant information based on AI-driven analysis of existing customer data, such as previous inquiries, transactions, assets, and market data. Through AI, customer data is processed into information and delivered via chatbots to support customers' value-creating activities, giving the insurance company a competitive advantage.

Quah and Chua (2019) anticipated that chatbots will expand into various aspects of banking, including mass wealth management, taking into account individual customers' risk profiles. They are expected to underwrite loans and insurance, conduct data analyses and advanced analytics, and identify and alert customers to fraudulent activities, all through an automated virtual assistant.

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2.3 State of Digitalization of Malaysian Commercial Banks

Historically, the first form of use of electronic innovation in the Malaysia banking system was the introduction of Automated Teller Machine in 1981. Another AI milestone was on 1st June 2000 when BNM gave the first mover advantage to allow domestic banks in Malaysia to provide Internet banking services. Then, only 13 out of 23 local commercial banks offered online banking to their customers (Chong et al., 2015). Customers were able to pay bills, credit cards, transfer funds, use enquiry functions and view transaction history. Foreign commercial banks were only allowed to provide Internet banking in 2002 (Ong et al., 2023).

Despite the numerous benefits of Internet banking for customers, such as convenience due to 24/7 accessibility without the need to physically visit branches and the limitations of banking hours as well as fast and cashless transfer, the usage of Internet banking in Malaysia only started to gain traction around 2015 to 2016. The spike was mainly due to a push from BNM, where from January 2015, BNM imposed a stamp duty of MYR0.15 and a processing fee of MYR0.50 for each cheque issued. In contrast, online fund transfer via Internet banking platforms were free (Ong et al., 2023). Since then, the use of Internet banking has grown tremendously, exceeding 90% in 2018, quadrupling from 2010 (International Monetary Fund. Asia and Pacific Dept, 2020).

According to IMF, the average technology-related spending over overall expenses of the top five Malaysian banks has increased from 4.1% in 2016 to 6.4% in 2018 as compared to a target of 6.5% for ASEAN 5 (i.e., Indonesia, Malaysia, The Philippines, Singapore and Thailand). The increased focus on fintech was also apparent in their annual reports judging from the number of times “digital”, “fintech” and “mobile banking” were mentioned in their annual reports between 2013 to 2018. Since 2017, these banks have launched digital transformation

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programs to cater to shifting consumer preferences and banking services towards electronic platforms. Banks aim to improve operational efficiency through technology such as advanced analytics, chatbots and automation (International Monetary Fund. Asia and Pacific Dept, 2020).

Financial services providers (i.e., banks, insurers and payment operators) in Malaysia are exploring the use of intelligent chatbot to scale up customer support capacity at lower cost (Bank Negara Malaysia, 2022)**.** This report revealed that:

- Apart from chatbot, current use cases of AI/ML by financial services providers in Malaysia are in credit underwriting, trading, anti-money laundering and fraud detection, technology risk management, liquidity planning, customer analytics, Know Your Customer /Digital Onboarding and human resource.
- AI/ML is most commonly be used in customer analytics and engagement as well as for e-Know Your Customer and digital customer onboarding. Some banks are also supplementing their credit underwriting processes with AI/ML techniques.
- Half of the respondents considered AI/ML adoption as a potential game changer for the way they do business and are already looking for opportunities beyond the context of known use cases.
- The top three concerns on the use of AI/ML from the perspective of the financial services providers are model validation, interpretability and explainability and data security and privacy.

In recognizing the prevalent use of technology in the provision of financial services, BNM issued Risk Management in Technology which was effective from January 2020. The purpose of this policy is to provide guidelines and requirements for financial institutions regarding technology risk management, cybersecurity and the regulatory process for technology-

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related applications. It aims to ensure the security, reliability and resilience of technology functions and systems, protect customer and counterparty information and strengthen the technology resilience of financial institutions against operations disruptions and emerging cyber threats. The document also emphasizes the need for risk assessments, controls and continuous monitoring to mitigate cybersecurity risks and ensure the integrity of financial transactions. Additionally, it outlines the necessary frameworks, procedures and oversights for governance, technology risk management and technology operations management in financial institutions Notably, the implementation of chatbot or live chat onto the existing approved platform to facilitate non-complex activity requires notification to the regulator (Bank Negara Malaysia, 2020).

In recent years, major banks in the region, including DBS Bank and CIMB Bank, have ventured into digital-only banking in India (DBS), Indonesia (DBS), and the Philippines (CIMB). However, Malaysian banks have primarily focused their digital efforts on payment solutions rather than lending services. One of the main obstacles has been the absence of approval of a digital identity-verification process approved by BNM**.** At this juncture, BNM is considering to allow the use of e-Know-Your-Customer solution to onboard customer digitally which eventually allows the banks to digitalize the onboarding process, improving convenience, expanding their reach and reduce operation costs of the banks (Rating Agency Malaysia, 2020).

Five digital bank licenses have been issued since April 2022 (Bank Negara Malaysia, 2022). To date, three digital banks have been allowed to operate after passing further screening from the regulators. The emergence of digital banks will spur innovative banking products, but they are not expected to emerge as major competitors to the traditional banks within the next five years. Firstly, BNM imposed regulatory limits on their activities i.e. bank assets of MYR3 billion

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which essentially means that even based on the most favorable assumptions, the aggregate balance sheets of digital banks will be less than 1% of the banking system (Fitch Ratings,2022).

As shown in Table 1, two local banks in Malaysia have launched banking chatbots for businesses in 2021 and 2023 respectively. CIMB Bank Berhad (CIMB) launched its SME virtual assistant called EVA in 2021. Powered NLP, it is touted as an electronic relationship manager to assist customers with queries SME products, suggestions on the most suitable products and queries on financial assistance offered to the customers during the Covid-19 outbreak. Available 24/7, customers can leave queries and their contact details so that the bank can reach them later (CIMB, 2021). The introduction of SME virtual assistant is part of the bank's Forward 23+ strategic plan to become the leading focused ASEAN bank (CIMB, 2022).

Alliance Bank Berhad (Alliance Bank) introduced its banking chatbot named BOB in 2023. The chatbot allows businesses to make account inquiries, checking their balances and transaction history at any time, perform payments, ability to set up reminders for payments or approvals and checking foreign exchange rate (Alliance Bank, 2024).

Table 1

Local Banks in Malaysia With Business Banking Chatbot

Bank	Name of Chatbot	Start Date	Function	Source
CIMB	EVA	2021	Queries on financial assistance during Covid-19 outbreak, Answer on queries on all SME products, Eligibility Check features.	(CIMB,2021)
Alliance Bank	BOB	2023	Accounts enquiry, Perform payment, Set up reminder for payment or approval for a transaction on a fixed date or specific duration, Quick payment for recurring payments, Check foreign exchange rate.	(Alliance Bank, 2024).

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2.4 Relationship Marketing

Corporates are commonly seen as expert customers with professional skills and capabilities in specific field such as finance, leading them to adopt a more professional approach to selecting financial services (Tyler & Stanley, 1999; Watson, 1986). Corporate treasurers are also increasingly demanding of their banks (Turnbull & Gibbs, 1987).

To improve marketing performance and to provide tailor-made banking services and products to customers, banks typically segment the corporate customers according to type of industry, size of organization (measured in terms of turnover) and geographical location (Turnbull & Gibbs, 1987).

The size of the company plays a significant role in shaping the nature of the relationship marketing (Turnbull & Gibbs, 1987). Typically, larger firms possess greater financial strength, can tap into various funding options and are adept at utilizing its internal financial resources (Moriarty et al., 1983). According to Holland (1992), larger companies adopt more transaction-based multi-bank strategies to reduce cost and avoid overdependence on a single bank (Tyler & Stanley, 1999). Conversely, the importance of the bank's relationship with the firm typically grows as the size of the firm increases as larger company tend to use more banking products (T. Moriarty et al., 1983) with potential for high volume sales and drawdown and opportunities for cross-selling of bank products (Watson, 1986). In contrast, smaller companies have greater needs for banking relationships but often experienced lower level of satisfaction as compared to larger companies which may be attributed to the inherent power imbalance and information gap between the banks and smaller companies (Turnbull & Gibbs, 1989).

Nonetheless, in a study investigating the factors that determine bank selections among corporate customers in South Africa, the findings suggest that regardless of the size of the

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corporates, the quality of services provided by the bank is the most crucial factor influencing the choice of banks among corporate customers in South Africa (Turnbull & Gibbs, 1989).

The banking services of corporates can be broadly categorized into three main groups; namely, routine services that occur daily, trading services (such as foreign exchange, derivatives and hedging) and strategic services which involve irregular long-term projects (Tyler & Stanley, 1999). Additionally, Tyler and Stanley (1999) observed that banks enter relationship with borrowers but not with depositors. Typical banking services and products offered to corporate customers are deposits, current accounts, overdrafts, money market instruments, off-shore finance, foreign exchange, medium/long term loans, leasing, factoring and internet banking (Turnbull & Gibbs, 1989).

Corporate customers demand five key elements of operational quality from their relationship managers and banks. These five key elements are reliability, assurance, empathy, responsiveness and proactivity. Reliability refers to the ability of the banks and relationship managers to consistently deliver accurate and dependable services. This includes minimal errors, efficient problem-solving and consistent services across all touchpoints. Assurance involves instilling confidence in the corporate customers by demonstrating knowledge and being well-informed of the banks' products, services and as well as the customers' business needs. Empathy encompasses two key aspects i.e., understanding customers' needs and building trust. Corporate customers expect banks to have deep understanding of not only the bank's products and services but also the customers' business and banking needs such as account history, company policies and routines. Trust is seen as a foundation of a genuine partnership between the corporate customers and banks. Corporate customers seek relationships where they can completely open with banks, discuss problems and options and alternative strategies. Responsiveness refers to the

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banks' ability to quickly address inquiries and requests from the corporate customers. Proactivity refers to the corporate customers expectation of the banks to actively seek ways to improve their services and advise corporate customers on how to optimize their financial systems, structure and procedures (Tyler & Stanley, 1999).

In a study conducted on the corporate customers in Cyprus, the findings suggest that bank-client relationship hinges significantly on the quality of service which involves intangible aspects such as promptness resolution of issues and accurate dissemination of information. This quality is highly tied to personal factor i.e., the expertise of the relationship managers or branch managers to understand corporate customers' business needs. To foster relationship marketing, banks must continuously monitor and invest in adaptations to meet evolving needs of the corporate customers including reassessing products offerings and adopting a proactive approach rather than reactive approach (Turnbull & Demades, 1995).

2.5 Studies on Adoption of Internet Banking by Firms in Southeast Asia

Rogers (1995) proposed several approaches to research design to forecast rate of adoption; of which one of them is to extrapolate the rate of adoption of new technology from previous similar technology. The adoption of chatbot technology is anticipated to follow a diffusion trajectory like that observed with the acceptance of Internet banking in the early 2000s (Quah & Chua, 2019).

As shown in Table 2, the researcher reviewed the existing studies on organizational adoption of Internet banking in Southeast Asia. In the study of adoption of Internet banking by firms in Malaysia, it was revealed that four factors (i.e., awareness of the service and benefits, safety and security transactions over the Internet, cost of using Internet banking and the access to computer or Internet) significantly important to the adoption of Internet banking in Malaysia.

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Meanwhile, two factors (i.e., ease of use and reluctance to change) were insignificant (Alam et al., 2009).

In the study of adoption of Internet banking by firms in Indonesia, five factors were found to have significant impact on the adoption of Internet banking by firms in Indonesia. These were perceived cost, security, top management support, service provider support and government support. Whereas relative advantage, complexity, company size, company scope, education and training and influence of business partner did not affect internet banking acceptance by firms in Indonesia (Wirani et al., 2020)

In the study to identify how corporate customers perceive the barriers to Internet banking usage in Thailand, security of the system, reliability of the transaction and trust of the bank were most critical issues inhibiting the use of Internet banking by firms in Thailand (Rotchanakitumnuai & Speece, 2003).

Table 2

Studies on the Adoption of Internet Banking by Firms in Southeast Asia

Authors	Purpose of the study	Theories / Independent Variables	Research Method / Sample	Data Analysis
(Alam et al., 2009)	To investigate Malaysia corporate customers' Internet banking adoption intention.	Awareness of the service and benefits, ease of use, Safety and security transactions over the Internet, cost of using Internet banking, reluctance to change from current traditional banking, the access to computer or Internet	Quantitative, random sampling with survey questionnaire sent out to businesses from the telephone and business directory; n=223	Regression
(Wirani et al., 2020)	Acceptance of Internet banking in Indonesia from	Relative Advantage, Perceived Cost, Complexity, Security, Company Size, Company Scope, Top Management Support,	Quantitative; survey questionnaire sent via email to users of corporate	Structural Equation Modelling

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Authors	Purpose of the study	Theories / Independent Variables	Research Method / Sample	Data Analysis
	corporate customers' perspective	Education and Training, The Influence of Business Partner, Service Provide Support, Government Support	Internet banking of banks in Indonesia; n=334;	
(Rotchanakitumnuai & Speece, 2003)	To identify how corporate customers perceive barriers to the usage of Internet banking provided by Thai banks.	Trust of the system – Security of the system, Reliability of the transaction, Trust of the bank; Legal support – Fair liability, Court capability to solve online cases efficiently, Privacy protection; Organization barrier – Management attitude, Lack resources, Lack knowledge	Qualitative; Judgement sampling method; face-to-face interview of users of corporate internet banking; n=15 firms	Qualitative content analysis

2.6 Conceptual Model

The primary objective of a firm, rooted in economic theories, has evolved from profit maximization to shareholder value maximization. This shift is supported by the argument that for a firm to flourish, it must align managers with those of the shareholders. Despite this change, maintaining positive operational profit and profit margins remain crucial for the survival and success of the firm (Dvorský & Slintak, 2019).

