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**EXAMINING FACTORS INFLUENCING ATTITUDE AND ADOPTION OF
CHATBOTS AMONG CONSUMERS**

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ABSTRACT

Chatbot implementation for assisting customers as a virtual agent can be seen as a tool for helping an organisation serve better customer service. Malaysia is among the countries forging ahead with the Fourth Industrial Revolution. One of the core technologies mentioned is adopting artificial intelligence tools such as chatbots. In the last few years, there has been a growing interest in AI-based chatbot adoption in various business transactions. However, in the context of Malaysia, research on chatbot adoption is still new and is a less explored and examined topic in the information systems domain. Furthermore, most of the studies were not guided by information systems (IS) theories. Therefore, this study aims to identify factors that influence chatbot adoption by adapting the Technology Acceptance Model (TAM) as the IS theory reference. An online survey method was applied using the purposive sampling technique. Within a month, data were collected from 135 postgraduate students of Universiti Utara Malaysia, however only 121 questionnaires were useable for subsequent analysis since there were 14 respondents who were not chatbot users. Correlational and regression analyses were used to validate the research model and assess the presented research hypotheses. This research reveals that chatbot adoption is influenced by attitudes towards chatbots. Meanwhile, attitudes towards chatbots are influenced by their perceived usefulness and ease of use. This study offers theoretical and practical contributions for academics and professionals. The limitations of the study have been addressed, and some valuable suggestions for future research work are offered.

Keywords: Chatbot, Adoption, Attitude, Perceived Usefulness, Perceived Ease of Use.

ABSTRAK

Pelaksanaan Chatbot untuk membantu pelanggan sebagai ejen maya boleh dilihat sebagai alat untuk membantu organisasi memberikan perkhidmatan pelanggan yang lebih baik. Malaysia adalah antara negara yang menuju ke arah Revolusi Perindustrian Keempat. Salah satu teknologi teras yang disebutkan ialah menggunakan alat kecerdasan buatan (AI) seperti chatbots. Dalam beberapa tahun kebelakangan ini, terdapat minat yang semakin meningkat dalam penggunaan chatbot berasaskan AI dalam pelbagai transaksi perniagaan. Walau bagaimanapun, dalam konteks Malaysia, penyelidikan mengenai penggunaan chatbot masih baru dan merupakan topik yang kurang diterokai dan diteliti dalam domain sistem maklumat. Tambahan pula, kebanyakan kajian tidak berpandukan teori sistem maklumat (IS). Oleh itu, kajian ini bertujuan untuk mengenal pasti faktor yang mempengaruhi penggunaan chatbot dengan mengadaptasi Model Penerimaan Teknologi (TAM) sebagai rujukan teori IS. Kaedah tinjauan dalam talian telah digunakan menggunakan teknik persampelan bertujuan. Selama 1 bulan, data dikumpul daripada 135 pelajar pascasiswazah di Universiti Utara Malaysia, walau bagaimanapun, hanya 121 borang soal selidik boleh digunakan untuk analisis seterusnya memandangkan terdapat 14 responden bukan merupakan pengguna chatbots. Analisis korelasi dan regresi digunakan untuk mengesahkan model penyelidikan dan menilai hipotesis kajian yang dibangunkan. Penyelidikan ini mendedahkan bahawa penggunaan chatbot dipengaruhi oleh sikap terhadap chatbots. Sementara itu, sikap terhadap chatbot dipengaruhi oleh tanggapan kegunaan dan tanggapan kemudahan penggunaannya. Kajian ini menawarkan sumbangan teori dan praktikal untuk ahli akademik dan profesional. Batasan kajian telah ditangani, dan beberapa cadangan berharga untuk kerja penyelidikan masa depan ditawarkan.

Kata Kunci: Chatbot, Penggunaan, Sikap, Tanggapan Kegunaan, Tanggapan Kemudahan Penggunaan.

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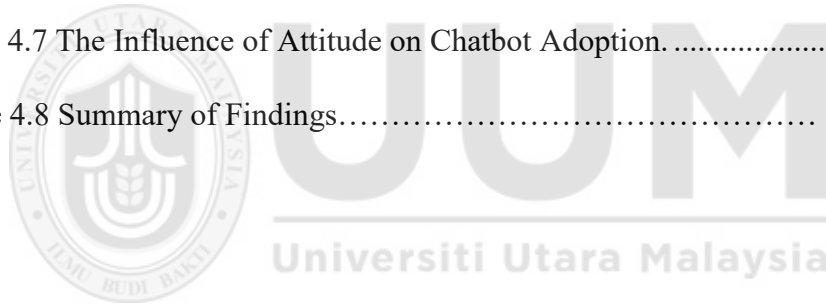
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CHAPTER ONE

INTRODUCTION

1.1 Introduction

The concept of AI-based technology, in particular chatbots, has generated a lot of interest and has been the central focus of research. The purpose of this study is to examine the factors influencing consumers' adoption of chatbots in their daily transactions. This chapter introduces the background of the study, problem statement, research objectives, research questions, the significance of the study, and thesis organization.

1.2 Background of the Study

Recent technological developments have transformed the way consumers and financial institutions interact with each other (Mónika-Anetta et al., 2021). Moreover, the COVID-19 pandemic has led to a rapid shift to digital technologies and banks have transitioned to remote sales and provision at a fast pace (Bensley et al., 2020). The rise of artificial intelligence (AI) based technology is contributing extensively to this transformation as more and more banks have begun to implement AI-based applications to deepen customer relationships, provide more personalized offers, detect and prevent fraud, improve processes for anti-money laundering, and cost-saving (Business Insider, 2021). One very popular and impactful form of technological development is the implementation of AI-based chatbot technology (Lee & Park, 2019)

Chatbots are software agents that provide access to services and information through interaction in the users' everyday language through text and voice (Brandtzaeg & Følstad, 2018). The term 'chatbot' partly overlaps with the terms 'conversational agents' and 'dialogue systems' and may refer to task-oriented as well as non-task-oriented solutions.

Chatbots represent one of the most frequently used types of human–computer interaction (HCI). They are virtual customer assistants and “AI technology products that can ask and answer customers through online channels via text message and web chat” (Ho et al., 2018). A chatbot is an application to which humans may ask their questions freely and without limitation (Karri & Kumar, 2020). Chatbots may be provided with a messaging infrastructure or even voice and provide information within the time frame and limits determined by customers.

Chatbots that interact with users through text or voice are frequently used in sales, marketing, customer support, technical support, and training (Smutny & Schreiberova, 2020). Banks often use chatbots in customer relations management, sales, marketing activities, investment analysis, and recommendations. They provide fast services and solutions, personalized digital services, and cost-effective access to customer service. As mentioned by the news website Business Insider (2019), according to a report from research and markets, the chatbot market size is projected to grow from \$2.6bn in 2019 to \$9.4bn by 2024.

Customer service, retail, and e-commerce represent those market segments that are projected to grow their market size at the highest compound annual growth rate, owing to the increasing demand to provide customers with a seamless omnichannel experience (Business Insider, 2019). The ease and accessibility of building a chatbot, the substantial developments in artificial intelligence (AI), and the increased usage of messaging apps are the main factors pushing the chatbot industry forwards.

Chatbots are currently grabbing the attention of a growing number of researchers, addressing their interest in visual-conversational cues and interactivity of chatbots (Go & Sundar, 2019; Chattaraman et al., 2019) as well as their potential role in enhancing customers' satisfaction (Chung et al., 2018) and company perceptions (Araujo, 2018).

In line with the fourth industrial revolution globally and the National Transformation 2050 (TN50), Malaysia is moving towards AI innovation (Noor & Mansor, 2019). Since the Malaysian government has taken a great interest in pursuing AI-enabled technologies, several initiatives have been commenced by agencies such as the Malaysian Digital Economy Corporation (MDEC) (Abdullah et al., 2017). MDEC has announced that it has established an AI unit with local and international experts to support the National AI Framework to ensure Malaysia is on the right track to develop an AI ecosystem in the country. As a result, new technical skills and higher-level capabilities are expected from the current workforce (EAC Focus, 2022).

Chatbots have gained popularity in Malaysia, and they are being used in various industries and sectors. Companies in Malaysia are leveraging chatbots to enhance customer service, streamline operations, and provide personalized experiences. Here are a few examples of how chatbots are used in Malaysia:

1. Customer Service: Many businesses in Malaysia use chatbots to provide 24/7 customer support. These chatbots can handle frequently asked questions, provide product information, assist with troubleshooting, and even initiate basic transactions.

2. E-commerce: Online retailers in Malaysia utilize chatbots to improve the shopping experience. Chatbots can help customers find products, provide recommendations based on their preferences, assist with order tracking, and handle payment inquiries.
3. Banking and Finance: Banks and financial institutions in Malaysia have implemented chatbots to offer customer support, answer account-related queries, provide balance information, and facilitate transactions like fund transfers and bill payments.
4. Travel and Tourism: Chatbots are used in the travel industry to assist tourists with inquiries about flights, accommodations, tourist attractions, and local information. They can also provide personalized travel recommendations and assist with booking reservations.
5. Government Services: Some government agencies in Malaysia have integrated chatbots on their websites or mobile applications to provide information and support to citizens. These chatbots can assist with services like passport applications, license renewals, and general inquiries.
6. Healthcare: In the healthcare sector, chatbots are used to provide basic medical information, answer common health-related questions, and assist with appointment scheduling. They can also offer advice on self-care and provide reminders for medication.
7. Education: Chatbots are being used in educational institutions in Malaysia to provide students with academic support, answer questions related to course registration, offer career guidance, and assist with administrative tasks.

These are just a few examples of how chatbots are utilized in Malaysia. With advancements in natural language processing and artificial intelligence, chatbots continue to evolve, providing more sophisticated and personalized interactions to users. Chatbots are widely used in Malaysia across various industries and sectors. They are employed by businesses to enhance customer service, automate processes, provide information, and engage with users.

Here are a few examples of chatbots in Malaysia:

1. **Maybank's MAE ChatBot:** Maybank, one of Malaysia's largest banks, has its Mobile Virtual Assistant (MAE) ChatBot. It assists customers with banking transactions, balance inquiries, fund transfers, and other account-related inquiries through popular messaging platforms like WhatsApp and Facebook Messenger.
2. **AirAsia's Ava:** Ava is the virtual assistant of AirAsia, a well-known low-cost airline in Malaysia. Ava assists customers with flight bookings, rescheduling, and baggage inquiries, and provides flight-related information. It helps streamline the customer experience and provides quick responses to common queries.
3. **MySejahtera:** MySejahtera is a mobile application developed by the Malaysian government to manage COVID-19-related information. The app includes a chatbot feature that provides users with information on COVID-19, vaccination centers, testing facilities, and guidelines issued by the government.
4. **Lazada Malaysia's Chatbot:** Lazada, an e-commerce platform in Malaysia, employs a chatbot to assist customers with product inquiries, order tracking, and general customer support. The chatbot offers quick responses and helps customers navigate through the online shopping process.

5. Celcom's Chatbot: Celcom, a major telecommunications company in Malaysia, has a chatbot that assists customers with mobile service inquiries, billing information, plan upgrades, and technical support. The chatbot is accessible through Celcom's website and mobile app.

Applying a chatbot to customer service has gained in popularity, benefiting both firms and customers. On the customer side, with traditional customer service, customers usually suffer from queuing and waiting for a response to solve their issues due to a lack of service personnel, which may cause a negative service experience (Brandtzaeg & Folstad, 2017). By contrast, virtual agents, such as chatbots, are capable of providing immediate responses and relevant information to customers' problems (Alalwan et al., 2017).

