EXAMINING THE ADOPTION OF CHATGPT TECHNOLOGY AMONG ACADEMICS IN HIGHER EDUCATION INSTITUTIONS IN MALAYSIA

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Examining The Adoption of ChatGPT Technology Among Academics in Higher Education Institutions in Malaysia

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DECLARATION

I hereby declare that:

(1) This Research Project is the result of my own work, and due acknowledgement has been given in the references to all sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

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AI	Artificial Intelligence
Chat-GPT	Chat-Generative Pre-trained Transformer
HEIs	Higher Education Institutions
ITS	Intelligent Teaching Systems
NLP	Natural Language Processing
TAM	Technology Acceptance Model
UTAUT	Unified theory of Acceptance and Use of Technology

ABSTRACT

This research investigates the adoption of ChatGPT technology among academics in Malaysian higher education institutions (HEIs), focusing on factors influencing their decisions. Utilizing a robust survey instrument, the study explores the role of facilitating conditions, perceived trust, performance expectancy, and effort expectancy in shaping adoption patterns. Reliability analyses confirm the consistency of the survey, ensuring the credibility of the collected data. Comprehensive demographic profiling offers insights into the diverse academic landscape, emphasizing the need for tailored adoption strategies. Correlation analyses reveal intricate relationships between variables, highlighting the significance of supportive environments and trust in technology adoption. This quantitative study employs SPSS software to explore the adoption patterns of ChatGPT technology within Malaysian HEIs. Utilizing a structured survey instrument, the research investigates the impact of facilitating conditions, perceived trust, performance expectancy, and effort expectancy on academics' adoption decisions. From rigorous reliability analyses, the survey's consistency and stability are verified, ensuring the reliability of the collected data. The study's findings underscore the importance of institutional support, ethical awareness initiatives, and comprehensive policies to facilitate responsible ChatGPT integration. This research provides a foundational understanding of ChatGPT adoption in Malaysian academia, offering valuable insights for future research, policymaking, and educational practices.

***Keyword**:* ChatGPT technology, adoption, higher education institutions, facilitating conditions, perceived trust, performance expectancy, technology integration, academic attitudes, ethical awareness, Malaysia.

CHAPTER 1

RESEARCH OVERVIEW

1.0 Introduction

In recent years, the rapid advancement of artificial intelligence (AI) and natural language processing (NLP) technologies has revolutionized various industries and sectors worldwide (Adams & Bock, 2020). One of the notable developments in this field is the emergence of ChatGPT, a conversational AI model that utilizes deep learning techniques to engage in human-like text-based conversations. ChatGPT, based on the GPT-3.5 architecture developed by OpenAI, has demonstrated remarkable capabilities in understanding and generating human language, enabling it to communicate and interact with users in a conversational manner. This trend of using ChatGPT technology has gained significant attention across different domains, including academia (Afzal et al., 2019).

Higher education institutions (HEIs) in Malaysia stand as pillars of academic excellence and cultural diversity in Southeast Asia. Renowned for the world class programs, state-of-the-art facilities, and a rich tapestry of international students, Malaysia HEIs offer a unique and inclusive learning environment (Antony et al., 2012). Malaysia boasts a vibrant higher education sector with both public and private institutions that cater to a wide spectrum of academic disciplines. These

institutions are known as a commitment to fostering global competitiveness, research, and innovation, making Malaysia a favored destination for users seeking quality tertiary education. With a unique fusion of traditional values and modernity, Malaysian HEIs are instrument in shaping the future of the nation and the global community. HEIs in Malaysia, like the global counterparts, are increasingly exploring the potential of ChatGPT to enhance teaching, research, and administrative processes. The ability of ChatGPT to understand and respond to complex inquiries, provide personalized assistance, and generate coherent text has attracted interest among academics (Benavides et al., 2020).

The transformation of HEIs in Malaysia has been a dynamic process marked by globalization, quality assurance, diversity, technology integration, industry collaboration, community engagement, research excellence, and a focus on lifelong learning. Malaysian HEIs have become more internationally oriented, fostering global collaborations, and attracting a diverse student. HEIs have placed a strong emphasis on quality assurance, ensuring that programs and institutions meet international standards. Moreover, HEIs have evolved into centers of cutting-edged research and innovation, contributing to societal and economic development. These institutions have also adopted modern technology, making e-learning and digital resources integral to education. Collaboration with industries ensures that graduates are well-equipped for the job market, and community engagement efforts have created a strong sense of social responsibility (Giesenbauer & Müller-Christ, 2020). The responsiveness of Malaysian HEIs to the evolving educational landscape, positioning them as competitive players on the world stage.

Digitalization has been transforming the educational landscape worldwide, and Malaysia is no exception. As the country strives to become a digitally driven nation, there has been an emphasis on integrating technology into various aspects of education (Al Ghatrifi et al., 2023). This includes the adoption of AI-powered tools and platforms to support teaching and learning, improve student engagement, and streamline administrative tasks. ChatGPT presents itself as a promising solution to

meet these evolving needs in HEIs. However, the adoption of ChatGPT technology among academics in Malaysian HEIs is a relatively new and evolving phenomenon. As such, there is a need to examine the extent of adoption, the challenges faced, and the potential benefits that academics perceive in utilizing ChatGPT (Almurayh, 2021). This study aims to delve into the experiences and perspectives of academics in Malaysia regarding the adoption of ChatGPT technology, shedding light on the implications for teaching, research, and administrative practices within higher education.

By exploring the adoption of ChatGPT in Malaysian academia, this research will contribute to the growing body of literature on the integration of AI in education (Alzahrani & Rajkhan, 2021). It will provide insights into the factors influencing the acceptance and usage of ChatGPT technology by academics, the perceived impact on teaching and learning outcomes, and the implications for pedagogy and educational policies. The remainder of this research paper will present an in-depth analysis of the adoption of ChatGPT technology in Malaysian HEIs. It will delve into the theoretical frameworks guiding the study, the research methodology employed, the findings obtained, and the recommendations derived from the analysis (Aung et al., 2021). Through this comprehensive investigation, we aim to offer valuable insights and contribute to the ongoing discourse surrounding the incorporation of AI technologies in the academic setting.

The field of artificial intelligence, or AI, has advanced significantly in recent years, resulting in a wide range of applications in fields such as education and health care. Using enormous volumes of data, AI systems may be trained to replicate the way humans think and perform everyday tasks (Bengio et al., 2021). For example, in healthcare, AI may help doctors by synthesizing patient information, interpreting diagnostic pictures, and flagging health issues. Artificial intelligence technologies have also been used in education to improve administrative functions and academic assistance. Intelligent teaching systems (ITS), for example, can be used to imitate

one-on-one human tutoring. According to the findings of a meta-analysis, ITS had a relatively beneficial influence on users' academic success.

However, developing ITS may be difficult since it requires not just content generation and design but also improvement of feedback language and dialogue methods (Brynjolfsson & McAfee, 2017). ChatGPT, an OpenAI-created conversational chatbot, could make it simpler for instructors to use AI in education and instruction. ChatGPT generates human-like answers to user input using natural language processing. It has received international recognition for its outstanding ability in generating cohesive, methodical, and informative replies (Bukar et al., 2023). ChatGPT surprised everyone by passing four distinct exams at the University of Minnesota Law School. Although its scores were not (yet) very high, the findings show that an AI application can get a university diploma. ChatGPT has been the fastest-growing consumer application in history, achieving 100 million monthly users just two months after its introduction on 30th November 2022 (Hanna, 2023).

Despite its effectiveness, ChatGPT has created new educational problems and risks. Because of its capacity to offer precise responses to user queries, it may be used for completing written assignments and exams on users' behalf, raising worries about AI-assisted cheating. As a result, several HEIs have prohibited academicians from using ChatGPT on campus (Chua & Yu, 2023). Researchers conducted an evaluation of the implications of ChatGPT in the realm of education (Mhlanga, 2023). The author examined eight papers on ChatGPT and discovered that educators were concerned about the usage of ChatGPT in education. They raised concern that students would outsource the entire work to ChatGPT due to its capacity to create acceptable texts quickly. As a result, it also underlined the significance of using ChatGPT responsibly and ethically (Dennen, 2021). According to the research, 60 papers has been examined on ChatGPT in healthcare, medical training, and academia (Sallam, 2023). Variety of issues discovered throughout the investigations, ranging from copying to wrong replies and citations. As a result, the consequences of ChatGPT-assisted learning necessitate rapid attention to maximize its advantages while minimizing its negatives (Area & Adell, 2021).

1.1 Research Background

Since the invention of computer equipment, scientists, engineers, and intellectuals have been fascinated with artificial intelligence (AI). The origins of AI may be linked back to the 1950s, when a long journey began that would eventually lead to the construction of sophisticated, human-like robots capable of autonomous thinking, acquiring knowledge, and reasoning (Gilson et al., 2023). Initially, AI was viewed as a panacea, a technology capable of automating any work and displacing human labor. Early research concentrated on developing rule-based systems capable of making judgments based on established logical criteria. Nonetheless, these systems were restricted in their use since they were stiff and unable to learn from information or adapt to unexpected situations (Ahuja, 2019). The primary goal of AI research changed in the 1960s and 1970s to constructing systems of experts that were able to rationalize and make judgments based on considerable domain-specific knowledge (Temsah et al., 2023). The systems in question were widely employed in a variety of disciplines, including medical, finance, and the field of engineering, and were regarded as a significant achievement in AI research. However, the limits of systems of experts became clear in the decades that followed, when they were unable to deal with the multifaceted nature and uncertainty of real-world issues (Gilson et al., 2023). This resulted in the creation of deep learning algorithms capable of learning from data and making judgments based on analytical patterns (Giannos & Delardas, 2023). Deep learning algorithms, which can understand complex patterns in pictures, audio, and text, developed with the development of the World Wide Web and the accessibility of huge amounts of data (Thirunavukarasu et al., 2023).

In this era of globalization, the advancement of Information Technology has provided much convenience to day to day lives (Deb, 2015). The advancement of artificial intelligence (AI) has led to the development of virtual assistants like ChatGPT, which can interact with users and assist them in various tasks. This

research project aims to analyze the impact of ChatGPT as a virtual assistant on productivity and job satisfaction among academics (Elbanna & Armstrong, 2023). The study will explore how ChatGPT can support academic professionals in their daily activities and examine its influence on their efficiency and overall job satisfaction. The findings of this research will contribute to the understanding of the potential benefits and challenges associated with the integration of AI-powered virtual assistants in academic environments (Huang et al., 2022).

The development of ChatGPT builds upon the success of previous AI language models, such as OpenAI's GPT-3. GPT-3 (Generative Pre-trained Transformer 3) is a state-of-the-art language model that utilizes deep learning techniques and transformer architecture to generate human-like text based on given prompts (Foroughi et al., 2023). Released in June 2020, GPT-3 achieved remarkable results in natural language processing tasks, demonstrating its potential in various applications (Al Ghatrifi et al., 2023). OpenAI introduced ChatGPT as an extension of GPT-3, specifically designed for interactive conversational experiences. By fine-tuning GPT-3 on conversational data and incorporating reinforcement learning techniques, ChatGPT was trained to provide more coherent and contextually appropriate responses in dialogue settings. This made it suitable for applications like chatbots, virtual assistants, and customer support systems (Gbenga et al., 2020). The initial release of ChatGPT sparked considerable interest and excitement among researchers, developers, and technology enthusiasts worldwide. It showcased the potential of AI language models to engage in dynamic and responsive conversations, blurring the lines between human and machine interactions.

However, as with any AI technology, ethical concerns around biases, misinformation, and misuse also surfaced, leading to debates about responsible deployment and regulation (Gubareva & Lopes, 2020). OpenAI launched ChatGPT as a research preview, allowing users to experiment and provide feedback while exploring its capabilities and limitations. This approach aimed to gather insights from real-world usage and improve the system over time. By encouraging user

feedback and addressing its limitations, OpenAI sought to develop a safer, more useful, and more robust AI system that could benefit a wide range of applications, including education (Hu et al., 2021). So, the adoption of ChatGPT technology in HEIs, particularly in Malaysia, holds promising prospects for enhancing teaching, learning, and academic support. Understanding the background, usage patterns, and implications of this technology can shed light on its potential benefits and challenges in the context of the Malaysian higher education system. Moreover, exploring the historical development of ChatGPT provides insights into its evolution from previous language models and the iterative improvements made by OpenAI to create a more interactive and conversational AI system (Foroughi et al., 2023).

Technology adoption (TA) study examines how and why people, communities, and organizations embrace and use new technology. This research, which conducted by Lund and Agbaji (2023) on the adoption of technology for community development, helps to understand the elements that impact the acceptance and spread of new technologies, as well as how they might be advocated more successfully in academic literature. The perceived advantages of the technological advances, the perceived costs of adoption, the ease of integration of the technology with current systems and processes, and the accessibility of social and technical assistance are all factors that impact technology adoption (Hansen et al., 2018). Furthermore, the amount of technological innovation and risk, the level of complexity as well as ease of use, the level of interoperability with current systems and procedures, and the level of social acceptance and peer pressure all have an impact on technology adoption (Bukar et al., 2023).

1.2 Problem Statement

The increasing adoption of AI-powered virtual assistants in academic environments raises the question of how these tools affect the productivity and job satisfaction of

academicians. While there is existing research on virtual assistants and AI in education, there is a need for a comprehensive analysis focusing specially on the impact of ChatGPT as a virtual assistant on academicians' performance and job satisfaction. The adoption of ChatGPT technology among academics in HEIs in Malaysia is an area that requires examination and attention (Gilson et al., 2023). While ChatGPT, a language model developed by OpenAI, has the potential to enhance various aspects of teaching, research, and communication in academia, there is a lack of understanding regarding the factors influencing its adoption and the potential challenges associated with its implementation in the Malaysian higher education context (Huang et al., 2022). One key problem is the limited research conducted on the adoption of ChatGPT technology in the Malaysian higher education setting (Giesenbauer & Müller-Christ, 2020). There is a need to explore the extent to which academics in Malaysia are aware of ChatGPT and its potential benefits. Understanding the current level of awareness can help identify the gaps and barriers that may hinder the widespread adoption of this technology among academics.

The acceptance and adoption of ChatGPT technology may vary among different disciplines within HEIs. It is crucial to examine the factors that influence the adoption of ChatGPT technology in various academic disciplines and understand how these factors differ across disciplines (Jiang & Shen, 2020). This knowledge can help tailor strategies and interventions to promote the adoption of ChatGPT technology effectively across different disciplines. Moreover, the challenges associated with implementing ChatGPT technology in the Malaysian higher education context need to be identified. These challenges may include technological infrastructure limitations, the resistance to change among academics, concerns about the quality and reliability of the generated content, and the need for appropriate training and support for effective utilization of ChatGPT technology (Bengio et al., 2021). Understanding the problem of the limited adoption of ChatGPT technology among academics in HEIs in Malaysia is crucial to leverage the potential benefits of this technology (King & Joshi, 2019). By addressing the gaps in knowledge and identifying the factors influencing adoption and the

associated challenges, appropriate strategies and interventions can be developed to promote the effective and widespread integration of ChatGPT technology in Malaysian HEIs. The use of AI in academics is a contentious topic. Some refer to it as a digital transformation, while others refer to it as a digital disruption (Lo, 2023). Similarly, in higher education, the usage of Open AI produced chatbot Chat-GPT (Generative Pre-trained Transformer) has the potential to provide a variety of benefits, particularly in academic writing assignments (Roose, 2022). However, the employment of chatbots is perceived to pose difficulties in gaining academic skills. According to several research, Chat-GPT is frequently utilized in education and has garnered substantial attention and debate. It ranges from being regarded as the finest chatbot powered by artificial intelligence ever released to the public at large to the most disastrous, predicting negative impacts in the knowledge industry (Cotton et al., 2023).

The adoption of ChatGPT technology among academics in HEIs in Malaysia has been a topic of growing interest due to its potential to revolutionize teaching, research, and communication processes (Chua & Yu, 2023). ChatGPT, powered by artificial intelligence, offers an innovative approach to streamline academic activities, enhance student engagement, and facilitate collaborative learning. However, despite its promises, the technology's integration into the academic landscape has encountered various challenges, especially in HEIs.

1.2.1 Academics' Issues with ChatGPT Adoption

Several issues have emerged regarding the adoption of ChatGPT technology by academics in Malaysian HEIs. First and foremost, many academics express concerns about technology’s ability to replace traditional teaching methods. Some fear that the introduction of AI-powered systems might undermine the importance of personalized interactions with users, leading to a potential decline in the quality of education (Bukar et al., 2023). As academics take pride in their student-centered approach to teaching, the idea of relinquishing direct, face-to-face engagement with

learners raises questions about the efficacy of ChatGPT in preserving a human touch in education. Moreover, academics are apprehensive about the learning curve associated with integrating ChatGPT into their pedagogy (Bengio et al., 2021). Not all educators are familiar with AI technologies, and this lack of expertise might hinder their confidence in utilizing ChatGPT to its full potential. Training and upskilling programs will be crucial to address these concerns and equip academics with the necessary knowledge and skills to leverage AI effectively as a complementary tool rather than a replacement for their teaching practices (Choudhury & Shamszare, 2023).

Furthermore, there might be a resistance to change among certain faculty members, as they may perceive the implementation of AI as a threat to their job security or autonomy in the classroom. A comprehensive change management strategy that addresses these fears and highlights the benefits of incorporating ChatGPT as a supportive tool rather than a disruptive force is essential to gain widespread acceptance and adoption among academics. Therefore, concerns about data security and privacy stand in the way of ChatGPT's widespread implementation (Bukar et al., 2023). Academics are rightfully worried about the confidentiality of their intellectual property, research data, and student information, particularly in the context of HEIs where proprietary research is often conducted. Robust data protection policies, encryption measures, and clear guidelines on data usage and access must be established to instill trust and confidence among academics regarding the safety and privacy of their valuable academic assets.

