5G TECHNOLOGY ADOPTION IN UTeM: LEVERAGING THE UTAUT MODEL FOR ANALYSIS

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5G TECHNOLOGY ADOPTION IN UTeM: LEVERAGING THE UTAUT MODEL FOR ANALYSIS.

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SUPERVISOR DECLARATION

"I hereby declare that I had read through this thesis and in my opinion that this thesis is adequate in terms of scope and quality which fulfil the requirements for the award of Bachelor of Technology Management (High-Tech Marketing) with Honours''

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DECLARATION OF ORIGINAL WORK

I hereby declare that all the work of this thesis entitled "5G technology adoption in UTeM: leveraging the UTAUT model for analysis'' is originally done by myself, expect for certain explanations and passages where sources are clearly cited. There is no portion of the work encompassed in this research project proposal that has been submitted in support of any application for any other degree or qualification of this or any other institute or university of learning.

SIGNATURE:

NAME: SUHANTINI A/P VASUDEVAN

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DEDICATION

To my beloved supervisor, Dr. Diana Rose binti Faizal, who has guided me and motivated me along the way of finishing the thesis. Thank you for your patience in leading us through the research process. Next, I would like to express my profound gratitude to my parents and my family has always supported me through my good and bad times and provided me with the extra boost that I always needed to wrap up my thesis. I want to thank my friends who have always been such motivating people by providing supportive ideas related to my studies and giving me the encouragement I need. Lastly, I would like to thank all the respondents who have assisted me in completing my study.

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ABSTRACT

The adoption of 5G technology is rapidly increasing worldwide, offering improved connectivity and performance. However, adapting to this technological advancement can be challenging for users, especially in academic institutions. This study aims to examine the readiness and key factors influencing the adoption of 5G technology in UTeM using the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The researcher collected data from 336 respondents, consisting of students and academic staff, through a Google Forms survey. Then, the researcher analyzed the data using the Statistical Package for the Social Sciences (SPSS) Version 27. The findings indicate significant relationships between performance expectancy, effort expectancy, social influence, and facilitating conditions in influencing 5G technology adoption in UTeM.

Keywords: 5G technology, UTAUT model, technology adoption, academic institutions, Malaysia

ABSTRAK

Penggunaan teknologi 5G meningkat pesat di seluruh dunia, menawarkan ketersambungan dan prestasi yang lebih baik. Walau bagaimanapun, menyesuaikan diri dengan kemajuan teknologi ini boleh mencabar pengguna, terutamanya di institusi akademik. Kajian ini bertujuan untuk mengkaji kesediaan dan faktor utama yang mempengaruhi penggunaan teknologi 5G dalam UTeM menggunakan model Unified Theory of Acceptance and Use of Technology (UTAUT). Penyelidik mengumpul data daripada 336 responden, yang terdiri daripada pelajar dan kakitangan akademik, melalui tinjauan Borang Google. Kemudian, penyelidik menganalisis data menggunakan Pakej Statistik untuk Sains Sosial (SPSS) Versi 27. Penemuan menunjukkan hubungan yang signifikan antara jangkaan prestasi, jangkaan usaha, pengaruh sosial dan keadaan memudahkan dalam mempengaruhi penggunaan teknologi 5G dalam UTeM.

Kata kunci: Teknologi 5G, model UTAUT, penggunaan teknologi, institusi akademik, Malaysia

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LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
UTAUT	The Unified Theory of Acceptance and Use of Technology
IoT	Internet of Things
SPSS	Statistical Package for Social Sciences
VR	Virtual Reality
KLIA	Kuala Lumpur International Airport
UTeM	Universiti Teknikal Malaysia Melaka

LIST OF APPENDICE

CHAPTER 1

INTRODUCTION

In this chapter the general understanding of the whole research study will be discussed. This chapter contains background of the study, conceptual and operational definition, problem statement, research questions and research objectives, scope and limitation of the study and key assumption of the study, significance of the study and summary of this chapter.

1.0 Background of study

The rapid advancement of mobile communication technology is causing a major shift in the academic scene. Every generation has transformed the way users connect and receive information, from the basic voice conversations of 1G to the fast data transmission of 4G (Rappaport, 2019). 5G is currently in the works and has the potential to completely change not just communication but also several other industries, including academia. In comparison to its predecessors, 5G technology offers unprecedented speed, ultra-low latency, and vast network capacity. 5G is primarily focused on linking things and enabling the Internet of Things (IoT), whereas earlier generations were mostly focused on connecting people (Ericsson, 2023). With applications like real-time data interchange, remote machine management, and smooth device integration into a single network, this opens a multitude of options for user adaptation (Ahluwalia et al., 2021).

The potential of 5G is incredibly beneficial for the academic industry. Imagine remote learning settings where students can participate in real-time interactive sessions from any location, or classrooms outfitted with augmented reality (AR) and virtual reality (VR) experiences that bring abstract concepts to life (Wong et al., 2020). However, the instructor adoption of 5G technology is a vital component of its successful integration. There are few studies that explicitly look at user perception and uptake within academic contexts, despite research on user acceptability of 5G technology in general settings (Ansari & Ahmed, 2017). (Mishra & Koehler, 2019). This knowledge gap hinders the development of targeted strategies to promote successful 5G implementation and maximize its potential benefits for teaching and learning.

This present study aims to address this gap by investigating user readiness of adopting 5G technology among educators in Malacca, Malaysia. By employing the UTAUT model (Unified Theory of Acceptance and Use of Technology), the study will explore the factors influencing educators' willingness to adopt 5G in their classrooms and contribute to a broader understanding of 5G's potential impact on educational practices in developing regions.

1.1 Conceptual & Operational Definition of Study

1.1.1 Conceptual Definition

A huge advancement in wireless communication is expected with the introduction of 5G technology, which promises previously unheard-of speed, lower latency, and the capacity to link numerous devices at once. The need for quicker and more dependable connectivity to meet the expanding demands of digital applications and the Internet of Things (IoT) has given rise to this next-generation network technology, which is the result of decades of improvements in telecommunications. Global telecommunications companies, tech entrepreneurs, and regulatory bodies have worked together to drive the development of 5G technology, which aims to improve mobile broadband experiences and open new applications like smart cities, driverless cars, and advanced healthcare systems (Shafi et al., 2017). The advent of 5G technology has the potential to transform educational settings profoundly. By delivering high speed internet connectivity, facilitating real-time collaboration, and enabling immersive educational tools like virtual and augmented reality, it can greatly enhance online and blended learning experiences. This enhanced connectivity can also support extensive research endeavors by enabling quicker data transfer and access to cloud resources, fostering a more dynamic and interactive educational environment. The integration of 5G technology is a critical move towards modernizing the academic landscape and enhancing overall educational outcomes as educational institutions strive to prepare students for a technologically advanced society (Taleb et al., 2017).