Additionally, Dospinescu et al. (2019) argued that waiting times, transaction costs, and competitive services were the most important factors determining customer satisfaction in the relationship with service providers (i.e., banks). Hence, responsive chatbot-aided customer service is thereby considered the key to customer satisfaction (Dale, 2016). On the firm side, chatbot services can handle a large number of customers' requirements, 24/7, with the absence of employee engagement, enabling firms to effectively reduce operating costs (El-Masri & Tarhini, 2017). From a long-term perspective, applications of chatbots, together with other technology-enabled solutions, are expected to enhance the sustainable development of businesses (Go & Sundar, 2019). For these benefits, chatbots are implemented in various industries from banking, retail, and healthcare to tourism and hospitality.

Currently, chatbots are used for marketing, customer service, and sales (Wirtz et al., 2018; Ashfaq, Yun, Yu, & Loureiro, 2020). Consumers can use chatbots to talk and communicate with one another (Przegalinska et al; 2019), either for product information, food ordering, or to place a virtual order (Przegalinska et al., 2019; Pizzi, Scarpi, & Pantano, 2021). Chatbots can aid businesses with technical support, guided selling, website navigation, help desk support, and customer service. Other chatbot applications include weather forecasting (Facebook's Poncho chatbot), news updates, booking flights, ordering pizzas, or delivering flowers, food recipes, health care, and mortgage.

Around 80 percent of firms expect to use or offer chatbots to keep in touch with their customers around the clock. Customer communication with brands is aided by messaging applications and new technology (such as machine learning and AI). Companies recognized the need for these applications for more effective consumer communication. As a result, many businesses have begun to use messaging programs since they can reply to and act on customers' requests and inquiries.

1.3 Problem Statement

The rise of the internet and digitization have continually evolved. In this digital era, chatbots are critical technological tools equipped with artificial intelligence that allows businesses to interact with their customers. Customers can use this technology to search for information, make purchases, or request after-sales services via their computers or mobile devices (De Cosmo et al., 2021).

The use of artificial intelligence (AI) is considered crucial in Industry 4.0 as several AI-powered technologies have evolved with the potential to significantly improve people's quality of life in a variety of sectors, including healthcare sectors (Bajwa et al., 2021; Limna et al., 2021). Despite these prospects, chatbots are being challenged by serious exposure to web attacks which continue to pose challenges to their effective utilization (Kaushik et al., 2015). Also, there are growing concerns about privacy and data control and management, questioning how the big data generated through these chats are being managed (Dwivedi et al., 2019). The human resources needed to develop and integrate the chatbot as a digital transformation tool also present an additional challenge for its adoption and use (Shum et al., 2018; Dwivedi et al., 2019).

Despite several advantages, chatbots cause some concerns. First, they may deviate from the pre-programmed script and misinterpret customers' questions and give wrong answers (Eren, 2021). This can cause frustration on the part of customers. Second, security, privacy, and spam management may be an issue for companies participating in mobile marketing via chatbots (Jimenez-Barreto, Rubio & Molinillo, 2021). Malik et al (2021) addressed that usefulness, ease of use, and risks play an active role in how customers perceive chatbots.

Productivity is the primary reason why customers use chatbots (Aslam et al, 2022). Therefore, users who think it is wiser to use chatbots despite possible risks are likely to continue to use them. A study from Microsoft stated that by 2025, AI will approximately double the rate of revolution and enhance employee productivity improvements by 70 percent in Malaysia (Paramasivam, 2019). However, despite having momentum, most Malaysian companies face challenges in adopting AI-induced banking tools (Yun, 2019).

Although the benefits such as cost-effectiveness and better customer service derived from AI applications are well established in the literature (Crosman, 2018), research on AI adoption is very limited. Prior studies in this field have concentrated on techniques and applications (Walczak, 2016), ignoring the customer perspective. While Malaysian customers are prepared to use various services that rely on AI (Unisys Corporation, 2018), it is still crucial to clearly understand the factors that may influence their decisions. Furthermore, the limited research on AI adoption in various industries shows that the implementation stage is still modest (Kaya et al., 2019).

Many research studies on AI chatbots have focused on their technological features (Adamopoulou & Moussiades, 2020; Walczak, 2016; Wang et al, 2023), consumers' inferences of human characteristics to AI chatbots, and their consequences on interaction (Pantano & Pizzi, 2020). While AI chatbots are an emergent technology in e-commerce, little research has investigated the consumers' perception and usage of this technology (Oguntosin & Olomo; 2021; Cheng et al., 2021). To ensure the long-term deployment of AI chatbots, empirical research must be conducted on customers' perceptions and acceptance of chatbots in this context (Moriuchi et al., 2021; Wang et al., 2023).

Most importantly, the majority of technology acceptance models have been developed and modified in Western countries, particularly in Europe and South America (Kripanont, 2016). According to Linjun (2018), information systems research reveals that there are different technology adoption and usage patterns when cultural difference is taken into account.

The determinants of different patterns of user perception and acceptance across cultures are still unclear, and therefore It is controversial to admit whether the models/theories of technology acceptance that have been developed, extended, and modified in Western countries could be applied in other countries or cultures, specifically in Malaysia.

As been discussed above, AI chatbots, while efficient, pose various challenges such as privacy, consent, transparency, and accountability. Addressing these challenges requires continuous improvement, advancements in chatbots, and a user-centric approach in chatbot development. As technology continues to evolve, exploring chatbots and their applications can be a valuable step towards improving efficiency, user experiences, and overall business processes. Consequently, this study intends to investigate the influence of perceived ease and perceived usefulness on attitude towards chatbots and the relationship between attitude and chatbots adoption among consumers.

1.4 Research Objectives

The general objective of this study is to investigate the factors that influence consumers' adoption of using chatbots. The specific objectives are as follows:

- i. To examine the influence of perceived usefulness and perceived ease of use on attitudes toward chatbots.
- ii. To investigate the relationship between attitudes towards chatbots and chatbots adoption among consumers.

1.5 Research Questions

To achieve the objectives, this research addresses the following questions:

- i. What are the influences of perceived usefulness and perceived ease of use on attitudes towards chatbots?
- ii. What is the relationship between attitudes towards chatbots and their adoption among consumers?

1.6 Scope of Study

This study examines the factors influencing consumers' adoption of using chatbots in their e-commerce activities. Among the popular chatbots in Malaysia are Shopee Malaysia Chatbot, Boost Chatbot, MyEG Virtual Assistant, Grab Malaysia Chatbot, ChatGPT, CIMB EVA chatbot, HALI (Hong Leong Bank), Tesco AiChat, Mydin, Billie (IKEA), Putri (PLUS), Siti (MyGCC), MHchat (Malaysia Airlines), AVA (AirAsia Virtual Allstar) etc.

In this study, university students were chosen as a sample of the study. The reason is that university students are the Millennial generation that has a high attraction to technology (Yeap, Ramayah & Soto-acosta, 2016). Besides that, university students around the world not only use smartphones and tablets during university days but also for personal purposes (Yeap, et al., 2016). In addition, students' perceptions and consumption behaviour are similar to other user's characteristics (Sahi et al., 2016). They also mentioned in their research that students can reduce the impact of non-controllable confounding variables as they are considered homogenous.

1.7 Significance of the Study

The findings of this study are expected to make a substantial contribution to theoretical and applied knowledge in the field of chatbot technology.

1.7.1 Theoretical Contributions

The present study contributes to the existing body of knowledge by providing an exploratory analysis of the customers' viewpoint regarding chatbot usage. To keep up with the technological transformation of the e-commerce sector, marketers need to better understand the consumers' needs to effectively introduce AI such as chatbots. This study widens the scope of the AI adoption decision by explicitly incorporating consumers' perspectives, which may serve as a good source of information for practitioners while devising AI adoption strategies. Although chatbot technology is still relatively new to Malaysia, many service providers are eager to innovate and automate to improve customer communications. The ultimate goal is to make communication faster and more effective, but understanding customer preferences is necessary, especially through their experiences.

1.7.2 Practical Contributions

The results of the study will facilitate chatbot developers to design chatbots that can facilitate users effectively. Chatbot providers will come to know how they can appropriately design the chatbot that can benefit the users. They will be aware of factors influencing the acceptance of chatbots. Chatbot developers will learn about chat features aiding in the acceptance of chatbots. By considering these features, they can be assured to benefit from chatbot as a platform to maximize customer satisfaction and communication with customers.

The research outcome is expected to provide an overview of the current consumers' experiences towards adopting chatbots in the e-commerce-related industry. The feedback from the end-user is crucial as input is to be considered by the e-commerce provider before the implementation. The fact is that, due to the ever-increasing capabilities of Artificial Intelligence, there is no limit to what chatbots can do today. Future-focused have huge potential to carefully design and develop their online conversation agents to match different market segments.

1.8 Definitions of Key Terms

- a. Chatbots - Chatbots are software agents that provide access to services and information through interaction in the users' everyday language through text and voice (Brandtzaeg & Følstad, 2018).
- b. Adoption – Adoption refers to the acceptance and integration of the chatbot into a user's routine or activity (Wang et al, 2023).
- c. Attitude - Attitude is a concept that refers to an individual's feelings, opinions, or beliefs about chatbots (Kwangsawad & Jattamart, 2022).
- d. Perceived usefulness - Perceived usefulness refers to the degree to which individuals believe that a particular technology or system will enhance their performance or make their tasks easier (Moslehpour et al. (2018).
- e. Perceived ease of use - Perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort (Abdullah et al. (2017).

1.9 Organization of the Thesis

This thesis comprises five chapters. The first chapter provides the background of the study, the problem statement, the objectives of the study, the research questions, the theoretical framework, and the potential contributions of the study.

The second chapter focuses on a review of the existing literature related to the variables considered in this study including the theory of the Technology Acceptance Model (TAM). Based on the literature reviewed, this chapter subsequently discusses the theoretical framework adopted and the hypotheses generated for this study.

The third chapter discusses research methodology. This includes research design, variables measurements, population and sample involved, data collection procedure, questionnaire design, and the result of a pilot test. Statistical techniques used for inference of this study are explained at the end of this chapter.

The fourth chapter is related to the findings of this study. The profiles of respondents, descriptive analyses, and the result of hypotheses testing are presented. At the end of this chapter, a summary of the results is presented.

Finally, chapter five focuses on the discussion of the findings and theoretical and managerial implications. This chapter ends with limitations of this study and recommendations for future research and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the important variables mentioned in this study. The chapter is divided into two parts: the first identifies the main variables in this research from a literature review to provide a better understanding of the research topic and problem; finally, the hypotheses development and framework of the study are presented at the end of this chapter.

2.2 The Development of Chatbot

Industry 4.0 emphasizes the humanization of technology, where it gives focuses on the Internet of Things (IoT) and Artificial Intelligence (AI). Humanization of technology can reduce the mistakes done by the human workforce and it can help businesses cut down unnecessary costs (Adamopoulao & Moussiades, 2020). One of the examples of humanization of technology is “chatbot”, or what we call as “chat robot”.

As mentioned by Eren (2021), a chatbot is a computer program or an artificial intelligence (AI) application that is designed to simulate human-like conversations or interactions with users through text-based or voice-based interfaces. Gumus and Cark (2021) highlighted that the main purpose of a chatbot is to provide automated responses and assist users in finding information, completing tasks, or engaging in a conversation. Yu et al. (2022) added that Chatbots use natural language processing (NLP) and machine learning techniques to understand user queries, interpret their intent, and generate appropriate responses.