1.2.2 Adoption of ChatGPT among HEIs

HEIs in Malaysia face unique challenges compared to their public counterparts, leading to an evident adoption gap in ChatGPT and AI technologies. One notable issue is the financial constraint that many private institutions encountered (Greig, Weeks, & Nguyen, 2006). Unlike public universities that may receive substantial government funding, HEIs often have limited resources to invest in cutting-edge

technologies like ChatGPT. As a result, they might lag in embracing AI solutions, making it difficult for their academics to benefit from the technology's advantages. Furthermore, HEIs tend to have smaller faculty sizes, and faculty members often wear multiple hats, including administrative roles and research responsibilities (Adams & Bock, 2020). This limited faculty capacity might hinder the implementation of ChatGPT as academics have less time to dedicate to learning and integrating new technologies into their teaching methods. Additionally, smaller faculty sizes might result in a lack of peer support and collaboration, further impeding the adoption process.

According to a survey conducted by the Malaysian Higher Education Department, only 35% of academics in HEIs reported incorporating AI technologies like ChatGPT into their teaching practices, compared to 60% in public universities. This significant gap in adoption indicates that HEIs face more challenges in integrating AI technologies into their educational ecosystem (Area & Adell, 2021). Moreover, a research study conducted by the Institute of Education Sciences revealed that 68% of academics in HEIs expressed concerns about the potential negative impacts of AI on personalized student interactions, citing it as a major deterrent to adopting ChatGPT in their classrooms. These concerns highlight the need for clear communication and professional development programs to address misperceptions about AI and its role in the educational setting (Lou, 2023). In terms of financial resources, data from the Private Colleges and Universities Malaysian Association showed that, on average, HEIs allocate only 5% of their budget to educational technology investments. This is considerably lower than the 12% allocated by public universities, limiting the opportunities for HEIs to implement AI technologies effectively. Securing additional funding sources and exploring collaborative initiatives can help bridge the financial gap and promote AI adoption among academics in all institutions (Alzahrani & Rajkhan, 2021). In conclusion, while ChatGPT technology holds significant promise for transforming higher education in Malaysia, academics in HEIs face notable challenges in adopting and fully embracing it. Issues surrounding traditional teaching concerns, faculty readiness, data privacy, and financial constraints must be addressed to facilitate the

seamless integration of ChatGPT and other AI-powered tools into the academic ecosystem, ensuring that all institutions and educators can leverage its potential benefits effectively (Choudhury & Shamszare, 2023). Through a concerted effort to address these challenges, Malaysian HEIs can create a supportive environment for academics to harness the power of AI and shape the future of education in the country.

1.3 Research Objectives

1.3.1 General Objectives

The purpose of this research is to analyse and study about the impacts of performance expectancy, effort expectancy, facilitating conditions and perceived trust on the adoption of ChatGPT technology among academics in Malaysian HEIs.

1.3.2 Specific Objectives

The study aims to achieve the following research objectives:

1. To determine the impact of performance expectancy on the adoption of ChatGPT Technology among academics in HEIs.

2. To determine the impact of effort expectancy on the adoption of ChatGPT Technology among academics in HEIs.

3. To determine the impact of facilitating condition on the adoption of ChatGPT Technology among academics in HEIs.

4. To determine the impact of perceived trust on the Adoption of ChatGPT Technology among academics in HEIs.

1.4 Research Question

The following research questions are developed:

1. Does performance expectancy influence the adoption of ChatGPT Technology among academics in HEIs?

2. Does effort expectancy influence the adoption of ChatGPT Technology among academics in HEIs?

3. Does facilitating condition influence the adoption of ChatGPT Technology among academics in HEIs?

5. Is there a connection between academics' adoption of ChatGPT Technology in HEIs and their perception of trust?

1.5 Hypotheses of the Study

I. There is a significant relationship between performance expectancy and the adoption of ChatGPT Technology among academics in HEIs.
II. There is a significant relationship between effort expectancy and the adoption of ChatGPT Technology among academics in HEIs.
III. There is a significant relationship between facilitating condition and the adoption of ChatGPT Technology among academics in HEIs.
IV. There is a significant relationship between perceived trust and the adoption of ChatGPT Technology among academics in HEIs.

1.6 Target Respondents

The target respondents for this study will be academicians working in various educational institutions, including universities, colleges, and research organizations. The sample will include all academicians who interact with ChatGPT as part of their professional activities.

1.7 Research Scope

Using a quantitative research technique, this study intends to investigate the adoption of ChatGPT technology among academics at Malaysian HEIs. The study will investigate the amount of acceptance, the variables that influence adoption, and the perceived benefits and obstacles of using ChatGPT technology into teaching and learning methods. To meet the study aims, a survey questionnaire will be prepared and sent to a representative sample of academics from various disciplines in Malaysian HEIs. The questionnaire will collect information on academics' knowledge of ChatGPT technology, frequency of usage, and opinions of its use in improving teaching and learning outcomes (Bengio et al., 2021).

The information gathered will be examined using statistical analysis to determine the amount of acceptance, frequency of usage, and perceived benefits and obstacles connected with ChatGPT technology. Inferential statistical approaches such as correlation and regression analysis will be used to uncover links between variables and to identify the elements that impact academics' adoption of ChatGPT technology. The outcomes of this study will give insights into the present level of ChatGPT technology acceptance among academics in Malaysian HEIs, as well as contribute to a better understanding of the variables driving its integration into teaching and learning practices. The findings can help policymakers, managers, and educators develop tactics and measures to support the effective use of ChatGPT technology in education.

1.8 Significance of Study

For several stakeholders, the study project that aims to investigate how ChatGPT, a virtual assistant, affects academics' job fulfillment and efficiency is very important. The study's findings can contribute to academic institutions, virtual assistant developers, and academicians themselves, providing valuable insights and implications for practice and future research.

The significance of studying the adoption of ChatGPT technology among academics in HEIs in Malaysia lies in its potential to transform the teaching and learning landscape. As an advanced language model developed by OpenAI, ChatGPT has the capacity to facilitate communication and knowledge exchange between academics and academicians in an interactive and dynamic manner. By examining its adoption, this study can shed light on the benefits and challenges associated with integrating ChatGPT technology into the higher education context in Malaysia (Lo, 2023). First and foremost, the results of this study have the potential to improve the teaching techniques used in HEIs. ChatGPT technology has the potential to facilitate personalized and adaptive learning experiences, allowing academics to tailor their instructional approaches to meet the individual needs and learning preferences of academicians. It can be accomplished to develop strategies for encouraging the effective use of ChatGPT technology by having a better understanding of the factors that influence its adoption among academics. This will ultimately improve the effectiveness of instruction and student encouragement (Mohammed et al., 2023). Secondly, investigating the adoption of ChatGPT technology can provide insights into the potential impact on the research and scholarly activities of academics in Malaysia. ChatGPT has the capability to assist researchers in information retrieval, literature review, and data analysis, enabling them to streamline their research processes and enhance their productivity (Bukar et al., 2023). Examining the extent to which academics embrace ChatGPT technology can inform policymakers and institutional leaders about the integration of advanced technologies into the research ecosystem, fostering a culture of innovation and knowledge creation within HEIs in Malaysia (Adams & Bock, 2020).

1.9 Chapter Layout

There are five chapters in this research study that examine how academics in Malaysian HEIs are adopting ChatGPT technology and how this is influenced by performance expectancy effort expectancy, facilitating conditions, and perceived trust. The research project's general concept is briefly introduced in Chapter 1, along with the research background, problem statement, objectives, questions, and hypotheses. It also encompasses the target respondents, research scope, research significance, and chapter layout. Subsequently, factors pertaining to its impact on the study's dependent variable are developed.

The relationship between the independent and dependent variables will be demonstrated in the second chapter of the literature review. This study looked at how academics in Malaysian HEIs expected to be using ChatGPT technology in terms of performance, effort, facilitating conditions, and perceived trust. The proposed theoretical or conceptual framework, the hypothesis to investigate the relationship, and a detailed discussion of the review from the existing literature and related conceptual models will be covered. As the educational materials' contents are examined and reviewed.

The research methodology, which covers the entire research design and the research's advancement, will be addressed in Chapter 3. A questionnaire will be created and given to the specific responders. The research's dependability will be evaluated using SPSS software. Once the data has been generated, it is interpreted to yield accurate and trustworthy findings, at which point the end of this chapter.

Chapter 4 will cover the analysis of the results that were calculated using SPSS software. The various analyses will be interpreted in this chapter. The demographic profile of respondents and measurements of construct central tendencies are part of

descriptive analysis. In addition, scale measurement provides an interpretation of the variables' reliability, while inference analysis generates outcomes about the demographic characteristics.

Apart from that, chapter five will provide a summary and deeper analysis of the research results. All the significant discoveries, management ramifications, research constraints, and some suggestions and ideas for additional study will be concluded in this chapter.

1.10 Summary of Chapter

In conclusion, this chapter gave a summary of the research study looking at how academics in Malaysian HEIs are using ChatGPT technology. The background of the study highlighted the importance of technological integration in the educational context. The problem statement identified the gap in understanding the adoption of ChatGPT technology among academics in Malaysia. The research question and objectives were formulated to guide the study. The target respondents were identified as academics from HEIs in Malaysia. Lastly, the significance of the study was emphasized, highlighting the potential contributions to the literature and the development of strategies and policies to promote the effective integration of ChatGPT technology into teaching and learning practices.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter provides an overview of the key concepts and theoretical framework that form the foundation for the research study on the adoption of ChatGPT technology among academics in HEIs in Malaysia. It begins by exploring the role of virtual assistants and AI in academia, highlighting their potential benefits and impact on teaching and learning. The chapter then introduces the dependent variable, which is the adoption of ChatGPT technology among academics, and discusses the importance of understanding the factors influencing this adoption. The independent variable, the Unified Theory of Acceptance and Use of Technology (UTAUT), is introduced, highlighting its four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. The chapter concludes by summarizing the main points covered, setting the stage for the subsequent sections that delve deeper into hypothesis formation and the theoretical framework.

2.1 Underlying Theory

2.1.1 Virtual Assistants and AI in Academia

Virtual assistants, powered by AI technologies like ChatGPT, have gained prominence in various fields, including academia. These virtual assistants are designed to interact with users, provide information, and assist with tasks (Lou, 2023). In the academic setting, virtual assistants can support academicians by answering queries, organizing schedules, providing research assistance, and facilitating communication.

Virtual assistants and AI technologies have gained significant attention and application in various sectors, including academia. In the context of HEIs, virtual assistants powered by AI offer immense potential to transform teaching, learning, research, and administrative processes. These technologies, such as ChatGPT, can interact with users, understand natural language, and provide personalized responses, making them valuable tools for academics (Opara et al., 2023). One prominent application of virtual assistants in academia is in the realm of teaching and learning. Virtual assistants can serve as intelligent tutoring systems, providing academicians with personalized guidance and support (Choudhury & Shamszare, 2023). It can be answering academicians' questions, providing explanations, and offering additional resources based on their individual needs. This level of personalization and interactivity can enhance the learning experience by providing immediate feedback, adapting to academicians' learning styles, and addressing their specific learning gaps. Virtual assistants can also assist in grading assignments and providing constructive feedback to users, thereby lightening the workload of academics, and enabling them to focus on higher-level tasks (Rudolph et al., 2023).

Moreover, virtual assistants can play a crucial role in supporting research activities in academia. They can assist researchers in conducting literature reviews by quickly retrieving relevant information from vast databases and academic resources (Zhai, 2022). Virtual assistants can also aid in data analysis by processing large datasets, running statistical analyses, and generating visualizations. These capabilities enable researchers to save time, enhance efficiency, and access information more effectively, ultimately contributing to the advancement of knowledge and research

outcomes (Woithe & Filipec, 2023). Virtual assistants powered by AI can have administrative benefits within HEIs. They can handle routine administrative tasks, such as scheduling appointments, managing calendars, and answering frequently asked questions from academicians. This automation of administrative processes can streamline operations, reduce manual workloads, and improve overall efficiency. It allows administrative staff and faculty members to focus on more complex and strategic tasks, fostering a more productive and effective work environment. However, the adoption of virtual assistants and AI technologies in academia is not without challenges. One primary concern is the ethical use of AI, particularly in areas such as data privacy, bias, and fairness (Xiao et al., 2023). Careful attention must be given to ensuring that virtual assistants maintain data privacy and security standards, protect sensitive information, and mitigate any biases in their responses. Additionally, there is a need for ongoing monitoring and evaluation to ensure that virtual assistants align with the values, policies, and regulations of HEIs (Rudolph et al., 2023).

Therefore, virtual assistants and AI technologies have the potential to revolutionize academia by enhancing teaching and learning, supporting research activities, and streamlining administrative processes (Choudhury & Shamszare, 2023). By leveraging the capabilities of virtual assistants like ChatGPT, academics can provide personalized support to academicians, optimize research workflows, and improve operational efficiency (Roose, 2022). However, careful consideration must be given to ethical considerations to ensure responsible and effective use of these technologies. The adoption of virtual assistants and AI in academia has the power to transform HEIs, offering new opportunities for innovation and advancement in teaching, research, and administration (Al Ghatrifi et al., 2023).

2.2 Review of Literature

2.2.1 Dependent Variable: Adoption of ChatGPT Technology among Academics in Malaysian HEIs

Acceptance of ChatGPT in higher education is significant as it can impact the adoption and utilization of ChatGPT as an innovative educational technology. In higher education, ChatGPT is accepted by academicians. ChatGPT acceptance in higher education is measured by attitudes, perceptions, beliefs, and behaviors (Xiao et al., 2023). The adoption of ChatGPT technology among academics in HEIs holds great potential for transforming the teaching and learning landscape. ChatGPT, developed by OpenAI, is an advanced language model that can engage in interactive conversations, providing natural language responses and facilitating knowledge exchange. Examining its adoption among academics in HEIs can shed light on the benefits, challenges, and implications of integrating this technology into the academic environment (Woithe & Filipec, 2023). Dilekci and Karatay (2023) highlighted the importance of academicians acquiring 21st century skills in response to technological advancement in the information age. These skills encompass critical thinking, problem solving, creative thinking, collaborative work, and proficiency in technology including digital and information literacy.

One significant benefit of adopting ChatGPT technology is its potential to enhance the teaching methodologies employed by academics. ChatGPT can serve as a virtual assistant, enabling personalized and adaptive learning experiences. Academics can utilize ChatGPT to deliver content, address student queries, and provide on-demand support. This technology allows for interactive engagement, immediate feedback, and customized guidance, catering to the diverse needs and learning preferences of users (Zawacki-Richter et al., 2019). By integrating ChatGPT into their teaching practices, academics can create more dynamic and interactive learning environments that foster student engagement, collaboration, and critical thinking. Furthermore, the adoption of ChatGPT technology can have a positive impact on research and scholarly activities among academics in HEIs.

ChatGPT can assist researchers in various aspects of their work, such as information retrieval, literature review, and data analysis. Researchers can leverage ChatGPT's natural language processing capabilities to extract relevant information from vast databases, identify key research papers, and summarize complex concepts (Zawacki-Richter et al., 2019). The technology can also aid in data analysis by generating insights, visualizations, and statistical models, thus streamlining the research process. By leveraging ChatGPT, academics can potentially increase research productivity, accelerate the knowledge creation process, and contribute to advancements in their respective fields (Zhai, 2022). However, the adoption of ChatGPT technology in HEIs may also present challenges. One significant challenge is the need for academics to acquire the necessary skills and knowledge to effectively utilize ChatGPT in their teaching and research activities. Training programs and professional development initiatives should be implemented to familiarize academics with the functionalities and applications of ChatGPT, ensuring they can make optimal use of the technology. Additionally, concerns related to data privacy and security should be addressed to protect sensitive information shared through ChatGPT and maintain confidentiality (Zawacki-Richter et al., 2019).

The integration of ChatGPT technology into HEIs also requires careful consideration of ethical implications. Academics must be mindful of potential biases that may be present in the language model and take steps to ensure fairness and inclusivity. Regular monitoring and evaluation should be conducted to identify and mitigate any unintended biases or limitations that may arise in the use of ChatGPT (Almurayh, 2021). In conclusion, the adoption of ChatGPT technology among academics in HEIs has the potential to revolutionize teaching, learning, and research practices. Its personalized and adaptive nature can enhance student engagement and support, while its assistance in research activities can improve productivity and knowledge creation (Choudhury & Shamszare, 2023). However, the successful adoption of ChatGPT requires addressing challenges such as skill development, data privacy, and ethical considerations. By embracing and

effectively integrating ChatGPT technology, academics can unlock new opportunities for innovation, collaboration, and advancement in higher education.

2.2.2 Independent Variable

Unified theory of Acceptance and Use of Technology (UTAUT) is a theoretical framework widely used to understand and explain individuals' acceptance and adoption of new technologies. UTAUT incorporates four key constructs: Performance expectancy (technology able to enhance performance); Effort expectancy (using the technology is easy); Perceived trust (in using or adopting technology will lead to individual dedication to participating in specific activities); and Facilitating conditions (necessary resources and support are available to use the technology) (Sykes, Venkatesh, & Gosain, 2009).

According to recent research, an AI-powered virtual assistant, a collective reflection on the speculative futures of ChatGPT and generative AI within the academic environment (Bozkurt, et al., 2023). This involves utilizing ChatGPT to provide support, assistance, and automation for academic tasks and workflows (Shibl, Lawley, & Debuse, 2013). The integration may include tasks such as answering queries, providing information, organizing schedules, offering research assistance, and facilitating communication between academicians and other stakeholders (Johnsons & Williams, 2020).

2.2.3 Independent Variable: Performance Expectancy

Performance expectancy is a key concept of technology acceptance and adoption, particularly on models such as the Technology Acceptance Model (TAM) and UTAUT. It refers to an individual's belief that using a particular technology will enhance their performance in a specific task or activity (Davis, 1989; Venkatesh & Davis, 2003). It is based on the perception that the technology will provide benefits,

improve efficiency, or increase productivity (Lou, 2023). Users assess the potential of a technology to augment their task efficiency, effectiveness, or overall job-related functions (Robey, 1979). The utility and functionality of the technology play a critical role, as users gauge how well it aligns with their needs and requirements. Additionally, perceived ease of use is closely intertwined with performance expectancy (Davis, 1989). While a technology that users find intuitive and easy to learn is more likely to be perceived as enhancing performance (Hill, Smith & Mann, 1987).