1.1.2 Operational Definition

The Unified Theory of Acceptance and Use of Technology (UTAUT) model is used to investigate the factors influencing the adoption of 5G technology at UTeM. Venkatesh et al. (2003) established this model, which emphasizes four essential factors influencing user acceptance: performance expectancy, effort expectancy, social influence, and facilitating conditions. The study uses these constructs to assess how these factors influence the adoption readiness of 5G technology among students, teachers, and staff at UTeM (Venkatesh et al., 2003).

1.2 Problem Statement

As educational institutions endeavor to incorporate cutting-edge technologies into their environments, understanding the adoption of 5G technology becomes paramount. The fundamental barrier is a lack of awareness and understanding among academic stakeholders regarding the capabilities and implications of 5G technology (Rogers, 2019). This lack of information can cause misunderstandings and adoption reluctance, which makes it difficult to use effectively for educational objectives.

Moreover, it is imperative to guarantee that educational institutions have the infrastructure required to accommodate 5G technology (Al-Fuqaha et al., 2015). Inequalities in the preparedness and accessibility of infrastructure could hinder its broad implementation, hence restricting the prospects for improved connectedness and creative pedagogical approaches. Not only that, but people may also voice concerns about 5G technology's potential effects on privacy and security in academic contexts (Yang et al., 2020). To promote confidence and trust in the system, these issues must be addressed. Failing to do so may cause people to be reluctant to use 5G-enabled services and apps, which would hinder the incorporation of these technologies into academic workflow.

Addressing these problems is critical to the effective implementation of 5G technology in academic contexts. If this isn't done, there may be lost possibilities for innovation, rising educational inequalities, and a higher chance of data breaches and eroded confidence. Thus, the purpose of this study was to identify the readiness of 5G technology adoption in UTeM: leveraging the UTAUT model for analysis in Malacca.

1.3 Research Questions

RQ 1: What are the factors influencing the adoption of 5G technology in UTeM using the UTAUT model?

RQ 2: What is the level of readiness are students and academic staff in UTeM to adopt 5G technology?

1.4 Research Objectives/Proposition

RO 1: To identify the factors influencing the adoption of 5G technology in UTeM using the UTAUT model.

RO 2: To evaluate the level of readiness of 5G technology adoption among students and academic staff in UTeM.

1.5 Scope and Limitation of Study

The scope of this study is to identify the adoption of 5G technology within UTeM. This research focuses on UTeM, examining the readiness for 5G technology adoption, and the key factors influencing this adoption.

This study will use a qualitative research strategy to collect data from students and academic staff. Furthermore, the study will look into the relevance of the Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm in assessing the preparedness of 5G technology in an academic setting.

Several limitations should be noted in this investigation. The study's shortcomings include its focus on a single academic institution, UTeM, which may limit the findings' applicability to other universities. Furthermore, the study solely considers students and academic staff, leaving out other stakeholders who may be impacted by the implementation of 5G technology.

1.6 Significance of Study

This study lies in its potential to address a notable gap in existing theory regarding the relationship between 5G technology adoption in UTeM. Although earlier studies have investigated how technology is accepted and adopted in different settings, a thorough knowledge that is especially suited to the special environment of academic institutions is lacking. This study intends to provide deeper insight into the factors impacting user readiness of 5G technology in academics by concentrating on UTeM, Malacca and using a quantitative methods approach.

This study's findings also have practical consequences for a wide range of stakeholders, including academic administrators, instructors, and students. Making well-informed decisions on how to incorporate 5G technology into their infrastructure and teaching methods can help academic institutions become more innovative, collaborative, and connected. While students may benefit from better access to educational resources and higher learning results, educators can use the study's insights to create more interesting and productive learning experiences.

There is an assumption that must be made for the researcher to conduct a study the hypothesis. The researcher's main assumption is that all participants in the study will be completely honest in their responses, assuming they have the necessary understanding of the subject under study as well as the necessary background information and experience to offer the best possible answers. Some of the replies gathered for this study might not accurately reflect the responses provided by the respondents under the relevant circumstances. However, the researcher continues to believe that the respondents who took part in this survey understood the research study correctly. To perform this study, the researcher contacts the appropriate respondents.

1.7 Summary

An overview of the research serves as the chapter's framework. This research's topic selection is described, along with its background, operational definition, problem statement, research questions, and objectives. It also includes information on its scope and limitations along with significance.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, discuss the literature reviews that are important to this investigation. at this chapter, the researcher will go into greater detail about 5G technology, 5G technology at academic institutions, 5G technology, and readiness intentions. Finally, to better understand how people utilize 5G technology and what drives their decision to adopt it, it proposed a theoretical model known as the unified theory of acceptance and use of technology (UTAUT). The readiness to accept technology is determined by the direct effect of four major constructs: performance expectancy, effort expectancy, social influence, and facilitating factors. At the conclusion of this chapter, the researcher will create a conceptual framework to explain the research.

2.1 5G Technology

The fifth generation of wireless mobile communication technology, or 5G technology, is a major development in the telecom industry. It offers previously unheard-of possibilities in several industries, including industry, transportation, healthcare, and education. Its characteristics include fast speed, low latency, and extensive connectivity (Research on

Teaching Competence and Improvement Path for University Teachers in the 5G+AI Era (2024). According to Andrews et al. (2014), 5G technology is predicted to be a paradigm shift, combining extraordinarily high carrier frequencies with enormous bandwidths, remarkable base station and device densities, and an unprecedented number of antennas.

Moreover, in the service industry, 5G network implementation enables quicker and higher-quality services, such as steady and quick video streaming, which boosts efficiency and productivity (Maulani & Johansyah, 2023). Not only that, (Yang & Hua, 2019, Lin & Hsu, 2021, Tian et al., 2019; Bai & An, 2019) described 5G technology has the potential to be used in telemedicine systems, wireless communication, financial technology innovation, automobile networks, and the Internet of Things (IoT). According to Bai and An (2019), the fundamental technologies of 5G wireless communication are MIMO antenna technology, simultaneous co-frequency fullduplex technology, D2D communication networking, non-orthogonal multiple access technology, wireless transmission and network architecture technology, and intelligent technology.