Research on firm adoption of new technologies is closely linked to the practical benefits and usefulness derived from the innovation, with technology adoption decisions typically characterized by a strong productivity orientation (Venkatesh & Brown, 2001).

Rogers (1995) introduced the concept of relative advantage as one of the five attributes of new technology that impact its diffusion. Rogers (1995) defined relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes". It suggests that organizations considering the adoption of new innovations will likely conduct a

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cost-benefit analysis, either through a formal process or informally. This analysis leads potential adopters to select innovations that offer greater advantages compared to existing alternative. Benefits can include profitability, low entry cost, reduction in discomfort, improvement in social prestige, time-saving, and instant reward. According to Rogers (1995), relative advantage is one of the best predictors of innovation adoption. It is not surprising since most firms are centered on economic benefits. This construct of "relative advantage" can be mapped to the concept of usefulness (Keil et al., 1995).

Similarly, ease of use, which is considered a characteristic of the user interface in the context of information system, is also an important determinant of a new IS system (Keil et al., 1995). The concept of ease of use can be mapped to the concept of 'complexity' of innovation in Diffusion of Innovation theory (Davis et al., 1989). Complexity is the "degree to which an innovation is perceived as relatively difficult to understand and use". This infers that the more complicated the innovation, the less likely it is will be adopted by the users.

In the digital age, concerns over security and data privacy have become increasingly important in the adoption of new technologies. In the context of Internet banking adoption by firms in South East Asia, studies conducted in Malaysia, Indonesia, and Thailand have consistently shown that security concerns are a significant barrier to adoption. These findings highlight the importance of addressing security issues to encourage the adoption of new technologies by firms.

Based on the findings and suggestions from the literature review, a conceptual model as shown in Figure 1 incorporating three main constructs—usefulness, ease of use, and concerns on security and data protection—have been identified as playing an important role in influencing firms' intention to adopt banking chatbots. These constructs, supported by evidence from various

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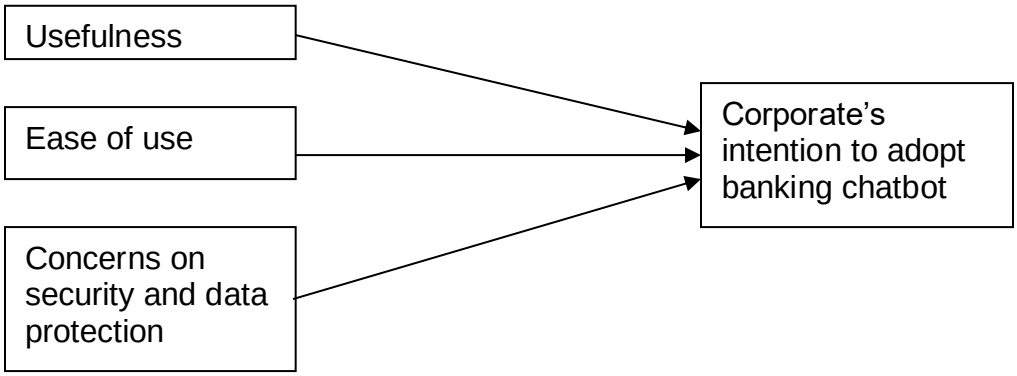
studies, form the foundation for understanding the factors that affect the adoption of banking chatbots by firms in Malaysia.

Figure 1

Conceptual Model



2.7 Characteristics of Banking Chatbots and Security and Data Protection Features Prioritized by Malaysian Firms

There is a strong correlation between the informative nature of a chatbot and the overall customer experience. The speed and relevance with which a chatbot can provide information to customers are crucial factors that influence the adoption rate of banking chatbots. Consumers prioritized informative content, fast responses, and functionality as the most desired banking chatbot characteristics. Despite the chatbots being easy to use and responsive, 76% of the millennial interviewees were dissatisfied due to the chatbots' inability to provide specific answers to queries, instead offering only relevant links. This lack of informative content led the interviewees to discontinue using the chatbots and refrain from recommending them to others (Quah & Chua, 2019).

Therefore, it is very important to consider the characteristics of chatbots so that they can

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be designed to meet users' expectations and enhance users 'experience. Our second research question aims to investigate the characteristics and security feature and measures of the banking chatbot, which will provide valuable insights for banks and chatbot developers in designing and implementing chatbot solutions that meet the needs and expectations of corporate customers.

2.7.1 Usefulness

Usefulness holds significant importance in innovation research as it captures the benefits and improvements that users believe will result from the adoption of the innovation. The usefulness of a new technology, often evaluated in terms of its potential to improve productivity, efficiency or other performance indicators, is a crucial factor in a firm's decision to adopt new innovations. It refers to the benefits an organization can enjoy and gain from adopting the new technology. In the context of banking chatbots, its usefulness can be linked to its output i.e. the information quality which is the financial data it provides.

Reliable Information. In the context of traditional relationship marketing, reliability refers to the ability of banks and relationship managers to consistently deliver accurate and dependable services (Tyler & Stanley, 1999). The quality of an information system is assessed by its reliability, which ensures that users can depend on the system to provide accurate and consistent information (Mulyono & Sfenrianto, 2022).

Reliability is closely linked to trust, as consistent service foster trust between the corporate customers and the bank. A reliable banking service, whether provided by human staff or chatbots, is essential for maintaining strong relationships with corporate clients and ensuring their satisfaction with the banks 'services.

Timely Information. Timeliness is defined as capability in acting at a fitting or advantageous time or performing exactly at the time appointed (Fadzlah, 2013).

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Corporates wants to have the confidence that their requests would be dealt with promptly without having to follow up (Tyler & Stanley, 1999). In the context of banking chatbot, it must be able to furnish updated information, perform tasks and give support to the users as and when needed (Nguyen et al., 2021).

Accurate Predictions. Corporate customers expect minimal errors from their relationship managers with efficient problem-solving ability (Tyler & Stanley, 1999). Given that banks are financial institutions, the accuracy of the output of the banking chatbots is of utmost important, as it directly impacts customer's financial decision. Inaccurate predictions by banking chatbots can lead to misguided decision-making and financial losses for the users. Therefore, corporate customers expects that banking chatbots to provide them with accurate and relevant information to support their decision-making process.

Personalized Recommendations. In the context of traditional relationship marketing, corporate customers expect bank staff to possess a deep understanding of both the bank's products and the customers' business and banking needs such as familiarity with account history, company policies and detailed banking requirements (Tyler & Stanley, 1999). Meanwhile, in the context of banking chatbot, personalized recommendations and responses can save users 'time and effort when searching for information, thereby enhancing their trust in the chatbot (Nguyen et al., 2021). By tailoring recommendations to each corporate customer's unique needs and preferences, banking chatbots can improve the user experience and strengthen the bank-customer relationship.

Competitive Advantage. Information system can be used to achieve competitive advantage in either cost or differentiation (Porter & Millar, 1985). For an information system to offer competitive advantage to its users, the system must be able to provide substantial value and

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significant benefits to the users (Johnston & Vitale, 1988). Banking chatbots, typically embedded in a bank's internet platform, can assist users in navigating complex and time-consuming interfaces. By streamlining processes and improving efficiency, banking chatbots allow users to focus on value-added tasks, ultimately leading to benefits and competitive edge. For example, during the Covid-19 pandemic, businesses faced unprecedented challenges, and financial institutions introduced assistance programs to support their customers. However, the novelty and complexity of the situation led to a surge in customer queries, overwhelming traditional support channels. CIMB deployed SME banking chatbots to assist customers with inquiries related to financial assistance. By using chatbots, customers quickly and easily accessed the information they needed, saving valuable time and resources that could be redirected towards more critical aspects of their business operations during the crisis.

2.7.2 Ease of Use

Ease of use directly and indirectly increases the intention to use a system. The misconception that a useful system will be used regardless of its ease of use fails to consider that not all firms have the resources for training or expert assistance. User-friendliness is crucial for these organizations, and simplicity and intuitiveness of the interface can be deciding factors in adoption and continued use, especially for resource-limited firms.

There is a close relation between ease of use and ease of learning the new technology (Davis et al., 1989). System designers typically assume that users will automatically adopt the system if it is useful, regardless of the ease of use. They believe that users will learn over time and technical support can compensate for lack of use. However, firms may lack the resources, time or willingness to invest in learning complex systems, incur training costs for their staff or

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seek expert assistance. All this can lead to rejection, resentment or under-utilization of the system (Oly Ndubisi & Jantan, 2003).

The Response From the Chatbot Must be Clear. One of the pertinent complaints by the U.S. consumers on the use of consumer chatbot is the failure of chatbot to give them clear and reliable responses which left them felt frustrated (Consumer Financial Protection Bureau, 2023).

Chatbots must provides clear, concise, and error-free information. This means the information provided should be up-to-date, factually correct, and directly address the question asked. Irrelevant or incorrect information can lead to user confusion and frustration (IBM, 2024).

The Response From the Chatbot Must be Understandable (No Difficult Jargon). Anic and Wallmeier (2020) emphasized that the information on banking products should be intuitive and easy to comprehend for the products to be deem attractive. In the context of banking chatbot, its response should be easy to understand without complicated jargons. A prime example of the significance of clear and jargon-free communication is Wells Fargo's recent revamp of its corporate and investment Internet banking portal, now called Vantage. This AI-powered platform emphasizes the importance of using language that is easily understood by customers, avoiding technical terms and jargons. Wells Fargo believes that customers should not have to learn complex terminology to use their service (Finextra Research, 2022).

2.7.3 Security and Data Protection

The use of banking chatbots has the potential to compromise customers' data and personal privacy. The concerns on security and data protection can overshadow the potential benefits, making it a critical factor to address for encouraging positive attitudes and adoption intentions. AI technologies in the chatbots may expose users to security risks if the chatbots are

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improperly designed, misused or contain malicious code. When customers use banking chatbots to access financial information, trust, data security and personal privacy are key issues (Lai et al., 2019). Therefore, for the successful adoption and continued use of chatbots, maintaining trust and addressing the privacy concerns of the users are very important (Yang et al., 2023). Any compromise of a banking chatbot's security could lead to financial losses for the affected users and erode the trust that has been carefully cultivated between the banks and the users.

A study conducted by BNM in 2021 shows that security and privacy are the most crucial factors influencing consumers' willingness to share their data with the banks. The financial services providers (i.e., banks, insurers and payment operators) in Malaysia shared similar concerns (Bank Negara Malaysia, 2022).

Security was a critical factor in the adoption of Internet banking by firms, as evidenced by its significance in studies conducted in Malaysia, Indonesia, and Thailand. In Malaysia (Alam et al., 2009; Wirani et al., 2020; Rotchanakitumnuai & Speece, 2003).

To prevent breaches of data and privacy, ensuring the security of chatbot operations is a crucial challenge that must be addressed. This requires a multi-stakeholder approach involving banks and regulator i.e. BNM to maintain the security of banking chatbots.

Banks to Publicly Disclose Chatbot Security Breaches. To foster trust and confidence among users, banks should be transparent and promptly disclose any security breaches related to their banking chatbots. In this regard, the Securities and Exchange Commission has implemented rules requiring publicly traded companies in the U.S., including listed banking institutions, to disclose any material breach within four days of its occurrence (The U.S. Securities and Exchange Commission, 2023)

Legal Protection for Chatbot Users. Regulators have a vital responsibility in holding

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banks and banking chatbot developers accountable for any violations of security or privacy (Yang et al., 2023).

Regulators to Ensure That Banks Adhere to a Strong Set of Cyber Risks Governance and Management.

Striking the right balance in banking regulations is challenging, as excessive rules can lead to significant inefficiencies, while overly relaxed oversight has the potential to jeopardize the stability of the entire economic system (Marcinkowska, 2013).

Regulators overseeing the implementation of AI in the banking sector aim to strike a balance between preserving financial stability, safeguarding consumer interests, and fostering innovation. The regulatory guidelines prioritize consumer protection in the context of AI-powered banking services. By focusing on protecting consumers' rights and interests, regulators seek to bolster customer trust and confidence in the use of AI-driven financial solutions (Hong Kong Academy of Finance, 2020). To promote consumer's confidence and adoption of AI-driven banking services (including chatbots), regulators have been striving to strike a delicate balance between promoting innovation, upholding the stability of the financial market while nurturing public confidence in AI-powered banking solutions (Atadoga et al., 2024).

Regulators should enforce robust risk governance frameworks to ensure that chatbots are deployed in a responsible and ethical manner with relevant regulations and industry best practices. It also needs to monitor the development and use of chatbots to ensure that they comply with relevant law and regulations (Yang et al., 2023).