Furthermore, individual differences, such as skill level and expertise, influence these perceptions. Recognizing and addressing these factors are essential for the successful adoption and acceptance of new technologies, ensuring users believe in the positive impact on their job performance (Doraiswamy et al., 2019). In the past experiences with similar technologies, training and support availability, and the presence of clear feedback mechanisms all contribute to shaping performance expectancy (Schmidt et al., 2021; Sohn and Kwon, 2020a; Taddeo and Floridi, 2018; Turner et al., 2010). In the context of ChatGPT technology adoption among academics, performance expectancy would be related to the belief that using ChatGPT will lead to improved teaching effectiveness, enhanced student engagement, or increased research productivity. Positive perceptions of performance expectancy are likely to drive academics towards adopting and using ChatGPT (Adams & Bock, 2020). This variable refers to the perceived usefulness and benefits that academics associate with using ChatGPT technology in higher education.

For instance, Davis (1989) asserts that individuals' belief in the utility of a particular application in enhancing job performance plays a crucial role in determining whether they will adopt that application. Ventaskesh and Speier (1999) also recognize that achieving describe outcomes, such as increased payment and enhanced job performance, serves as a significant motivation for embracing technologies. Applied to the adoption of ChatGPT, this suggests that individuals may stick to conventional work methods if they perceive that ChatGPT technology and applications will not contribute to better performance or increased efficiency and effectiveness.

Additionally, Martin (2014) argues that the absence of user-friendly interfaces discourages ChatGPT users. Consequently, significant variations in the content and manner of data utilization may exist among different users involved in using ChatGPT (Hunnius, Krieger, & Schuppan, 2014). It encompasses the belief that ChatGPT can enhance teaching effectiveness, improve users learning outcomes, facilitate research, or provide valuable academic support (Almurayh, 2021).

2.2.4 Independent Variable: Effort Expectancy

Effort expectancy refers to the perception of how easy or difficult it is to use the technology (Sykes, Venkatesh, & Gosain, 2009). It relates to the user's belief that interacting with the technology and incorporating it into their workflow will be straightforward and require minimal effort. This perception significantly influences the adoption of new technologies, as users are more inclined to embrace and persist in using a system if it is perceived as easy to navigate (Johnson, Zheng, and Padman, 2014).

Several elements can impact the perceived ease of using open data technologies. For example, the complexity and associated expenses of accessing open government data are notable factors (Ding, Peristeras, & Hausenblas, 2012). This complexity arises from the dispersion of data across various infrastructures, contributing to challenges in locating the information (Braunschweig, Eberius, Thiele, & Lehner, 2012; Conraide & Choenni, 2014).

Effort expectancy is a crucial factor in the adoption of new technologies because users are more likely to embrace and continue using a system if they perceive it as easy to use, which is one of the dimensions of the TAM. TAM is a widely used theoretical framework for predicting and understanding user acceptance of technology (Davis, 1989). According to the research of TAM which conducted by Ma & Liu (2011), if users perceive a technology as easy to use, they are more likely to accept and use it (Jetzek, Avital, & Bjorn-Anderson, 2014).

In the case of ChatGPT adoption, academics would consider factors such as user-friendliness, intuitive interface, and ease of integration with existing tools and systems. If academics perceive ChatGPT as easy to use and integrate into their teaching and research activities, it will positively influence their adoption intentions (Afzal et al., 2019). Effort Expectancy represents the perceived ease of use and simplicity of integrating ChatGPT technology into academic practices. It includes the extent to which academics believe that ChatGPT is user-friendly, requires minimal effort to learn, and can be easily incorporated into their existing teaching or research methods (Bukar et al., 2023).

2.2.5 Independent Variable: Facilitating Conditions

Facilitating conditions refer to the availability of necessary resources, support, and infrastructure to use the technology effectively (Ventakesh et al., 2003). According to Huijiboom and van den Broek (2011), the presence of facilitating conditions, such as networks, internet connectivity, ample and suitable open data, and appropriate open data infrastructures, can influence a higher inclination to use open data. Parycek and Sachs (2010) illustrate this by noting that academicians may have varying levels of internet access, including that the facilitating conditions for an individual's adoption and acceptance of technologies may differ. It includes factors such as access to appropriate hardware and software, technical support, training programs, and institutional policies that encourage and support the adoption of the technology.

In the case of ChatGPT adoption, academics would need access to devices with internet connectivity, institutional support in terms of training and technical assistance, and integration of ChatGPT into existing systems. The presence of facilitating conditions positively influences the adoption of ChatGPT by academics, as they users might feel empowered and adequately supported to utilize the technology (Bukar et al., 2023).

By considering these four key constructs of UTAUT – performance expectancy, effort expectancy, perceived trust, and facilitating conditions – researchers can gain

insights into the factors influencing the adoption of ChatGPT technology among academicians in HEIs. Understanding these constructs and their impact on adoption intentions can guide the development of strategies and interventions to promote the effective use of ChatGPT and maximize its benefits in the academic context (Gbenga et al., 2020). Facilitating Conditions encompass the availability of necessary resources and support systems that enable the adoption of ChatGPT in HEIs. These conditions may include access to reliable internet connections, technical infrastructure, training programs, institutional policies, and administrative support for implementing ChatGPT effectively (Alzahrani & Rajkhan, 2021).

On the other hand, Gurstein (2011) contends that societal divisions or background conditions, driven by variations in income, education, and literacy, can create two groups. Based on the research, one group comprises individuals with access to the internet and open-source data, which holds significance in their daily lives, while the other group lack of such access, leading to a "data divide." For those without easy access to the internet, academics data, and other necessary resources, the conditions facilitating meaningful use and acceptance of open data are more constrained. In contrast, individuals with internet access and availability of open public sector data and other necessary resources may experience facilitating conditions to a greater extent than other users. In the absence of these facilitating conditions, barriers are likely to be insurmountable, resulting in lower intentions among potential open data users to engage with open data and related technologies,

2.2.6 Independent Variable: Perceived Trust

Perceived trust refers to an individual's personal evaluation or judgment regarding the dependability, credibility, and reliability of a person, system, technology, or entity (Moorman et al., 1992). This assessment is subjective and is shaped by factors like past experiences, reputation, transparency, and the perceived competence of the subject. Perceived trust is a subjective measure of trustworthiness and can differ among individuals based on their unique perceptions and encounters (Mason et al., 2020; Shin, 2020).

One of the studies conducted and proposed by Gefen, Karahanna, and Straub in 2003, perceived trust in a technology, which correlates positively with performance expectations, reinforces the idea that when users have heightened confidence in ChatGPT's ability to function efficiently, they are more likely to depend on its suggestions, positively impacting users' decision-making processes (Choudhury & Shamszare, 2023). The cognitive fit theory complements this dynamic by asserting that the harmony between an individual's cognitive processes and how technology represents information affects problem-solving and decision-making effectiveness. As users perceive ChatGPT as a proficient tool aligned with their cognitive processes and expectations, they are more inclined to integrate its recommendations into their decision-making, leading to enhanced outcomes.

According to the research, Empirical investigations indicate that positive user experiences with technology have the potential to enhance trust in that technology (Shin, 2020). For instance, Shin (2021) discovered that users who had positive encounters with smart speakers were more inclined to trust the technology. Likewise, studies on chatbots reveal that users' perceptions of a chatbot's competence and usefulness can impact their trust in the chatbot (Festinger, 1957). Trust in technology can also defined as "the extent to which a user is willing to depend on a technology and its outcomes" (Mayer et al., 1995, p.718).

In the context of the adoption of ChatGPT, trust pertains to users' confidence in the accuracy and reliability of ChatGPT's responses. Users are willing to trust that the technology will consistently provide accurate information, generate reliable responses, and maintain data privacy and security (Choudhury & Shamszare, 2023). Trust can be influenced by factors such as reputation, credibility of the technology provider, and user experiences. Higher levels of perceived trust in ChatGPT are likely to increase academics' willingness to adopt and use the technology (Bukar et al., 2023). Previous research has shown that a positive correlation between perceived trust in technology and users' intention to use that technology (Jeng, 2019; Van der Heijden et al., 2003; Y. Wang et at., 2020).

2.3 Proposed Theoretical Framework

UTAUT is a technology acceptance model formulated in user acceptance of information technology (Venkatesh et al., 2003). The conceptual framework for examining the adoption of ChatGPT technology among academics in HEIs in Malaysia consists of independent variables that influence the dependent variable. The independent variables in this framework are performance expectancy, effort expectancy, facilitating conditions, and perceived trust, while the dependent variable is the adoption of ChatGPT in Malaysian HEIs.

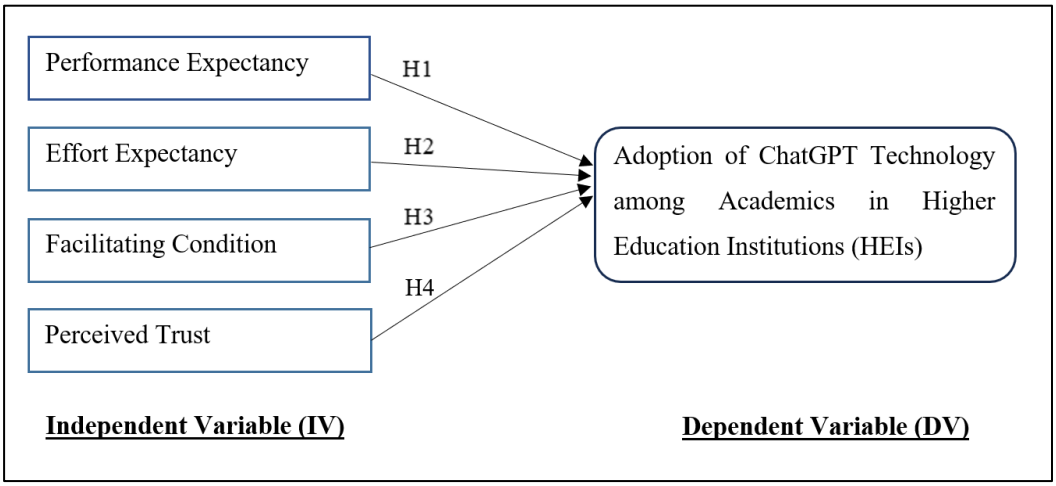


Figure 2.3: *Proposed Framework of the study*.

The suggested theoretical framework, which aims to highlight the influence of independent variables, is shown in Figure 2.3 which including performance expectancy, effort expectancy, facilitating condition and perceived trust on the adoption of ChatGPT technology among academics in Malaysian HEIs.

The dependent variable is the actual utilization and acceptance of ChatGPT technology by academics in HEIs in Malaysia (Choudhury & Shamszare, 2023). It measures the extent to which academicians have incorporated ChatGPT into their teaching, research, or other academic activities. The conceptual framework shown

that the independent variables (Performance Expectancy, Effort Expectancy, Facilitating Conditions, and Perceived Trust) collectively influence and predict the level of Adoption of ChatGPT in Higher Education among academics in Malaysia.

By examining these variables, researchers can assess the factors that positively or negatively influence academics' decision to adopt ChatGPT technology in their teaching and research practices. This framework provides a foundation for understanding and analyzing the adoption process and can guide the development of strategies to enhance the integration and utilization of ChatGPT in HEIs in Malaysia.

2.4 Hypothesis Development

The hypotheses of the study are formulated based on the literature reviews conducted in previous sections, which provided insights into the adoption of ChatGPT technology among academics in HEIs. The following hypotheses are proposed to examine the relationships between the key constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT) and the adoption of ChatGPT technology.

These hypotheses are based on the expectation that the integration of ChatGPT as a virtual assistant in academic environment will lead to increased productivity and improved job satisfaction among academicians. The positive impact of ChatGPT on productivity can be attributed to its ability to automate routine tasks, provide quick access to information, and streamline communication processes. Similarly, the positive impact on job satisfaction can be attributed to the reduction of workload, improved task efficiency, and increased access to resources facilitated by ChatGPT.

2.4.1 The relationship between Performance Expectancy and the Adoption of ChatGPT Technology among academics in Malaysian Higher Education Institutions (HEIs)

The correlation between performance expectancy and the adoption of ChatGPT technology among academicians in Malaysian HEIs is intricately tied to the anticipated benefits academicians foresee in their professional tasks upon integrating ChatGPT into their workflows. For educators, there is an expectation that ChatGPT will evaluate the quality of teaching materials, contributing to an enhanced learning experience for students.

Researchers foresee potential assistance in drafting research, conducting literature reviews, and expediting data analysis. The tool is expected to streamline administrative responsibilities, automating tasks like email responses and document generation, ultimately improving efficiency. The anticipation extends to improve communication, particularly in multilingual settings, where ChatGPT's language capabilities might bridge communication gaps.

The positive relationship between performance expectancy and adoption of ChatGPT technology is further influenced by factors such as a user-friendly interface, the availability of training resources, peer influence, and institutional support. As academicians gauge the perceived benefits of ChatGPT in facilitating their professional responsibilities, their expectations play a pivotal role in shaping the extent to which this technology is adopted within the unique landscape of Malaysian HEIs.

Therefore, the following hypotheses are formed:

H_0: There is no significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_1: There is a significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

2.4.2 The relationship between Effort Expectancy and the Adoption of ChatGPT Technology among academics in Malaysian Higher Education Institutions (HEIs)

The correlation between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs can be explored within established technology acceptance frameworks like TAM or UTAUT. These models provide a theoretical foundation for studying the factors that influence the acceptance and utilization of technology. Effort expectancy, within this context, refers to the perceived ease of use associated with ChatGPT. It involves academicians' perceptions of how easy or challenging it is to integrate ChatGPT into their daily academic endeavours, such as research, teaching, and other professional activities.

Adoption of ChatGPT technology encompasses the willingness and intention of academicians to incorporate ChatGPT into their work. This extends to the actual use and integration of ChatGPT into their routine academic practices. The positive relationship between effort expectancy and the adoption of ChatGPT suggests that as the expectation of ease-of-use increases, indicating that academicians are more inclined to embrace and utilize ChatGPT in their professional capacities. If academicians find ChatGPT easy to use and integrate into their existing workflows, they are more inclined to adopt the technology.

Research initiatives may involve surveying academicians to assess their perceptions of effort expectancy and their intention to adopt ChatGPT. In conclusion, recognizing and addressing the relationship between effort expectancy and the adoption of ChatGPT among academics in Malaysian HEIs is crucial for the

successful integration of the technology into academic environment. Efforts to enhance the perceived ease to use can positively impact the willingness of academicians to adopt ChatGPT for their professional activities.

Therefore, the following hypotheses are formed:

H_0: There is no significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_2: There is a significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

2.4.3 The relationship between Facilitating Condition and the Adoption of ChatGPT Technology among academics in Malaysian Higher Education Institutions (HEIs)

The connection between facilitating condition and the updates of ChatGPT technology among academician realm of Malaysian HEIs is a pivotal aspect to explore. Facilitating conditions encompass a range of factors that can either enhance or hinder the adoption of innovative technologies. In context of ChatGPT technology, these facilitating conditions might include the availability of necessary infrastructure, institutional support, and the level of technical expertise among academics. Essentially, the seamless integration of ChatGPT within the academic setting depends on the presence of conducive conditions that make the adoption process more straightforward and appealing.

When Malaysians HEIs invested in the necessary resources, provide adequate training, and foster a supportive environment, academicians are more likely to embrace and incorporate using the ChatGPT technology into their teaching and research practices. Understanding and addressing this facilitating condition is

therefore crucial for a successful and widespread adoption of ChatGPT technology in Malaysian HEIs.

Therefore, the following hypotheses are formed:

H_0: There is no significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_3: There is a significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.

2.4.4 The relationship between Perceived Trust and the Adoption of ChatGPT Technology among academics in Malaysian Higher Education Institutions (HEIs)

The correlation between the perceived trust and the adoption of ChatGPT technology within Malaysian HEIs among academics can be analysed through established technology adoption models and trust theories. The TAM serves as pertinent framework, asserting that academician's acceptance is depending on how they view the technology's simplicity of use and usefulness. In order to implement ChatGPT, academicians' assessments of its usability and utility in fulfilling their academic tasks become pivotal. The element of perceived trust can be dissected into facets such as reliability, security, and competence, with academics likely to embrace ChatGPT when it consistently delivers accurate information, ensures data security, and demonstrates competence in generating relevant content.

Additionally, culture and institutional factors specific to Malaysian HEIs may exert an influence on trust perceptions. Effective communication, positive interactions, and ethical considerations also contribute significantly to the establishment of trust. Furthermore, the experiences of academicians, peer influence, and the provision of

user training and support collectively shape the dynamics of perceived trust and subsequent adoption of ChatGPT technology in the academic context. A holistic approach, considering both technological and socio-cultural dimensions, is imperative for the successful integration of this ChatGPT technology withing academicians in Malaysian HEIs.

Therefore, the following hypotheses are formed:

H_0: There is no significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_4: There is a significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.

2.5 Chapter Summary

A quick summary of this chapter, this chapter started with discussing the literature review of the defined independent and dependent variables of the study with supported citations. This Chapter presents a comprehensive summary of the theoretical framework used that explains the ChatGPT technology adoption among academics in HEIs in Malaysia. The chapter focuses on the UTAUT and its four key constructs: performance expectancy, effort expectancy, perceived trust, and facilitating conditions. By understanding the four key constructs of UTAUT, researchers can gain valuable insights into the factors influencing the adoption of ChatGPT technology among academics in Malaysian HEIs. These constructs provide a framework for analyzing the beliefs, perceptions, and contextual factors that impact academics' acceptance and use of ChatGPT. The findings from this study will contribute to a deeper understanding of the adoption process and inform strategies and interventions to promote the effective integration of ChatGPT into the academic environment.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

This chapter will provide an overview of the methodology used to gather pertinent information and data to justify the relationship between the variables and support the hypothesis. Research methodology is a method or procedure for doing research that includes data collection, analysis, and conclusion. It is critical to use the proper research methodology while proving the data validity of the research findings. The methodology for this study is given in this chapter, with the purpose of developing a research practice that can achieve the academic quality requirements. The path to comprehending the multifaceted dynamics of technology adoption in educational contexts requires a thoughtful selection of research design, data collection techniques, participant selection criteria, data analysis and reliability analysis. The methodology for this study, which primarily focuses on quantitative research methods, is described in this chapter, to investigate the adoption of ChatGPT technology among academics within Malaysian HEIs. By utilizing a quantitative approach, this study aims to provide a systematic and data-driven analysis of the factors influencing ChatGPT adoption, to draw statistically supported conclusions.