2.2 Adoption of 5G Technology in Higher Education

The integration of 5G technology in higher education has the potential to transform teaching, learning, and research. With its high-speed data transfer, low latency, and ability to connect multiple devices, 5G supports advanced digital learning methods. Technologies such as Augmented Reality (AR) and Virtual Reality (VR) can create immersive learning experiences, allowing students to engage in interactive lessons. For example, language learners can practice real-time conversations in virtual environments, leading to better learning outcomes (Ding & Qi, 2022). Additionally, cloud and edge computing powered by 5G can provide seamless access to educational resources, making collaboration between students and educators more efficient (Hou et al., 2022).

In research, 5G can improve data collection and analysis by enabling real-time transmission of large datasets. This is particularly beneficial in fields like environmental science, healthcare, and engineering, where researchers rely on fast and reliable data sharing (Erunkulu et al., 2021). Furthermore, the Internet of Things (IoT) can enhance research by allowing smart sensors to collect continuous data, improving the accuracy and scope of studies (Shafique et al., 2020). However, despite these advantages, implementing 5G in universities comes with challenges. The high cost of infrastructure and training can be a financial burden for institutions (Sahu, 2024). Additionally, concerns about data security and privacy may make some universities hesitant to adopt 5G fully (Ahmad et al., 2018; Granata, 2023).

Some universities have already started using 5G to enhance education and research. Studies show that integrating 5G into classrooms improves student engagement and learning through interactive technology (Baratè et al., 2019). In research, 5G has enabled real-time data analysis and remote collaboration, helping institutions conduct large-scale studies more effectively (Erunkulu et al., 2021). While 5G offers many benefits, universities must address financial, security, and training challenges to maximize its potential in education.

2.3 Theoretical Framework: UTAUT Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) explains factors influencing technology adoption. Developed by Venkatesh et al. (2003), it combines elements from multiple acceptance models, such as TAM and TPB (Chang, 2012; Andwika & Witjaksono, 2020). The model highlights four key constructs that shape users' behavioral intentions: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC).

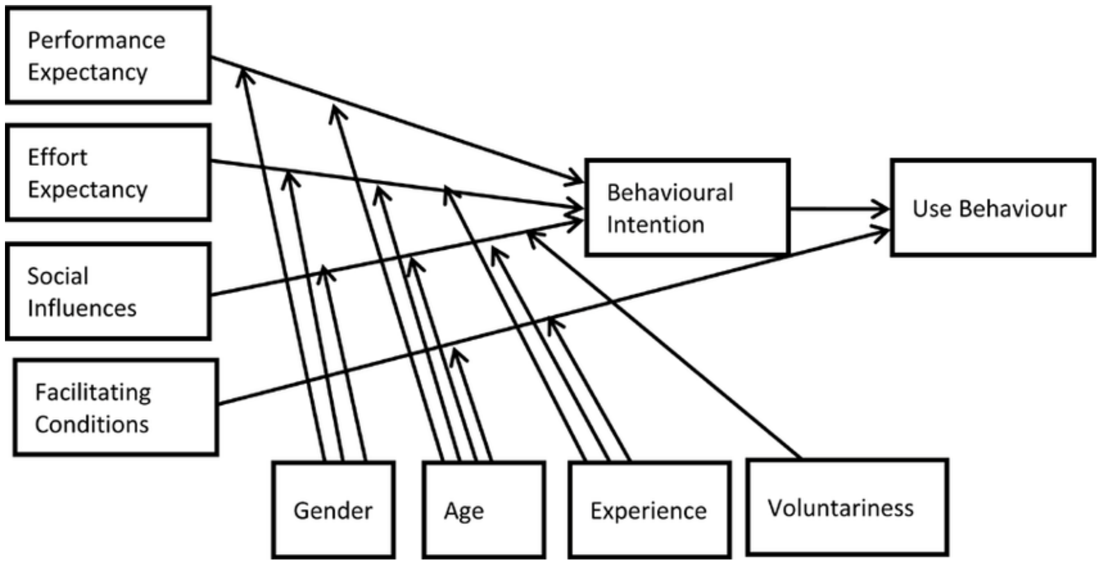


Figure 2.1 Theoretical framework of UTAUT model

Source: (Venkatesh et al., 2003)

2.3.1 Performance Expectancy (PE)

Performance expectancy refers to the belief that using technology will improve efficiency or productivity. Similar to perceived usefulness in TAM, higher performance expectancy increases the likelihood of adoption (Sehat, 2024). In education, students are more likely to use e-learning platforms if they believe these tools enhance their learning experience (Ojiaku, 2024; Xue, 2024).

2.3.2 Effort Expectancy (EE)

Effort expectancy relates to how easy technology is to use. When users find a system simple and intuitive, they are more likely to adopt it (Feldstein & Martin, 2013). In academic settings, students prefer digital learning platforms that are easy to navigate (Urus et al., 2022; Abbad, 2021).

2.3.3 Social Influence (SI)

Social influence measures how much an individual's decision is affected by others' opinions. Peer pressure, faculty recommendations, or institutional policies can impact technology adoption (Liu et al., 2016). In universities, students are more likely to use technology when encouraged by instructors or classmates (Yang et al., 2022).

2.3.4 Facilitating Conditions (FC)

Facilitating Conditions includes resources and support that help users adopt technology. Adequate infrastructure, training, and IT support encourage adoption in educational institutions (Algharibi & Arvanitis, 2011). Universities with strong technical support systems enable students and staff to integrate new technologies effectively (Andwika & Witjaksono, 2020).

2.4 Factors Influencing 5G Technology Adoption in UTeM

The UTAUT model's primary characteristics influence the adoption of 5G technology at UTeM. Adoption readiness is determined by factors such as performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). These criteria are consistent with the research aims, providing insights into 5G uptake at UTeM.

2.4.1 Performance Expectancy (PE) and 5G Adoption

Students and educators perceive 5G as beneficial for enhancing learning and research through high-speed connectivity and low latency. This enables immersive experience with tools like VR and AR, improving engagement and accessibility (Dadhich, 2023). The ability to stream high-quality content without interruptions further supports online learning, making it more interactive (Mokhsin et al., 2022). Studies highlight that performance expectancy significantly impacts technology adoption. When users believe 5G enhances their academic experience, their willingness to adopt it increases. Research also shows that in developing regions, perceived educational benefits drive interest in 5G adoption (Dadhich, 2023).