Banks to Deploy Advanced Chatbot Security Mechanism. Banks that deploy these chatbots must implement appropriate security measures to protect users from unauthorized access or disclosure (Yang et al., 2023). Effectively managing and controlling the security

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measures of the chatbot is paramount for banks to safeguard the users' sensitive information and maintain their trust (Lai et al., 2019).

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3. Method

This chapter explains the research methodology and procedure. This chapter is segregated into four sections. The first section gives an overview of the research design and research instrument. The second section discusses the sampling unit and location of the study. The third section touches on the sampling method. Lastly, the fourth section covers the data collection method.

3.1 Research Design and Research Instrument

This research used quantitative method to collect all relevant data via a structured questionnaire created using Google Forms. Quantitative method is suitable for this study as it involves data collection through standardized procedures, resulting in numerical data from which statistical inferences can be made (Meadows, 2003).

Specifically, a cross-sectional survey design was used, which involves collecting data at a single point in time. This design is suitable for the current study as it enables the researcher to gather data from a number of firms efficiently and cost-effectively in a short period of time, while also providing a snapshot of the current state of awareness and adoption of banking chatbots in Malaysia.

The survey was conducted using an online questionnaire which was distributed via WhatsApp. The researcher chose to use WhatsApp to disseminate the questionnaire due to several reasons. First, WhatsApp is the main communication channel in Malaysia (i.e., Malaysia is ranked 2nd for the most active WhatsApp user in the world). Second, the ease of use of WhatsApp whereby the questionnaire in the form of Google Forms can be attached to the message and respondents can click on the attached link to answer the questionnaire immediately, therefore, increasing the rate of response. (Suhaimi et al., 2022).

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3.2 Sampling Unit and Location

The sampling unit are organizations in Malaysia that presently have contact with the banks via relationship managers, branch managers or business managers. Given the strong tradition of business secrecy in Asia and low response rate from organizations, the researcher leveraged her professional network established during her tenure in the corporate banking department of a local bank in Malaysia to facilitate data collection. While this approach may be perceived as research limitation, it was chosen as the most practical method to ensure sufficient number of responses within a short period of time. The researcher acknowledges that this non-probability sampling method may limit the generalizability of the findings. However, given the challenges associate with obtaining a representative sample in this context, the use of the researcher's professional network is deemed appropriate.

The lack of information on the research population, specifically the size of population of the organizations whose primary contact uses relationship manager, branch manager and business managers in Malaysia, makes it impossible to determine whether the number of responses received constitutes a statistically valid sample. Therefore, no statistical analysis such as confidence interval estimation, of the date was conducted. However, it is believed that sufficient responses were received to be able to draw a reasonable conclusion.

Malaysia is selected as the focus of the study as the researcher is from Malaysia and she has keen interest in understanding the perception of organizations in accepting new technological products such as banking chatbots.

3.3 Respondents of the Survey

This study aims to study the factors that drive the corporate's intention to adopt banking chatbots in Malaysia. Therefore, the target respondents of the survey must at least hold

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managerial positions that are finance-related in the firm. This includes the owner, major shareholder, chief executive officer, chief operating officer, managing director, general manager, director, chief financial officer, financial controller, accountant, finance manager, treasury manager, and other finance-related management position. They are considered the most appropriate key informants as they are well-positioned and well-versed in the firm's finance, cash management or treasury and likely to be the primary contact between the firm and the banks.

In this study, purposive sampling, a non-probability sampling method was used. Also referred to as judgment sampling, purpose sampling involves the intentional selection of respondents based on their specific qualities and characteristics. Purposive sampling does not require underlying theories or a set number of respondents. This sampling method is commonly used in qualitative research to identify and select cases that are rich in information, allowing for the most effective use of available resources. The primary objective of purposive sampling is to focus on individuals who possess characteristics that enable them to provide more accurate and relevant responses to the survey questions (Etikan et al., 2016). However, the disadvantages of purposive sampling are, first, it is prone to researcher bias and therefore, vulnerable to errors in judgment by the researcher, and second, difficult to defend the representatives of the sample (Rai & Thapa, 2015).

Although purposive sampling is typically used in qualitative research, it has also been used in quantitative research (Cheam et al., 2021; Kumar et al., 2023; Cheng et al., 2014; Yu et al., 2015). The use of purposive sampling in this study is deemed suitable, as it enabled the researcher to deliberately choose respondents who fulfill the specific requirements of this study.

3.4 Data Collection Method

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This research used a questionnaire survey as the main instrument to collect data from firms in Malaysia. The questionnaire was first distributed to the respondents between April 1, 2024 to April 27, 2024. Follow-up messages via WhatsApp were sent to non-respondents after one and two weeks to encourage participation.

A total of 50 questionnaires were sent and 39 completed questionnaires were received, representing response rate of 78% and 32 responses are useable. The data collected from the survey was analyzed via descriptive statistics such as frequencies and mean and ranked to the level of importance.

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4. Design of the Questionnaire Survey

This chapter focuses on the questionnaire development and method of data analysis.

4.1 Questionnaire Development

The factors affecting Malaysian firms to adopt banking chatbot, characteristics and features of banking chatbots and current functionalities of banking chatbot stated in the questionnaire (Appendix 1) were derived from the literature review in Chapter 2. This research used mainly close-ended questionnaire survey as the main instrument to collect data. Questionnaires were used because of their convenience and time effectiveness. The questionnaire was prepared in simple grammar to be easily understood by the respondents so that it is easy for them to read and fill up. The questionnaire was pre-tested by sending it to two business owners and a few semantic changes was done after their feedback.

The close-ended questionnaire was chosen for several reasons. It is easier to assess and less complicated for the respondents to answer considering how busy they can be. Therefore, it is speedy and has relatively higher rate of response as compared to open-ended questionnaires (Hyman & Sierra). Moreover, it aligns with the data collection method i.e., administered through WhatsApp. Close-ended questions are easier to use online because they generally require only single-key or mouse-press responses and are less cognitively demanding (Connor Desai & Reimers, 2019). Since the channel of communication is via WhatsApp, it is likely that respondents respond to the questionnaire through mobile instead of PC web. Study shown that while people have problems answering questions through small touchscreen and most likely they are multi-tasking with their mobile phones, respondents can still provide high-quality responses if the question formats in a small touchscreen are easy to use (Antoun et al., 2017).

However, the use of a close-ended questionnaire means that the researcher is unable to obtain detailed information or new insights from the respondents (Hyman & Sierra, 2016).

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Two questions were designed as open-ended questions (i.e., number of years the firm has been in business and the number of employees that firm has). The answer field of these two questions were set to accept numerical data only.

One question was designed as semi-open question (i.e., the position of the respondent in the surveyed firm). Apart from the pre-determined positions, another option "Others" with option to state the answer was added. Based on researcher's knowledge, certain / title designations that do not explicitly sounds finance - related (such as executive assistant to the chief executive officer) may also have insights and visibility into the firm's intention to adopt banking chatbot.

Screening Questions

To ensure the accuracy and relevance of the collected data, the questionnaire included two 'screening' questions. The first question verified the respondents' current position within the firm while the second question confirmed whether the firms currently have primary contact with the bank through relationship managers, branch managers or business managers. These questions are crucial because the researcher had left the bank approximately two years and the respondents' role or the firm's banking relationship may have changed during that time. The inclusion of these 'screening' questions allowed for the identification and removal of responses that no longer met the target respondent criteria. This screening process ensured that the responses are qualified respondents who could provide accurate and relevant insights into the adoption of banking chatbots by firms in Malaysia. As a result, seven responses were excluded from the analysis due to changes in the respondents' job responsibilities or the firms' banking relationships.

All the questions were set as compulsory and therefore, respondents were unable to skip any questions. Hence, there is no missing data in this survey.

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Section 1 - Consent

Section 1 seeks consent from the participants to participate in the questionnaire, ensuring that all responses are voluntary.

Section 2 (Question 2 to 8) – Profile of the firms

Section 2 (Questions 2 to 8) aims to gather demographic information of the respondents and their firms and to gauge the awareness and experience with banking chatbots. This section includes questions related to the respondent's position within the firm (Question 2), the industry the firm belongs to (Question 3), the number of employees (Question 4), the firm's years in business (Question 5), whether the firm currently has designated relationship managers/branch managers/business managers as their primary contacts with the banks (Question 6) as well as the firm's awareness (Question 7) and use of banking chatbots for the past 6 months (Question 8).

Section 3 - Definition and Use Case of Banking Chatbot

Section 3 provides a brief definition of chatbot technology and use cases of banking chatbots for businesses by DBS and CIMB. It should be noted that presently, the awareness and use of banking chatbots in Malaysia is low. Hence, this section is designed to ensure that all participants have a basic understanding of chatbots and their current application in the banking sector.

Section 4 (Question 9 to 12) – Factors Driving the Adoption of Banking Chatbot

Section 4 comprises four questions (Questions 9 to 12). Each question is followed by several Likert-type statements. Respondents were required to rate the importance of each statement, on a scale from 1 to 5 where 1 – Not important at all; 2 – Less important; 3 – Important; 4 – Fairly important and 5 – Very important.

Question 9, as shown in Figure 2, is to address Research Question 1 and respondents were asked to rate the importance of the three main factors: 1) Ease of use; 2) Usefulness, and 3) Concern on security and data protection, in influencing their firms' decision to use chatbot.

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Figure 2

Rate the Importance: Ease of use, Usefulness and Concern on Security and Data Protection

9. Rate the importance of each factor in determining your firm's intention to adopt banking chatbot.
① - Not Important at all, ② - Less Important, ③ - Important, ④ - Fairly Important, ⑤ -Very Important

	①	②	③	④	⑤
Ease of Use					
Usefulness					
Concern on security & data Protection					

Question 10, 11 and 12 are to address Research Question 2. Question 10, in Figure 3, required respondents to rate the importance of three characteristics of banking chatbot related to ease of use i.e., 1) Learning to use the chatbot should be easy; 2) The response of the chatbot must be understandable (no difficult jargon) and 3) The response of the chatbot must be clear.

Figure 3

Rate the Importance of Characteristics of Ease of use

10. With regards to use of use, rate the importance of each factor to your firm.
① - Not Important at all, ② - Less Important, ③ - Important, ④ - Fairly Important, ⑤ -Very Important

	①	②	③	④	⑤
Learning to use the chatbot should be easy.					
The response of the chatbot must be understandable (no difficult jargon)					
The response of the chatbot must be clear.					

In Question 11, as shown in Figure 4, respondents were asked to rate the importance of five characteristics of banking chatbot associated with usefulness to facilitate decision making of the firm i.e.; 1) The prediction of the chatbot must be accurate; 2) The recommendation of the

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chatbot must be personalized; 3) The information of the chatbot must be reliable; 4) The information of the chatbot must be timely; and 5) The information of the chatbot must provide competitive advantage over competitors.

Figure 4

Rate the Importance of Characteristics of Usefulness in Facilitating the Decision Making in Your Firm

11. With regards to usefulness, rate the importance of each factor in facilitating the decision making of your firm.
① - Not Important at all, ② - Less Important, ③ - Important, ④ - Fairly Important, ⑤ -Very Important

	①	②	③	④	⑤
Accurate prediction					
Personalized recommendation					
Reliable information					
Timely information					
Gain competitive advantage over competitors					

Finally, in Question 12, as shown in Figure 5, respondents were required to rate the importance of the four features and measures to alleviate the concern of security and data protection i.e., 1) Banks to publicly disclose chatbot security breaches; 2) Legal protection for chatbot users; 3) Regulators to ensure that the banks adhere to a strong set of cyber risk governance and management; and 4) Banks to regularly deploy advanced chatbot security mechanism.

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Figure 5

Rate the Importance of the Features of Security and Data Protection of the Banking Chatbot

12. With regards to concern on security and data protection, rate the importance of each factor to your firm.
① - Not Important at all, ② - Less Important, ③ - Important, ④ - Fairly Important, ⑤ -Very Important

	①	②	③	④	⑤
Banks to publicly disclose chatbot security breaches.					
Legal protection for chatbot users.					
Regulators to ensure that banks adhere to strong set of cyber risk governance & management.					
Banks to regularly deploy advanced chatbot security mechanism.					

Section 5 (Question 13) – Banking Chatbot Functionality That Firm is Likely to Adopt

Figure 6 shows Question 13 where respondents were required to state their preference, i.e., 1) Unlikely to adopt chatbot, 2) Might or might not adopt chatbot, and 3) Likely to adopt chatbot, for the following functionality of a banking chatbot: 1) Check account balance, 2) Retrieving transactions, 3) Provide issued cheques status, 4) Navigate the bank's Internet banking platform; 5) Retrieve foreign exchange rate, 6) Answer FAQs; and 7) Remittances.

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Figure 6

Banking Chatbot Functionality That Firm is Likely to Adopt

13. Please indicate if your firm would use the chatbot for the following functionality:
① - Unlikely to use banking chatbot, ② - Might / Might Not use banking chatbot, ③ - Likely to use banking chatbot

Functionality	①	②	③
Check account balance			
Retrieving transactions			
Provide issued cheque status			
Navigate the bank's internet banking platform			
Retrieve foreign exchange rate			
Answers on FAQs			
Remittances			

4.2 Method of Data Analysis

The data collected from the online survey was analyzed using descriptive statistics (i.e.; frequency and mean). Each factor, characteristic, and feature of the banking chatbot was ranked in importance according to its mean score.