According to Wen et al. (2023), chatbots can be categorized into two types:

1. **Rule-Based Chatbots:** These chatbots follow predefined rules and decision trees to respond to user inputs. They are programmed with specific patterns and responses and can handle simple, structured interactions. Rule-based chatbots work well for handling frequently asked questions or providing scripted responses.
2. **AI-Powered Chatbots:** These chatbots leverage machine learning algorithms and NLP techniques to understand and generate responses. They can learn from user interactions and improve their understanding and accuracy over time. AI-powered chatbots are more flexible and can handle complex, unstructured conversations with users.

Chatbots have various applications across different industries. They are commonly used for customer support, providing information and recommendations, assisting with transactions, automating tasks, and enhancing user experiences. Chatbots can save time and resources for businesses by handling repetitive and common inquiries, while also offering 24/7 availability to users. The development of chatbots involves designing conversational flows, implementing NLP models, integrating with relevant systems and databases, and continuously improving the chatbot's performance through user feedback and iterative development (Nazim Sha & Rajeswari, 2019). Overall, chatbots are powerful tools that enable automated and interactive communication between users and computer systems, providing efficient and personalized experiences in various domains.

Chatbots can be found on various platforms, including websites, messaging apps, mobile apps, and virtual assistants. At the early stage, the chatbot is only used to solve frequently asked questions (FAQ) by the customers. However, as the e-commerce industry grows

rapidly, and when the live chat system is not able to handle all the customers' requests and questions anymore, a chatbot is then modified into a more advanced phase (Frank, Chrysochou & Mitkidis, 2023). The development of chatbots worldwide has been rapidly evolving over the years. Chatbots are computer programs designed to simulate conversations with human users, typically through text-based interfaces. They can be found in various applications, such as customer support, virtual assistants, and even as standalone conversational agents.

Here are some key aspects of the development of chatbots worldwide:

1. **Advancements in Artificial Intelligence (AI):** AI technologies, including natural language processing (NLP) and machine learning, have significantly contributed to the development of chatbots. These technologies enable chatbots to understand and respond to user queries more accurately.
2. **Industry Applications:** Chatbots are widely used in industries such as e-commerce, healthcare, banking, and customer service. They can provide 24/7 support, answer frequently asked questions, assist with transactions, and help streamline business processes.
3. **Messaging Platforms:** Chatbots are integrated into popular messaging platforms like Facebook Messenger, WhatsApp, and Slack, allowing businesses to engage with customers conversationally directly through these platforms.
4. **Voice-Enabled Chatbots:** With the rise of virtual assistants like Amazon Alexa, Google Assistant, and Apple's Siri, voice-enabled chatbots have gained prominence. These chatbots leverage speech recognition and synthesis technologies to provide voice-based interactions with users.
5. **Chatbot Frameworks and Tools:** There are numerous frameworks and development tools available to create chatbots, such as Microsoft Bot Framework, Dialogflow,

IBM Watson Assistant, and Rasa. These tools provide developers with the necessary resources to build, train, and deploy chatbot applications.

6. **Multilingual Support:** Chatbots are being developed to support multiple languages, enabling businesses to engage with users from diverse linguistic backgrounds.
7. **Personalization and Contextual Understanding:** Improvements in AI allow chatbots to understand user preferences, personalize interactions, and maintain context throughout a conversation. This enhances the user experience by providing more relevant and tailored responses.
8. **Integration with Other Systems:** Chatbots can integrate with existing systems and databases, allowing them to retrieve information and perform tasks on behalf of users. This integration expands their capabilities and makes them more versatile.

The development of chatbots worldwide is an ongoing process, driven by advancements in AI, user demands, and technological innovations (Aslam et al., 2022). As the field continues to evolve, we can expect more sophisticated and intelligent chatbot solutions to emerge.

2.3 Chatbot in Malaysia

Today, every organization depends on Information and Communication Technology (ICT) for efficient service delivery and cost-effective application of technological resources. With a growing preference towards faster services and acceptance of Artificial Intelligence (AI) based tools in business operations globally as well as in Malaysia. The global chatbot market is going to accelerate in the next decade. In the era of AI, the chatbot market is witnessing extraordinary growth with the increased demand for smartphones and increased use of messaging applications.

In the past few years, the food delivery business, finance, and the E-commerce industry have embraced chatbot technology. Chatbot that is used in today's world is more humanize since it can provide engagement with the customers by chatting to them without the restrictions of time and location.

In Malaysia, the development of chatbots has been gaining momentum in recent years. Organizations across various industries have recognized the value of chatbots in improving customer service, enhancing user experiences, and streamlining business processes (Tan & Lim 2023). Below are some key aspects of the development of chatbots in Malaysia:

1. **Business Applications:** Malaysian businesses, including banks, e-commerce platforms, telecommunications companies, and government agencies, have started adopting chatbots to automate customer support and engage with their customers. Chatbots help handle common inquiries, provide information, and assist with transactions.
2. **Language Support:** Chatbots in Malaysia are often developed to support multiple languages, including Malay, English, and Chinese. This ensures that users can interact with the chatbots in their preferred language, catering to the country's multilingual population.
3. **Customer Support:** Chatbots are being used extensively for customer support in Malaysia. They provide 24/7 assistance, answer frequently asked questions, help with troubleshooting, and guide users through various processes. This reduces the workload on human customer support agents and improves response times.
4. **E-commerce Integration:** Chatbots are integrated into e-commerce platforms in Malaysia to provide personalized product recommendations, assist with purchases,

track orders, and handle customer inquiries. They enhance the overall shopping experience by offering real-time assistance to users.

5. **Virtual Assistants:** Virtual assistants powered by chatbot technology are becoming popular in Malaysia. These assistants can perform tasks like setting reminders, providing weather updates, answering general knowledge questions, and even controlling smart home devices.
6. **Mobile Applications:** Chatbots are integrated into mobile applications in Malaysia, enabling users to interact with businesses and services seamlessly through chat-based interfaces. This allows for convenient and efficient communication on mobile devices.
7. **Government Services:** The Malaysian government has also embraced chatbot technology to improve citizen services. Chatbots are used to provide information on government initiatives, assist with administrative procedures, and address citizen queries.
8. **Chatbot Development Community:** The chatbot development community in Malaysia is growing, with developers and startups focusing on building chatbot solutions for various industries. They leverage platforms and frameworks like Dialogflow, Microsoft Bot Framework, and custom-built solutions to create chatbot applications.

The development of chatbots in Malaysia is driven by the need to enhance customer experiences, improve operational efficiency, and keep up with technological advancements (Zainol et al., 2023). As the adoption of chatbots continues to expand, we can expect to see further innovation and integration of chatbot technology across different sectors in the country.

In Malaysia, the usage of chatbots can be seen widely in the Facebook Messenger app. Recently, many small and medium businesses in Malaysia are using the Facebook Messenger Chatbot to keep in touch and respond to the inquiries of customers. For example, GDEX, a courier service in Malaysia, uses its Messenger chatbot to engage with customers in parcel-related matters. In addition, CIMB bank in Malaysia also launched its chatbot which is named EVA to solve customers' banking-related inquiries. Furthermore, Malaysia Airlines also launched its new chatbot named Amadeus chatbot which serves through the platform named MHchat, where it provides a simpler way for clients to book flight tickets, create a secure payment, and verify travel iteration.

To conclude, chatbots are increasingly becoming important gateways to digital services and information—taken up within domains such as customer service, health, education, and work support. Chatbots have become an essential tool for businesses to provide efficient and personalized customer service. However, a number of challenges remain to be resolved before the potential of chatbots can be fully realized. To help advance knowledge in this emerging research area, more research agenda in the form of future directions and challenges need to be addressed by chatbot research.

2.4 Technology Adoption Model (TAM)

Technology Acceptance Model (TAM) is a theory on the usage of information technology systems, which is considered very influential and is generally used to explain the individual acceptance of information technology system usage (Gunawan & Nugroho, 2019). Technology Acceptance Model (TAM) is an extensively used and acknowledged model in technology adoption research and it investigates the behavioral intention to adopt new technology (Lai, 2017). TAM was introduced by Fred Davis in 1986 as shown in

Figure 1 below. An adaptation of the Theory of Reasonable Action, TAM is specifically tailored for modeling users' acceptance of information systems or technologies (Pillai & Sivathanu, 2020).

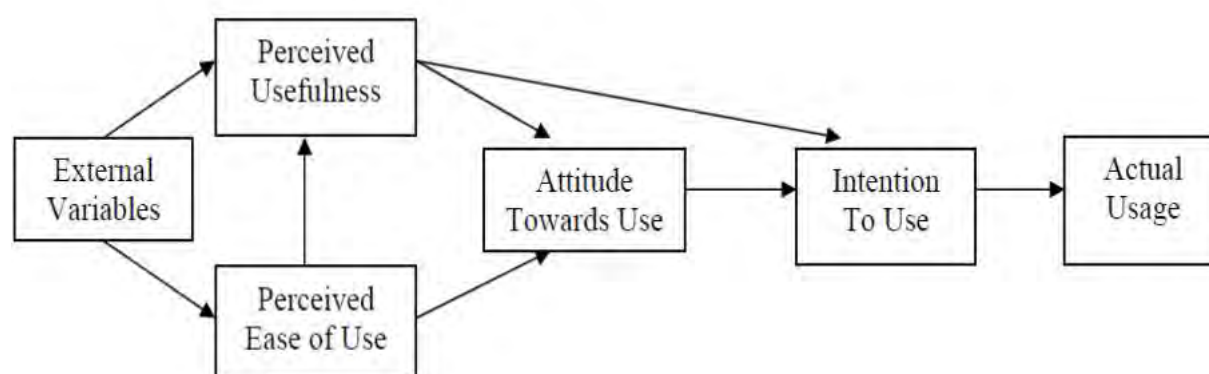


Figure 1
Original Technology Acceptance Model (Davis, 1986).

The TAM originated as an adaptation of the more generalized Theory of Reasoned Action (TRA) and was developed more specifically later to predict and explain technology usage behaviour. It was developed to identify the factors which lead to users' acceptance or rejection of technology by integrating technological aspects with organizational behaviour concepts (Davis et al., 1989; Davis, 1989). Two important factors are perceived usefulness and perceived ease of use. Shroff et al. (2018) reported that by manipulating these two determinants, system developers can have better control over users' beliefs about the system and so can predict their behavioural intention and actual usage of the system.

The model suggests that perceived usefulness and perceived ease of use influence users' attitudes toward using new technology (Yuen et al., 2021). User shows positive feelings about the new technology if he or she believes it is good for their job performance, thus users' attitudes towards using new technology will be more positive. Such attitudes will

furthermore influence the user's behavioral intention and actual system use (Kemp, Palmer & Strelan, 2019). According to Venkatesh (2015), TAM is an extensively used and acknowledged model in technology adoption research and it investigates the behavioral intention to adopt new technology. The user's conviction regarding the perceived ease of use (PEA) and perceived usefulness (PUL) of new technology impacts the user intention (Davis, 1989). TAM was used to study the adoption of social media for selecting tourist destinations (Hua et al., 2017), self-service hotel technology (Kaushik et al., 2015), Web-based self-service technology in the hospitality industry (Lee, 2013), and e-tourism in Egyptian tourism companies (Ghanem et al., 2017).