2.4.2 Effort Expectancy (EE) and 5G Adoption

Effort expectancy refers to how easy users find a technology to learn and use. If 5G-enabled tools are intuitive and require minimal effort, adoption rates in universities are likely to rise. Simplified interfaces and efficient onboarding processes further encourage usage among students and staff. Research indicates that institutions providing proper training and support experience higher adoption rates (Zhang et al., 2022). When users perceive 5G tools as user-friendly, they are more likely to integrate them into their learning and research activities (Mokhsin et al., 2022).

2.4.3 Social Influence (SI) and 5G Adoption

Social influence plays a crucial role in technology adoption, as peer recommendations and institutional encouragement impact decision-making (Dadhich, 2023). When universities promote 5G adoption through faculty and student endorsements, acceptance tends to increase. Research shows that students are more inclined to adopt 5G if they see their peers using it effectively (Zhang et al., 2022). This peer-driven influence can accelerate adoption, creating a more technology-driven learning environment.

2.4.4 Facilitating Conditions (FC) and 5G Adoption.

Facilitating conditions involve the availability of infrastructure, resources, and support to ensure smooth technology adoption. Institutions with proper 5G infrastructure and IT assistance have a higher likelihood of successful implementation. Studies suggest that universities investing in advanced networks and technical support create an environment conducive to digital transformation (Zhang et al., 2022). Ensuring access to necessary tools and training enhances users' confidence in adopting 5G for educational purposes (Dadhich, 2023).

2.5 Readiness of 5G Technology Adoption in Higher Education

Readiness for 5G adoption in higher education refers to how well institutions, students, and staff are prepared to integrate and utilize advanced connectivity. It includes factors such as technological infrastructure, user competence, and institutional support (Luo, 2022; Aruleba et al., 2022). Effective adoption requires both hardware and software availability, along with adequate training to ensure students and educators can maximize 5G's potential in teaching and research. Without proper readiness, the benefits of 5G, such as faster access to resources and enhanced digital learning, may not be fully realized.

Key indicators of 5G readiness include technological competence, infrastructure availability, institutional support, user attitudes, and collaborative environments (Nkrumah, 2024; Jurva et al., 2020). Institutions with well-established digital infrastructures and initiative-taking training programs are better positioned for successful adoption (Tayyib, 2020; Gallego-Madrid et al., 2022). Additionally, students and staff must be willing to embrace new tools and recognize the benefits of 5G for education and research (Aruleba et al., 2022).

Case studies show varying levels of readiness across universities. For instance, Malaysian institutions that provided dedicated support systems saw improved student engagement with 5G-enabled learning tools (Mokhsin et al., 2022). Meanwhile, research in South African universities found that limited resources hindered technology adoption, despite positive attitudes toward innovation. Comparatively, universities implementing smart campus projects, such as the GAIA 5G initiative, demonstrated higher preparedness by integrating IoT and digital services (Gallego-Madrid et al., 2022). These findings highlight the importance of infrastructure and institutional strategies in ensuring smooth 5G adoption.

2.6 Conceptual Framework

Figure 2.2 illustrates the Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm, which functions as a complete framework. This will help us understand how new technologies are adopted and used in a variety of contexts, including academic institutions. Venkatesh et al. (2003) developed the UTAUT model, which combines eight significant technology acceptance theories into a coherent perspective while highlighting four basic constructs: performance expectancy, effort expectancy, social impact, and facilitating factors.

The results will be reported and compared to the hypothesis using a comprehensive framework. This study investigated into how UTAUT constructs (performance expectancy, effort expectancy, social influence, and facilitating factors) affected 5G technology adoption in UTeM. This theoretical model of UTAUT proposes that the adoption readiness of technology is determined by intention.

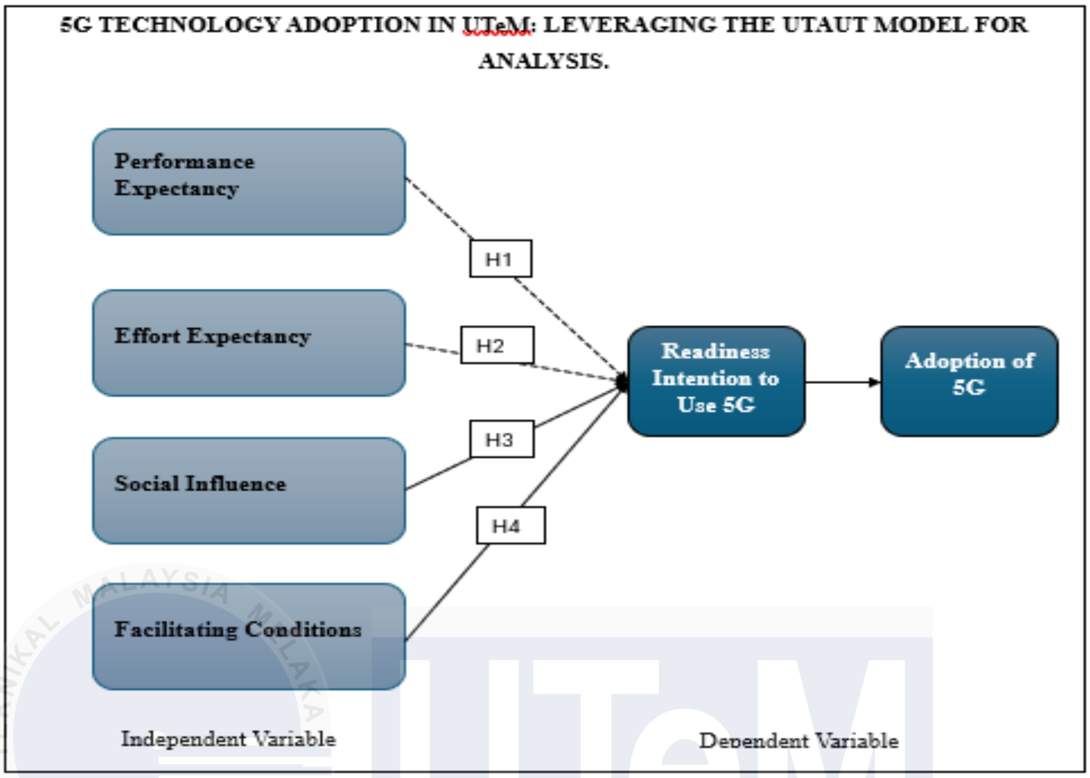


Figure 2:2 Conceptual Framework

2.7 Hypotheses

Hypothesis 1 (H1)

H0: There is no significant relationship between performance expectancy and the adoption of 5G technology in UTeM.