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5. Results

This chapter presents the results of the survey conducted among firms in Malaysia. The chapter is divided into seven sections. The first section discusses the survey response rate. The second section provides an overview of the profile of the firms. The third section analyzes the factors that influence firms' adoption of banking chatbots. The fourth, fifth and sixth section delve into the respective characteristics relating to usefulness and ease of use and measures and features of the banking chatbot to reduce the concern of security and data protection. Section 7 presents the results of the banking chatbot functionalities that firms are likely to adopt.

5.1 Survey Response and Data Screening

50 questionnaires were distributed to potential respondents. 39 responses were received, yielding a response rate of 78%. After reviewing the response, 32 responses are deemed usable for the study, while the remaining seven were excluded as they did not meet the study criteria. No missing values were detected as all the questions in the questionnaire survey have been set as compulsory.

5.2 Profile of the Surveyed Firms

Position of the Respondent in the Firm

This study collected data from firms that primarily interact with banks through relationship managers. The respondents are confined to the owner, major shareholder, chief executive officer, chief operating officer, managing director, general manager, director, chief financial officer, financial controller, accountant, finance manager, treasury manager, and other finance-related management position of the said firms.

Figure 7 shows the breakdown of respondents' position within their respective firms. The largest group of respondents, comprising 12 individuals (37.5%), holds position such as accountant, finance manager, treasury manager or other finance-related management roles. The

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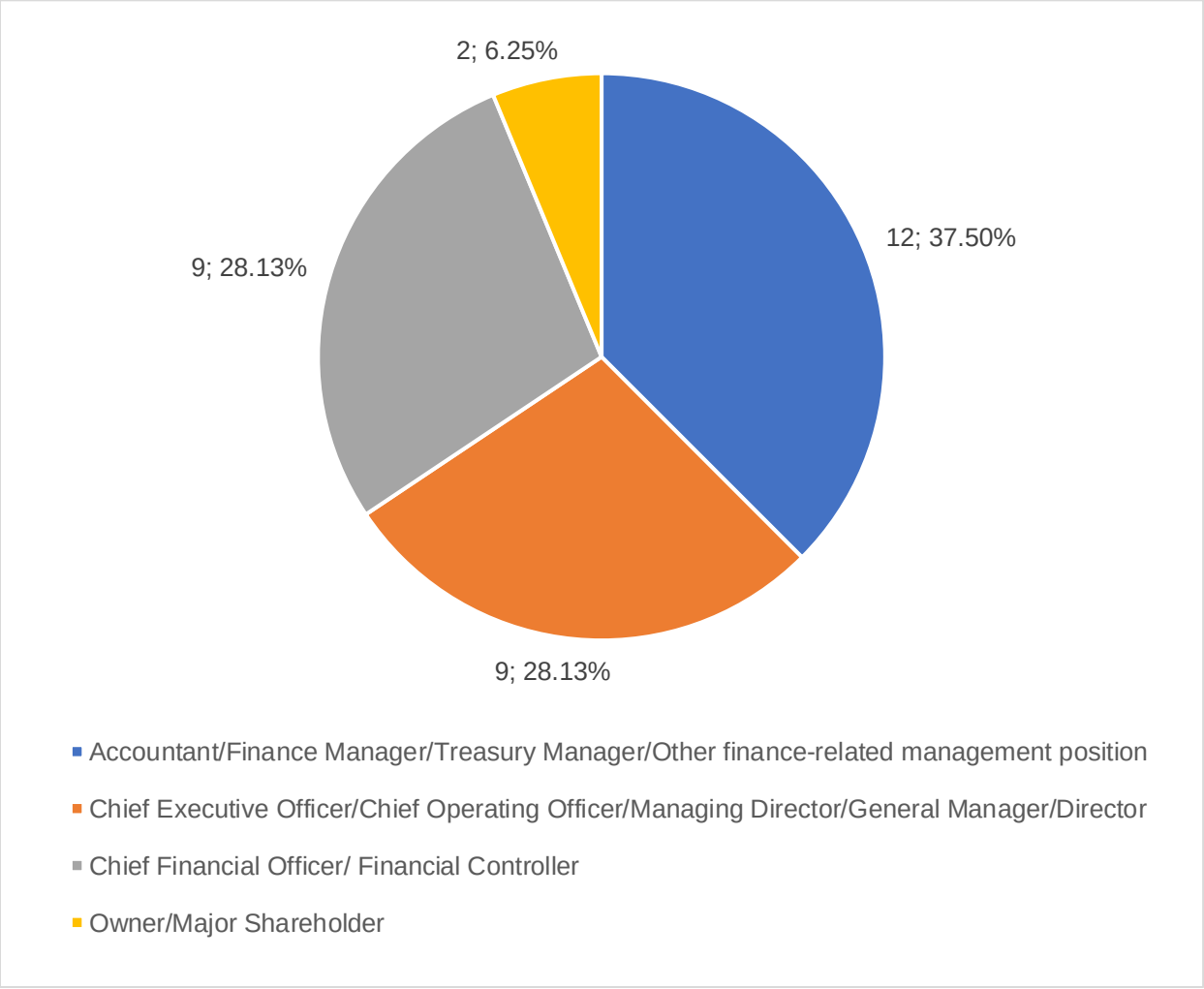
second and third largest groups, each consist of 9 respondents (28.13% each) consists of two categories (i.e.; chief executive officer, chief operating officer, managing director, general manager, director and chief executive officer and financial controller). Lastly, 2 respondents (6.25%) are owners or major shareholders of the surveyed firms.

Figure 7

Position of the Respondent in the Firm



Main Business of The Firms

As seen on Figure 8, over half of the firms, 17 out of 32 (53.13%) are principally involved in the Real estate activities. The second most represented industry is Information and

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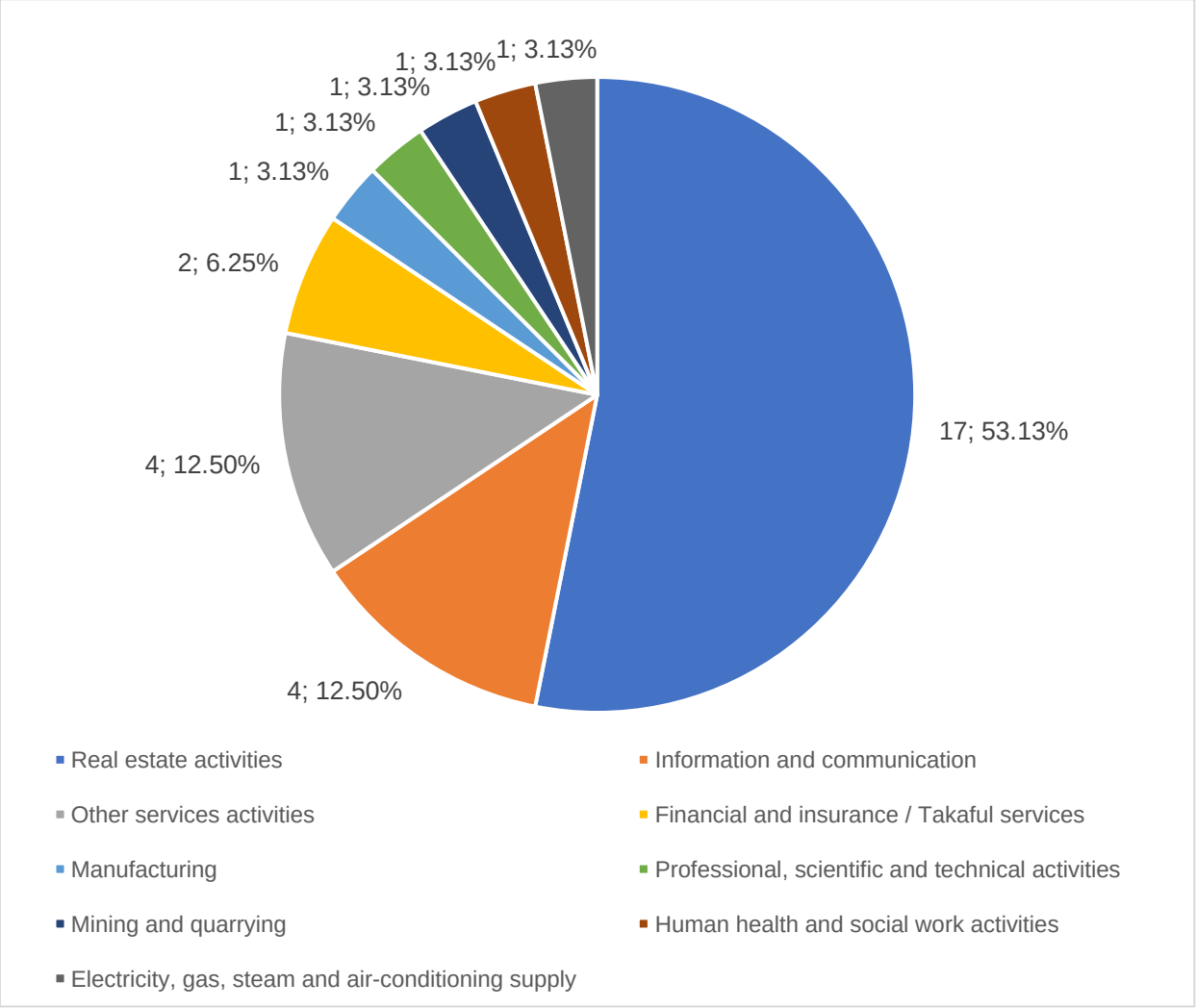
communication with 4 respondents (12.50%). Other services activities also have 4 respondents (12.50%).

Financial and insurance / takaful activities as well as Electricity, gas, steam and air-conditioning supply, each have 2 respondents (6.25% each).

The remaining industries, namely Manufacturing, Professional, scientific and technical activities, Mining and quarrying and Human health and social work activities, each have 1 respondent (3.13% each).

Figure 8

Principal Business of the Firm



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Number of Employees in the Firm and Classification of Firm as SME or non-SME

Table 3 presents the distribution of the number of employees in the firms surveyed. The data shows that the majority of the firms (8 out of 32) have between 0 to 75 employees. The next most common category is firms with 76 to 150 employees, representing 6 out of the 32 firms. There are an equal number of firms (5 each) in the categories of 151-300 employees, 301-450 employees, and 1,000-2,000 employees. There is a single firm with 5,000 employees. Two firms have a significantly higher number of employees, falling into the 15,000 to 16,000 range.

Table 3

Number of Employees in the Firm

Number of Employees	Number of Firms
0-75	8
76-150	6
151-300	5
301-450	5
1,000-2,000	5
5,000	1
15,000 – 16,000	2
Total	32

In Malaysia, a SME is defined as having sales not exceeding RM200 million or full-time employees of not exceeding 75 workers (“Financing for Small & Medium Enterprises”, n.d.). There is no formal definition of enterprise beyond SME. Figure 9 shows that, 8 out of 32 firms (25%) have less than 75 employees and hence, defined as SME, while the remaining 24 (75%) employ more than 75 employees and hence, are non-SMEs.

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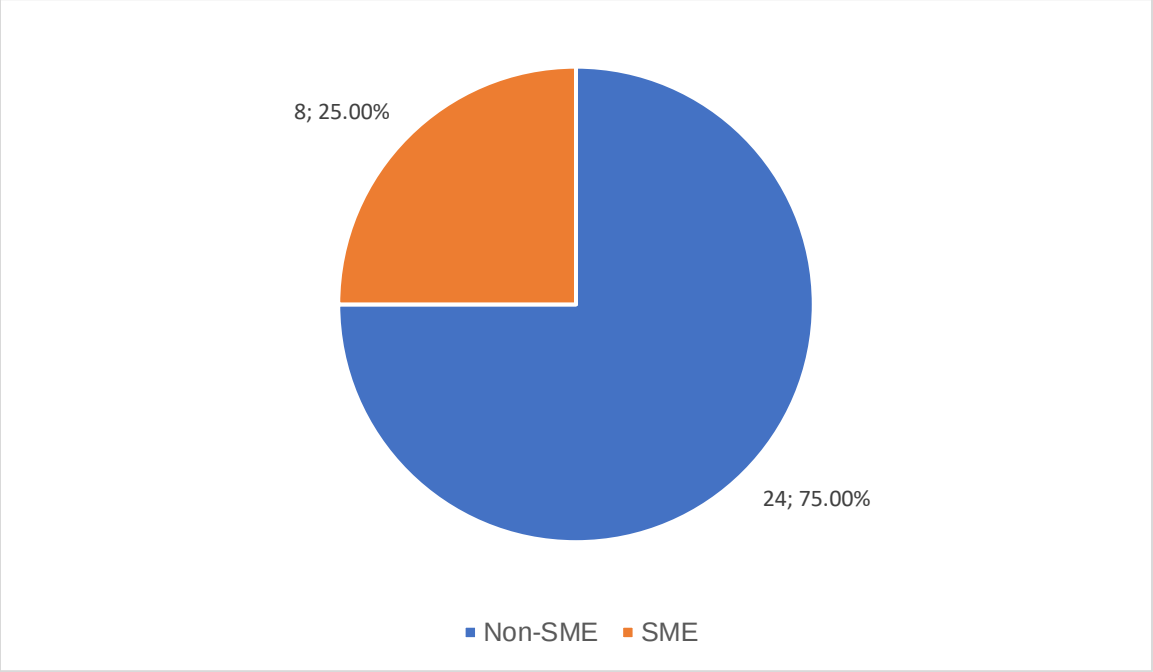
Figure 9

Classification of Firm as SME or Non-SME



Number of Years the Firm Has Been in Operations

Figure 10 shows that almost half (i.e.; 15 firms) have been operating between 1 to 20 years. 6 firms have been operating between 21 to 30 years and the remaining 11 firms have been operating between 31 to 80 years.