3.1 Research Design

A methodical plan was employed in the research design to collect and analyze the necessary data (Zikmund, Babin, Carr, & Griffin, 2010). To put it briefly, the proposed research work's plan is known as the research design. According to Inaam (2016), research can be thought of as a framework. To address the research questions, a research design incorporates procedures like gathering data information, measurement, and analysis.

Quantitative and qualitative design are two types of design used in this research design. Qualitative design refers to data that is ideally represented by a symbol, number code, or name, whereas quantitative design collects and evaluates numerical data, such as counts, values, and effectively expressed numerical values. In this scenario, the study will incorporate quantitative research. This study employed ChatGPT technology for quantitative research. Alaxei (2002) states that the objective is to describe both the independent and dependent variables of the study precisely and explicitly. The quantitative research design is well-suited for capturing trends, patterns, and quantifiable relationships related to technology adoption, thereby offering a comprehensive understanding of the subject matter.

Additionally, there are three types of research: casual research, descriptive research, and exploratory research. When the study problem is well-defined, causal research aims to identify the variable that may be responsible for the behavior in question and examine any influence or correlation between variables (Zikmund, 2003). Cause-and-effect connections will be applied in this study to identify the cause and effect of the relationship between performance expectancy, effort expectancy, facilitating condition and perceived trust on the adoption of ChatGPT technology among academics in Malaysian HEIs. Thus, this study is to determine the impact of independent variable including performance expectancy, effort expectancy, facilitating condition and perceived trust towards the adoption of ChatGPT technology among academics in HEIs in Malaysia (Dependent variable).

3.2 Data Collection Method

To answer specific research questions, test hypotheses, and analyze results, data collection is the process of gathering and assessing information on variables of interest in a way that follows established system guidelines (Syed, 2016). Primary and secondary are the two categories under which data collection methods are divided. Primary data were obtained and used to gather information and formulate a hypothesis for this study's analysis. The information that was previously collected and assessed by other researchers is referred to as secondary data (Bustamante-Gavino, 2011). The sources were collected from UTAR's electronic databases, which included Science Direct, Sage, and Google Scholar.

Primary data is information gathered by researchers from what are referred to as first-hand sources (Driscoll, 2011). There are several ways to obtain data, including surveys, observations, interviews, and experiments. Kothari (2009) defines data as the proof, information, or measurement that was gathered and examined for the purpose to determine the study 's conclusions. The questionnaire method will be used in this study to collect primary data because it can save a significant amount of money and time. The questionnaire method is frequently employed in social science research (Murgan, 2015). The questionnaire has thoughtfully constructed questions that are ready for the intended respondents to respond to.

Data collection primarily relies on the distribution of surveys to a representative sample of academics within Malaysian HEIs. These surveys are carefully designed to extract information regarding the adoption levels of ChatGPT technology, usage patterns, perceived benefits, and potential barriers. The structured format of the surveys ensures uniformity in responses and facilitates statistical analysis.

3.3 Sampling Design

3.3.1 Target Population

According to Kabir (2016), the target population is the entire group whose information is sought or were looking for. A group of people who are closely related to the topic and goals of the researcher is known as the target population. Based on information from the target population, the researcher collects data, analyzes the data, and makes conclusions (Draugalis, 2009). The academicians employed by Malaysian HEIs are target population in this study.

3.3.2 Sampling Location, Sampling Frame & Sampling Elements

Sampling frames are defined as a list that contains the chosen sampling units, according to Kabir (2016). The sample frame for this study consists of 60,138 academicians from both public and private higher education institutions in Malaysia (Statistics Report from Ministry of Higher Education (MoHE) Malaysia, 2023). The reason of Malaysian HEIs has been selected to participate in this research is because of there is a huge number of academicians work at Malaysian HEIs (excluded administrative staffs), and these give Malaysian HEIs' academicians the best chance, relative to other nations, of obtaining highly accurate data for this research study (Zamboni, 2018).

A university's performance is another factor that determines its ranking. "QS world University Rankings" will assess this performance using six metrics. Academic reputation is one of the metrics that receives the highest percentage of weight when evaluating an institution (QS TOP UNIVERSITIES, 2020). It suggests that the high caliber academicians at Malaysian HEIs can equip students with appropriate and effective teaching techniques, resulting in positive outcomes. Academicians who perform well are recognized for having a high level of acceptance of ChatGPT adoption and a high perceived UTAUT score (Caesend, Stinglhamber, Demoulin, & De Wilde, 2017).

3.3.3 Sampling Techniques

Probability sampling and non-probability sampling are the two categories into which sampling techniques are divided. Different sampling techniques can be employed different kinds of sampling methods (Alvi, 2016). A simple random sampling technique under probability sampling will be conducted in this study. This method available for each and all participants of the target population have equal chance of being selected in the sample frame (Alvi, 2016). For instance, all academicians in Malaysian HEIs have an equal chance to participate in the survey form. Furthermore, the research sample that has been selected for this study may be a good representative sample of the population. The chosen sample frame has received a soft copy of the survey questionnaire.

3.3.4 Sampling Size

The sample size is defined as the total number of chosen target respondents. The accuracy of the real population increases with sample size. Because the number of populations is unknown, the sample size has been determined by applying G power. The G power calculation results shown in (figure 3.1) indicated that a minimum sample size of 119 is required for the researcher to gather data. To lower the possibility of receiving insufficient data, 208 sets of questionnaires were randomly distributed or delivered to academicians in both private and public Malaysian HEIs. Questionnaires will be given to the sample, and they will be requested to complete it. The standard confidence level is between 90% and 95%. The confidence level of 95% has a better accuracy, with a margin of error of 0.05. (Singh & Masuku, 2014).

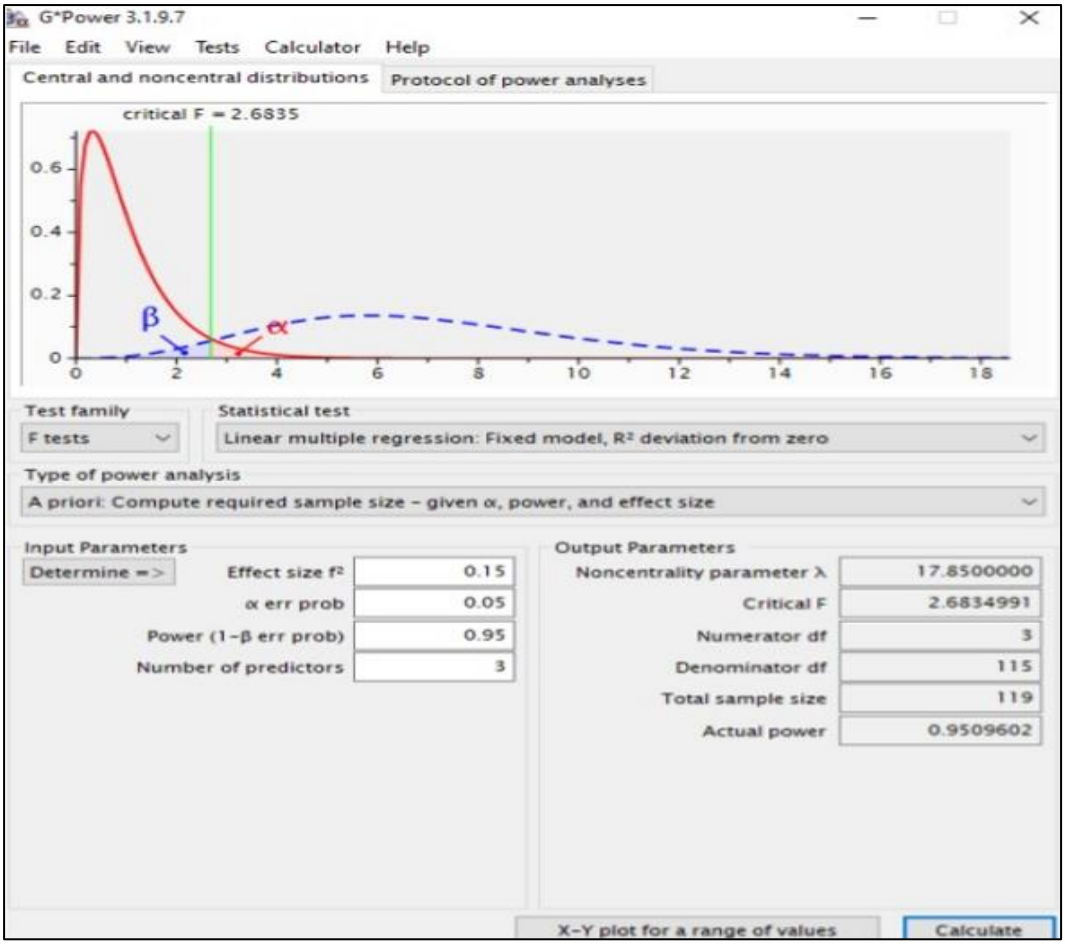


Figure 3.1: *G Power Result.*

The sample size for this study can be determined by using Slovin's Formula. The following is the sample size calculation formula:

$$n = \frac{N}{1 + Ne^2}$$

3.4 Research Instrument

3.4.1 Questionnaire Survey

According to Roberts (2003), a research instrument is a tool used to measure the variable specified in the research proposal. The researcher will conduct a self-

administered survey with respondents who have committed to completing the questionnaire. It suggests that the researcher will not hinder the respondents from responding. Respondents will be recruited online, primarily using the social media website: Facebook, Microsoft Teams, and WhatsApp as a source for respondents. In the case of Malaysia, Facebook is the most actively used social media platform according to MCMC (2020), with over 91% of all active internet users being found on this website, thus it is providing the richest source for sampling. Nevertheless, the academicians at HEIs will also receive the questionnaires via e-mail and Google forms. The rationale behind employing questionnaires is their ability to measure behavior, attitudes, opinions, preferences, and intentions more quickly and easily then other methods while also allocating data from an extensive range of respondents (McLeod, S., 2018).

3.4.2 Questionnaire Design

A Google Form will be used to prepare the questionnaire, the responses will be categorized based on online social media platforms like Facebook, Microsoft Teams, WhatsApp, and E-mail. The intended respondents must complete all of the provided questionnaires and return in a timely manner to allow for additional research. There are fixed alternatives questions in each of the three sections of this questionnaire to aid respondents in making decisions quickly by allowing them to select from a variety of options.

All the questions in section A that pertain to the respondents' demographic profile – such as their age, gender, ethnicity, and degree of education which are typically found in the first section. The participant sample can be segmented and understood with the aid of this demographic data. The questions in section B and C are more likely to elicit responses regarding the factors of performance expectancy, effort expectancy, facilitating conditions and perceived trust on the adoption of ChatGPT technology among academics in Malaysian HEIs. Questions designed were created using a Likert five-point scale in these 2 sections, and it was connected to the dependent variable (DV) and independent variable (IV) in this study.

3.4.3 Pilot Test

Before the full study is implemented, the purpose of a pilot study is to identify any flaws or potential issues with the research instrument and protocol, as well as to assess the consistency and reliability of the questionnaire (Zailinawati Abu Hassan, Schattner, P., & Mazza, D., 2006). 64 pilot tests and 64 respondents in Malaysian HEIs will be carries out to answer the questions prepared through the distribution questionnaires with the objective to prevent any mistakes and errors. It is mandatory for participants to provide input derived from the survey. Using the Statistical Package for Social Science (SPSS) program to manipulate, organize, retrieve, and evaluate the data, reliability and validity tests were conducted.

The Thumb Cronbach's Alpha Coefficient Size rules consists of five ratings (Hair, J. F., Money, M. W., Samouel, P., & Page, M.J., 2015). The Alpha Coefficient Range and Strength of Association is shown in Table 3.1.

Table 3.1: Alpha Coefficient Range and Strength of Association

Alpha Coefficient Range	**Level of Measurement**
< 0.6	Poor
0.6 to < 0.7	Moderate
0.7 to < 0.8	Good
0.8 to < 0.9	Very Good
0.9 and above	Excellent

Table 3.2: Variables and Cronbach's Alpha value

Variables	Cronbach's Alpha Value (α)
Independent variable – Performance Expectancy	0.880
Independent variable – Effort Expectancy	0.954
Independent variable – Facilitating Condition	0.941
Independent variable – Perceived Trust	0.773
Dependent variable – Adoption of ChatGPT Technology among Academics in HEIs	0.930

The outcomes of the reliability test and alpha value are presented in the table above. The results demonstrated that the coefficient alpha values for performance expectancy, effort expectancy, facilitating condition, perceived trust, and the adoption of ChatGPT technology were, respectively, 0.880 (very good), 0.954 (excellent), 0.941 (excellent), 0.773 (good), 0.930 (excellent) respectively. As the pilot test demonstrated the reliability of this set of questionnaires, the questionnaire is thus ready to be used for the full study.

3.5 Construct Measurement

3.5.1 Origins of Constructs

Table 3.3: Construct Measurement

Factor	Measurement Items	Sources

Independent Variable: Performance Expectancy	1. ChatGPT is context-aware, understand the specific context of my questions. 2. ChatGPT activity will enhance the efficiency of the higher education system. 3. ChatGPT helps me accomplish my problems in managing academic administration matters better. 4. ChatGPT can provide accurate and relevant information in response to students' questions. 5. ChatGPT technology enables me to have a broad and extensive knowledge base. 6. ChatGPT technology improves my productivity in teaching and research activities. 7. ChatGPT technology enhances the quality of my teaching and research outputs.	Lou (2023)
Independent Variable: Effort Expectancy	8. Learning how to use ChatGPT is practical. 9. The instructions and communication with the ChatGPT are clear and understandable. 10. I find ChatGPT easy to use. 11. It is easy for me to become skillful at using ChatGPT in managing academic administration matters. 12. I find it easy to get the information as per my expectation while using ChatGPT.	Sykes, Venkatesh, & Gosain (2009)

Independent Variable: Perceived Trust	13. I will use ChatGPT if I feel that the content is trustworthy. 14. I will use the ChatGPT if I feel that the chatbot provides reliable information. 15. I will use ChatGPT if the chatbot is able to switch to the language that I want. 16. I will use the ChatGPT technology if it is secure. 17. I am confident in the security and privacy of my interactions with ChatGPT technology.	Moorman et al. (1992)
Independent Variable: Facilitating Condition	18. ChatGPT is a user friendly and easily accessible platform. 19. ChatGPT is compatible with other technologies that I use. 20. Clear instructions and guidance are available on how to use ChatGPT effectively. 21. Reliable internet connection is available for seamless communication and interaction with ChatGPT. 22. ChatGPT usage is entirely within my control. 23. My institution provides adequate support and resources for the adoption of ChatGPT technology. 24. I have access to the necessary technical infrastructure (E.g., computer and internet) to use ChatGPT technology effectively.	Ventakesh et al. (2003)

Dependent Variable: The Adoption of ChatGPT Technology	25. Adoption of ChatGPT in Higher Education Institutions (HEIs) is good for education. 26. Adoption of ChatGPT in higher education will make education more interactive. 27. Adoption of ChatGPT in higher education will make it cost-effective. 28. Adoption of ChatGPT in higher education will make the teaching-learning activity more interesting. 29. Adoption of ChatGPT has reduced my workload and stress levels. 30. Adoption of ChatGPT has improved my job satisfaction. 31. Adoption of ChatGPT has improved my work-like balance. 32. Adoption of ChatGPT has enhanced my job performance.	Xiao et al. (2023)

Source: Developed for research.

3.5.2 Measurement of Scale

The term "scale of measurement" describes how variables are defined and categorized. Specific characteristics of each scale of measurement dictate if it is appropriate to use a given statistical analysis. Nominal scale, ordinal scale, interval scale, and ratio scale are the four types of measurement scale metrics.

3.5.2.1 Nominal Scale

For non-numerical variables, nominal scale is utilized, and nominal level is the most fundamental measurement level in between measurement ranges (Sekaran &

Bougie, 2012). Among the four variable measurement scales, this model is the most straightforward. Data are categorized using a nominal scale in an arbitrary order and without any ranking. The numbers linked to this scale's variables are merely division labels; in certain instances, the scale is utilized for classification purposes. Few demographic questions, including gender and ethnicity, can be measured in this study using nominal scale in Section A of the questionnaire.

3.5.2.2 Ordinal Scale

An ordinal scale is a measurement scale for variables that is used to describe the order of variables. Any variable that can be sorted or ranked into a group based on preferences (Sekaran & Bougie, 2010). A few of the questions in section A were categorized as ordinal scale. For instance, the age, level of education attained, professional background, role held by academicians, and frequency of use of ChatGPT for any academic-related tasks among the respondents.

3.5.2.3 Interval Scale

An interval scale is a numerical scale on which the variables' order has been determined. The interval scale is utilized to categorize variables that possess consistent, measurable, and recognizable differences. According to Sekaran and Bougie (2010), an interval scale typically possesses both nominal and ordinal scale properties. All designed questions falling under section B and C are all subject to this scale. The questionnaire designed was scored using a five-point Linkert scale to measure the degree of respondents' opinion.

3.6 Data Processing

The process of using raw data to create meaningful information is referred to as data processing. Before creating and analyzing the data, the procedure entails verifying, revising, coding, and transforming (Sekaran & Bougie, 2013).

3.6.1 Data Checking

The crucial step for researchers to verify the questionnaire is data checking (Sekaran & Bougie, 2013). The researcher will proofread the questionnaire for spelling and grammar checking and make sure that no jargon is used. Verifying that the final data was accurate and refined is the goal of data checking (Macro Di Zio, 2016). Before moving on to the next phase of this study, researchers will double check the data that has been gathered.

3.6.2 Data Editing

According to Sekaran & Bougie (2013), data editing involves making omissions, clarifying responses, avoiding biased editing, and making logical adjustments. The purpose of this procedure is to make sure that there wasn't any manipulation of the questionnaire or that participants did not leave any blank answers. If any answers were found to be missing or defective, adjustments will be made.