H1: There is a relationship between performance expectancy and the adoption of 5G technology in UTeM

Hypothesis 2 (H2)

H0: There is no significant relationship between effort expectancy and the adoption of 5G technology in UTeM

H1: There is a relationship between effort expectancy and the adoption of 5G technology in UTeM

Hypothesis 3 (H3)

H0: There is no significant relationship between social influence and the adoption of 5G technology in UTeM

H1: There is a relationship between social influence and the adoption of 5G technology in UTeM

Hypothesis 4 (H4)

H0: There is no significant relationship between facilitating conditions and the adoption of 5G technology in UTeM

H1: There is a relationship between facilitating conditions and the adoption of 5G technology in UTeM

2.8 Summary

This chapter provides a literature overview on the adoption of 5G technology in academic institutions, with a particular emphasis on the factors impacting adoption among UTeM students and academic staff. It investigates the key components of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, such as performance expectancy, effort expectancy, social influence, and facilitating factors, which are critical for understanding technology adoption behaviors. The review emphasizes the importance of 5G technology in improving educational experiences and facilitating research in areas where dependable connectivity is critical. However, there is a gap in the literature covering the implementation of 5G in Malaysian higher education institutions, particularly at UTeM. This study aims to bridge this gap by applying the UTAUT model to analyze the factors influencing 5G adoption among UTeM students and academic staff, contributing valuable insights into their readiness for 5G technology. By addressing this gap, the study aims to offer recommendations to UTeM on fostering an environment conducive to adopting emerging technologies like 5G.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

This chapter highlights the methods that are used to conduct the study which include research design, research location, methodology choice, data source, research instrument, sampling technique, research strategy and data analysis method. The collected information and data to address the aims of the research will be analysed and presented.

3.1 Research Design

Research design is the fundamental plan that a researcher formulates to address a research question or test a research hypothesis (Aramide et al., 2023a). It is essential for helping researchers choose the right techniques, steps, and analyses to properly address the current study issue (Aramide et al., 2023b). In this study, research design is used to understand the 5G technology adoption in UTeM: leveraging the UTAUT model for analysis.

Quantitative research design refers to the systematic planning and organization of a study with the goal of gathering, assessing, and interpreting numerical data to answer research questions or hypotheses. Causal research, also known as explanatory research, aims to determine the cause and effect of a phenomenon (Reed, 2018). Causal research looks into causal relationships; therefore, it always involves one or more independent variables (or theorized causes) and their interactions with one or more dependent variables. As a result, the purpose of this study is to investigate the relationship between independent variables and dependent variables. Independent variables in this study is the four core constructs which are the performance expectancy, effort expectancy, social influence, and facilitating conditions while the dependent variable is to study the readiness to adopt 5G technology in UTeM

3.2 Methodological Choices

A quantitative technique analyzes data to reach broad conclusions about a phenomenon (Regoniel 2015). It focuses on objective measures and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, as well as the manipulation of pre-existing statistical data with computational tools (Labaree, 2009). In this study, a quantitative approach is used to evaluate the link between numerous factors that influence the adoption of 5G technology in academic settings. The Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm provides a good foundation for understanding these concepts.

3.3 Primary Data Sources and Secondary Data Sources

Primary data are data that are collected for specific research purposes through the uses of methods that fit to the research problem (Hox & Boeije, 2005). In research, primary data is often considered more dependable and relevant to the specific research question at hand, as it is collected directly from the source, allowing researchers to tailor data collection methods to suit their research objectives (Rochmat et al., 2022).

The methods that are used to collect data such as investigation, questionnaires, local sources, telephone, and internet are the sources of primary data (Ullah, 2014). In this study, a survey is conducted through questionnaires to collect the opinion of college students and academic staff towards the 5G technology adaptation in UTeM.

Secondary data sources are data that have been collected by others for purposes other than the specific research being conducted. These sources can include data from government publications, websites, commercial databases, academic journals, articles, and other published materials. Researchers often use secondary data sources to complement primary data or when primary data collection is not feasible due to constraints such as time, cost, or access to the target population Panchenko & Samovilova (2020). Secondary data sources can provide valuable information for analysis, comparison, and triangulation of research findings, offering a cost-effective and efficient means of accessing data for research purposes (S. et al., 2023). In this study, as a researcher, I used institutional data to survey and usage statistics from universities and colleges that have implemented or are testing 5G technology.

3.4 Location of Research

The researcher selected Universiti Teknikal Malaysia Melaka (UTeM) as the location for this study. The research will be conducted within UTeM's campus in Melaka, Malaysia. UTeM was chosen due to its strong focus on engineering, technology, and innovation, making it a suitable environment for studying the adoption of 5G technology among students and academic staff. As one of Malaysia's technical universities, UTeM provides an advanced academic infrastructure that supports the integration of emerging technologies. By focusing on UTeM, this study aims to provide valuable insights into the factors influencing 5G technology adoption within a higher education institution that emphasizes technological advancement.

3.5 Research Instrument

The core data for the study was collected through a questionnaire. To make it easier to fill out the questionnaire, the items only include closed-ended questions. The questionnaire form is divided into two sections. Section A includes demographic information such as age, gender, academic role (student or academic staff), field of study or department, level of education for students, familiarity with 5G technology, and how frequently you use mobile data or internet services for academic purposes.

While section B will consist of questions about the factors influencing the adaptation of 5G technology in UTeM using the key constructs of the UTAUT model. This section the questionnaire will address on performance expectancy, effort expectancy, social influence and facilitating conditions. This question consists of the Likert scale will have a 5-point Likert scale in which ranging from 1-strongly disagree to 5-strongly agree.

EXAMPLE OF A FIVE-POINT LIKERT SCALE

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

Figure 3:1 Five Points Likert Scale

Source: Test, L. (2023, June 20)

3.6 Population and Sample

Sampling techniques are used to find out the validity of the research or survey results. Sampling techniques can be classified into probability sampling or non-probability sampling. Probability sampling, which is known as random sampling select the sample randomly from the population to make sure equally chance among the sample while non-probability techniques is the technique that elements for a sample is selected by the researchers which depend on the researchers' ability (Singh, 2018).