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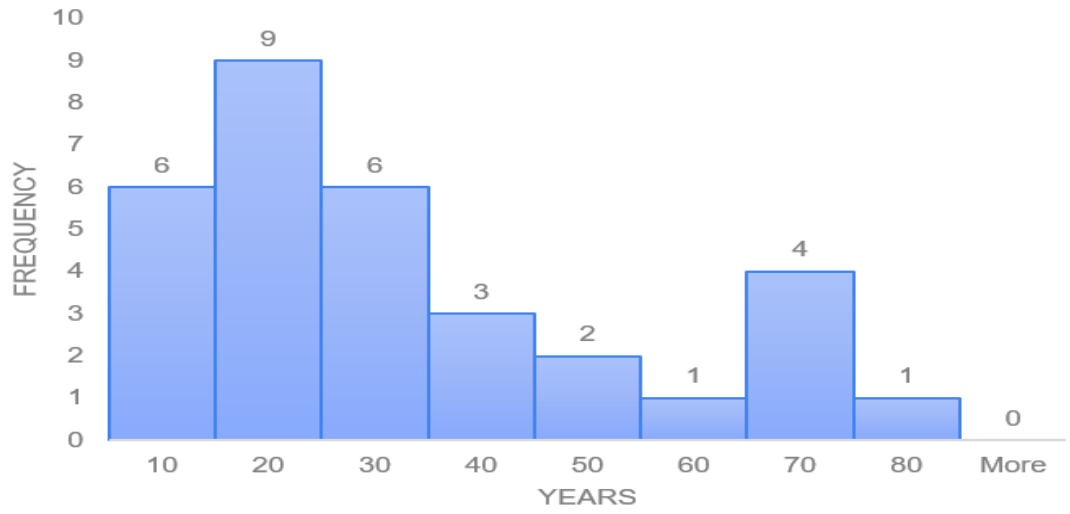
Figure 10

Number of Years the Firm Has Been in Operations



Firm's Awareness and Experience of Using Banking Chatbot

Figure 11 shows that out of the 32 firms, 17 (53.13%) are aware of banking chatbots while 15 (46.88%) are not aware of them.

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Figure 11

Firm's Awareness of Banking Chatbot

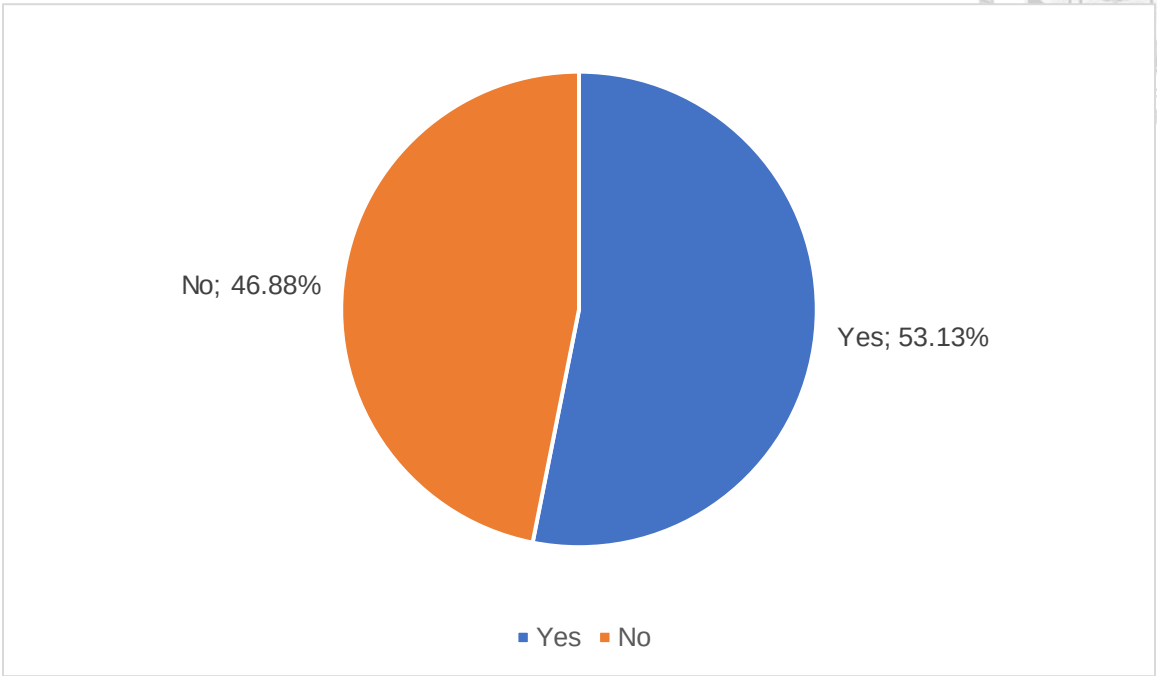

Figure 12 shows that among these 17 respondents, only 3 (i.e.,17.65%) have used banking chatbots in the past 6 months, while 14 respondents (i.e.,82.35%) have not used banking chatbots during this period.

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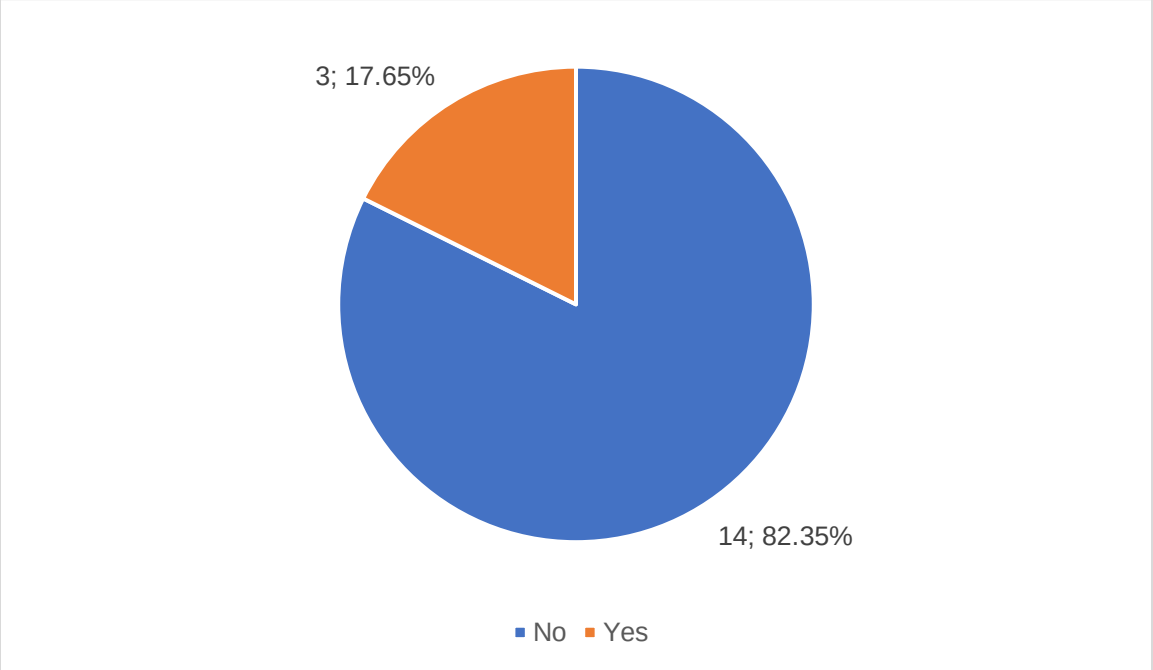
Figure 12

Firm's Experience of Using Banking Chatbot



5.3 Factors Affecting Firm's Intention to Adopt Banking Chatbot

To address the first research question, "What factors affect the Malaysian firms' intention to adopt AI-driven banking chatbots?" this study has identified three main factors: ease of use, usefulness and concern on security and data protection.

As shown in Table 4, the firms considered concern on data and security protection with mean score pf 4.66 as the most critical factor influencing their decision to adopt banking chatbots. The second most important determinant is the usefulness of the banking chatbots with mean score of 4.25. Lastly, the ease of use ranks as the least significant factor with mean score of 4.19.

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Table 4

Ranking of Importance: Concerns on Security and Data Protection, Usefulness and Ease of Use

Question: Rate the importance of each factor in determining your firm to use banking chatbot; n=32

Statement	1 = Not important at all	2 = Less important	3 = Important	4 = Fairly important	5 = Very important	Mean	Rank
Concerns on security and data protection	0	0	4	3	25	4.66	1
Usefulness	0	3	4	7	18	4.25	2
Ease of use	0	3	6	5	18	4.19	3
Frequency	0	6	14	15	61		

5.4 Features and Measures to Alleviate Concern on Security and Data Protection

Regarding the security and data protection, Table 5 and Figure 13 shows that firms prioritized the role of the regulator in ensuring banks adhere to a robust set of cyber risk governance and management with mean score 4.84. The firms rated "Banks to regularly deployed advanced chatbot security mechanism" and "Legal protection for chatbot users" equally important with mean score of 4.63. Finally, the least important feature is "Banks publicly disclosing chatbot security breaches" with mean score of 4.31.

Table 5

Features and Measures to Alleviate Concern on Security and Data Protection

Please rate the importance of each feature and measures to your firm; n=32

Statement	1 = Not important at all	2 = Less important	3= Important	4 = Fairly important	5 = Very important	Mean	Rank
Regulators to ensure that banks adhere	0	0	1	3	28	4.84	1

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Please rate the importance of each feature and measures to your firm; n=32

Statement	1 = Not important at all	2 = Less important	3= Important	4 = Fairly important	5 = Very important	Mean	Rank
to a strong set of cyber risk governance and management							
Banks to regularly deploy advanced chatbot security mechanism	0	0	4	4	24	4.63	2
Legal protection for chatbot users	0	0	4	4	24	4.63	3
Banks to publicly disclose chatbot security breaches	0	2	6	4	20	4.31	4
Frequency	0	2	15	15	96		

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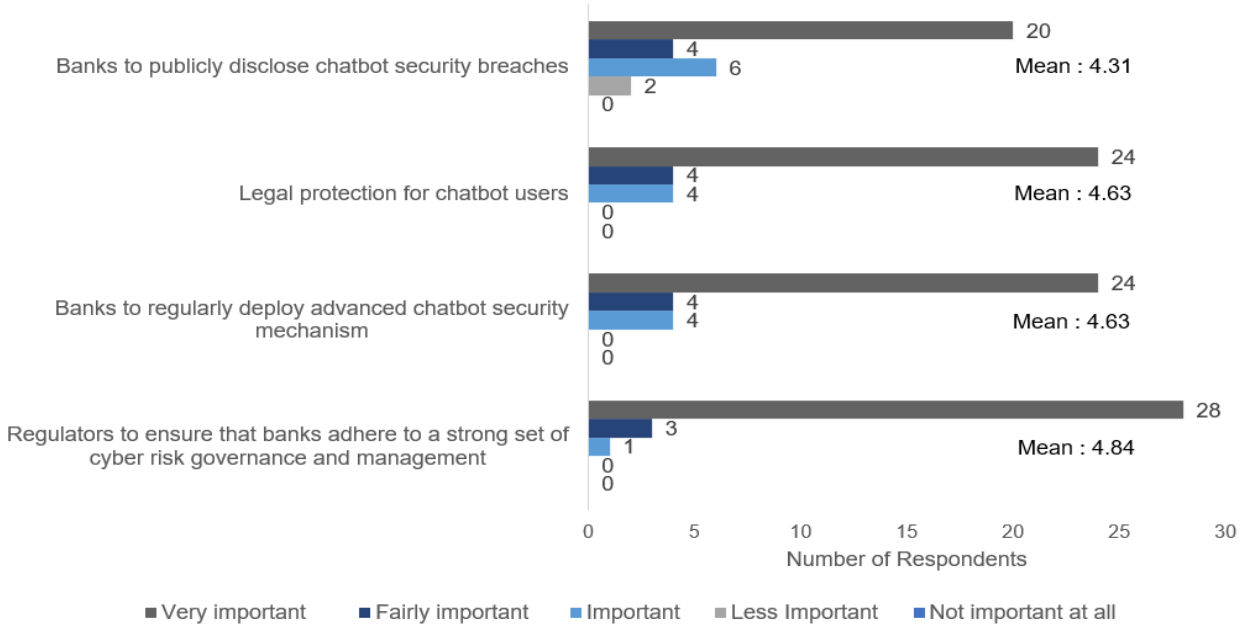
Figure 13

Features and Measures to Alleviate Concern on Security and Data Protection



5.5 Characteristics of Banking Chatbot Related to Usefulness

When evaluating the usefulness of banking chatbots in facilitating decision-making, as Table 6 and Figure 14 shows that firms considered reliable information as most important with mean score of 4.66 and followed closely by timely information with mean score of 4.63. Firms ranked accurate predictions as the third most significant characteristics with mean score of 4.28, followed by the chatbots' ability to help them gain a competitive advantage over their competitors with mean score of 4.19. Lastly, the firms considered personalized recommendations as the least important among the five characteristics with mean score of 3.84. Notably, 'personalized recommendations' ranked as the lowest amongst the 12 characteristics of the banking chatbots.