3.6.3 Data Coding

Data coding is the process of dividing codes from the observed data. It aims to summarize the collected data, remove unused data, and bring meaningful data (Reading Craze, 2014). In this process, the respondent's response will be digitized

with numbers before key into the SPSS software. The software will then analyze the data once the responses have been tabulated and catalogues into the system.

3.6.4 Data Transforming

This is a process to transcribe or turn any form of data into written form to ensure the participants can study in detail and use together with analytic coding (Stuckey, 2014). It is the step where researcher transfers codded data to run the reliability test by using SPSS software. SPSS software analyses the data and release the accurate and reliable results for the research.

3.7 Proposed Data Analysis Tools

The process of methodically using statistical techniques to define, explain, summarize, restate, and evaluate data is known as data analysis. The Statistical Package of Social Science (SPSS) was utilized by the researcher to code and analyze the data obtained from respondents via questionnaires. Its purpose is to ascertain whether the dependent and independent variables have a statistically significant relationship. This makes it possible for the researcher to comprehend the relationship between the dependent and independent variables better.

3.7.1 Descriptive Analysis

Given that descriptive analysis is utilized to quantify and characterize the diverse features of respondents, it is imperative (Lankford, 2002). The researcher will administer this study questionnaire, which asks about personal details like gender, age, ethnicity, and education. By examining the mean, mode and median of the collected questionnaires, which are subsequently displayed in a pie chart —

researchers will be able to identify common patterns or traits of the respondents. In this study, the frequency distribution was employed to examine the respondents' personal or demographic data found in section A of the questionnaire.

3.7.2 Reliability Analysis

Zikmund et al. (2013) state that a measure's internal consistency can be determined by its reliability. The key to understanding dependability is consistency. It was asserted that a measure is trustworthy if multiple approaches to measuring the same thing yield a similar result. Repetitive testing by the same or different individuals can yield similar results, in which case the results can be considered reliable owing to their consistency. In this research, a reliability test will be performed to guarantee that the data gathered is consistent and stable, with very few mistakes, to assure the consistency of the results. The researcher in this study will evaluate the reliability of the finding by using Cronbach's alpha. Cronbach's alpha shown the result as a number ranging from 0 to 1.

Table 3.4: Level of Reliability and the Rules of thumb of Cronbach's Alpha

Range of Cronbach's Alpha	**Level of Reliability**
α = 0.80 to 0.95	Very Good Reliability
α = 0.70 to 0.80	Good Reliability
α = 0.60 to 0.70	Fair Reliability
α = < 0.60	Poor Reliability

Note. From Zikmund, W.G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods* (9th ed). New York: South-Western/Cengage Learning.

Table 3.4 indicates that an alpha value within the range of 0.80 to 0.95 is deemed very good reliability; within the range of 0.70 to 0.80 signifies as good reliability; within the range of 0.60 to 0.70 considered as fair reliability; and below 0.60 is classified as poor reliability (Leontitsis, A., & Pagge, J., 2007).

3.7.3 Inferential Analysis

Multiple regressions and Pearson's correlation coefficient will be used in this analysis to examine the relationship between the independent and dependent variables. The application of both analyses is justified by their ability to yield appropriately relative results, which will illustrate the direction, magnitude, and significance of the relationship between the independent and dependent variables. Both positive and negative values are possible.

3.7.3.1 Pearson Correlation Coefficient Analysis

Table 3.5: Categories of correlation

Range of Coefficient	**Strength**
+/- 0.91 to +/- 1.00	Very Strong
+/- 0.71 to +/- 0.90	High
+/- 0.41 to +/- 0.70	Moderate
+/- 0.21 to +/- 0.40	Small but Definite Relationship
0.00 to +/- 0.20	Slight, almost Negligible

Note. From Hair, Money, Samouel, (2007). Research methods for business. Chichester, West Sussex: Sons, Inc. & John Wiley.

In this study, the direction, strength, and significance of the linear relationship between the independent and dependent variable will be ascertained using the Pearson Correlation Coefficient Analysis. Perfect positive correlation between two variables was represented by a value of +1.0, and perfect negative correlation between two variables was represented by a value of -1.0. The value of the other variables tends to increase if the value of one variable increases, and vice versa, in accordance with a positive (+) correlation coefficient. In this study, the following hypotheses are tested by using the Pearson Correlation Coefficient:

H_1: There is a significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_2: There is a significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_3: There is a significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_4: There is a significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.

3.7.3.2 Multiple Regression Analysis

Predicting the value of dependent variable based on two or more independent variables is done using multiple regression analysis (Petchko, 2018). Multiple Regression Analysis will be used in this study to show how each IV relates to and is relevant to DV prediction. To predict the dependent variable, all independent variables which consists of performance expectancy, effort expectancy, facilitating condition and perceived trust are entered into the same equation. The coefficient of each variable is subsequently discovered with the goal to clarify the relationship between the variables and forecast future occurrences.

3. 8 Chapter Summary

This chapter concludes with a brief discussion of the research design, data collection techniques, sampling design, research instrument, measurement construct and data processing. The significance of the research methodologies depends on their ability to facilitate the collection, analysis, and interpretation of data. The research design will employ quantitative and five-point Likert scale survey methodologies. The analysis was carried out with the aid of SPSS software. Inferential and descriptive analysis, including multiple regression analysis, Pearson Correlation coefficient analysis, and reliability, are also covered in this chapter.

CHAPTER 4

RESEARCH RESULTS

4.0 Introduction

In this chapter, the analysis and results of the study examining the adoption of ChatGPT technology among academics in higher education institutions in Malaysia are presented. This chapter offers a thorough explanation of the methodology used, the variables analyzed using SPSS software version 23, reliability analysis, demographic profiles, correlation analysis, and F-test results.

4.1 Descriptive Analysis Test

In this subsection, a detailed descriptive analysis of the demographic variables collected from the participants in the study is presented. Descriptive statistics, including measures such as frequency and percentage, are employed to summarize the characteristics of the participants. These statistics offer a clear and concise overview of the central tendencies and variability within the demographic data.

4.1.1 Respondents' Demographic Profile

This section presents the demographic profile of the research participants looking at the use of ChatGPT technology among academics in Malaysian higher education institutions is presented. The analysis delves into key demographic factors such as

age, gender, academic rank, years of teaching experience, and institution type. Through descriptive analysis techniques, including means, medians, modes, and standard deviations, a comprehensive overview of the participants' characteristics is provided. Understanding these demographics is essential as it sheds light on the diverse backgrounds of the academics involved in the adoption process. Moreover, this analysis enables researchers to identify potential patterns or trends within specific demographic groups, offering valuable insights into how different factors might influence the adoption of ChatGPT technology. By examining these demographics, the study gains a nuanced understanding of the participants' profiles, allowing for a more in-depth interpretation of the subsequent adoption patterns and behaviors analyzed in the study.

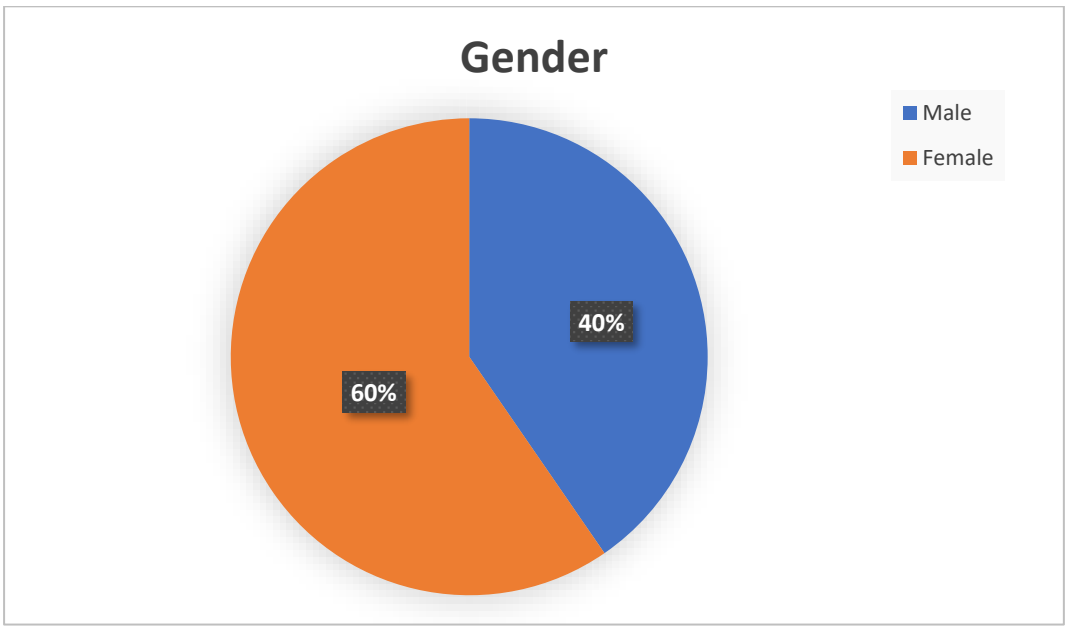
4.1.1.1 Gender

Table 4.1: Respondents' Gender

Variables	Category	Frequency	Percent
Gender	Female	84	40.4
	Male	124	59.6

Note. Generated from SPSS software (Version 23).

Figure 4.1: Respondents' Gender



Note. Developed for research.

Table 4.1 and Figure 4.1 show that 59.62% are male participants and 40.38% are the female participants. So, the graph represented that male is the largest cohort involved in this research.

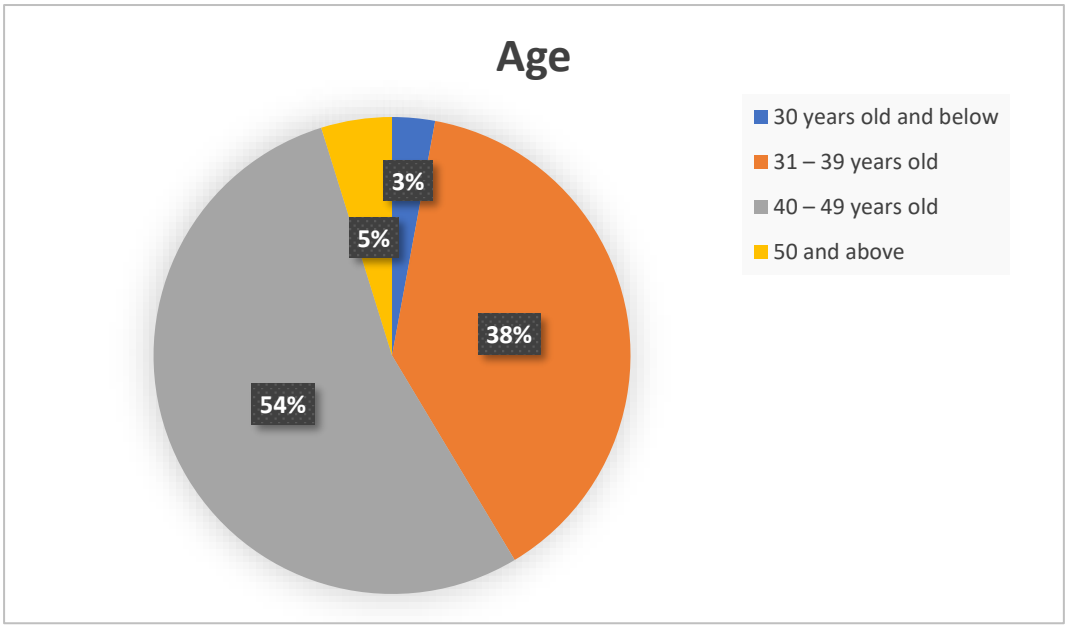
4.1.1.2 Age Group

Table 4.2: Respondents' Age Group

Variables	Category	Frequency	Percent
Age	30 years old and below	6	2.9
	31 – 39 years old	80	38.5
	40 – 49 years old	112	53.8
	50 and above	10	4.8

Note. Generated from SPSS software (Version 23).

Figure 4.2: Respondents' Age Group



Note. Developed for research.

2.88% of the participants, as shown in the above graph, are in the age range of 30 years old or younger. 38.46% of the participants are in the age range of 31–39 years old, 53.85% of the participants are in the age range of 40–49 years old and 4.81%

of the participants are in the age range of 50 and above. Therefore, the largest cohort of participants in this research is those between the ages of 40 and 49.

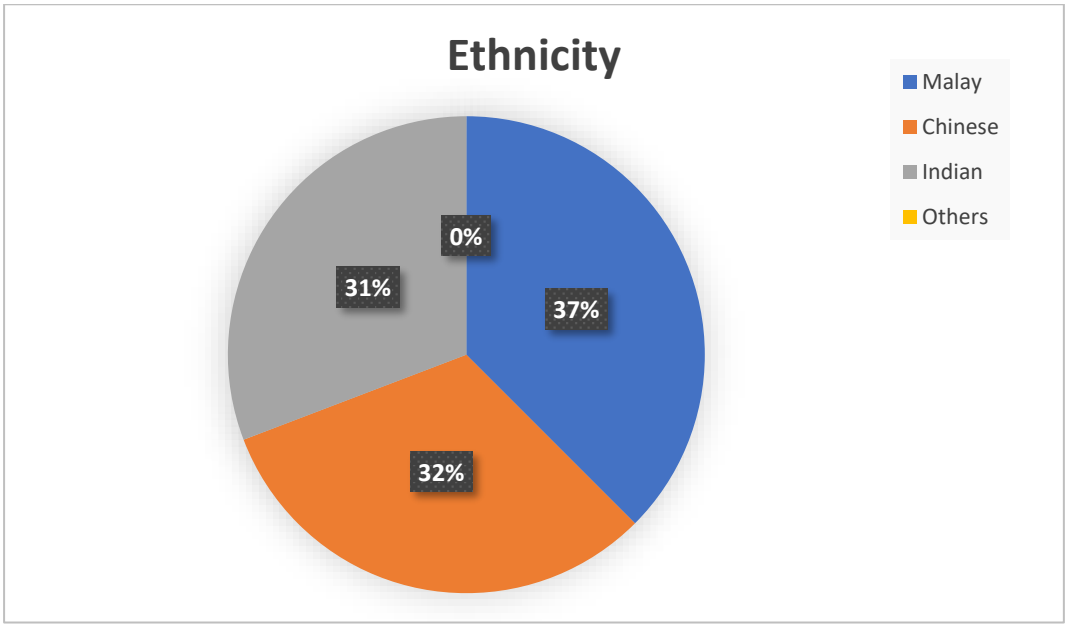
4.1.1.3 Ethnicity Group

Table 4.3: Respondents' Ethnicity

Variables	Category	Frequency	Percent
Ethnicity	Malay	78	37.5
	Chinese	66	31.7
	Indian	64	30.8
	Others	0	0

Note. Generated from SPSS software (Version 23).

Figure 4.3: Respondents' Ethnicity



Note. Developed for research.

Based on the above Graph, Ethnicity, the sample showcases a multicultural representation, with Malay, Chinese, and Indian participants are 37.50%, 31.73%, and 30.77% respectively distributed. So, we can say that a Malay participant is the largest cohort involved in this research.

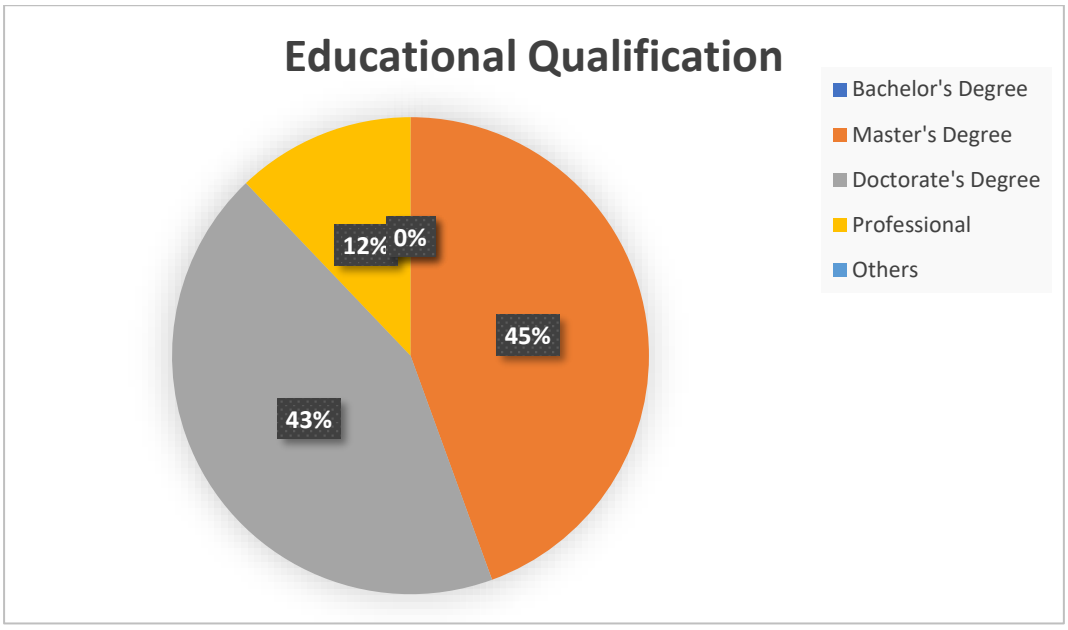
4.1.1.4 Educational Qualification

Table 4.4: Respondents' Educational Qualification

Variables	Category	Frequency	Percent
Educational Qualification	Bachelor's Degree	0	0
	Master's Degree	92	44.2
	Doctorate's Degree	91	43.8
	Professional Level	25	12.0
	Others	0	0

Note. Generated from SPSS software (Version 23).

Figure 4.4: Respondents' Educational Qualification



Note. Developed for research.

According to Table 4.4 and Figure 4.4, 44.2% of 208 respondents had a master's degree or higher in education, 43.8% of respondents have doctorate degree, and 12% represent Professional degree.