3.6.1 Probability Sampling

Probability sampling is a sampling technique in which each member of the population has a known, non-zero chance of being chosen. This technique is useful because it ensures that the sample is representative of the larger population, allowing researchers to draw relevant population inferences based on the sample data (Foley, 2018). It removes biases caused by human judgment while simultaneously ensuring accurate participant selection. Furthermore, probability sampling saves time and money by reducing the selection process, making it an effective data collecting approach (Devkota 2019).

In this study, probability sampling was employed to provide a representative sample of the UTeM student and faculty population. This allowed the sample's findings to be generalized to the total student and academic staff population. The sampling frame was constructed from the UTeM population, and respondents were chosen at random to participate in the study on 5G technology adoption. Probability sampling is essential for ensuring data accuracy and reliability.

3.6.2 Krejcie and Morgan Sampling Method

The Krejcie and Morgan Sampling Method (Krejcie & Morgan, 1970) is a widely accepted technique used to determine the appropriate sample size for a study, particularly when dealing with finite populations. This method is invaluable in ensuring that the sample size is statistically valid, and representative of the population being studied. It simplifies the process of calculating the sample size, making it easier for researchers to identify the number of respondents needed for accurate results.

For this research, the Krejcie and Morgan method was applied to determine the sample size for the study. With a total population of students and academic staff at UTeM, the sample size was calculated to ensure an accurate representation of the population. According to Krejcie and Morgan's table, for a population size of approximately 2,000 (a conservative estimate for the total number of students and staff), a sample size of 336 respondents was deemed appropriate for the study. This ensures a high degree of confidence and reliability in the results while maintaining manageable data collection efforts.

Similarly, previous studies, such as Nyaaba (2022), have employed the Krejcie and Morgan method to determine sample sizes. For instance, Nyaaba's study on college students' acceptability of technology in learning used this method to determine a sample size of 346 students from a total population of 3,200 students, demonstrating the practicality and effectiveness of this approach in academic research.

Table 3: 1 Krejcie and Morgan Sampling Method

Source: (Krejcie and Morgan, 1970)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size Source: Krejcie & Morgan, 1970

3.7 Research Strategy

Research strategy refers to the methodical preparation and techniques that researchers use to gather, examine, and evaluate numerical data to answer research questions or test hypotheses. It includes the strategies and tactics employed to collect quantitative data, guaranteeing that the study is conducted in an organized and exacting way (Goodman & Zhang, 2017). In the context of interaction research, the quality and outcomes of quantitative research methods play a significant role in shaping research practices and informing cumulative perspectives from previous reviews (Plonsky & Gass, 2011).

3.7.1 Pilot Test

A pilot study, also known as a pilot test, is a small-scale preliminary study conducted to evaluate the feasibility, logistics, and potential effectiveness of a larger definitive study or trial (Arain et al., 2010). The main objective of pilot study, in contrast to hypothesis-testing studies, is to determine whether a bigger, definitive trial is feasible and worthwhile proceeding it (Leon et al., 2011).

Pilot test is conducted to initial test on questionnaire to collect data. The purpose of the pilot test is to enhance the reliability of questionnaires so that it can reduce the problems that might be faced by respondents when they are answering the question, and the error occur in recording the data. The reason for conducting pilot test is to provide researcher with at least some idea of the questionnaire’s face validity which the questionnaire appears to make sense. Hence, a pilot test is conducted to initial testing the questionnaire on 35 academic respondents. Their feedback collected was studied to improve the questionnaire before distributing it to the actual sample.

3.8 Data Analysis Method

To evaluate the data, the researcher would use the Statistical Package for Social Science (SPSS) version 27. SPSS was a comprehensive statistical software package that could successfully analyze data. Furthermore, the researcher's interpretation of the findings was straightforward. In this study, the researcher would use a range of approaches to examine the data, including descriptive analysis, reliability analysis, Pearson correlation analysis, and linear regression analysis.

3.8.1 Descriptive Analysis

Descriptive analysis was employed to provide a clear summary of the demographic characteristics of the respondents and their responses to the survey questions. This method involved calculating measures such as frequencies, percentages, and means to describe the distribution of variables like gender, age, faculty, and level of education, as well as the frequency of use of mobile data for academic purposes and familiarity with 5G technology. Descriptive analysis helps identify patterns and trends in the data, offering insights into the overall attitudes and behaviors of the sample population (Field, 2013; Pallant, 2020). By summarizing the data, it also aids in the interpretation of how demographic factors might influence 5G adoption among students and academic staff at UTeM.

3.8.2 Normality Test

The Normality Test determines if the data has a normal distribution, which is a necessary assumption for many parametric statistical studies. Common normality tests include the Shapiro-Wilk and Kolmogorov-Smirnov tests, which compare the observed data distribution to a normal distribution. If the data deviates significantly from normality, nonparametric tests may be used instead (Field, 2013). normalcy is crucial because it supports the validity of statistical techniques like t-tests and regression analysis, which rely on normalcy to make reliable inferences (Pallant, 2020).

3.8.3 Pearson Correlation Coefficient Analysis

The Pearson Correlation Coefficient Analysis was done to determine the strength and direction of the linear relationship between two continuous variables in the study. This statistical method computes a correlation coefficient (r) on a scale of -1 to +1, with values closer to +1 or -1 indicating a strong positive or negative linear link, and values around 0 indicating little to no linear relationship. Pearson's correlation is especially beneficial for determining how variables like performance expectations and effort expectancy may be related to the adoption of 5G technology (Field 2013). This approach helps to determine the extent to which changes in one variable predict changes in another, providing useful insights into the factors that drive technology adoption (Pallant, 2020).

Table 3.2: Pearson Correlation Coefficient

r value	Interpretation
0.81 to 1.00	Very Strong
0.61 to 0.80	Strong
0.41 to 0.60	Moderate
0.21 to 0.40	Low
0.00 to 0.20	Very low

3.8.4 Multiple Regression Analysis

Multiple Regression Analysis regression is used to explain the relationship between one continuous dependent variable and two or more independent variables. This method can be used to detect how strong independent variables may affect a dependent variable (Statistics Solutions, 2018). It is a statistical tool that enables researchers to investigate numerous independent factors connected to a dependent variable. Once researchers have determined how these various variables link to the dependent variable, they may use information from all of the independent variables to generate far more powerful and accurate predictions about why things are the way they are (Higgins, 2005). A multiple linear regression analysis is carried out to predict the values of a dependent variable, Y, given a set of p explanatory variables (x1, x2,….,xn).