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Table 6

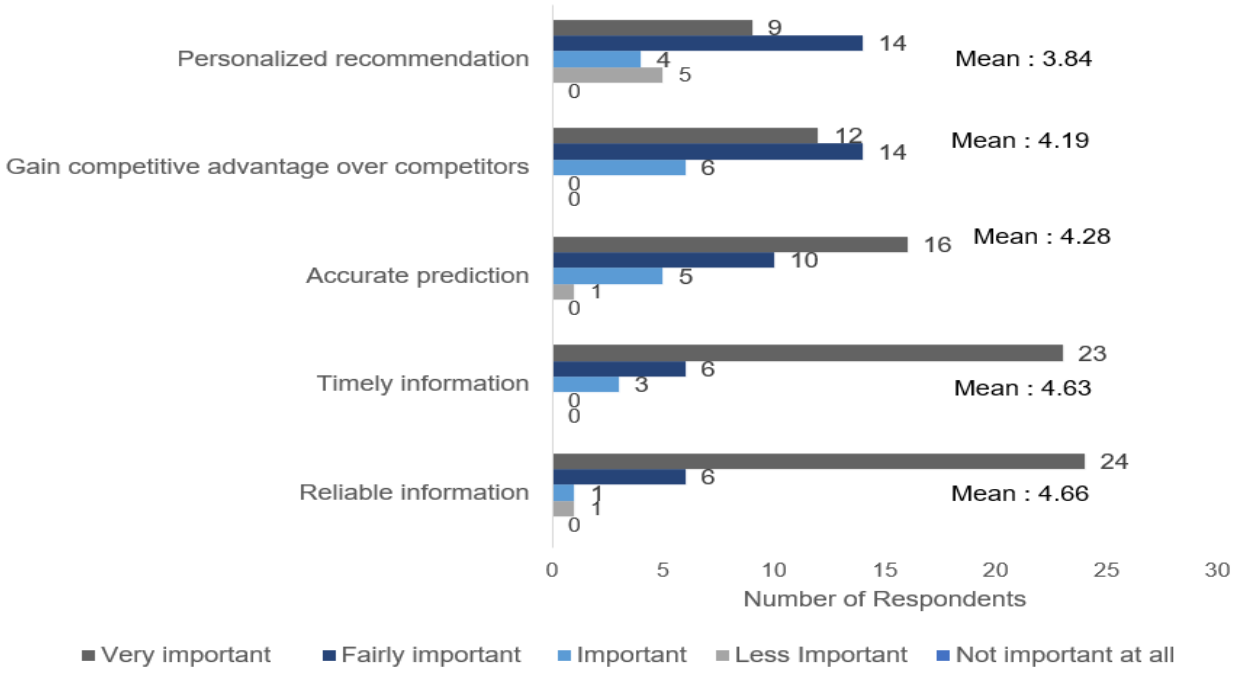
Characteristics of Banking Chatbot Related to Usefulness

Question: To facilitate your firm's decision making, rate the importance of the following; n=32

Statement	1= Not important at all	2=Less important	3=Important	4=Fairly important	5 =Very important	Mean	Rank
Reliable information	0	1	1	6	24	4.66	1
Timely information	0	0	3	6	23	4.63	2
Accurate prediction	0	1	5	10	16	4.28	3
Gain competitive advantage over competitors	0	0	6	14	12	4.19	4
Personalized recommendation	0	5	4	14	9	3.84	5
Frequency	0	7	19	50	84		

Figure 14

Characteristics of Banking Chatbot Related to Usefulness



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5.6 Characteristics of Banking Chatbot Related to Ease of Use

Table 7 and Figure 15 shows that firms placed the highest importance on the clarity of the chatbots' responses with mean score of 4.56 followed by understandability (no difficult jargon) of the chatbot's responses with mean score of 4.44. Firms ranked the ease of learning to use the chatbots as the least important characteristics with mean score of 4.06.

Table 7

Characteristics of Banking Chatbot Related to Ease of Use

Question: Rate the importance of the following to your firm; n=32

Statement	1=Not important at all	2=Less important	3=Important	4=Fairly important	5=Very important	Mean	Rank
The response of the chatbot must be clear	0	0	4	6	22	4.56	1
The response of the chatbot must be understandable (no difficult jargon)	0	0	7	4	21	4.44	2
Learning the chatbot should be easy	0	2	9	6	15	4.06	3
Frequency	0	2	20	16	58		

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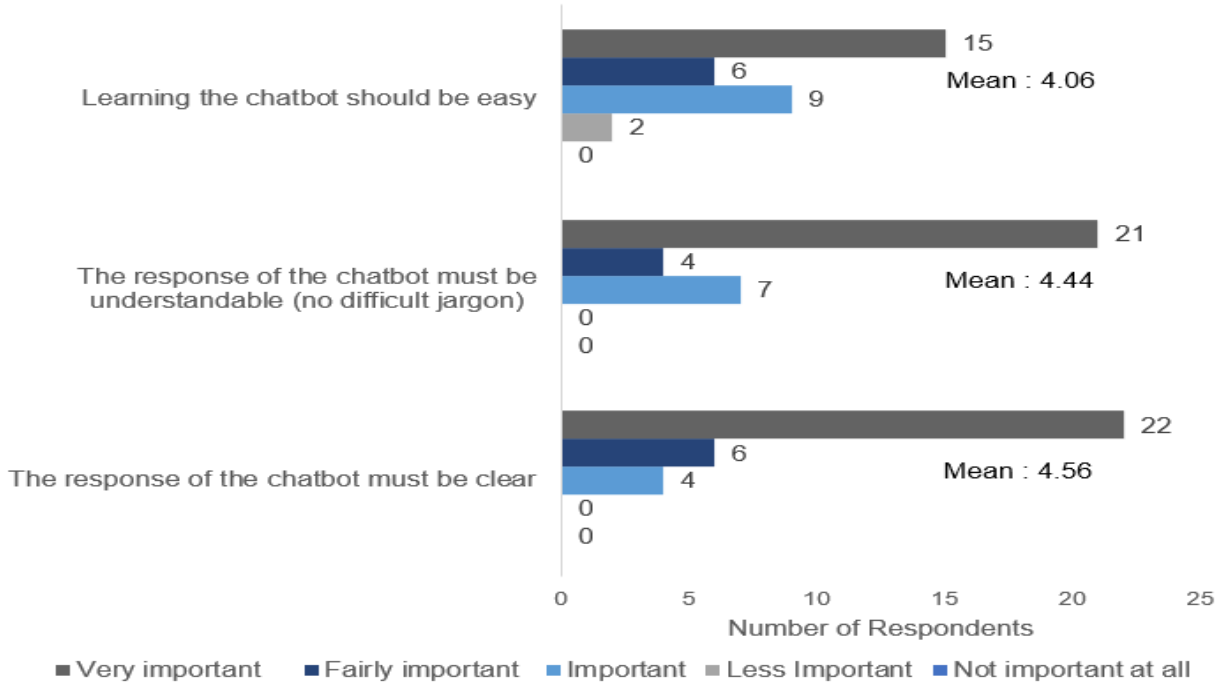
Figure 15

Characteristics of Banking Chatbot Related to Ease of Use



5.7 Summary of Characteristics of Banking Chatbots and Security and Data Protection Features Prioritized by Malaysian Firms

Table 8 summarizes the characteristics of banking chatbots and security and data protection feature and measures prioritized and expected by Malaysian firms. The table presents 12 characteristics, features and measures categorized under the main factors of security and data protection, usefulness, and ease of use.

The top priority for Malaysian firms is for regulators to ensure that banks adhere to a strong set of cyber risk governance and management, with a mean score of 4.84. This is followed by the reliability of the information provided by the chatbot with mean score of 4.66. Firms rated timelines of information, banks to regularly deploy advanced chatbot security mechanism and legal protection for chatbot users as equally important with similar mean score of 4.63. The

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clarity and understandability of the chatbot's responses are also considered important, with mean scores of 4.56 and 4.44.

Table 8

Summary of Characteristics of Banking Chatbots and Security and Data Protection Features Prioritized by Malaysian Firms

Characteristics / Features / Measures Prioritized by firms	Category	Mean Score	Rank
Regulators to ensure that banks adhere to a strong set of cyber risk governance and management.	Security and data protection	4.84	1
To facilitate the firm's decision making, the information from the chatbot must be reliable.	Usefulness	4.66	2
To facilitate the firm's decision making, the information from the chatbot must be timely.	Usefulness	4.63	3
Banks to regularly deploy advanced chatbot security mechanism.	Security and data protection	4.63	3
Legal protection for chatbot users.	Security and data protection	4.63	3
The response of the chatbot must be clear.	Ease of use	4.56	6
The response from the chatbot must be understandable (no difficult jargon).	Ease of use	4.44	7
Banks to publicly disclose chatbot security breaches	Security and data protection	4.31	8
To facilitate the firm's decision making, the prediction from the chatbot must be accurate.	Usefulness	4.28	9
To facilitate the firm's decision making, the information from the chatbot must assist to gain competitive advantage over competitors.	Usefulness	4.19	10
Learning to use the chatbot should be easy.	Ease of use	4.06	11
To facilitate the firm's decision making, the information from the chatbot must be personalized.	Usefulness	3.84	12

5.8 Banking Chatbot Functionality That Malaysian Firms are Likely to Adopt

As shown in Table 9, firms expressed the highest preference for using the banking chatbots to retrieve transactions and check account balance. The second most preferred function is checking status of issued cheques, followed by answering on FAQs, guidance to navigate the

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bank's Internet banking platform and retrieval of foreign exchange rates. Lastly, firms show the least interest in using chatbots for remittances.

Table 9

Banking Chatbot Functionality That Malaysian Firms Are Likely to Adopt

Functionality	Frequency; n=32			Rank (based on likelihood to adopt)
	1=Unlikely to adopt banking chatbot	2=Might / Might not adopt banking chatbot	3=Likely to adopt banking chatbot	
Retrieving transactions	4	6	22	1
Check account balance	5	5	22	1
Provide issued cheque status	3	8	21	3
Answering FAQ	3	9	20	4
Navigate the bank's internet banking platform	5	7	20	5
Retrieve foreign exchange rates	3	10	19	6
Remittance	9	9	14	7

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6. Discussion

This study revealed that the most significant factor influencing Malaysian firms' decision to adopt banking chatbots is their concern over the security and data protection of the chatbots. The usefulness and ease of use were found to be the second and third most important factors, respectively. The firms believe that regulators play an important role in ensuring that banks adhere to a strong set of cyber risk governance and management practices. They also prioritize the information provided by chatbots to be reliable, timely, clear, and understandable (without difficult jargon). The study also suggested that Malaysian firms are more inclined to use banking chatbots for information retrieval or checking, rather than for fund transfers.

6.1 Findings 1: Concern on Security and Data Protection as Most Important Factor, Ease of use as Least Important Factor

Figure 16 shows that firms placed extreme importance on security and data protection when considering the adoption of banking chatbots. The usefulness ranked second in importance and the ease of use was the least important.