2.5 Adoption of Chatbots Technology

With the advanced and dynamic growth of technologies, how fast consumers are accepting these technologies depends on several factors such as availability of technology, convenience, consumers' need, security, etc. Chatbot adoption refers to the acceptance and integration of the chatbot into a user's routine or activity (Wang et al, 2023). There have been many researchers addressing the consumers' adoption of new technologies (Meuter et al., 2018; Dapp et al., 2016; Lai & Zainal, 2016). The adoption of chatbot technology is an emerging subject of research and many studies have been done worldwide in various contexts. The studies conducted for the adoption and usage of chatbot technologies are travel, tourism, and hospitality companies (Ivanov & Webster, 2019), service chatbots (Sheehan, 2018), hotel interactive technologies (Morosan & DeFranco, 2019), service robots (Belanche et al., 2020; Mende et al., 2019), chatbots in general (Brandtzaeg & Følstad, 2017) and chatbots adoption in Siri case (Io & Lee, 2019).

Most online shopping sites (e-commerce websites) have chatbots because they have a wide range of products with a large and complex database in each of their categories (Sheehan, Jin & Gottlieb, 2020). Those products are spread over many websites and categorized according to their types. Navigating those websites to find relevant and personalized results can be unintuitive, time-consuming, and exhausting. Users visit e-commerce websites to search for specific products or just to do window shopping (Tzeng et al., 2021). Search tools use keyword matching to display multiple results, some of which may be relevant, while others may not. This is supported by Almugari et al. (2022) that irrelevant results lead to unpleasant user experiences. A customer who uses vague keywords to describe a product/service is likely to get irrelevant results. Moreover, conventional systems cannot help a user who knows little about the product he/she is looking for.

Wang et al (2023) reiterate that chatbots try to overcome these problems by offering a more intuitive interaction between e-commerce sites and users. They interact with customers and suggest the right products. The customer enters keywords directly in the message window. The chatbot matches that input with programmed responses and finds the right or relevant products for the customer (Oguntosin & Olomo, 2021). All brands/companies should benefit from chatbots because they are user-friendly and convenient (Chiu & Cho, 2019).

2.6 The Influence of Attitude on Chatbot Adoption

Attitude is a concept that describes a person's intentions to behave in specific ways in various contexts (Davis, 1989; Fishbein, 1967; Jattamart & Leelasantitham, 2019). Previous studies have examined intentions related to technology adoption, such as their

relationship with user attitudes toward e-banking and attitudes toward using a smartphone chatbot for shopping (Kwangsawad & Jattamart, 2022; Lai, 2017). Attitude toward using technology is a manifestation of someone's willingness to adopt the presence of technology before making it a habit (Kemp, Palmer, & Strelan, 2019). It was found that users' attitudes play an essential role in their satisfaction with chatbots (Ahmad et al., 2020; Kasilingam, 2020). Indeed, when a chatbot can meet the customer's basic needs, this condition leads the customer to have a positive attitude, increased satisfaction, and increased intention to use the chatbot (Wang et al., 2023). However, if users are dissatisfied with chatbot conversations or using the technology, this can significantly reduce their intentions to use chatbots.

Attitude toward using a particular system is a major determinant of the intention to use that system, which in turn generates the actual usage behavior. The underlying premise is that individuals make decisions rationally and systematically based on the information available to them (Yuen et al., 2021). Many existing studies in the context of e-business have shown that an individual's attitude directly and significantly influences behavioral intention to use a particular e-business application (Sitthipon et al., 2022; Tan & Lim, 2023; Zainol et al., 2023). For example, Gumus & Cark (2021) found a strong positive relationship between an individual's attitude toward purchasing online and the user's behavioral intention. De Cicco, Silva, and Alparone (2020) studied the acceptance of millennials' attitudes toward chatbot wireless technologies by users. Also, Mun, So, and Jeong (2019) found that attitude significantly affects the intention to adopt mobile banking. They demonstrated support for the relationship between attitudes toward using mobile commerce/ banking and behavioral intention.

Consumers with more positive attitudes are more likely to have decisions to buy online (Meng-Hsiang et al., 2014). Hsu et al., (2013) similarly argue that the attitude of consumers shopping online positively influences attitudes and decisions to re-visit and the decision to buy, therefore, in chatbot, it is believed that consumers with more positive attitudes will be more likely to adopt chatbot in doing online transaction.

2.7 The Influence of Perceived Usefulness on Attitude towards Chatbot

Perceived usefulness refers to individuals having faith in information technology being able to increase performance (Moslehpour et al. (2018). Herrero and Martín (2018) define it as “the degree to which an individual considers that using a particular system will improve the performance in a task.” An individual who thinks that a system, a device, or an app can help him/her complete a task is more likely to use it again Raza, Umer & Shah (2017). In a customer setting, perceived usefulness is described as the extent to which customers have faith that the technology can provide interest in performing specific tasks (Keno, 2020).

Perceived usefulness becomes the determiner of a system, adoption, and behavior of the users. Technology can be said to be successful if it has the value of usefulness needed by the customer. According to Rahmi, Birgoren, and Aktepe (2018), perceived usefulness has a dominant influence on online shopping decisions. It is supported by Indarsin and Ali (2017) and Wilson (2019) that perceived usefulness can influence consumers' online shopping decisions. Iriani and Andjarwati (2020) also stated that perceived usefulness has a positive influence on attitude and intention to online shopping.

Many studies have found the impact of perceived usefulness on attitudes toward new technology services (Tubaishat, 2018; Chen & Aklikokou, 2020; Raza, Umer & Shah, 2017). This shows that the more useful a person perceives a technology, the more likely it is that he/she will accept it (Gunawan, Ali & Nugroho, 2019). Abdullah et al. (2017) also state that perceived usefulness is a critical factor that positively affects purchase intention in hotel booking.

2.8 The Influence of Perceived Ease of Use on Attitude towards Chatbot

According to Abdullah et al. (2017), perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort." According to Wilson, Keni, and Tan (2021), perceived ease of use is a belief in ease of use, namely the level at which the user believes that the technology/system can be used easily and without problems. More specifically, a technology is more favorable for use than another if it is most likely to be approved by users (Irani & Andjarwati, 2020). In other words, the less complicated a technological application is perceived to be, the more likely the technology will be used.

Perceived ease of use gives rise to users' attitudes towards technological devices, which affect their intention to use those devices (Raza, Umer & Shah, 2017). Tubaishat (2018) addressed that the frequency of use and interaction between the users with the system are also able to show the ease of use. The more commonly used system shows that the system is better known, easier to be operated, and easier to be used by its users.

In addition, Mensah (2020) suggested that perceived ease of use is also able to increase consumer acceptance related to the product or services. Hanjaya, Kenny & Gunawan (2019) stated that perceived ease of use influences attitudes toward mobile apps. It is also supported by Abdullah et al. (2017) that perceived ease of use is proven to have a positive and significant preference toward online hotel booking.

Chatbot developers interested in reaching a large number of customers should find ways to make sure that users consider chatbots easy to use. In a customer setting, ease of use is described as customers having faith in a chatbot that is free of effort (Kwangsawad & Jattamart, 2022). Past researchers have studied the relationship between attitudes toward new technology services and ease of use (Kuberkar & Singhal, 2020; Pillai & Sivathanu, 2020) and have adopted ease of use as a significant driving antecedent in predicting use attitudes toward chatbots (Ukpabi et al., 2019; Wang et al., 2023).

According to TAM, perceived ease of use affects a person's attitude toward using the system. The existing studies suggest that ease of use is a major attribute of e-business applications such as Internet commerce (Alshammari & Rosli, 2020; Indarsin & Ali, 2017), online banking (Mutahar et al., 2018), and mobile commerce (Wilson, 2019). Users would be concerned with the effort required to use that application and the complexity of the process involved. Such perceived ease of browsing, identifying information, and performing transactions should enable favorable and compelling individual experiences (Nugroho, Bakar & Ali, 2017).

2.9 Research Framework

Underpinned by the Technology Acceptance Model (TAM), the purpose of this study is to determine whether attitude towards chatbots is influenced by perceived usefulness and perceived ease of use of using chatbots and to establish the relationship between attitude and adoption of chatbots. Thus, the research framework for this study is shown in Figure 2.1 below.

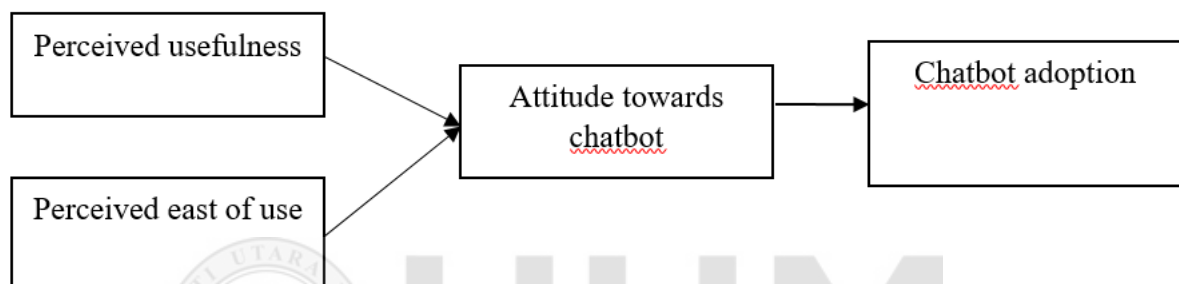


Figure 2

The Research Framework

2.10 Hypotheses Development

Tsai et al. (2019) analyzed the association between individual motivation and user acceptance of a knowledge management system. The results demonstrate that whether the use of a knowledge management IS can improve users' work performance, productivity, and efficiency will affect users' frequency of using the system. The results show a positive relationship between perceived usefulness and users' intention to use. In addition, Mensah (2020) suggested that perceived ease of use is also able to increase consumer acceptance related to the product or services.

Chiou and Fang (2017) explored users' behavior in using the internet and concluded that frequently updating useful information on a website can affect users' preferences to use the website. The study proved the positive relationship between perceived usefulness and users' attitude toward the technology. Hence, this relationship is hypothesized as follows:

H1: Perceived usefulness positively influences consumer's attitude towards chatbot.

Perceived ease of use is the extent to which a consumer believes that using a particular system would be easy and free of effort. It is an antecedent of behavioral intention to use technology (Ryan & Rao, 2018; Luque-Martínez et al., 2017). Consumers would use technology if they perceived that it is easy to use and helpful for their usage. Perceived ease of use was theorized as a direct determinant of attitude toward use by many researchers (Park, 2019; Chang et al., 2012). Improvements in ease of use may not only be beneficial to influence intentions but also lead to a positive attitude. Thus, this study examines the following hypothesis:

H2. Perceived ease of use positively influences consumer's attitude towards chatbot.

The attitude toward adoption is the cognitive process that depicts the prospective adopter's positive or negative affection for adopting technology. An individual's favourable or negative feelings (evaluative affect) about executing the target behaviour" is how attitude is defined (Davis et al. 1989). It was proposed that one's intention to effectively use an information system is directly influenced by one's attitude toward this activity, drawing on theories of reasoned action and planned behaviour (Ajzen, 1991; Fishbein & Ajzen, 1980).

Because effectively employing a technical tool is more complex and time-consuming than merely using it, an individual's willingness to engage in such conduct should be based on how favourable his or her ideas about the consequences are and how favourably he or she judges the outcomes (Davis et al. 1989).