The T-test is used to investigate the linear relationship between independent variables and dependent variables. A t-test is used as a hypothesis testing tool, which allows testing of an assumption applicable to a population (Kenton, 2019). There is a significance level to accept or reject the null hypothesis (Bryman & Cramer, 2011). In addition, ANOVA test is used to determine the influence that independent variables have on the dependent variable in a regression study (Kenton, Analysis of Variance (ANOVA), 2019). Both T-test and ANOVA test are used to test at 5% level of significance.

The regression equation is expressed as:

$$\mathbf{Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\epsilon}$$

Where:

- Y = 5G Technology Adoption (dependent variable)
- X_1 = Performance Expectancy (independent variable)
- X_2 = Effort Expectancy (independent variable)
- X_3 = Social Influence (independent variable)
- β_0 = Intercept
- β_1, β_2, β_3 = Regression coefficients
- ε = Error term

3.9 Time Horizon

In research, a time horizon refers to the period over which data is collected and analyzed, significantly impacting the scope and conclusions of a study. It determines whether a study adopts a cross-sectional approach, examining data at a single point in time, or a longitudinal approach, observing variables over an extended period to identify trends and changes. The choice of time horizon influences the study's design, methodology, and the robustness of its findings, with longer horizons offering deeper insights into causal relationships and temporal dynamics (Ployhart & Vandenberg, 2010).

In this research a cross-sectional time horizon is well-suited to capturing a comprehensive snapshot of the current state of adoption. In this approach, data is collected at a single point in time from a representative sample of users within UTeM, such as students and administrative staff. Thus, it enables the gathering of a large amount of data quickly, facilitating the analysis of correlations and patterns among the different variables that influence technology acceptance.

3.10 Scientific Canons

Scientific canons are fundamental principles that guide the conduct of research, ensuring its rigor, validity, and reliability. These principles provide a framework for designing studies, collecting data, and interpreting results, helping researchers produce credible and generalizable findings. The main scientific canons include internal validity, generalizability (or external validity), construct validity, and reliability.

3.10.1 Internal Validity

Internal validity is the degree to which a study effectively demonstrates a causal relationship between independent and dependent variables while limiting the influence of other factors. Internal validity was assured in this study by carefully designing survey questions using the UTAUT paradigm, which is frequently utilized in technology adoption research. Furthermore, the use of probability sampling helped to eliminate selection bias, ensuring that the acquired data accurately represented the intended population. Cronbach's Alpha Reliability Analysis was used to increase response reliability and establish the consistency of the measurement scales (Hair et al., 2019).

3.10.2 Generalizability/External Validity

External validity, also known as generalizability, refers to the extent to which the study findings can be applied to a broader population beyond the sampled respondents. Since this research used the Krejcie and Morgan Sampling Method, the selected sample size of 336 respondents is considered adequate to generalize the findings to the student and academic staff population at UTeM. However, generalizability may still be limited to institutions with similar academic environments and technological infrastructures. To enhance external validity, future research could incorporate a larger and more diverse sample across multiple universities (Pallant, 2020).

3.10.3 Construct Validity

Construct validity refers to the degree to which a test or instrument measures the concept or construct it is intended to measure. According to Cronbach and Meehl (1955), construct validity involves both the theoretical and empirical aspects of a construct, ensuring that the operational definitions used in research are accurately and consistently linked to the theoretical concepts they are supposed to represent. This involves verifying that the measures of constructs are properly defined and that indeed capture the theoretical attributes they are meant to assess.

The construct validity in this research is addressed through careful operationalization of the constructs derived from the UTAUT model. The constructs such as Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions are well-defined based on established literature and have been translated into measurable survey items. These items have been validated through pre-testing and expert reviews to ensure they accurately reflect the intended constructs. Furthermore, it has utilized validated scales from previous studies to enhance the credibility and validity of the constructs measured.

3.10.4 Reliability

Reliability refers to a measurement instrument's capacity to produce reliable results over multiple trials. Cronbach's Alpha Reliability Analysis was performed to evaluate the internal consistency of survey items measuring Performance Expectancy, Effort Expectancy, Social Influence, and 5G Technology Adoption. A Cronbach's Alpha score greater than 0.70 is typically seen as suggesting a high level of reliability (Hair et al., 2019). A higher alpha value indicates that the items in a construct are highly connected and accurately assess the same underlying concept. Ensuring high reliability in measurement tools increases the credibility and dependability of research findings (Pallant, 2020).