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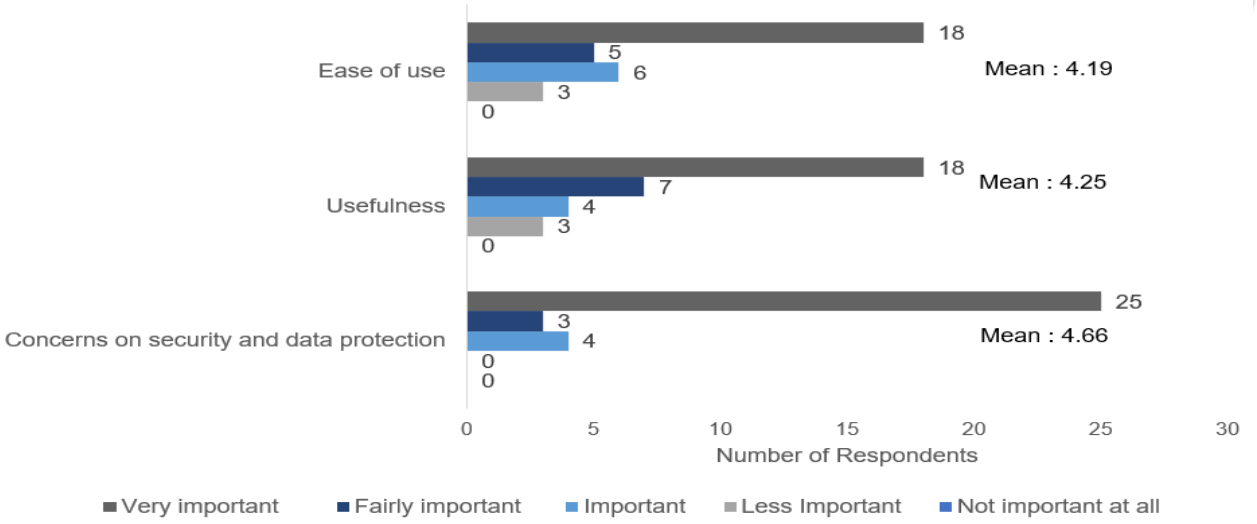
Figure 16

Factors Affecting Firm's Intention to Adopt Banking Chatbot



Firm's concern over security and data protection when adopting banking chatbot is consistent with previous studies on the adoption of Internet banking by firms in Malaysia (Alam et al., 2009), Indonesia (Wirani et al., 2020) and Thailand (Rotchanakitumnuai & Speece, 2003), highlighting the critical role of security in the acceptance of new financial technologies. BNM's 2021's findings also showed that security and privacy are the most crucial factors influencing customers' willingness to share their data with banks (Bank Negara Malaysia, 2022). Several factors contribute to the prioritization of data and security protection over the potential benefits of banking chatbots. Firstly, banking chatbots store sensitive financial data and facilitate monetary transactions for businesses. Security breaches could lead to severe financial losses and reputational damage, emphasizing the importance of robust security measures. Secondly, recent high-profile data breaches involving government agencies and prominent companies in Malaysia made firms more cautious about adopting new technologies. Furthermore, Malaysian consumers have been receiving unsolicited marketing messages and scam calls/SMS, contributing to a

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general sense of unease about data security, which could influence firms' attitudes towards adopting banking chatbots.

Malaysian firms ranked the usefulness of banking chatbots as the second most important factor; prioritizing tangible benefits over ease of use. Study of organization adoption of Internet banking in Malaysia (Alam et al., 2009) showed that the benefits of adoption is a significant factor in driving the adoption of Internet banking. Existing research on firm adoption of new technology also emphasizes the significance of tangible benefits derived from innovation (Venkatesh & Brown, 2001; Rogers, 1995). These advantages are likely to be more compelling for firms than the ease of use.

Lastly, ease of use is ranked as least important. This is consistent with the study of organization adoption of Internet banking in Malaysia (Alam et al., 2009) and Indonesia (Wirani et al., 2020). Corporate customers are expert customers and may perceive that learning and using the banking chatbot is easy and should be like that of Internet banking. Moreover, consumers have been exposed to various smart gadgets and hence, perceive the innovations especially those for customer's use, should be easy to use. Firms may also consider ease of use as a 'threshold' factor whereby ease of use is perceived as a minimum requirement criteria for an innovation to be considered for use.

6.2 Findings 2: Characteristics of Banking Chatbots and Security and Data Protection Features Prioritized by Malaysian Firms

Figure 17 shows that the top priority for Malaysian firms considering the adoption of banking chatbots is for regulators to ensure that banks adhere to a strong set of cyber risk governance and management. **"**Reliable information" and "Timely information" are ranked as second and third most important characteristics. Firms also place a high priority on the

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importance of banks to regularly deploying advanced chatbot security mechanisms. Firms also placed high importance on the clarity and understandability (no difficult jargon) of chatbot responses. “Personalized recommendation” was ranked as the least important characteristics amongst the 12 characteristics.

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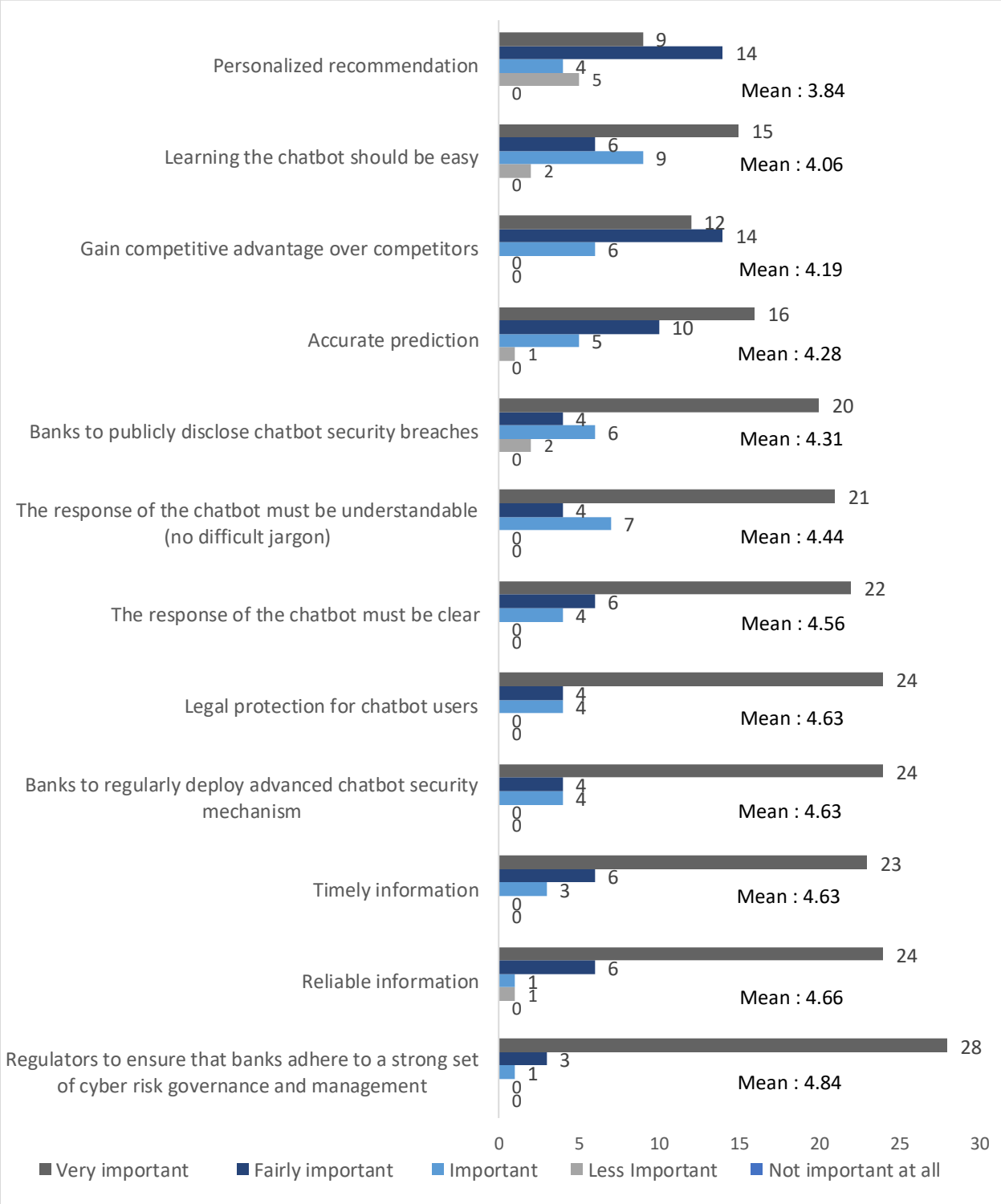
Figure 17

Characteristics of Banking Chatbots and Security and Data Protection Features Prioritized by Malaysian Firms



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6.2.1 Role of Regulators to Drive Adoption of Banking Chatbot

Figure 17 shows suggests that regulators play a crucial role in enhancing firms' intention to adopt banking chatbots. Although there is limited published research on the impact of individual trust in central banks on the adoption of new banking technology, a survey conducted by The Official Monetary and Financial Institutions Forum in 2019 revealed that Malaysians have the highest net trust in their central banks (The Official Monetary and Financial Institutions Forum, 2020). This trust can be attributed to BNM's instrumental role in strengthening the country's financial system post AFC and its swift response during the 2008 subprime crisis and the Covid-19 outbreak. BNM's reforms and measures have enhanced the resilience and stability of the financial sector, enabling it to weather crises effectively. Therefore, to address data and security concerns surrounding the implementation of generative AI in the banking sector, multi-stakeholder efforts involving banks, regulators, and technology providers will be essential. While the use of generative AI and banking chatbot technology is still in its early stages in Malaysia, the technology is already present and rapidly advancing. It is inevitable that Malaysian banks will need to adopt these technologies sooner rather than later to remain competitive.

As suggested by Yang et al., (2023), regulators should enforce robust risk governance frameworks to ensure that chatbots are deployed in a responsible and ethical manner with relevant regulations and industry best practices. It also needs to monitor the development and use of chatbots to ensure that they comply with relevant law and regulations. By focusing on protecting consumers' rights and interests, regulators seek to bolster customer trust and confidence in the use of AI-driven financial solutions (Hong Kong Academy of Finance, 2020). Therefore, BNM must continue robust monitoring of banks while ensuring a conducive environment for innovation.

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To cultivate user trust, apart from the regulators, banks can use their Internet banking platforms to educate users on the importance of data and security protection while deploying robust security mechanisms on existing products to strengthen consumer trust. Education outreach on the importance of AI in increasing productivity and data security is crucial for banks and their employees. Banks should start educating employees on the benefits and security concerns of AI, even if there are no immediate plans to adopt banking chatbots or client-facing AI-based financial products.

6.2.2 Reliable and Timely Information is Important; Personalized Recommendation Least Important

Figure 17 shows that “Reliable information” and “Timely information” are ranked as second and third most important characteristics of the banking chatbot. The emphasis on the reliability and timeliness of information is not surprising given that corporate customers are accustomed to dealing with relationship managers they trust to provide accurate and up-to-date information. The high importance placed on these factors underscores the need for banking chatbots to deliver the same level of trustworthiness and prompt information that corporate customers expect from their human bankers.

Interestingly, “Personalized recommendation” was ranked as the least important characteristics amongst the 12 characteristics. This finding is particularly noteworthy, as it challenges the conventional understanding that personalization is a major benefit of chatbot, it appears that firms place a lower value on this aspect. The low ranking of "Personalized recommendation" could be attributed to several factors specific to the business segment. First, the respondents who are senior management of the firms, possess specialized knowledge in finance and banking and hence, may be skeptical of trusting chatbot recommendations,

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especially if the underlying algorithms are not transparent or easily explainable. The 'black box 'nature of chatbots could raise concerns especially from risk-averse customers when it comes to relying on personalized recommendations involving sensitive financial information or decisions. Second, firms may have established protocols, policies and processes for making financial decisions. The lack of explainability of the decision from the chatbot may be perceived as insufficient as compared to the expertise provided by their human bankers whom they have established trust over the years. Thirdly, to provide truly personalized recommendations, chatbot require access to significant amount of user data and personal information. The reluctance to share information with the bank is consistent with the findings by (Bank Negara Malaysia, 2022; Unisys, 2018). Moreover, firms may be reluctant to share all their company information with a bank, as they may not want the bank to have complete visibility into their operations and finances.

6.2.3 Clear and Understandable (No Difficult Jargon) Response Also Important

Figure 17 shows that the surveyed firms placed high importance on the clarity and understandability (no difficult jargon) of chatbot responses. This finding aligns with the research conducted by Anic and Wallmeier (2020) and the report "Chatbots in Consumer Finance" (Consumer Financial Protection Bureau, 2023). Wells Fargo's recent revamp of its corporate and investment Internet banking portal, Vantage, emphasizes the importance of using easily understood language and avoiding technical terms and jargon. This approach underscores the value of ensuring that banking chatbots provide clear and easily comprehensible responses to users, even if they are expert customers (Finextra Research, 2022)

6.3 Findings 3: Banking Chatbot Functionality That Malaysian Firms Are Likely to Adopt

The survey results, as depicted in Figure 18, indicate that Malaysian firms are more

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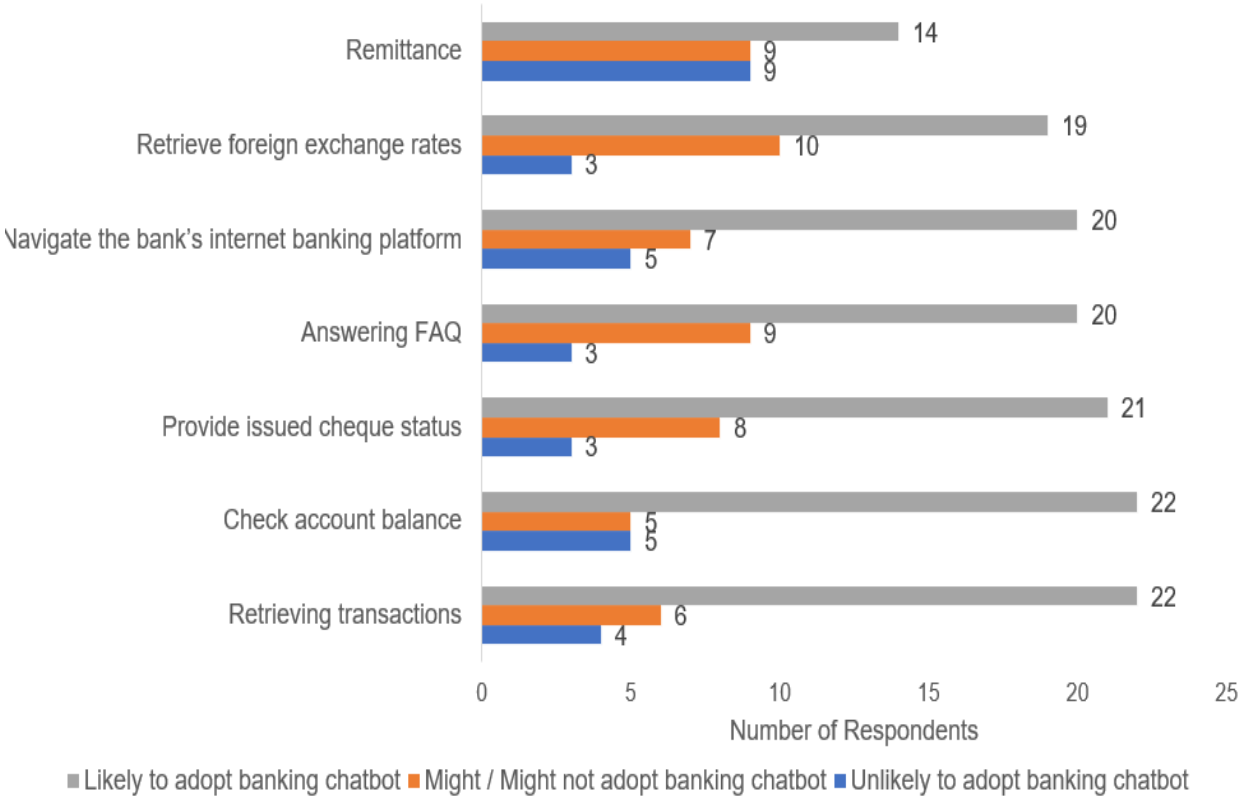
inclined to adopt banking chatbot functionalities that do not involve the direct transfer of funds from their accounts. The most preferred functionalities are those that provide information, such as retrieving transactions and checking account balances. In contrast, functionality that involves the potential outflow of money from the firms' accounts, such as remittance, is less preferred.