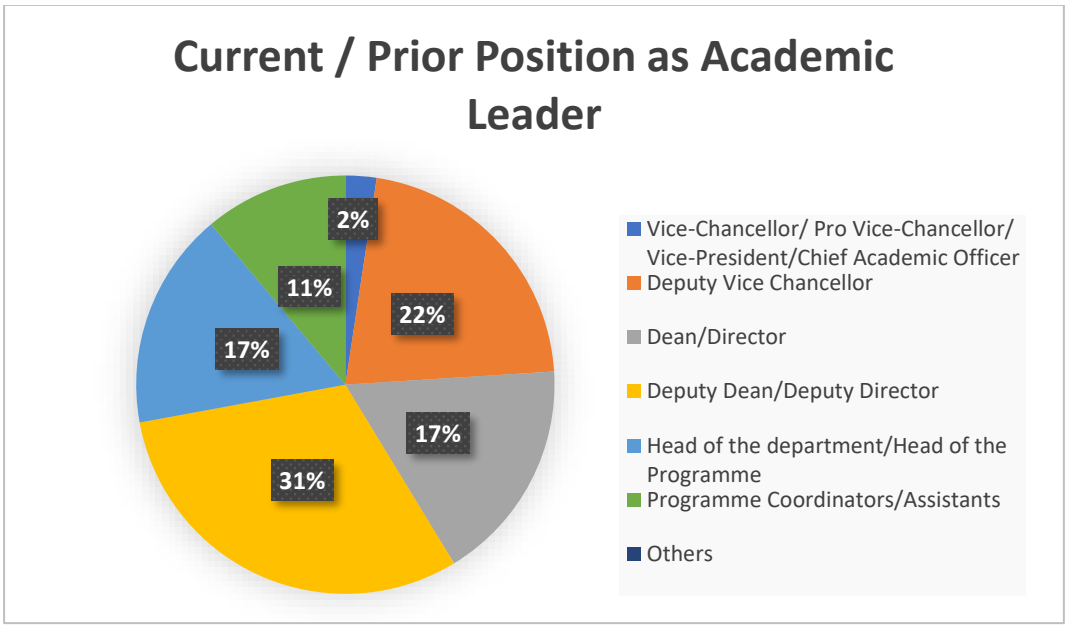
4.1.1.5 Current/Prior Position as Academic Leader

Table 4.5: Respondents' Current / Prior Position as Academic Leader

Variables	Category	Frequency	Percent
Current/prior position as academic leaders:	Vice-Chancellor/ Pro Vice-Chancellor/ Vice-President/Chief Academic Officer	5	2.4
	Deputy Vice Chancellor	45	21.6
	Dean/Director	36	17.3
	Deputy Dean/Deputy Director	64	30.8
	Head of the department/Head of the Programme	35	16.8
	Programme Coordinators/Assistants	23	11.1
	Others	0	0

Note. Generated from SPSS software (Version 23).

Figure 4.5: Respondents' Current / Prior Position as Academic Leader



Note. Developed for research.

As shown in Table 4.5 and Figure 4.5, exploring positions within academic institutions, 2.40% of the participants are Vice-Chancellor/ Pro Vice-Chancellor/ Vice-President/Chief Academic Officer, (21.63%) of the patrician's are Deputy Vice Chancellor, 17.31% of the patrician's are Dean/Director, 30.77% of the patrician's are Deputy Dean/Deputy Director, 16.83% of the patrician's are Head of the department/Head of the Program, and 11.06% of the patrician's are Program Coordinators/Assistants.

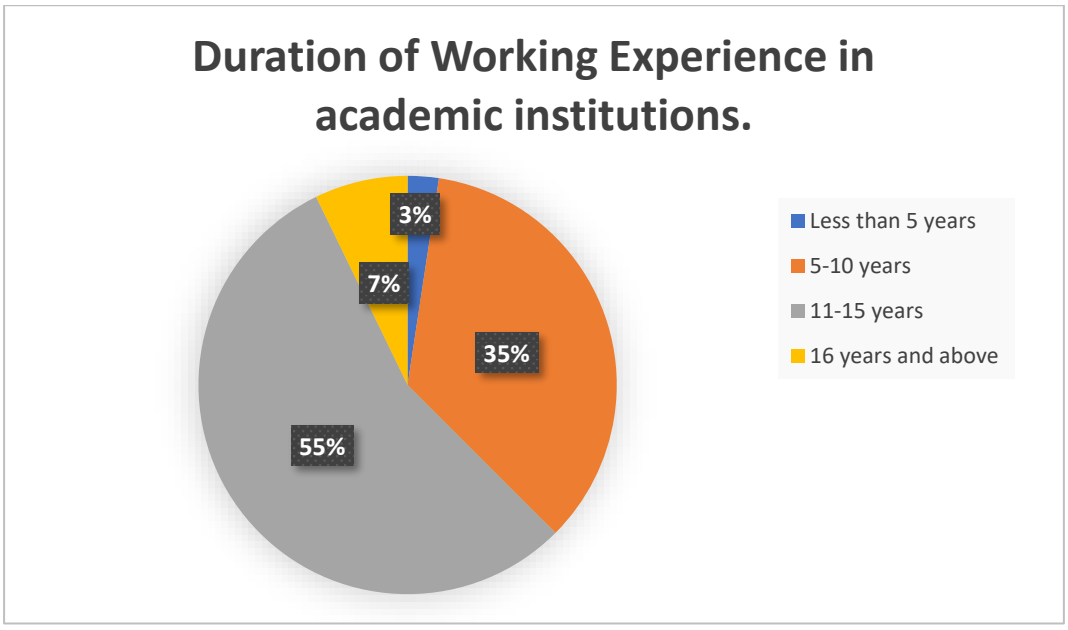
4.1.1.6 Duration of Working Experience in Academic Institutions

Table 4.6: Respondents' Duration of Working Experience in Academic Institution

Variables	Category	Frequency	Percent
Duration of Working Experience in academic institutions.	Less than 5 years	5	2.4
	5-10 years	73	35.1
	11-15 years	115	55.3
	16 years and above	15	7.2

Note. Generated from SPSS software (Version 23).

Figure 4.6: Respondents' Duration of Working Experience in Academic Institution



Note. Developed for research.

Table 4.6 and Figure 4.6 shows that 2.4% out of 208 respondents owned less than 5 years of working experiences in Malaysian HEIs, 35.1% of respondents have 5 to 10 years of working experiences, 55.3% have 11 to 15 years of working experiences, while there is only 7.2% of respondents have 16 years and above working experience in academic institutions.

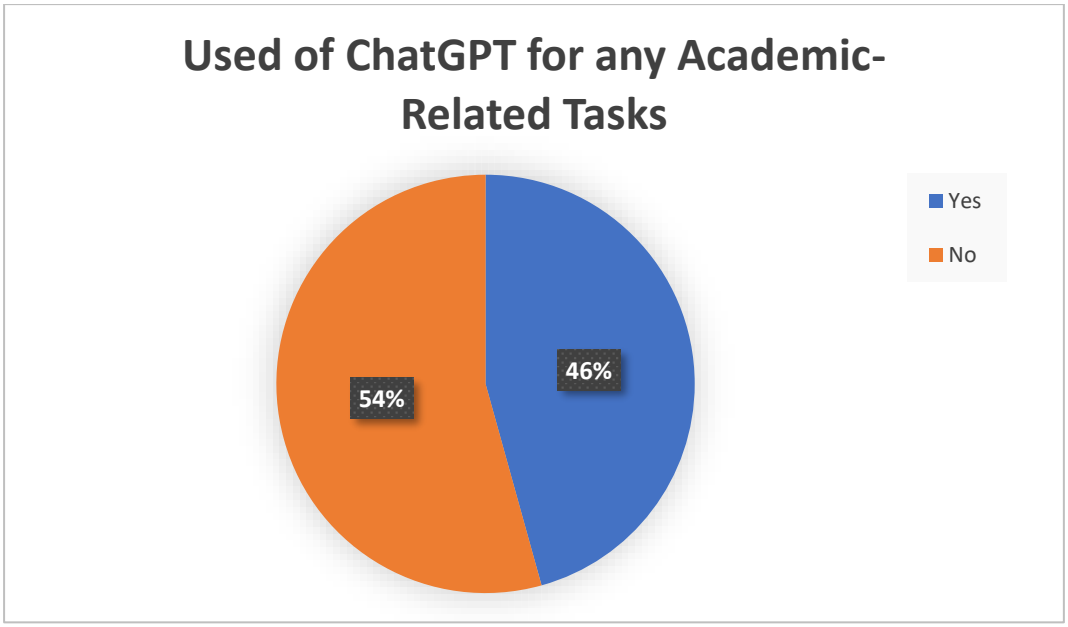
4.1.1.7 Used of ChatGPT for any Academic-Related Tasks

Table 4.7: Respondents' Used of ChatGPT for any Academic-Related Tasks

Variables	Category	Frequency	Percent
Have you ever used ChatGPT for any academic-related tasks?	Yes	95	45.67
	No	113	54.33

Note. Generated from SPSS software (Version 23).

Figure 4.7: Respondents' Used of ChatGPT for any Academic-Related Tasks



Note. Developed for research.

Table 4.7 and Figure 4.7 demonstrate that 45.67% participants used Chat GPT for any academic-related tasks and 54.33% of the participants did not use Chat GPT for

any academic-related tasks. So, we can say that participants are not used Chat GPT, the largest cohort involved in this research.

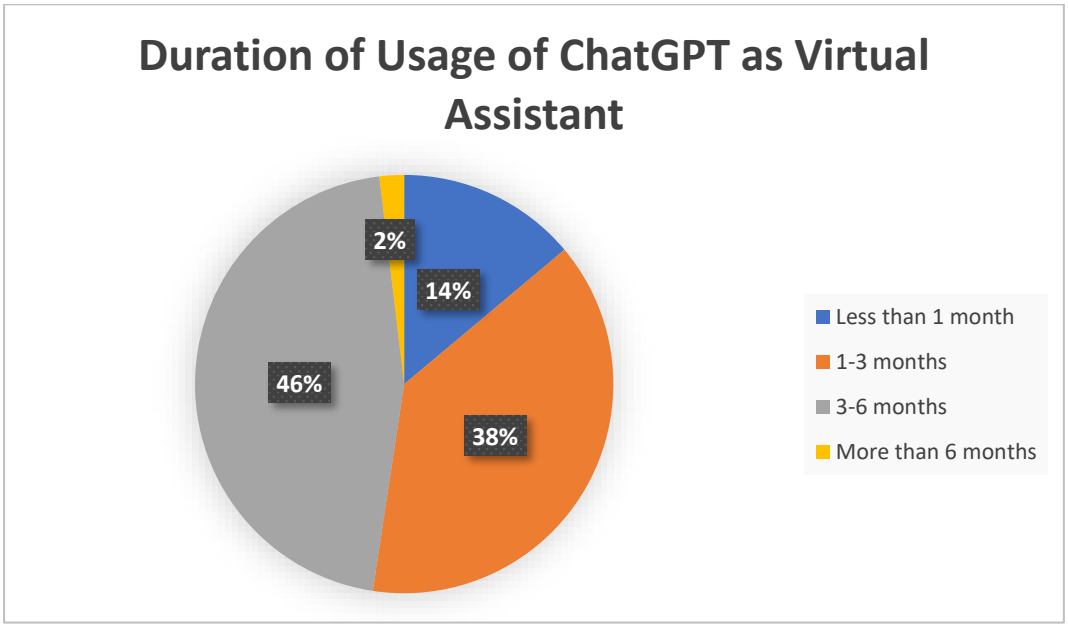
4.1.1.8 Duration of Usage of ChatGPT as Virtual Assistant

Table 4.8: Respondents' Duration of Usage of ChatGPT as Virtual Assistant

Variables	Category	Frequency	Percent
If yes, please indicate the duration of your experience with ChatGPT as a virtual assistant:	Less than 1 month	29	13.94
	1-3 months	80	38.46
	3-6 months	95	45.67
	More than 6 months	4	1.92

Note. Generated from SPSS software (Version 23).

Figure 4.8: Respondents' Duration of Usage of ChatGPT as Virtual Assistant



Note. Developed for research.

Based upon the above graph, Duration of Experience with ChatGPT, 13.94% of the participants have experience Less than 1 month, 38.46% of the participants have experience 1-3 months, 45.67% of the participants have experience 3-6 months, and 1.92% of the participants have experience more than 6 months. So, we can say that participants have experience 1-3 months is the largest cohort involved in this research.

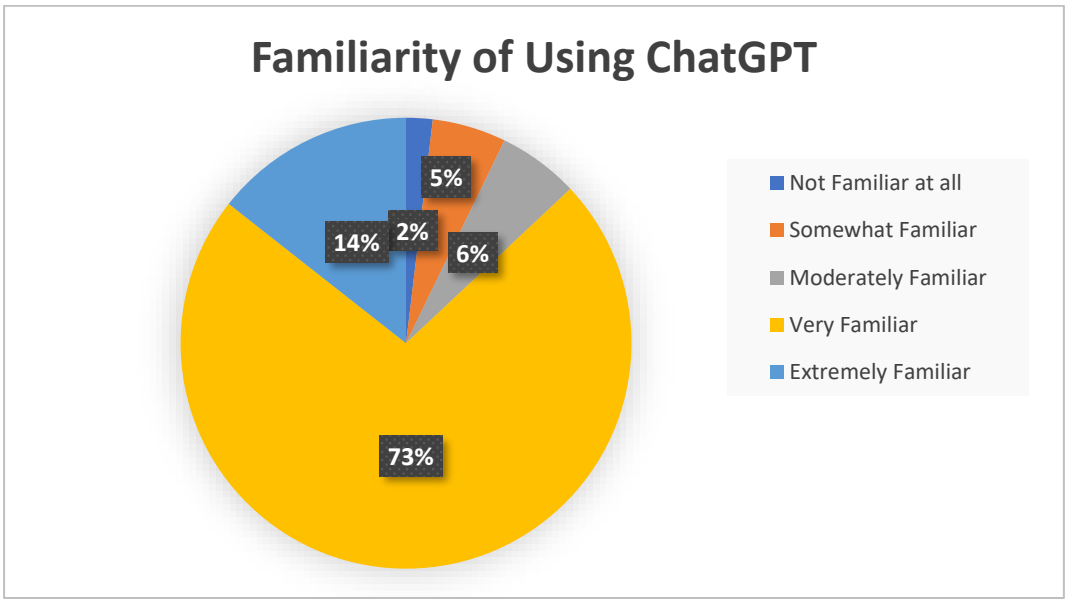
4.1.1.9 Familiarity of Using ChatGPT

Table 4.9: Respondents' Familiarity of Using ChatGPT

Variables	Category	Frequency	Percent
How familiar are you with ChatGPT (e.g., OpenAI's GPT-3.5, chat-based language models)?	Not familiar at all	4	1.92
	Somewhat familiar	11	5.29
	Moderately familiar	12	5.77
	Very familiar	151	72.60
	Extremely familiar	30	14.42

Note. Generated from SPSS software (Version 23).

Figure 4.9: Respondents' Familiarity of Using ChatGPT



Note. Developed for research.

According to the above graph, Familiarity with ChatGPT, 1.92% is not familiar at all, 5.29% are somewhat familiar, 5.77% are moderately familiar, 72.60% are Very familiar and 14.42% are extremely familiar. So, we can say that participants that are moderately familiar are the largest cohort involved in this research.

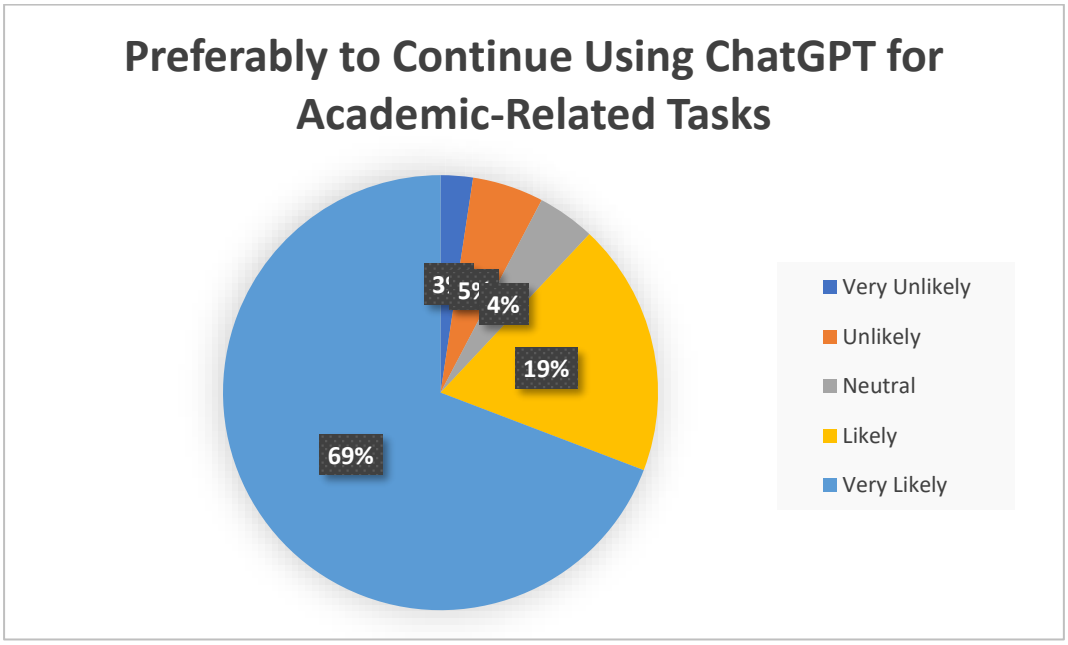
4.1.1.10 Preferably to Continue Using ChatGPT for Academic-Related Tasks

Table 4.10: Respondents' Preferably to Continue Using ChatGPT for Academic-Related Tasks

Variables	Category	Frequency	Percent
How likely are you to continue using Chat GPT for academic-related tasks in the future?	Very Unlikely	5	2.4
	Unlikely	11	5.3
	Neutral	9	4.3
	Likely	39	18.8
	Very Likely	144	69.2

Note. Generated from SPSS software (Version 23).

Figure 4.10: Respondents' Preferably to Continue Using ChatGPT for Academic-Related Tasks



Note. Developed for research.

According to the above graph, regarding to the Likelihood to Continue Using ChatGPT, 2.40% of the respondents are Very Unlikely, 5.29% of the respondents are Unlikely, 4.33% of the respondents are Neutral, 18.75% of the respondents are Likely, and 69.23% of the respondents are Very Likely. So, we can say that respondents are Very Likely is the largest cohort involved in this research.