Attitude has long been identified as a cause of intention and behaviour. In terms of a chatbot, it uses artificial intelligence (AI) and natural language processing (NLP) to understand and answer customer questions automatically by simulating voice or text chat responses in a human-like conversation. Prior empirical studies have shown the existence of such generalized attitude and its influences on the evaluation of new technology in similar situations (Rahimi et al., 2018; Kuberkar & Singhal, 2020; Al-Emran, Mezhuiev & Kamaludin, 2018). In this research, attitude is hypothesized to influence the adoption of chatbots. Accordingly, we hypothesized that:

H3: The positive attitude towards chatbot has a positive effect on the decision to adopt chatbot.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discusses the methodology of this study. Amongst others, this chapter elaborates on the study's research design, operationalization of variables, the population and sample of the study, as well as data collection procedure. Last but not least, this chapter also reports on the pilot test done for this study. This chapter ends with a discussion of the statistical techniques used to analyze the data.

3.2 Research Design

This study is correlational in nature. The study was conducted to obtain a good grasp of chatbot adoption among consumers. This study is cross-sectional where data was gathered once, to achieve the study's research objectives. This study used a survey method since this is best adapted to obtain personal and social facts, beliefs, and attitudes (Kahneman et al., 2004). The unit of analysis for this study is the individual consumers limited to students who have experience using chatbots via online transactions. This study treats each student's response as an individual data source.

Generally, there are three research approaches to answering research questions: quantitative, qualitative, and mixed methods (Creswell, 2019). Sahu (2018) stated that quantitative research is a kind of research in which systematic investigations having quantitative properties and phenomena are considered. This research approach allows the researcher to measure or quantify the phenomenon and analyze it numerically. This approach also allows the researcher to deal with and find out a solution for a research problem in a concerted manner (Frankfort-Nachmias & Nachmias, 2017). In a particular

research phenomenon, clear specification of both independent and dependent variables is required and quantitative research can do these with utmost efficiency and distinction (Matveev, 2002). In addition, keeping the main research focus on original goals, coming up with objective conclusions, examining hypothesis(es), isolating the driving variables, and avoiding or minimizing the issue of subjective judgment are fruitfully dealt with by the quantitative method (Frankfort-Nachmias & Nachmias, 1992). Besides, the availability of mechanisms for controlling observation, group surveys, or the existence of different types of manipulating mechanisms, and a high level of reliability on collected data can be ensured (Balsley, 1970). Therefore, the present research used the quantitative approach instead of the two approaches.

Concerning the time horizon, there are two options available. The first option is a longitudinal study and the second cross-sectional study. The longitudinal study is more appropriate when the researcher aims to seek how things vary over time, which requires data to be collected from the same sample units at multiple points in time (Sahu, 2018). In a longitudinal study, data are collected over an extended period. On the other hand, in a cross-sectional study, data for dependent and independent variables are collected and measured at the same point in time (Bhattachherjee, 2012) where the sampled people are asked to reflect on their experience with research questions (Cooper & Schindler, 2016; Sekaran & Bougie, 2020; Zikmund et al., 2018). The present study engaged in a cross-sectional study where data was gathered once to discover simultaneously the relationships between perceived usefulness and perceived ease of use on attitude as well as the relationship between attitude and adoption.

According to Slattery et al. (2019), surveys and questionnaires are powerful research tools to create meaningful data through correct construction, implementation, and management. Questionnaires refer to specific tools, also known as an instrument for gathering information through a series of questions, and are usually self-administered. In the present study, a survey method was employed to collect data. Kerlinger and Lee (2000) mentioned that survey research is best suited to collect facts, beliefs, or attitudes relating to personal and social aspects. In the same vein, Kotler, Keller, Koshy, and Jha (2009) noted that the survey method is used to learn knowledge, beliefs, preferences, and satisfaction.

3.3 Sample Size

The sample size decision is influenced by a variety of factors, including the nature of the research, statistical analysis, data analysis program selection, and practical concerns (Memon, 2020). According to Sekaran (2018), it is critical to have a trustworthy and valid sample size to generalize the findings from the sample to the population under study. To put it another way, the sample size should be statistically trustworthy and accurately represents the population parameters within a tight margin of error.

The sample size requirement of a study depends on the model. According to Hulland (1999), the minimum sample size should be ten times the number of structural paths pointing at one latent construct in the structural model. Feiner (2002) suggested sample size should be greater than 15 times the number of predictors. Hair et al. (2014) believed that data and models should be considered for determining sample size. Cohen (1992) provided a way to calculate sample size through power analysis. It required analysis of the required significance level, the desired statistical power, and the population effect size desired to be detected (Faul et al., 2009).

G*power 3.1 software was used to calculate the sample size following steps by Erdfelder et al. (1996). First, the significance level of 0.05 (95%) and medium effect size (0.15) were chosen. The analysis indicated that to achieve the statistical power of 80 percent, a minimum of 119 samples were required, as shown in Figure 3.1 below. Even though the sample size computed was 119, it was decided to increase the sample size to 150 ($n=150$) to get a better response rate.

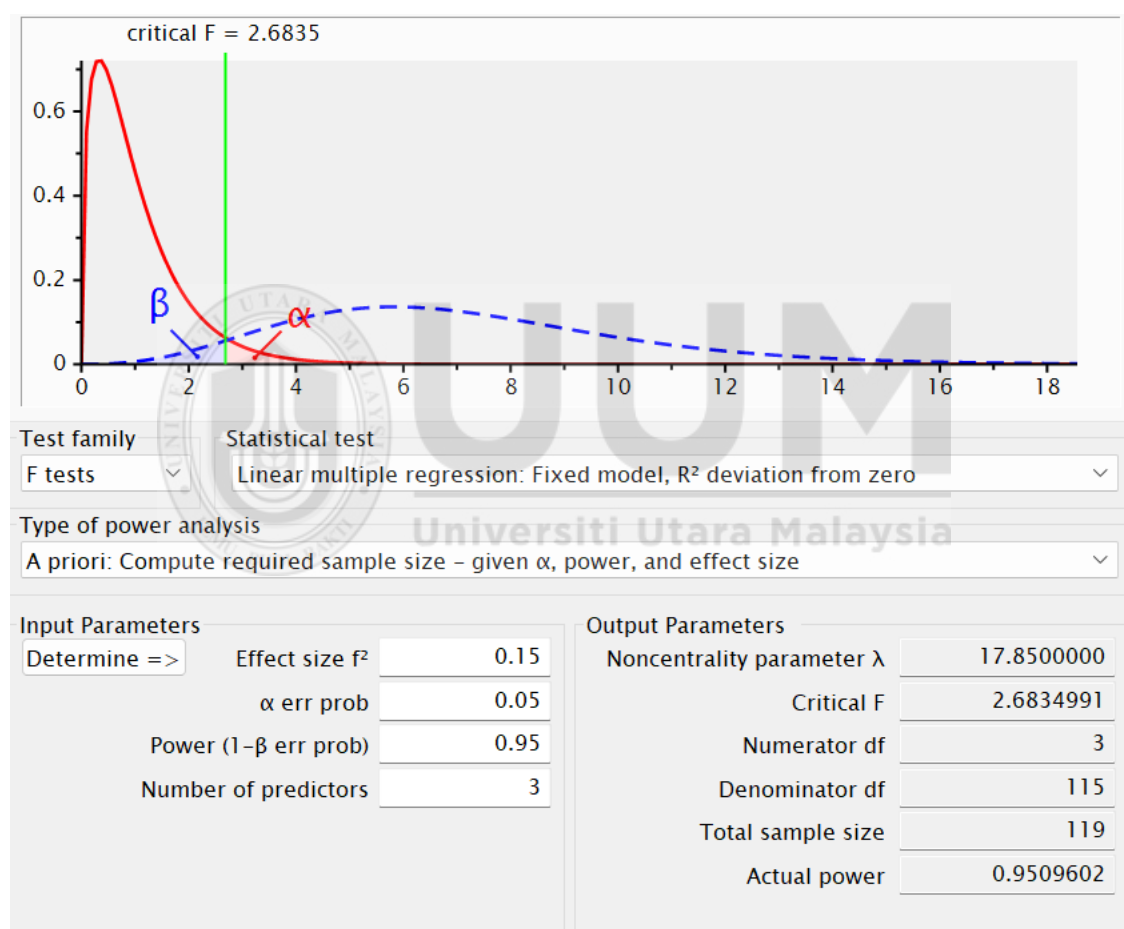


Figure 3.1
G Power Sample Calculation

3.4 Study Population and Sample

Sahu (2018) noted that the quantitative nature of research depends on the collection of data, the accuracy of data collected, and the consistency and efficiency of the data. Therefore, a discussion on the population, sampling frame, sampling size, and data collection procedure is as follows. The population is defined as the full universe of people or things from which the sample is selected (Greener, 2008) or a collection or totality of well-defined objects (Sahu, 2018). In the present study, a general population comprised all the consumers who have experience used chatbots.

The unit of analysis is related to the type of unit used in data measurement and the type of analysis carried out in the study. Based on the study's objective, the unit of analysis was a university student exposed to a chatbot app (Jung et al., 2012). This study targeted students who enrolled in various postgraduate programs at Universiti Utara Malaysia. The choice of targeted postgraduate students is based on the likelihood of their current or potential involvement with e-commerce activities (Said et al., 2022). Their selection is justified by the fact that they represent the highly educated sector of society and they have easy access to the Internet and may have had experience in using e-commerce (Al Ziadat et al., 2013).

Additionally, respondents were requested to engage in this study by completing a Google form questionnaire. The 150 targeted respondents were contacted using various social media platforms such as Facebook, WhatsApp, Instagram, and Telegram. They were chosen using the convenience method.

3.5 Sampling Design and Technique

Sampling techniques are an important aspect of quantitative research and are used to select a representative sample from a larger population. Scholars have divided sampling techniques into two broad categories: probability and non-probability sampling (Andridge & Valliant 2021).

Probability sampling techniques such as simple random sampling, stratified random sampling, and cluster sampling are based on the principle of random selection, providing equal opportunity for each element in the population to be selected. These techniques allow researchers to estimate the sampling error, determine the representativeness of the sample, and generalize the findings to the larger population.

On the other hand, non-probability sampling techniques such as convenience sampling, purposive sampling, and snowball sampling do not provide equal opportunity for selection, as they are based on the researcher's judgement. Convenience sampling is the simplest form of non-probability sampling and is based on selecting individuals who are readily accessible, while purposive sampling is a form of judgement-based sampling, where the researcher selects a sample based on specific criteria. Purposive sampling has the advantage of reducing the cost and ease of gathering the sample size required and is particularly useful in situations where the sample size is limited, or the population is hard to access.

In the context of studying the adoption of chatbot in this study, a purposive sampling method was employed due to the difficulties and complexities associated with obtaining a comprehensive list of the target population. The selection of respondents in this study

was guided by the purposive sampling method, which is a non-probability sampling technique. This method is applied because the goal of the study is to understand the chatbot adoption among consumers who have experience using chatbots. As such, it is essential to ensure that the respondents chosen for this study meet the specific criteria for the target population.

Purposive sampling enables the researcher to focus on specific characteristics or qualities of the participants, making it possible to obtain a sample that is representative of the target population. The advantage of purposive sampling is that it is cost-effective and efficient in gathering the required sample size for the study. According to Etikan (2016), the use of purposive sampling allows for a deliberate choice of participants based on their relevant characteristics, thereby increasing the representativeness of the sample and the validity of the results.

3.6 Operationalization and Measurement of Variables

Chatbot adoption was operationalized as the user's acceptance of a technology for specific purposes, in this case refers to chatbot (Wang et al., 2022). Attitude was operationalized as an individual's feelings, opinions, or beliefs about chatbots (Kwangsawad & Jattamart, 2022). On the other hand, perceived usefulness was operationalized as the degree to which individuals believe that a particular technology or system will enhance their performance or make their tasks easier (Moslehpour et al. (2018) and perceived ease of use was operationalized as the degree to which a person believes that using a particular system would be free of effort (Abdullah et al., 2017).