Figure 18

Banking Chatbot Functionality That Malaysian Firms Are Likely to Adopt



This finding is, to certain extent, is consistent with the study conducted by (Unisys, 2018) whereby Malaysians were not comfortable to authorize payment transfer via mobile. This suggests that security concerns may be a barrier for Malaysian firms when it comes to using chatbots for tasks that could potentially lead to unauthorized or unintended transfer of funds.

Interestingly, these findings resonate with a suggestion made by McKinsey & Company (2015) regarding the role of relationship managers in corporate banking. The consultant noted

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that relationship managers spend limited time on client-facing activities and proposed digitalizing commercial routines to enable relationship managers to focus more on client interactions and advisory services. The preferences expressed by Malaysian firms in this study seem to align with this idea, as they favor chatbot functionalities that provide information and support routine tasks rather than those involving sensitive financial transactions.

This presents an opportunity for banks to design chatbots that complement the role of relationship managers by focusing on providing routine information to customers and automating tasks. By implementing a coverage model where customers can perform certain activities online through chatbots while still connecting with relationship managers for more complex queries, banks can strike a balance between convenience and security. This approach allows firms to access routine information and perform non-critical tasks through chatbots while relying on human interaction for more sensitive or complex matters.

The alignment between the findings of this study and McKinsey & Company (2015)'s suggestion highlights the potential for banks to build trust and encourage the adoption of banking chatbot functionalities among their corporate clients by designing chatbots that complement the role of relationship managers. However, further research and practical implementations would be necessary to validate the effectiveness of this approach in the Malaysian context.

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7. Conclusion

This chapter is segregated into five sections. Section 1 presents the summary of the key research findings in relation to the research aims and questions. Section 2 and 3 summarize the value and contribution of the study in the academic and practical fields. Section 4 discusses the limitation of the study and Section 5 proposes the possible areas for future research.

7.1 Research Contribution

The current study aims to investigate the predictors that influence the intention of Malaysian firms to adopt banking chatbots. The main questions for this research were as follow:

1) What factors affect the Malaysian firms' intention to adopt AI-driven banking chatbots?
2) What are the characteristics of AI-driven banking chatbots, and what security and data protection features do Malaysian firms prioritize and expect from these chatbots?
3) Which banking chatbot functionalities are Malaysian firms prepared to adopt?

The findings revealed that Malaysian firms place significant importance on security and data protection when considering the adoption of banking chatbots. Notably, the effect of security and data protection concerns was found to be stronger than the usefulness of the chatbots. This finding underscores the critical role of security and risk mitigation in the adoption of financial technologies. To alleviate these concerns, firms in Malaysia believe that regulators play an important role in ensuring that banks adhere to a strong set of cyber risk governance and management practices. They also expect banks to regularly deploy advanced security mechanisms for their chatbots.

The study also sheds light on the characteristics of banking chatbots prioritized by firms in Malaysia. The firms prefer the information provided by chatbots to be reliable, timely, clear, and understandable (without difficult jargon). Interestingly, Malaysian firms ranked

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"personalized recommendations" as the least important feature.

Thirdly, the study revealed that Malaysian firms are more inclined to use banking chatbots for information retrieval or checking, rather than for fund transfers.

7.2 Theoretical Implications

This study makes a significant contribution to the existing literature by being the one of the first to investigate the factors that influence the intention of organizations in Malaysia to adopt banking chatbots. This study lays the groundwork for future research in this domain. As the chatbot technology continues to evolve and become more sophisticated, this study serves as a foundation for further investigations into the dynamic nature of banking technology adoption in the organization settings.

7.3 Practical Implications

The findings of this study suggest that Malaysian firms prefer banking chatbot functionalities that provide information, such as retrieving transaction history and checking account balances, over those that involve the direct transfer of funds or personalized recommendations. This preference presents an opportunity for banks in Malaysia to design and implement chatbots for firms that serve as the primary contact point for routine tasks and inquiries.

Banks can implement a coverage model where chatbots handle routine tasks and inquiries, while relationship managers are available for more complex and sensitive matters that require personalized attention and expert advice, such as large fund transfers, loan applications, or strategic financial planning. This two-tiered approach allows banks to strike a balance between the efficiency of chatbots and the value of human expertise.

This strategy can help banks optimize their resources, improve customer satisfaction, and

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build trust among their corporate clientele. By leveraging chatbots for routine tasks, banks can free up their staff to focus on more value-added activities, such as sales and customer engagement, ultimately enhancing the overall banking experience for their corporate customers and increase sales.

However, it is essential for banks to ensure that the chatbots they implement are secure, reliable, and user-friendly. The findings of this study also highlight the importance of addressing security concerns and building trust among corporate clients when introducing banking chatbots. Banks should prioritize the development of robust security measures and clear communication channels to maintain the confidence of their corporate customers in the chatbot services provided.

7.4 Limitations

This study makes a significant contribution to the academic literature by being the first to investigate the factors influencing the adoption of banking chatbots by firms in Malaysia. However, this study has some limitations.

Firstly, there is a lack of prior research on the adoption of banking chatbots by firms globally, let alone an emerging country in Malaysia. This lack of prior research presents several challenges: it limits the ability to draw upon established theoretical frameworks and methodologies specific to this context. Secondly, the absence of comparable studies makes it difficult to benchmark the findings of this study against similar investigations. To mitigate these limitations, the study has drawn upon the relevant literature from related fields such as technology adoption and relationship marketing. However, the novelty of this research topic in the Malaysian context highlights the need for further investigation to validate and build upon the findings of this study.

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Secondly, the researcher lacks access to the various banking chatbots for corporate customers; therefore, the researcher relied heavily on secondary sources such as official websites of the banks and third-party blogs and websites which may not provide the same level of detail or comprehensiveness as direct interaction with chatbots. This may result in potential gaps and understanding of the users' experience and pain points. To mitigate this limitation, researcher, to her best effort, relied on reputable secondary sources.

Thirdly, the result of the study is derived from a limited sample size of 32 responses which were obtained through purposive sampling. Respondents are from the professional network of the researcher. Therefore, the results may not be generalized and not representative of the business community and the various industry in Malaysia. However, the study involved owners, senior management and, management team and with their busy schedule, data collection was fairly difficult.

7.5 Future Research Suggestions

Future research could focus on the intention to adopt banking chatbots by different segments of corporate customers. Typically, in a bank, corporate customers are segmented into corporates, commercial, and SMEs, which differ in their available resources and banking needs. We suggest further research into each segment to better understand their adoption intentions.

This study focuses on the utilitarian benefits of banking chatbots, i.e.; ease of use and usefulness of banking chatbots. It is worthwhile, for future research, to investigate the impact of other constructs that could impact banking chatbot adoption by firms such as other characteristics of the banking chatbots, management's attitude towards new banking technology and the environment the firm operates in.

Further research can also be conducted with a larger number of samples based on

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probability sampling to allow for more generalized results.

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Appendix 1: Questionnaire Survey

Section 1 Consent

1. Do you agree to participate in this survey?

Yes	
No	

Section 2 Profile of the firm that you are currently attached to

2. Please choose one that best describes your position in the firm.

Owner / Major shareholder	
Chief Executive Officer / Chief Operating Officer / Managing Director / General Manager/ Director	
Chief Financial Officer / Financial Controller	
Accountant / Finance Manager / Treasury Manager / Other finance-related management position	
Others, please specify	

3. Please choose one that best describes the main business of your firm.

Agriculture, forestry and fishing	
Mining and quarrying	
Manufacturing	
Electricity, gas, steam and air-conditioning supply	
Water supply, sewerage, waste management and remediation activities	
Construction	
Wholesale and retail trade, repair of motor vehicles and motorcycles	
Transportation and storage	
Accommodation and food service activities	
Information and communication	
Financial and insurance / Takaful activities	
Real Estate Activities	
Professional, scientific and technical activities	
Administrative and support service activities	
Public administration and defense; Compulsory social activities	
Education	
Human health and social work activities	
Arts, entertainment and recreation	

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Other services activities	

4. How many employees are currently working with your firm?
_____

5. How many years your firm has been in business?
_____

6. Is there a Relationship Manager / Branch Manager / Business Manager from the bank currently assigned to your firm? (Please choose 1)

Yes	
No	
Not sure	

7. Is your firm aware of banking chatbot? (Please choose 1)

Yes (If yes, go to Question 8)	
No (If no, go to Section 3)	

8. If yes, has your firm used banking chatbot in the past 6 months? (Please choose 1)

Yes	
No	

Section 3 Brief Overview of banking chatbot and use cases in Malaysia and Singapore

A chatbot application is a computer program that utilizes Artificial Intelligence such as Natural Language Processing, image and video processing and audio analysis to simulate human conversations in their natural format i.e., text or spoken language (Bala et al.,2017).

Use Case of Business Banking Chatbot in Singapore

DBS Bank Ltd, Singapore launched Joy, for its SME customers. Its functions are:

- Check account balance
- Retrieving transactions
- Provide issued cheque status
- Check trade application status
- Guide users on the navigation of the bank's Internet banking platform.

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For queries that Joy cannot address, the customers will be connected to the Live Chat service team. Its Live Chat team service is available during business hours, i.e.; from Monday to Friday, 10 am to 7 pm, excluding public holidays.

Use Case of Business Banking Chatbot in Malaysia

CIMB Bank Malaysia launched EVA (Enhanced Virtual Assistant) for SMEs in July 2021. Its functions are:

- Queries on financial assistance / relief during Covid-19 outbreak
- Answers on queries on all SME products
- Offers Eligibility Check features

Users can leave queries and their contact details, enabling the representative from the bank to reach them.

Section 4 Factors Affecting the Adoption of Banking Chatbot

For Question 9-12, please rate the importance of each factor.

① - Not Important at all, ② - Less Important, ③ - Important, ④ - Fairly Important, ⑤ -Very Important

9. Please rate the importance of each factor in determining your firm's intention to adopt banking chatbot.

	①	②	③	④	⑤
Ease of Use					
Usefulness					
Concern on security & data Protection					

10. With regards to use of use, please rate the importance of each factor to your firm.

	①	②	③	④	⑤
Learning to use the chatbot should be easy.					
The response of the chatbot must be understandable (no difficult jargon)					
The response of the chatbot must be clear.					

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11. With regards to usefulness, please rate the importance of each factor in facilitating the decision making of your firm.

	①	②	③	④	⑤
Accurate prediction					
Personalized recommendation					
Reliable information					
Timely information					
Gain competitive advantage over competitors					

12. With regards to concern on security and data protection, please rate the importance of each factor to your firm.

	①	②	③	④	⑤
Banks to publicly disclose chatbot security breaches.					
Legal protection for chatbot users.					
Regulators to ensure that banks adhere to strong set of cyber risk governance & management.					
Banks to regularly deploy advanced chatbot security mechanism.					

Section 5 Chatbot Functionalities That Firm Likely to Adopt

13. Please indicate if your firm would use the chatbot for the following functionality:

① - Unlikely to use banking chatbot, ② - Might / Might Not use banking chatbot, ③ - Likely to use banking chatbot

Functionality	①	②	③
Check account balance			
Retrieving transactions			
Provide issued cheque status			
Navigate the bank's internet banking platform			
Retrieve foreign exchange rate			
Answers on FAQs			
Remittances			

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