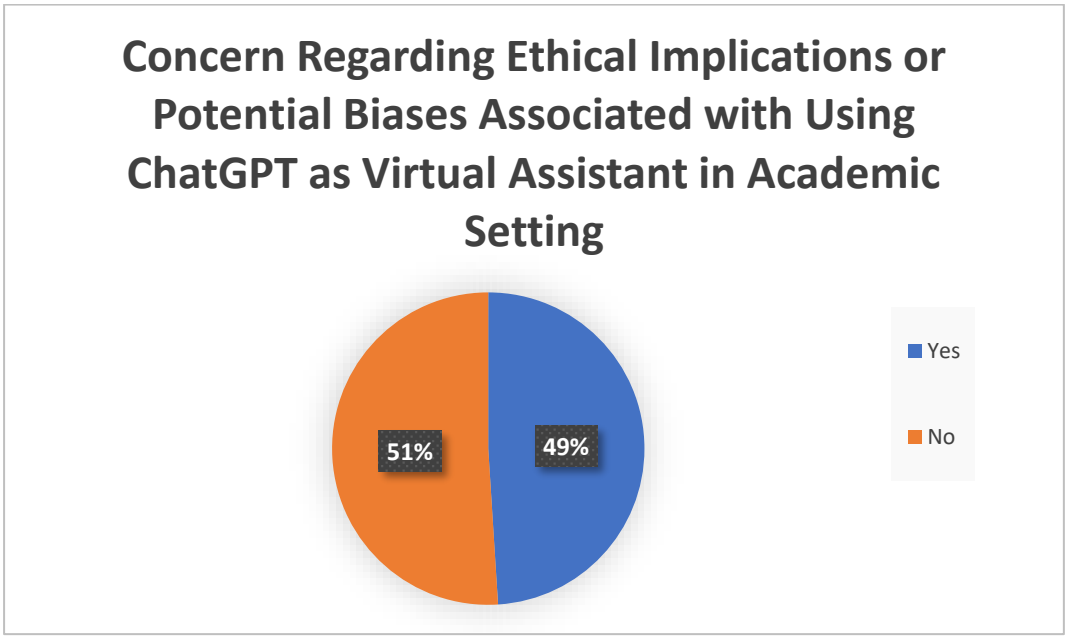
4.1.1.11 Concern Regarding Ethical Implications or Potential Biases Associated with Using ChatGPT as Virtual Assistant in Academic Setting

Table 4.11: Respondents' Concern Regarding Ethical Implications or Potential Biases Associated with Using ChatGPT as Virtual Assistant in Academic Setting

Variables	Category	Frequency	Percent
Do you have any concerns regarding the ethical implications or potential biases associated with the use of ChatGPT as a virtual assistant in an academic setting?	Yes	102	49.0
	No	106	51.0

Note. Generated from SPSS software (Version 23).

Figure 4.11: Respondents' Concern Regarding Ethical Implications or Potential Biases Associated with Using ChatGPT as Virtual Assistant in Academic Setting



Note. Developed for research.

According to the Table 4.11 and Figure 4.11, 49.04% of the participants do not concern on ethical implications or any potential biases associated with using ChatGPT as a virtual assistance in an academic setting while 50.96% of the participants concern on ethical implications or any potential biases associated with using ChatGPT as a virtual assistance in an academic setting.

4.2 Summary of Statistical Analysis

Table 4.12: Demographic Information's Summary

Variables	Category	Frequency	Percent
Gender	Female	84	40.4
	Male	124	59.6
Age	30 years old and below	6	2.9
	31 – 39 years old	80	38.5
	40 – 49 years old	112	53.8
	50 and above	10	4.8
Ethnicity	Malay	78	37.5
	Chinese	66	31.7
	Indian	64	30.8
	Others	0	0
Highest Education Level	Bachelor's Degree	0	0
	Master's Degree	92	44.2
	Doctoral Level	91	43.8
	Professional Level	25	12.0
	Others	0	0
Choose ONE answer which best describes your	Vice-Chancellor/ Pro Vice-Chancellor/ Vice-	5	2.4

current/prior position as academic leaders:	President/Chief Academic Officer		
	Deputy Vice Chancellor	45	21.6
	Dean/Director	36	17.3
	Deputy Dean/Deputy Director	64	30.8
	Head of the department/Head of the Program	35	16.8
	Program Coordinators/Assistants	23	11.1
	Others	0	0
Working Experience in academic institutions:	Less than 5 years	5	2.4
	5-10 years	73	35.1
	11-15 years	115	55.3
	16 years and above	15	7.2
Have you ever used Chat GPT for any academic-related tasks?	Yes	95	45.7
	No	113	54.3
If yes, please indicate the duration of your experience with ChatGPT as a virtual assistant:	Less than 1 month	29	13.9
	1-3 months	80	38.5
	3-6 months	95	45.7
	More than 6 months	4	1.9
On a scale of 1 to 5, how familiar are you with Chat GPT (e.g., OpenAI's GPT-	Not familiar at all	4	1.9
	Somewhat familiar	11	5.3
	Moderately familiar	12	5.8
	Very familiar	151	72.6

3.5, chat-based language models)?	Extremely familiar	30	14.4
How likely are you to continue using Chat GPT for academic-related tasks in the future?	Very Unlikely	5	2.4
	Unlikely	11	5.3
	Neutral	9	4.3
	Likely	39	18.8
	Very Likely	144	69.2
Do you have any concerns regarding the ethical implications or potential biases associated with the use of ChatGPT as a virtual assistant in an academic setting?	Yes	102	49.0
	No	106	51.0

Note. Develop for research.

The demographic summary of the targeted respondents can be found in Table 4.12. In total, 208 respondents took part in this study. According to the results in the above table 4.12, Firstly, concerning gender, the data illustrates a relatively balanced representation, with 59.6% male participants and 40.4% female participants. This gender balance within the academic cohort is indicative of a diverse sample, potentially providing a comprehensive perspective on ChatGPT adoption. Examining age, 2.9% of the participants are in the age range of 30 years old and below, 38.5% of the participants are in the age range of 31–39 years old, 53.8% of the participants are in the age range of 40–49 years old and 4.8% of the participants are in the age range of 50 and above. This demographic skew towards mid-career professionals suggests that the study predominantly captures the perspectives of experienced academics that are likely to have significant influence within their institutions. Regarding Ethnicity, the sample showcases a multicultural representation, with Malay, Chinese, and Indian participants are 37.5%, 31.7%, and 30.8% respectively distributed. Regarding the Highest Education Level, a significant portion of participants hold advanced degrees, with 44.2% having a master's degree and 43.8% possessing a Doctoral degree and 12.0% Professional

level qualification. Regarding to the Working Experience in academic institutions, 2.4% of the participants have experience Less than 5 years, 35.1% of the participants have 5-10 years, 55.3% of the participants have 11-15 years, and 7.2% of the participants have 16 years and above.

Moreover, 45.7% of the participants used Chat GPT for any academic-related tasks and 54.3% of the participants did not use Chat GPT for any academic-related tasks. Regarding the Duration of Experience with ChatGPT, 13.9% of the participants have experience Less than 1 month, 38.5% of the participants have experience 1-3 months, 45.7% of the participants have experience 3-6 months, and 1.9% of the participants have experience more than 6 months. Regarding the Familiarity with ChatGPT, 1.9% is not familiar at all, 5.3% are somewhat familiar, 5.8% are moderately familiar, 72.6% are Very familiar and 14.4% are extremely familiar. Regarding the Likelihood to Continue Using ChatGPT, 2.4% of the respondents are Very Unlikely, 5.3% of the respondents are Unlikely, 4.3% of the respondents are Neutral, 18.8% of the respondents are Likely, and 69.2% of the respondents are Very Likely. 49.0% have Concerns Regarding Ethical Implications and 51.0% have no Concerns Regarding Ethical Implications.

4.3 Reliability Test

Reliability analysis was conducted to assess the consistency and stability of the survey instrument used in this study. Reliability coefficients, such as Cronbach's alpha, were calculated to measure the internal consistency of the items in the questionnaire. A high reliability score indicates that the survey questions were reliable and consistent in measuring the intended constructs.

Table 4.13: Reliability Analysis Result

No.	Reliability statistics	No. of questions	Sample size	Standard Cronbach's alpha	Cronbach's alpha	Findings

1	Overall	32	208	0.7	0.711	Reliable
2	Performance Expectancy (PE)	7	208	0.7	0.73	Reliable
3	Effort Expectancy (EE)	5	208	0.7	0.72	Reliable
4	Perceived Trust (PT)	5	208	0.7	0.77	Reliable
5	Facilitating Conditions (FC)	7	208	0.7	0.74	Reliable
6	Adoption of ChatGPT Technology	8	208	0.7	0.76	Reliable

Note. Generated from SPSS software (Version 23).

The outcomes, which are compiled in Table 4.13, demonstrate the reliability of the survey questions in measuring the intended constructs. In the overall analysis, the Cronbach's alpha coefficient was calculated to be 0.711, indicating a satisfactory level of internal consistency for the entire questionnaire. This suggests that the questions across all sections of the survey were reliable and consistently measured the underlying constructs related to the adoption of ChatGPT technology among academics in Malaysian higher education institutions. When examining specific constructs, the findings reveal consistent reliability across various dimensions.

Performance Expectancy (PE) exhibited a Cronbach's alpha of 0.73, Effort Expectancy (EE) scored 0.72, Perceived Trust (PT) showed a strong reliability with a Cronbach's alpha of 0.77 and Facilitating Conditions (FC) displayed a coefficient of 0.74. These results imply that the questions related to these constructs were reliable and internally consistent, providing a robust foundation for analyzing participants' expectations, efforts, trust, and facilitating conditions concerning ChatGPT technology adoption. Furthermore, in the context of the adoption of

ChatGPT technology itself, the reliability coefficient was 0.76. This indicates that the questions designed to assess the participants' actual adoption behavior were reliable and consistent, ensuring a valid measurement of their acceptance and usage patterns. The high Cronbach's alpha values across different constructs and the overall adoption of ChatGPT technology indicate that the responses obtained from the participants were dependable, enabling a reliable exploration of the factors influencing the adoption process among academics in Malaysian higher education institutions. These robust findings enhance the credibility of the study's conclusions and provide a solid foundation for interpreting the subsequent analyses and results.

4.4 Inferential Analysis

4.4.1 Pearson Correlation Coefficient Analysis

The Pearson Correlation Analysis is a tool utilized to evaluate the significance, direction, strength, and correlation of the relationship between independent and dependent variables. Pearson Correlation Analysis was applied in this study to test the independent variables which consist of performance expectancy, effort expectancy, facilitating conditions, and perceived trust. Correlation analysis was conducted to explore the relationships between variables. This section discusses the correlation coefficients between different variables related to the adoption of ChatGPT technology. Positive, negative, or no correlation between variables are interpreted and analyzed to understand the patterns and associations within the data.

Table 4.14: Pearson Correlation Coefficient Range and the Strength.

Range of Coefficient	**Strength**
+/- 0.91 to +/- 1.00	Very Strong
+/- 0.71 to +/- 0.90	High
+/- 0.41 to +/- 0.70	Moderate
+/- 0.21 to +/- 0.40	Small but Definite Relationship
0.00 to +/- 0.20	Slight, almost Negligible

Note. From Hair, Money, Samouel, (2007). Research methods for business. Chichester, West Sussex: John Wiley & Sons, Inc.

Table 4.15: Pearson Correlation Coefficient Range and the Strength Results.

Correlations						
		FC	PE	EE	PT	ACGPT
FC	Pearson Correlation	1	.313**	.376**	.520**	.337**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	208	208	208	208	208
PE	Pearson Correlation	.313**	1	.328**	.379**	.177*
	Sig. (2-tailed)	.000		.000	.000	.011
	N	208	208	208	208	208
EE	Pearson Correlation	.376**	.328**	1	.440**	.194**
	Sig. (2-tailed)	.000	.000		.000	.005
	N	208	208	208	208	208
PT	Pearson Correlation	.520**	.379**	.440**	1	.309**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	208	208	208	208	208
ACGPT	Pearson Correlation	.337**	.177*	.194**	.309**	1
	Sig. (2-tailed)	.000	.011	.005	.000	
	N	208	208	208	208	208
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Note. Generated from SPSS software (Version 23).

The correlation analysis undertaken in this study provides valuable insights into the relationships between different variables related to the adoption of ChatGPT technology among academics in Malaysian higher education institutions. The correlation coefficients, indicating the strength and direction of the relationships, reveal significant patterns within the data. Facilitating Conditions (FC), encompassing factors that ease the adoption process, shows positive correlations with other variables, indicating that a conducive environment and resources within academic institutions are associated with higher levels of Performance Expectancy

(PE), Effort Expectancy (EE), Perceived Trust (PT), and the actual Adoption of ChatGPT Technology (ACGPT). Particularly noteworthy is the strong positive correlation between FC and PT ($r = 0.520$, $p < 0.01$), suggesting that a supportive environment significantly enhances the trust academics place in ChatGPT technology. Performance Expectancy (PE), reflecting the perceived benefits of using ChatGPT, demonstrates positive correlations with FC, EE, PT, and ACGPT.

This indicates that when academics perceive tangible benefits, the presence of facilitating conditions and a trustworthy environment further amplifies their willingness to adopt ChatGPT technology. Effort Expectancy (EE), representing the ease of use, exhibits positive correlations with FC, PE, PT, and ACGPT. A notable finding is the significant positive correlation between EE and PT ($r = 0.440$, $p < 0.01$), emphasizing that a seamless user experience contributes significantly to the trust academics place in ChatGPT. Perceived Trust (PT), indicating academics' confidence in ChatGPT technology, is positively correlated with FC, PE, EE, and ACGPT. The strong positive correlation between PT and FC ($r = 0.520$, $p < 0.01$) underscores the pivotal role of trust in the presence of facilitating conditions. Lastly, the Adoption of ChatGPT Technology (ACGPT) is positively correlated with FC, PE, EE, and PT. This suggests that when academics perceive ChatGPT as beneficial, easy to use, and trustworthy, and when facilitating conditions are in place, their actual adoption of the technology is more likely. So, the correlation analysis highlights the interrelated nature of various factors influencing ChatGPT adoption. Facilitating conditions, perceived benefits, ease of use, and trust are integral components, and their positive correlations emphasize the need for a supportive environment and a positive user experience. These findings underscore the multi-faceted nature of technology adoption in academic settings, offering valuable insights for institutions aiming to enhance the integration of ChatGPT technology among academics.

4.4.1.1 Hypothesis Testing

Based on the analysis of the collected data set, informed implications on the proposed hypothesis can be conducted. The proposed hypothesis as follow:

Hypothesis 1: Performance Expectancy and the Adoption of ChatGPT

H_0: There is no significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_1: There is a significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

Hypothesis 2: Effort Expectancy and the Adoption of ChatGPT

H_0: There is no significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_2: There is a significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

Hypothesis 3: Facilitating Condition and the Adoption of ChatGPT

H_0: There is no significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_3: There is a significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.

Hypothesis 4: Perceived Trust and the Adoption of ChatGPT

H_0: There is no significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.

H_4: There is a significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.

Table 4.16: Results and status of the proposed hypothesis in regard to the findings.

Hypothesis	Statistical Findings	Status
H_1	Correlation Results: r (208) = .177, with p < .001	Supported
H_2	Correlation Results: r (208) = .194, with p < .001	Supported
H_3	Correlation Results: r (208) = .337, with p < .001	Supported
H_4	Correlation Results: r (208) = .309, with p < .001	Supported

Note. Developed for research.

4.5 Multiple Linear Regression Analysis

Table 4.17: ANOVA test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82.121	4	20.530	69.745	< 0.000
	Residual	43.566	148	0.294		
	Total	125.687	152			

a. Dependent Variable: Adoption of ChatGPT

b. Predictors: (Constant), Performance Expectancy, Effort Expectancy, Facilitating Condition, Perceived Trust.

Source. Generated from SPSS software (Version 23).

The results in Table 4.17 indicate that the alpha value (0.05) is greater than the p value of less than 0.000. It demonstrates that the research's F statistic was significant, indicating that the suggested research model does a god job of characterizing the relationship between the independent variable and dependent variables. As result, every independent variable is important in explaining the variation in ChatGPT adoption. Alternative hypotheses or theories are supported by the data generated.

Table 4.18: Rule of Thumb for Interpreting the Strength of Correlation Coefficient

R-squared Value	Strength

Less than 0.3	None or very weak
0.3 to 0.5	Weak or low
0.5 to 0.7	Moderate
More than 0.7	Strong

Source. From Moore, D.S., Notz, W.I. & Flinger, M. A. (2013). The basic practice of statistics (6th ed.). New York, NY: W.H. Freeman and Company. Page (138).

Table 4.19: R-square Test Results

Models	**R-squared**	**Adjusted R-squared**
Model	0.719	0.590

Source. Generated from SPSS software (Version 23).

The R-squared value, also known as the coefficient of determination, is a statistical measure that indicates the proportion of the variance in the dependent variable that can be explained by the independent variables in a regression model. In this context, the R-squared value of 0.719 suggests that approximately 71.9% of the variance in the adoption of ChatGPT technology among academics in Malaysian higher education institutions is explained by the independent variables included in the regression model.

The adjusted R-squared, which accounts for the number of predictors in the model, is 0.590. The adjusted R-squared adjusts the R-squared value based on the number of predictors to provide a more accurate representation of the model's goodness of fit. In this case, the adjusted R-squared of 0.590 indicates that about 59% of the variance in the adoption of ChatGPT technology is explained by the predictors, considering the complexity of the model.

The value can be interpreting the independent variables used in the regression model collectively have a moderate to strong explanatory power in understanding the adoption patterns of ChatGPT technology among academics. This means that factors such as facilitating conditions, performance expectancy, effort expectancy, perceived trust, and other variables included in the model contribute significantly to explaining why academics adopt ChatGPT technology. However, it's important to note that approximately 28.1% (100% - 71.9%) of the variance in adoption

behavior is unable to account for variables in the framework. This unexplained variance might be attributed to other unaccounted factors, random variability, or measurement errors that influence the adoption process. Researchers should further explore these unexplained factors to gain a comprehensive understanding of the complexities surrounding the adoption of ChatGPT technology in the context of higher education institutions in Malaysia.