Except for demographic variables, all other variables included in this study were measured on multiple-item scales drawn from previous research. However, phrasing was adapted to suit the sample and local setting. One advantage of using the TAM to examine technology acceptance is that it has a well-validated measurement inventory (Davis, 1989). Measures for the various constructs were drawn from survey items in the literature as much as possible and adapted to the chatbot setting. All items were asked on a 1-5 Likert scale anchored by 1="strongly disagree" to 5="strongly agree".

Studies on perceived usefulness, perceived ease of use, and attitude toward the adoption have been well-researched, especially in the context of TAM applications. Measures for these constructs have been developed, validated, and adopted in many technology adoption studies. In this study, four items used to measure chatbots adoption were adapted from Toh and Tay (2022) while attitudes toward chatbots (3 items) were adapted from Taylor and Todd (1995). Perceived usefulness (5 items) and perceived ease of use (5 items) were measured using instruments by Davis (1989) and Kasilingan (2020). Items to measure all the variables are listed in Table 3.1 below:

Table 3.1
Items to Measure Variables

Items description	Source
Adoption	Toh & Lay (2022)
If given the opportunity, I aim to use chatbots for my future online transactions in the future.	
Given the opportunity, I expect to use chatbots for online transactions in the future.	
I would advise others to use chatbots.	
When the need arises, I will always try to use chatbots.	

Items description	Source
Attitude Using chatbots is a good idea. I like using chatbots. Using chatbots would be pleasant.	Taylor & Todd (1995)
Perceived Usefulness Chatbots will be useful to me. Using chatbots will enable me to accomplish transactions quickly. Using chatbots will increase my productivity. Using chatbots would enable me to accomplish my tasks fast. Using chatbots will enhance my effectiveness.	David (1989) and Kasilingan (2020)
Perceived Ease of Use Using chatbots does not require great mental effort. I think I will be able to use chatbots without the help of an expert. Learning to operate chatbots will be easy for me. Overall, I believe that using chatbots is easy. Working with chatbots is not complicated; it is easy to understand what is going on.	David (1989) and Kasilingan (2020)

3.7 Data Collection Procedures

The primary data was collected from an online questionnaire developed using established instruments. Adopting the online survey method allowed for quick and efficient data collection, as the completed questionnaires could be easily retrieved from the respondents. The use of this method was guided by the principle that the information required for the study could be obtained quickly and efficiently (Sekaran, 2003).

This method of data collection is suitable for the research objectives and allows for the collection of accurate and reliable data from a large number of participants. Additionally, the use of a self-administered survey instrument (questionnaire) also allows for anonymity, which can increase the likelihood of honest and truthful responses from participants.

In this study, a set of survey questionnaires were sent out to postgraduate students in UUM to get the data of this study. The survey was distributed using various online platforms such as Facebook, WhatsApp, Instagram, and Telegram as this platform helps in reaching people to the channel that are frequently used. The participants were given a set of questions online, and they were expected to read the instructions carefully before responding to the questions.

Google forms was utilized to prepare the online instrument. Google Forms is a free service of Google (Chaiyo & Nokham, 2017). Google form is highly secure yet easily sharable. Data collected through a Google form is readily processed. Apart from that, the Google forms App/Web interface itself provides numerous features to view the description of collected data in multiple formats. Google Forms can be easily shared with many respondents using various channels.

3.8 Pre-Test and Pilot Test

To detect any problems that may occur in the actual data collection process, the pre-testing was conducted by involving a small set of respondents. In this study context, two lecturers have been selected for the pre-testing. All remarks and suggestions from the respondents were taken into consideration to improve the questionnaire

before the pilot study took place. Before deciding on the actual instrument to be utilized in this study, a pilot study was conducted using a convenience sample of 30 students from one class. The researcher was with the respondents while they completed the questionnaire to identify difficulties in wording, to answer respondents' questions, and generally to check on the ease of completion. The reliability test for each instrument was calculated using the pilot study data.

One of the criteria for the selection of past instruments is an internal consistency of the scales using Cronbach's Alpha reliability coefficients. To test the internal consistency of the measurement, reliability analysis was conducted on the independent and dependent variables. In general, the closer the reliability coefficient gets to 1.0, the better it would be. Sekaran (2000) noted that reliability less than 0.60 is considered to be poor, those in the 0.70 range are acceptable, and those over 0.80 are good.

For the present study, a minimum reliability (Cronbach's Alpha) value of 0.60 was set, which is the threshold recommended by Nunnally (1978). The results of measures for the pilot study are shown in Table 3.2. Reliability estimates ranging from 0.86 to 0.93 are generally considered sufficient for research purposes (Nunnally, 1978), so the scales can be regarded as relatively reliable. The pilot test also identified several problems such as the questionnaire content, understanding of items, and time taken. Some vague sentences were noted and corrected.

Each respondent took approximately 10 minutes to complete the entire questionnaire. As expected, there was minor confusion about the sentences in the questionnaire, thus some amendments were made to the final version. The final version of the questionnaire is attached in Appendix A.

Table 3.2
Reliability Coefficient for Multiple Items in Pilot Study (n=30)

Construct	No. of items	Cronbach's Alpha
Chabots adoption	4	0.800
Attitude towards chatbots	3	0.861
Perceived ease of use	5	0.883
Perceived usefulness	5	0.911

3.9 Data Analysis

For data analyses and hypotheses testing, several statistical methods were employed from SPSS software version 21. These include descriptive statistics to describe the characteristic of respondents and variable, correlational analysis to describe the relationship between variables, and regression analyses to test the influences of independent variables on a dependent variable.

3.9.1 Descriptive Statistics

To acquire a feel for the data, descriptive statistics (mean values and standard deviations) for all the variables of interest will be obtained. The purpose of descriptive analysis is to present raw data transformed into a form that makes them easy to understand and interpret.

3.9.2 Correlation Analysis

Pearson correlation was used to describe the strength and direction of the relationship between two variables. Which are the relationship between independent and dependent variables. A positive correlation indicates that as one variable increases, so does the other. A negative correlation indicates that as one variable increases, the other decreases. A perfect correlation of 1, or -1 indicates that the value of one variable can be determined exactly by knowing the value of the other variable. On the other hand, a correlation of 0 indicates no relationship between the two variables.

3.9.3 Multiple Regression

Multiple regression is a more sophisticated extension of correlation and is used to explore the predictive ability of a set of independent variables on one dependent variable (Hair et al., 1998; Pallant, 2020). To test the hypotheses developed in the present study, multiple regression analyses were conducted. Besides that, the amount of variance of attitude towards chatbots explained by independent variables were examined through this analysis.

3.10 Chapter Summary

This chapter detailed the methodological aspect of this study. It detailed the data-gathering process and strategy, as well as the reason for the study design. In addition, population and sampling were discussed, as well as the analyses used.

CHAPTER FOUR

ANALYSIS AND FINDINGS

4.1 Introduction

This chapter presents the result of data analysis. Firstly, this chapter describes overview of data collection. Secondly, it presents profile of the respondents. It then follows with correlation and results of hypotheses testing using regression analysis.

4.2 Overview of Data Collected

The methodology employed in collecting data for this study involved the use of an online questionnaire, which was distributed through the use of Google Form. The time constraint posed a significant challenge to the original plan of conducting a face-to-face data collection. As a result, it became imperative to properly structure the collected data to ensure its validity and reliability.

The initial step in this process involved the proper labelling of each variable involved in the study. This included assigning meaningful names to the demographic data, the 13 items for the independent variables (IV) and the 4 items for the dependent variable (DV). The questionnaire was designed to capture a comprehensive picture of the research problem, and its five items on demographic data aimed to provide a background of the respondents. In order to effectively analyze the data, it is crucial to adopt a well-structured approach from the outset of the data collection process. The online questionnaire utilized in this study was therefore carefully crafted to ensure that the gathered data was both valid and reliable. Through the use of Google form, the study was able to reach a large pool of respondents, thereby increasing the representativeness of the sample population.

Descriptive statistics provided a comprehensive overview of the demographic profile of the participants in this study. The collected data underwent a thorough scrutiny and analysis using the Statistical Package for Social Sciences (SPSS) version 28. Subsequently, the relevant data was analyzed and assessed through the correlation and regression analysis application in the Statistical Package for Social Sciences (SPSS) version 28.

4.3 Data Preparation

As a crucial component of the survey process, data preparation involved the transformation of collected data into a suitable format for analysis (Sekaran & Bougie, 2010). This stage encompasses several important tasks, such as keying in, coding, and editing, all aimed at guaranteeing the accuracy and reliability of the data.

Correcting inconsistencies, and incomplete answers forms a critical aspect of the data preparation process. Inconsistencies, manifesting as a lack of uniformity in the data such as inconsistent coding or responses, can similarly impact the accuracy of the results. Incomplete answers can also pose a challenge, and it is essential to address these either by obtaining missing information or through appropriate statistical imputation methods. To guarantee the validity and reliability of the analysis results, data preparation must be approached with utmost care and attention to detail. This includes not only addressing inconsistencies, and incomplete answers, but also coding and editing the data, transforming it into a usable format for analysis. By ensuring that the data preparation process is performed accurately, the survey results can be relied upon to be trustworthy and dependable.

4.4 Survey Response Structure

The present study employed an online questionnaire as its research instrument, which was designed and administered using the Google forms platform. The widespread adoption of technology and internet access has made online questionnaires an increasingly popular choice for collecting data in recent years. The flexibility and convenience of online questionnaires have made them an attractive option for researchers, especially in light of the limited time and financial constraints.

Given the time and limitation, this study was unable to rely on traditional face-to-face data collection methods. Instead, the online questionnaire was distributed to potential respondents through WhatsApp, Telegram, Instagram, widely used digital platforms for communication. The use of these channels allowed the study to reach a larger and more diverse sample, thereby increasing the representativeness of the data collected.

The questionnaire was designed to ensure efficient identification and analysis of the study. The questions were organized based on the constructs they aimed to measure and consisted of 13 items for the independent variables, 4 questions for the dependent variable, and 5 questions for the demographic information of the respondents. The questions were formulated as closed-ended to enable a clear and concise assessment of the participants' responses. A 5-point Likert scale was employed to gauge the participants' opinions, with responses ranging from "strongly disagree" (coded as 1) to "strongly agree" (coded as 5). The purpose of this coding

process was to provide numerical indicators for each item, thereby facilitating the subsequent analysis and quantification of the data. (Hair et al., 2020).

4.5 Data Screening

Data screening is an essential step in the data preparation process that aims to identify and resolve any inconsistencies, errors, and outliers in the collected data. The purpose of data screening is to improve the quality of the data and ensure that it is suitable for further analysis. The initial step of data screening in the study involved the successful export of the files from google form to an excel spreadsheet. The absence of blank responses in the extracted data confirmed that all the questionnaires were filled up by the respondents, which is crucial for obtaining valid and meaningful results.

In data screening, the presence of missing data or values was also evaluated. Missing data occurs when a respondent does not answer one or more questions either intentionally or unintentionally. The absence of data can impair the statistical power of the dataset and thus it is crucial to identify and handle missing data effectively (Sekaran, 2003). In this study, the automated function of exporting the responses from google form to the excel spreadsheet minimized the potential errors from data entry.

The next step in data screening was the evaluation of straight lining of the responses. Straight-lining occurs when respondents answer a question in a straight line, indicating a lack of thought and reducing the validity of the responses. The evaluation of straight lining was conducted through the excel spreadsheet, and it

was found that there were no such responses in the data. The successful completion of data screening in this study gives confidence in the validity and reliability of the results obtained from the subsequent analysis.