4.6 Chapter Summary

This chapter provides a comprehensive analysis of the data collected from the survey conducted among academics in higher education institutions in Malaysia. Through coded variables, reliability analysis, demographic profiling, correlation analysis, and F-tests, a detailed understanding of the adoption patterns and factors influencing ChatGPT technology usage among academics is presented. The findings from these analyses contribute significantly to the overall understanding of the adoption process and can inform future strategies for the integration of ChatGPT technology in the educational context. The reliability analysis conducted on the survey instrument demonstrated the robustness of the data collection tool, ensuring the consistency and stability of responses. This foundational step provided confidence in the subsequent analyses, enhancing the reliability and validity of the study's findings. The correlation analysis revealed intricate relationships between key variables. Facilitating conditions, perceived benefits, ease of use, and trust were identified as pivotal factors influencing the adoption of ChatGPT technology. The positive correlations among these variables underscored the interdependent nature of various aspects influencing academics' decisions to embrace this innovative tool in their teaching and research activities. Furthermore, the regression analysis, with a significant F-test value, highlighted the presence of diverse adoption patterns among different segments of the academic community. The regression model, with its substantial R-squared value, explained a significant portion of the variance in adoption behavior, emphasizing the importance of factors like facilitating conditions, performance expectancy, effort expectancy, and perceived trust in shaping adoption decisions.

CHAPTER 5

DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.0 Introduction

In this final chapter, the purpose of this study was to examine how performance expectancy, effort expectancy, facilitating condition and perceived trust affected the adoption of ChatGPT among academics in HEIs. The study This chapter concludes the results of Chapter 4 and 5's findings and the consequences.

This chapter will bring the discussion delves into the consequences of the research's findings, addressing the key research questions and exploring the broader context of ChatGPT technology adoption in Malaysian higher education institutions. The chapter concludes by summarizing the study's contributions, limitations, and providing recommendations for future research and practical applications. The following is concluding observation will be made to conclude the thesis.

5.1 Recapitulation of Study

The focus of this study is on the examination of how UTAUT: performance expectancy, effort expectancy, facilitating condition and perceived trust affected the adoption of ChatGPT among academics in HEIs. The factor of performance expectancy refers to the users' belief in the technology's capability to enhance the job performance. In the context of ChatGPT adoption among academics, it involves

assessing whether the tool improves efficiency in tasks such as research paper drafting or content generation. Effort expectancy pertains to the perceived ease of use and the level of difficulty associated with adopting the technology. Academicians might evaluate whether ChatGPT is user-friendly and has a minimal learning curve, influencing its adoption positively (Sykes, Venkatesh, & Gosain, 2009). While facilitating conditions consider external support and resources facilitating the technology's use (Bukar et al., 2023). In academia, it could include training availability, technical support, and infrastructure for effective ChatGPT use. Furthermore, trust is critical in technology adoption. Academicians would likely consider the reliability, security, and ethical aspects of ChatGPT (Mason et al., 2020; Shin, 2020). A positive perception of trust can impact their intention to adopt the technology (Mayer et al., 1995, p.718).

This study was conducted to address the problem, which providing a better understanding of the relationship between independent variables of performance expectancy, effort expectancy, facilitating condition, perceived trust, and dependent variable of the adoption of ChatGPT among academicians.

The research outcomes are utilized to support the following research goals, which summarized as below:

i To investigate the influence of performance expectancy on the adoption of ChatGPT among academics in HEIs.

ii To investigate the influence of effort expectancy on the adoption of ChatGPT among academics in HEIs.

iii To investigate the influence of facilitating conditions on the adoption of ChatGPT among academics in HEIs.

iv To investigate the influence of perceived trust on the adoption of ChatGPT among academics in HEIs.

5.2 Discussion of Major Findings

Table 5.1: Summary of Hypothesis Testing Results

Hypothesis	**Result**	**Supported (Rejected H_0)**
H_1: There is a significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.	R-value = 0.177 p-value = <0.000	Yes
H_2: There is a significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.	R-value = 0.194 p-value = <0.000	Yes
H_3: There is a significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.	R-value = 0.337 p-value = <0.000	Yes
H_4: There is a significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.	R-value = 0.309 p-value = <0.000	Yes

Note. Develop for research.

5.2.1 Relationship between Performance Expectancy and Adoption of ChatGPT

H_1: There is a significant relationship between performance expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

The F-test results underline the diversity in adoption patterns among different demographic groups. Further analysis can reveal nuanced insights, such as the adoption behaviors of younger academics compared to their experienced counterparts or differences in adoption rates across institutions. Tailored

interventions, acknowledging these variations, can effectively promote technology integration. The correlation coefficient value (R-value) result for H_1 (0.177) provides an explanation of the non or very weak relationship between performance expectancy and adoption of ChatGPT because the p-value is <0.000 and less than alpha value of 0.05. As a result, the H_1 will be accepted while H_0 will be rejected. It indicates that if academicians earned a well performance expectancy in return from HEIs, they would increase their adoption of ChatGPT. The past study of Terwiesch (2023) examines detailed experiments of the performance of ChatGPT on the final examination in Operations Management, concluding a results of grade B or B-.

5.2.2 Relationship between Effort Expectancy and Adoption of ChatGPT

H_2: There is a significant relationship between effort expectancy and the adoption of ChatGPT technology among academics in Malaysian HEIs.

The correlation coefficient value (R-value) of H_2 (0.194) provides a clarification of the non or very weak relationship between performance expectancy and adoption of ChatGPT because the p-value is <0.000 and less than alpha value of 0.05. Hence, the H_2 in this hypothesis will be accepted, and rejected H_0. It indicates that when the academicians receive a good return in effort expectancy from academia, they will increase their usage of ChatGPT. According to the study, the greater perceived ease of technology, the more likely an individual is to adopt and use it (Fagan, Kilmon, & Pandey, 2012).

5.2.3 Relationship between Facilitating Condition and Adoption of ChatGPT

H_3: There is a significant relationship between facilitating condition and the adoption of ChatGPT technology among academics in Malaysian HEIs.

The strong positive correlations identified between facilitating conditions (FC) and other variables signify the significance of a supportive environment. The availability of resources, technical support, and training substantially influence

academics' trust, perceived benefits, and ease of use concerning ChatGPT. This aligns with prior research emphasizing the pivotal role of institutional support in technology adoption (Rogers, 2003). The study's diverse sample, representative of different academic positions, underscores the importance of tailored support strategies. For instance, mid-career academics, a significant cohort in the study, might require targeted assistance to bridge their technological knowledge gaps.

5.2.4 Relationship between Perceived Trust and Adoption of ChatGPT

H_4: There is a significant relationship between perceived trust and the adoption of ChatGPT technology among academics in Malaysian HEIs.

Perceived trust (PT) emerges as a crucial factor influencing ChatGPT adoption. The positive correlation between PT and other variables implies that academics' confidence in ChatGPT significantly impacts their adoption decisions. Addressing ethical concerns and ensuring transparency in AI algorithms can bolster trust. Institutions should prioritize building awareness regarding the ethical dimensions of AI to enhance academics' confidence in using these technologies responsibly. A weak relationship between performance expectancy and adoption of ChatGPT resulting the correlation coefficient value (R-value) for H_4 (0.309), because the p-value is <0.000 and less than alpha value of 0.05. Hence, the H_4 in this hypothesis will be accepted, and rejected H_0. It indicates that when the academicians gained a high perceived trust from academia, they will increase their usage of ChatGPT.

5.3 Implications of Study

5.3.1 Theoretical Implication

This study contributes significantly to the existing literature on the adoption of ChatGPT in HEIs in several ways. Firstly, it addresses a gap by exploring the factors influencing academicians' intention to use ChatGPT for educational purposes, emphasizing the performance expectancy, effort expectancy, facilitating conditions

and perceived trust. This knowledge fills a gap in understanding determinants of ChatGPT adoption in the education sector among academicians. According to UTAUT, performance expectancy refers to a degree to which an individual believes that using technology will help enhance their job performance (Zawacki-Richter et al., 2019). Academicians are likely to adopt ChatGPT if they perceive that it will improve their teaching, research, or administrative tasks. It brings a positive correlation between perceived performance improvement and adoption is expected.

Besides, academicians will find ChatGPT easy to use, it is more likely to be adopted. It implies that a lower perceived effort in using ChatGPT should positively influence its adoption. The easier a system is to use, the more likely it is to be adopted (Bukar et al., 2023). However, if HEIs provide the necessary support, resources, and infrastructure for the integration of ChatGPT, academicians are more likely to adopt it. For facilitating conditions, it describes a positive organizational environment which enhances the likelihood of adoption of ChatGPT. Perceived trust is a crucial factor in technology adoption. Trust relates to the belief that technology is reliable, secure, and will perform as expected. Academicians are more likely to adopt ChatGPT if they trust its capabilities, data security, and overall reliability. The result to support past literature review that shows the performance expectancy, effort expectancy, facilitating conditions and perceived trust are the positive significance that effect on the adoption of ChatGPT.

5.3.2 Managerial Implication

In this instance, the Malaysian HEIs' authorities ought to assume accountability and show concerns for encouraging academicians to use ChatGPT technology. The authority's efforts to support the academicians have a direct impact on university's annual performance (Davis, 1989; Venkatesh & Davis, 2003). Effective activities are proportionate to the performances of academicians. It clarifies the factors that influence the intention to use ChatGPT, emphasizing the significance of enhancing academicians' perceived usefulness of ChatGPT (Ventakesh et al., 2003). To achieve this, providing a clear information on the system benefits, such as quicker responses and more accurate answers, is crucial. Users unfamiliar with ChatGPT

may require training and support, which educational institutions can provide through resources like help desks (Goyal, 2018).

These kinds of interactions that designers of ChatGPT may need to allocate additional resources for implementation and maintenance, including technology upgrades for optimal effectiveness. The study revealed the drive academicians to provide a greater commitment for the institutions. When it empowers the academicians to gain higher performance expectancy, effort expectancy, good facilitating condition and perceived trust, it is perfect for generating a positive relationship in the adoption of ChatGPT effectively (Ding, Peristeras, & Hausenblas, 2012).

5.4 Research Limitations

While conducting research on the ChatGPT technology adoption among academics in higher education institutions in Malaysia, several limitations and weaknesses were identified. One significant limitation is the potential cultural bias that might affect the responses from participants. Malaysia is a diverse country with various cultural backgrounds, and these differences could influence participants' perceptions and attitudes toward technology adoption.

Moreover, the study's scope may not cover all higher education institutions in the country, leading to potential generalizability issues. Additionally, the research might face limitations related to the technology itself, such as the evolving nature of ChatGPT and potential technical glitches that could impact user experiences during the study. Furthermore, the study's reliance on self-reported data might introduce response bias, as participants may provide socially desirable answers. Lastly, the research timeline and resources constraints might limit the in-depth exploration of certain aspects, potentially leaving some relevant factors unexamined. These limitations highlight the need for careful interpretation of the findings and suggest avenues for future research to address these constraints comprehensively.

5.5 Recommendations for Future Research

Researchers discovered that there is remaining some area or chances for improvement the caliber of the research in future. Because of the limited time frame, some recommendations will be advice to assist for future research as follow: Firstly, suggested that future researchers could extend the scope of this study worldwide, not only in Malaysia. Target in larger population will generate more accuracy data in research study. Comparative studies with international institutions can offer a global perspective on technology adoption. Analyzing adoption patterns across different cultural and educational contexts can reveal unique challenges and effective strategies.

Next, suggested having a longitudinal study as a solution to the cross-sectional study' issue in this situation. The reason is that, in comparison to cross-sectional studies, longitudinal studies require more time to collect data in a manner that is more appropriate. Cross-sectional studies have difficulty providing accurate data in a limited time frame. Long-term studies tracking adoption patterns over several years can provide valuable insights into technological evolution. Understanding how adoption evolves and adapts to technological advancements is crucial for future planning.

In research topic base, suggested institutions should invest in comprehensive training programs focusing on ChatGPT applications in pedagogy and research. Continuous technical support and upskilling initiatives can enhance academics' confidence in using ChatGPT effectively. Furthermore, incorporating ethical awareness initiatives or discussions around AI and ChatGPT within academic curricula can foster responsible usage. Awareness campaigns and workshops addressing ethical implications are essential to mitigate concerns and enhance trust. Finally, institutions and policymakers should collaborate to develop comprehensive guidelines addressing AI technology integration in education. Clear policies safeguarding ethical use, data privacy, and accessibility can provide a structured framework for adoption.

5.6 Chapter Summary

In conclusion, this study sheds light on the complex interplay of factors influencing ChatGPT technology adoption among academics in Malaysian higher education institutions. The robust correlations highlight the multifaceted nature of adoption, emphasizing the need for comprehensive, institution-specific strategies. This research presents a comprehensive analysis of ChatGPT adoption in Malaysian higher education, emphasizing the multifaceted nature of the adoption process. The study's findings contribute significantly to the literature, offering valuable insights for researchers, policymakers, and educators. By addressing the challenges identified and implementing the recommended strategies, institutions can navigate the complexities of AI technology adoption, ensuring a responsible and effective integration of ChatGPT in higher education contexts.

In essence, this study stands as a foundational exploration, inviting further research, discussions, and collaborative efforts to harness the potential of ChatGPT and similar technologies in shaping the future of education.

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Appendix A – Statistic of Academicians in HEIs

Jadual *Table* **1.5**

Bilangan Staf Akademik mengikut Jantina dan Kelulusan Tertinggi berdasarkan IPT bagi Tahun 2021

Number of Academic Staffs by Gender and Level of Studies in HEIs for the Year 2021

Peringkat Pengajian *Level of Studies*		Kategori IPT *HEIs Category*	Staf Akademik / *Academic Staff*		
			Lelaki *Male*	Perempuan *Female*	Jumlah *Total*
1	Ph.D *Ph.D*	UA *Public Universities*	8,457	10,000	18,457
		IPTS *Private HEIs*	3,467	2,751	6,218
		Politeknik *Polytechnics*	76	122	198
		Kolej Komuniti *Community Colleges*	8	2	10
2	Sarjana *Master*	UA *Public Universities*	4,348	7,062	11,410
		IPTS *Private HEIs*	6,067	8,989	15,056
		Politeknik *Polytechnics*	1,159	2,002	3,161
		Kolej Komuniti *Community Colleges*	231	442	673
3	Ijazah Sarjana Muda *Bachelor Degree*	UA *Public Universities*	643	878	1,521
		IPTS *Private HEIs*	2,489	3,566	6,055
		Politeknik *Polytechnics*	1,558	2,239	3,797
		Kolej Komuniti *Community Colleges*	646	1,051	1,697
4	Diploma *Diploma*	UA *Public Universities*	33	8	41
		IPTS *Private HEIs*	333	327	660
		Politeknik *Polytechnics*	151	84	235
		Kolej Komuniti *Community Colleges*	210	182	392
5	Lain-lain *Others*	UA[1] *Public Universities*[1]	82	57	139
		IPTS[2] *Private HEIs*[2]	298	283	581
		Politeknik[3] *Polytechnics*[3]	9	2	11
		Kolej Komuniti[3] *Community Colleges*[3]	3	4	7
Jumlah *Total*		UA *Public Universities*	**13,563**	**18,005**	**31,568**
		IPTS *Private HEIs*	**12,654**	**15,916**	**28,570**
		Politeknik *Polytechnics*	**2,953**	**4,449**	**7,402**
		Kolej Komuniti *Community Colleges*	**1,098**	**1,681**	**2,779**
		Keseluruhan *Grand Total*	**30,268**	**40,051**	**70,319**

***Nota** / Notes :*

[1]**Diploma Lanjutan, Diploma Lepasan Ijazah, Profesional dan Sijil** / *Advanced Diploma, Postgraduate Diploma, Professional and Certificate*
[2]**Sijil, Diploma Lanjutan dan Professional** / *Certificate, Advanced Diploma and Professional Levels*
[3]**Sijil dan Diploma Lanjutan** / *Certificate and Advanced Diploma*

Sumber / *Sources :*
1. **Sistem Analitik MyMoheS, KPT** / *MyMoheS Analytic System, MOHE*
2. **Bahagian Standard Swasta, JPT** / *Private Standard Division, Department of Higher Education*

Appendix B – Coded variables in SPSS software

Variables	Category	Coding
Gender	Female	1
	Male	2
Age	30 years old and below	1
	31 – 39 years old	2
	40 – 49 years old	3
	50 and above	4
Ethnicity	Malay	1
	Chinese	2
	Indian	3
	Others	4
Highest Education Level	Bachelor's Degree	1
	Master's Degree	2
	Doctoral Level	3
	Professional Level	4
	Others	5
Choose ONE answer which best describes your current/prior position as academic leaders:	Vice-Chancellor/ Pro Vice-Chancellor/ Vice-President/Chief Academic Officer	1
	Deputy Vice Chancellor	2
	Dean/Director	3
	Deputy Dean/Deputy Director	4
	Head of the department/Head of the Program	5
	Program Coordinators/Assistants	6
	Others	7

Working Experience in academic institutions:	Less than 5 years	1
	5-10 years	2
	11-15 years	3
	16 years and above	4
Have you ever used Chat GPT for any academic-related tasks?	Yes	1
	No	2
If yes, please indicate the duration of your experience with ChatGPT as a virtual assistant:	Less than 1 month	1
	1-3 months	2
	3-6 months	3
	More than 6 months	4
On a scale of 1 to 5, how familiar are you with Chat GPT (e.g., OpenAI's GPT-3.5, chat-based language models)?	Not familiar at all	1
	Somewhat familiar	2
	Moderately familiar	3
	Very familiar	4
	Extremely familiar	5
How likely are you to continue using Chat GPT for academic-related tasks in the future?	Very Unlikely	1
	Unlikely	2
	Neutral	3
	Likely	4
	Very Likely	5
Do you have any concerns regarding the ethical implications or potential biases associated with the use of ChatGPT as a virtual assistant in an academic setting?	Yes	1
	No	2

Source. Generated from SPSS software (Version 23).