4.6 Response Rate

As been mentioned in Chapter three, although the minimum sample required in this study is 119, the researcher targeted to get 150 responses questionnaires. Online questionnaires were sent to potential respondents started mid of May 2023 until mid of June 2023. After the cut- off date, 135 questionnaires were received. Out of this number, 14 were excluded because the respondents did not have experience using chatbots. Thus, a total of 121 responses were usable and used for subsequent analysis, giving a response rate of 81 percent. Overview of the responses collected is summarized in Table 4.1 below:

Table 4.1
Summary of Responses Collected

Distribution of Questionnaires	Number of Responses
Minimum sample needed (based on G-power)	119
Total number of questionnaires distributed	150
Total number of questionnaires received	135
Total number of questionnaire excluded	14
Total useable questionnaire	121
Response rate	81%

4.7 Profile of the Respondents

Table 4.2 presents the profile of the respondents. There are approximately equal percentages of male and female respondents. There are 43 percent respondents who

are male and 57 are female. In terms of age, there is almost equal percentage of respondents at the age of less than 25 and between 26-35 years old. Sixty-four percent of the respondents are currently pursuing master's degree and the remaining are in Phd/DBA program. Majority of the respondents (67%) are Malays, followed by 23 percent Chinese and 21 percent Indian. With regards to marital status, 61 percent respondents are married while 39 percent are single.

Table 4.2
Profile of the Respondents (N=121)

Variable	Category	Frequency	Percentage (%)
Gender	Male	52	43
	Female	69	57
Ethnic	Malay	67	55
	Chinese	28	23
	Indian	26	21
	Others	0	0
Marital status	Single	74	61
	Married	47	39
Age	<25	41	34
	26-35	36	30
	36-45	21	18
	46-55	15	12
	56 and above	8	7
Academic program	Master's degree	78	64
	PhD/DBA	43	36

4.8 Descriptive Analyses of Main Variables

Descriptive statistics for the main variables of the study are shown in Table 4.3. For all the variables, the scale measurements used is a five-point Likert scale. Following Pallant (2020), the range of five point Likert-scales were categorized into equal sized categories of low, moderate and high.

Therefore, scores of less than 2.33 [$4/3 + \text{lowest value (1)}$] is considered as low; scores above 3.67 [$\text{highest value (5)} - 4/3$] is considered high and those in between considered moderate. From Table 4.3, the mean value for attitude is 3.51 and mean value for chatbot adoption is 4.23, indicate that respondents have moderate level of attitude towards chatbot and high adoption towards chatbots. Similarly, with mean value of 3.82 and 4.02 respectively, it can be concluded that respondents tend to have high perception on the ease of use and usefulness of chatbots.

Table 4.3
Descriptive Statistics for Main Variables

Variables	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic
Chatbot adoption	1.00	5.00	4.23	.911
Attitude	1.00	5.00	3.51	.932
Perceived ease of use	1.00	5.00	3.82	.623
Perceived usefulness	1.00	5.00	4.01	.435

4.9 Pattern of Chatbot Adoption Among Respondents

Figure 4.1 below shows that education is the main chatbot used by respondents (41%), followed by e-commerce 20 percent and government services (16%). As shown in Table 4.4, almost half of the respondents used chatbots everyday (56%), followed by twenty-one percent used once a week and eighteen percent (18%) used once a month.

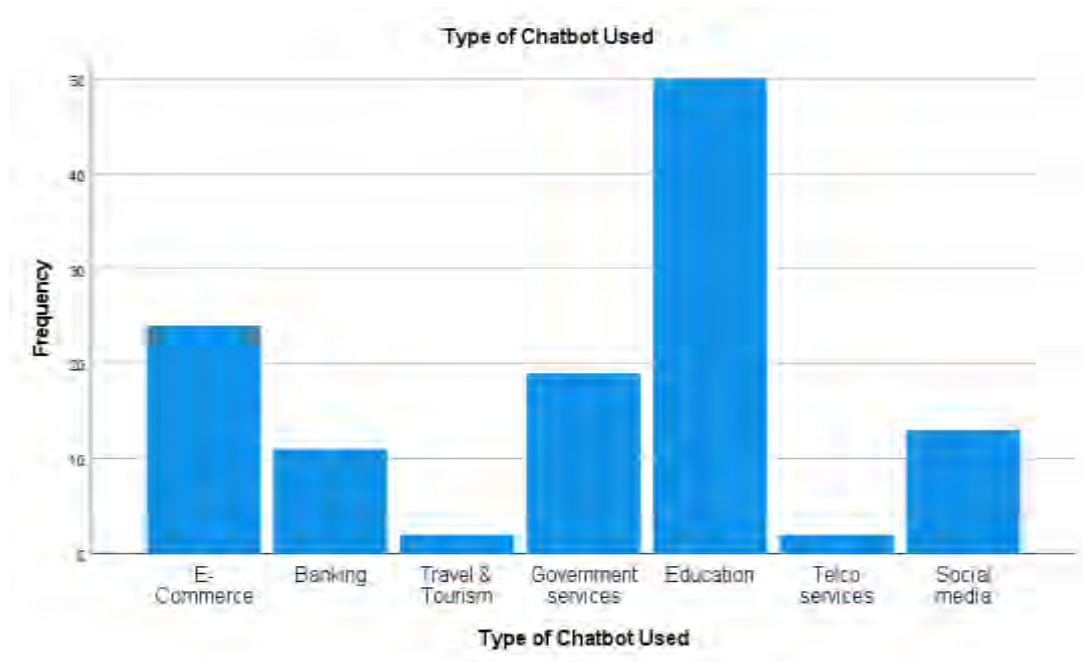


Figure 4.1
Type of Chatbot Used

Table 4.4
Chatbot Frequency Usage

Frequency	Percentage (%)
Everyday	56
Once a week	21
Every fortnight	11
Once a month	18
Less than once a month	15

4.10 Correlation Analysis

Correlation is a statistical technique that measures the relationship between two or more variables. It provides a numerical value, known as the correlation coefficient, that ranges from -1 to 1. The correlation coefficient can be used to determine the strength and direction of the relationship between the variables. A positive correlation coefficient indicates that as one variable increases, the other variable

also increases, and a negative correlation coefficient indicates that as one variable increases, the other variable decreases. A value close to 0 indicates that there is no relationship between the variables. Table 4.5 below shows the correlation coefficient between independent and dependent variables. The values in the table indicate the strength and direction of the relationship between each pair of variables. The correlation coefficient ranges from -1 to 1, where a positive value indicates a positive correlation (an increase in one variable is associated with an increase in the other), a negative value indicates a negative correlation (an increase in one variable is associated with a decrease in the other), and a value close to 0 indicates no relationship.

The values in the table that have two asterisks (**) are considered statistically significant, meaning that the relationship is not likely due to chance. For example, the correlation between Attitude and Adoption is .877, which is considered a strong and positive relationship. On the other hand, the correlation between Attitude and Perceived Usefulness is .49, which is a weak relationship.

The correlation between attitude towards chatbot and chatbot adoption is examined. As shown in table below, correlation amongst the variables show that attitude is significantly related to the adoption of chatbots. The correlation is positive and generally strong with correlation value of 0.87. Perceived usefulness is positively related to attitude towards chatbot ($r=0.54$), however perceived ease of use ($r=0.13$) shows no significant influence.

Table 4.5
Correlation Analysis

	ADOPT	ATT	PEOU	PU
Chatbot adoption (ADOPT)	1			
Attitude (ATT)	.877**	1		
Perceived Ease of Use (PEOU)	.226	.135	1	
Perceived Usefulness (PU)	.496**	.541**	.198	1

4.11 Hypotheses Testing

The hypotheses tested in this study are as follows:

H1: Perceived usefulness positively influence consumer's attitude toward chatbot.

H2: Perceived ease of use positively influence consumer's attitude toward chatbot.

H3: The positive attitude towards chatbot has a positive effect on the decision to adopt chatbot.

4.11.1 Regression Analysis on the Influence of Perceived Usefulness and Perceived Ease of Use on Attitude towards Chatbot

Table 4.6 provides evidence of the influence of independent variables on attitude towards chatbot. The F-statistic ($F=27.95$, $p<.001$) indicates that the relationship between independent and dependent variables is significant. The R^2 (0.674) obtained indicates that the independent variables (perceived usefulness and perceived ease of use) account for 67 percent of the variation in attitude towards chatbot. Of the variables included in the regression equation, all variables emerged as significant predictors of attitude towards chatbot.

Based on the results, hypothesis 1 and 2 are supported. This leads to the conclusion that perceived usefulness and perceived ease of use are positively related to attitude towards chatbot.

To investigate which independent variables that have the most influence on attitude towards chatbot, the beta values for both independent variables were examined. Of the two significant variables, based on the size of their beta, the independent variable exercising the higher influence on attitude towards chatbot is perceived usefulness ($\beta = 0.797$) while perceived ease of use β value is 0.104.

Table 4.6

The Influence of Perceived Usefulness and Perceived Ease of Use on Attitude towards Chatbot

Independent Variables	B	SEB	β
Perceived Ease of Use	.191	.206	.104**
Perceived Usefulness	.659	.092	.797**

Note: $R^2 = .67$; $F = 27.95$; $Sig. F = .001$; $**p < 0.001$

B = Unstandardized coefficient beta; SEB = Standard error of regression coefficient;

β = Beta coefficient

4.11.2 Regression Analysis on the Influence of Attitude on Decision to Adopt Chatbot

In order to answer the second research question that is, “What is the relationship between attitude towards chatbots and chatbots adoption among consumers? regression analysis was conducted to test the hypothesis 3. In this analysis, attitude is treated as the independent variable, while chatbot adoption as the dependent variable. Through regression analysis procedure, attitude was regressed on chatbot adoption. Table 4.7 shows the relationship between attitude and chatbot adoption.

Table 4.7
The Influence of Attitude on Chatbot Adoption

Independent Variables	B	SEB	β
Attitude	.853	.088	.871**

Note: $R^2 = .77$; $F = 93.526$; Sig. $F = .001$

** $p < 0.001$; B = Unstandardized coefficient beta;

SEB = Standard error of regression coefficient; β = Beta coefficient

With F value of 93.526 ($p = .001$), indicates that attitude is significantly influencing chatbot adoption. The model is moderate with attitude explaining only 77 percent of the variation in chatbot adoption. Furthermore, we note that attitude positively chatbot adoption ($\beta = .87$). Therefore, hypothesis 3 is supported. Presented below in

Table 4.8 is the summary of the findings from hypotheses testing:

Table 4.8
Summary of Findings

Hypothesis	Relationship	Std. Error	Unstandardized coefficient value	β - value	Decision
H 1	Perceived Usefulness > Attitude	0.092	0.659	0.797	Supported
H 2	Perceived ease of use > Attitude	0.206	0.191	0.104	Supported
H 3	Attitude > Adoption	0.088	0.853	0.871	Supported

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter recapitulates the findings, followed by a discussion of them. Both the theoretical and managerial implications together with limitations are also discussed and this chapter ends with suggestions for future research.

5.2 Recapitulation of the Study's Findings

Based on Theory of Acceptance Model (TAM), this study investigates the factors that influence attitude towards chatbot and the influence of attitude on chatbot adoption. Specifically, the first objective of this study is to examine the influences of perceived usefulness and perceived ease of use on attitudes towards chatbots and the second research objective is to investigate the relationship between attitudes towards chatbots and chatbots adoption among consumers.

Revisiting the study's objectives, this study was undertaken to seek answers to two research questions. Firstly, what are the influences of perceived usefulness and perceived ease of use on attitudes toward chatbots and secondly what is the relationship between attitude towards chatbots and chatbots adoption among consumers? As noted in Chapter 3, data were gathered from postgraduate students in Universiti Utara Malaysia. After the cut-off date, 135 responses were obtained but only 121 were useable, representing 80 percent response rate.

Responding to the first research question, the findings indicated that perceived usefulness and perceived ease of use have influence on attitude towards chatbot. To answer the second research question, this study found that attitude is positively related to the decision to adopt chatbot.

5.3 Discussion

The following section discusses in further detail regarding the factors that influence attitude towards chatbot and the influence of attitude on chatbot. The intent of this study is to extend our understanding regarding the adoption of chatbot applications using TAM model. Analyzing survey data from 121 respondents yielded important findings. The results support all the research hypotheses. However, the overall explanatory power of our research model was relatively moderate with an ΔR^2 of 77 percent for chatbot adoption. This is relatively low percentage when compared with previous studies in technology adoption (Al-Emran, Mezhyeyev, & Kamaludin, 2018; Ashfaq et al., 2020; Gümüş & Çark, 2021). Several insightful results could be summarized from our research framework.

The mean value of chatbot adoption in Table 4.3 indicates that chatbot adoption is at high level. This is inconsistent with Toh and Tay (2022) who found that acceptance of banking chatbots among millennial consumers in Malaysia is at average level. This probably because chatbot is no longer new in Malaysia. And as more and more financial institutions and business organizations launch their chatbot applications, it has become common to users and thus increase the usage level.

It was found that among the chatbots, the most frequently used by respondents is for education purpose. This is probably because the sample of this study is postgraduate students and students mainly used chatbot such as AI chatbot in their studies. As been mentioned by Noor Illiana et al (2022), in the era of AI, chatbots are being utilized more frequently in Higher Education Institutions for teaching and learning objectives among institutional staff and students.

The findings also support that perceived usefulness and perceived ease of use accounted for 67 percent of the variance in explaining attitude. Amongst these two predictors of attitude, perceived usefulness had a larger significant positive influence on creating a favourable attitude toward chatbot, whereas the effect of perceived ease of use on attitude was smaller. This is probably because in some scenarios, perceived ease of use might be critical, such as consumer products targeting a non-technical audience. However, in professional or business contexts, where users are willing to invest time and effort in mastering a technology for its benefits, perceived usefulness becomes more significant.

Results of the study support the addition of the factors that influencing attitude towards chatbot. Results of the study showed that perceived ease of use and perceived usefulness are significant determinants of consumer's attitude towards chatbot. These findings match those of Al Kurdi et al. (2020) and Huang and Chueh (2020). Students may not use the chatbot without the features that benefits to them.

This study also confirmed that attitude had a positive significant effect on the adoption of chatbot. It was quite expected that a favourable attitude toward an object leads to a higher level of consumer response (Albaity & Rahman, 2019; Ho et al., 2022). Adoption of chatbot technology requires mental and physical effort. If consumers do not have a positive attitude towards using it, it is impossible for them to adopt chatbots in their daily activities.

The more benefits of chatbot, the more positive of their attitude would be toward accepting chatbot as learning tool. This implies that if users perceive chatbots as beneficial to them, they will be more satisfied and more likely to continue using them in the future. These support the findings by Keong (2022) and Toh and Tay (2022). In this light, to be preferred and accepted by the users, any chatbots should be designed with a very good interface in terms of ease of use and useful features. This is because, the easier chatbot is to be used and when the user perceived the chatbot is useful to them, the greater will be a user's feelings of self-competence and tendency to use it (Said et al., 2022).

5.4 Theoretical and Managerial Implications

This study adopts the TAM by incorporating important variables such as attitude, perceived usefulness, perceived ease of use and adoption. TAM's appropriateness as a theoretical tool for assessing users' acceptance and adoption of chatbots is demonstrated by the findings of this study. This study thus contributes to the emerging literature on TAM by examining the applicability of this theory in the context of chatbot. This study validated the previous findings in similar technology addressing existing constructs to predict adoption in the Malaysian context.

As the implementation of chatbot services is beneficial for various service providers and their customers, the findings of this research can serve as a reference and valuable guideline for various chatbot providers in formulating practical solutions to promote consumers' adoption continuance. Our study indicates that consumers tend to continue using chatbot services only if they are easy to use and useful. Therefore, chatbot providers must pay close attention to the quality aspects of chatbot services (i.e., content, layout, easy to use, error-free, interaction) and users' expectations.

Developers of chatbots also need to ensure that chatbots have anthropomorphic characteristics so that users feel that chatbots are real, living and human-like. Designers and developers can ensure that chatbots communicate in various languages which would provide a user-friendly interface to the customers. A part from that, they need to ensure that chatbots do not create any anxiety related to the technology. The designers need to develop user-friendly chatbots so that technology anxiety can be eliminated from customers' minds.

Relevant government bodies should cultivate good knowledge on using chatbots as a path to promote digital intelligent assistants and achieve digital e-commerce inclusion. Consumers are more likely and motivated to adopt chatbots when they perceive their adoption of them is desirable to their needs and value. In turn, they will help promote the use of chatbots to others.

Lastly, chatbot providers must ensure the compatibility of the chatbots since miscommunication and accuracy remain a concern. Chatbot developers should ensure that the chatbots are accurate and trustworthy. They should also ensure that the chatbots can deliver the same content and result as a phone call. Otherwise, the users might feel hesitant about using it.

5.5 Limitations and Future Research Suggestions

First, the results of this study were analyzed based on the small sample size of the chatbot users through the convenience sampling technique; the respondents and results, therefore, are not generalized and representative of the entire chatbot users in Malaysia. Additionally, this study collected data by using the self-reported survey method. Even though common method bias was not a serious problem, as demonstrated before, it is always a concern (Nguyen et al., 2021). Thus, future studies should consider other types of approaches, such as the experimental method, to enhance the quality of respondents.

Second, our results only reflect the chatbot usage in a single context (i.e., UUM), a higher educational institution in Malaysia. The differences across countries, institutions cultures, or country-development levels may also influence our findings. Therefore, to strengthen the systematization of the current study, future studies can compare the current results with those from other countries with different cultural backgrounds (e.g., Western countries) and levels of development (e.g., developed markets vs. this emergent market). In addition, replicating this study in different contexts or industries and comparing the results with each other are also encouraged.

Third, the research model in this study was formulated by integrating the TAM to identify the key factors influencing chatbot users' attitude and adoption. Although the constructs included in this study are relevant to technology adoption and fit the initial research purposes, it is worthwhile to include other essential constructs that could predict chatbot technology adoption. This study suggests that future studies could extend the current research model by including personality-related concepts, such as self-efficacy, technology readiness, and compatibility, which may further explain chatbot adoption.

Furthermore, comparing the results using quantitative and qualitative methods may give researchers information to improve the quality of the data collection instrument such as focus group interviews. The longitudinal technique perhaps can be used by future researchers to forecast adoption intention over time. As a result, the model needs to be evaluated over time. Future research should, for instance, examine adoption in different periods such as before and after the adoption of a chatbot.

5.6 Conclusion

In summary, the study proposes a model that helps to conceptualize chatbot applications adoption through the integration of TAM model. The findings of this study have important implications for researchers and chatbot developers and designers in today's dynamic environment.

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Appendix A: Questionnaire



**A SURVEY ON FACTORS INFLUENCING ATTITUDE AND ADOPTION OF
CHATBOTS AMONG CONSUMERS**

Survey Information

This survey is conducted by Nur Nadia Azleen Binti Azli from School of Business Management, Universiti Utara Malaysia for her Master's degree Project Paper.

Her research project is supervised by Dr Tunku Nur Atikhah binti Tunku Abaidah. This study is conducted to examine factors influencing attitude and adoption of chatbots among consumers

Further Information;

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The questionnaire consists of THREE (3) major parts:

**The first part is on demographic information (Section A),
second parts (Section B) is on chatbot usage and last part (Section C) is about
respondent's perception on chatbots.**



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QUESTIONNAIRE

Section A: Personal Information About Yourself

The following section lists some questions about yourself. Please tick the appropriate answers or fill-in the blank where required.

1. Gender: Male _____ Female _____
2. Age: Below 25 _____
26-35 _____
36-45 _____
46-55 _____
56 and above _____
3. Ethnicity Malay: _____
Chinese _____
Indian _____
Others _____
4. Current Program: Master's degree _____
Phd/DBA _____
5. Marital Status Single _____
Married _____

Section B: Information on Usage of Chatbots.

The following section lists some questions about the usage of chatbots. Please tick the appropriate answers or fill-in the blank where required.

6. Do you use chatbots for your daily online activities? Yes _____ No _____

If your answer to question 6 is **NO**, you **should not proceed** to the following section.
-Thank you-

If your answer to question 6 is **YES**, you may proceed to the next questions.

7. How often do you use the chatbots?

Every day _____ once a week _____
 Every fortnight _____ once a month _____
 Less than once a month _____

8. Which type of transaction below that you **MOST FREQUENTLY** used chatbots?
(Choose only ONE)

Transaction	Your selection
E-Commerce (Examples: Shopee-Chat Assistant, Lavada-CLEO)	
Banking & Finance (Examples: Maybank's- MAE, CIMB-Eva)	
Travel & Tourism (Examples: Air Asia- Ava, PLUS-Putri, Malaysian Airline-Amadeus)	
Government Services(Examples: MySejahtera, MyEG-Mimi, KPDNHEP-Sara)	
Education (Examples: ChatGPT, Universiti Malaysia Sabah-KUKURO, UPM-Putrabot)	
Telco Services (Examples: Celcom, Apple-Siri))	
Social Media (Examples: Facebook Messenger)	
Others (please specify)	

Section C: Your Opinions on Chatbots

The following section lists some questions about your opinion regarding the use of chatbots. Please tick the appropriate answers. For each statement below, kindly circle the appropriate number that best describe your level of agreement using the following scale. 1= strongly disagree; 2= disagree; 3=neither disagree nor agree; 4= agree; 5= strongly agree

7. Your Chatbot Adoption

If given the opportunity, I aim to use chatbots for my future online transactions in the future.	1	2	3	4	5
Given the opportunity, I expect to use chatbots for online transactions services in the future regularly.	1	2	3	4	5
I would advise others to use chatbots.	1	2	3	4	5
When the need arises, I will always try to use chatbots.	1	2	3	4	5

8. Your Attitude towards Chatbots

Using chatbots is a good idea.	1	2	3	4	5
I like using chatbots	1	2	3	4	5
Using chatbots would be pleasant.	1	2	3	4	5

9. Your Perceived Ease of Use of Using Chatbots

Using chatbots does not require great mental effort.	1	2	3	4	5
I think I will be able to use chatbots without the help of an expert.	1	2	3	4	5
Learning to operate chatbots will be easy for me.	1	2	3	4	5
Overall, I believe that using chatbots is easy.	1	2	3	4	5
Working with chatbots is not complicated; it is easy to understand what is going on	1	2	3	4	5

10. Your Perceived Usefulness of Using Chatbots

Chatbots will be useful to me.	1	2	3	4	5
Using chatbots will enable me to accomplish transactions quickly.	1	2	3	4	5
Using chatbots will increase my productivity	1	2	3	4	5
Using chatbots would enable me to accomplish my tasks fast.	1	2	3	4	5
Using chatbots will enhance my effectiveness.	1	2	3	4	5

THANK YOU