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

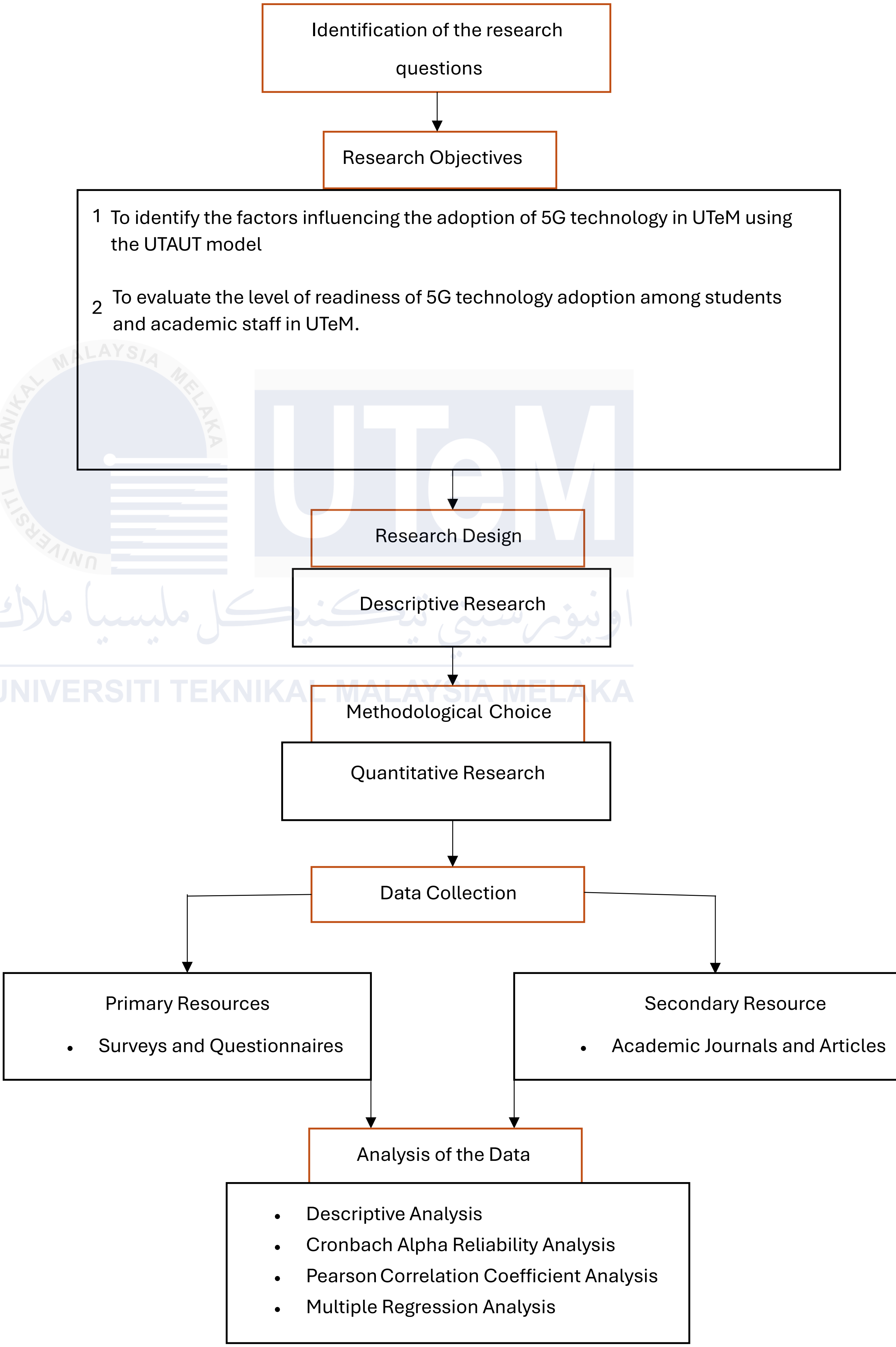
Figure 3.2: Cronbach 's Alpha Range

Source: (Stephanie, 2018)

3.11 Summary

This chapter addressed the research methodology used in this study, which covered the research design, demographic and sample methods, data collection procedures, and data analysis strategies. The study used probability sampling and the Krejcie and Morgan Sampling Method to choose participants from UTeM. The questionnaire was designed using the UTAUT model, and the data was analyzed using descriptive statistics, reliability testing (Cronbach's Alpha), Pearson correlation, and multiple regression analysis. Normality tests were used to ensure the validity of parametric testing. Furthermore, the study demonstrated validity and reliability by carefully constructing the questionnaire and doing statistical testing. These approaches help to provide trustworthy and valuable insights into the aspects driving 5G technology uptake among students and academic staff.

3.12 Research Framework



CHAPTER 4

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter will highlight the results derived from the analysis of the data collection. The data collection process involved the distribution of questionnaires to individuals belonging to UTeM students and UTeM's academic staff in Malacca. The survey was conducted exclusively through Google Forms. Subsequently, the collected data underwent analysis using Statistical Package for Social Science (SPSS) software version 27.0. This chapter will encompass descriptive statistics, reliability assessments, and normality tests. To determine the relationship between the dependent variable and independent variables, Pearson's correlation coefficient (parametric test) will be used when the data is normally distributed, as well as using multiple regression analysis.

4.1 Pilot Test

Pilot testing was conducted before the data collection process and distribution of the questionnaire to target respondents. The objective of conducting a pilot test is to evaluate the validity of the questionnaire and the data's reliability (Hamilton, 2022). To create a better questionnaire design and reduce issues for respondents answering the questionnaire and data screening issues, it is necessary to conduct pilot tests to ensure that the research can be carried out smoothly (Saunders, et al., 2019). Hence, 35 respondents' students and academic staff were chosen to conduct the pilot test.

Table 4. 1 Case Processing Summary (Pilot Test)

(Source: SPSS output)

Case Processing Summary			
		N	%
Cases	Valid	35	100.0
	Excluded[a]	0	.0
	Total	35	100.0
a. Listwise deletion based on all variables in the procedure.			

Table 4. 2 Reliability Statistics (Pilot Test)

(Source: SPSS output)

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.907	.912	21

From the table it can be concluded that the questionnaire included a total of N=21 items, and none of the 35 respondents had missing data. All items in the questionnaire have strong reliability and the set of questionnaires proved to be valid as the value of Cronbach's Alpha is above 0.7, which is 0.907.

4.2 Descriptive Analysis on Demographic Background

In this section, it analyzed respondent and demographic background regarding the demographic section in questionnaires. The questionnaires included gender, race, age, role in the institution, faculty, level of education, level of familiarity with 5G technology and how often do student and academic staff use mobile data or internet services for academic purposes. All the data obtained, presented in the table and graphs as well as evaluated in the further discussion. The table below shows the summary of demographic information.

Table 4.3 Summary of Total Demographic Information

Demographic	Demographic Details	Frequency	Percentage (%)
Gender	Male Female	136 200	40.5 59.5
Race	Malay Chinese Indian Other	181 75 71 9 0	53.9 22.3 21.1 2.7 0
Age	Under 20 years old 20 - 29 years old 30 - 39 years old 40 - 49 years old 50 years and above	60 206 47 18 5	17.9 61.3 14.0 5.4 1.5
Role at the institution	Student Academic Staff	259 77	77.1 22.9

Faculty	(FTKEK) (FTKE) (FTKM) (FTKIP) (FTMK) (FPTT)	38 46 37 30 38 147	11.3 13.7 11.0 8.9 11.3 43.8
Level of education	Diploma Degree Master PhD	70 206 34 26	20.8 61.3 10.1 7.7
Level of familiarity with 5G technology	Not familiar at all Somewhat familiar Moderately familiar Very familiar	0 5 8 323	0 1.5 2.4 96.1
Frequency of using mobile data/internet for academic purposes	Never Rarely Occasionally Frequently Very Frequently	- - 2 9 325	- - 6 2.7 96.7

4.2.1 Gender

Table 4. 4 Respondent's gender

(Source: SPSS output)

Respondent's gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	136	40.5	40.5	40.5
	Female	200	59.5	59.5	100.0
	Total	336	100.0	100.0	

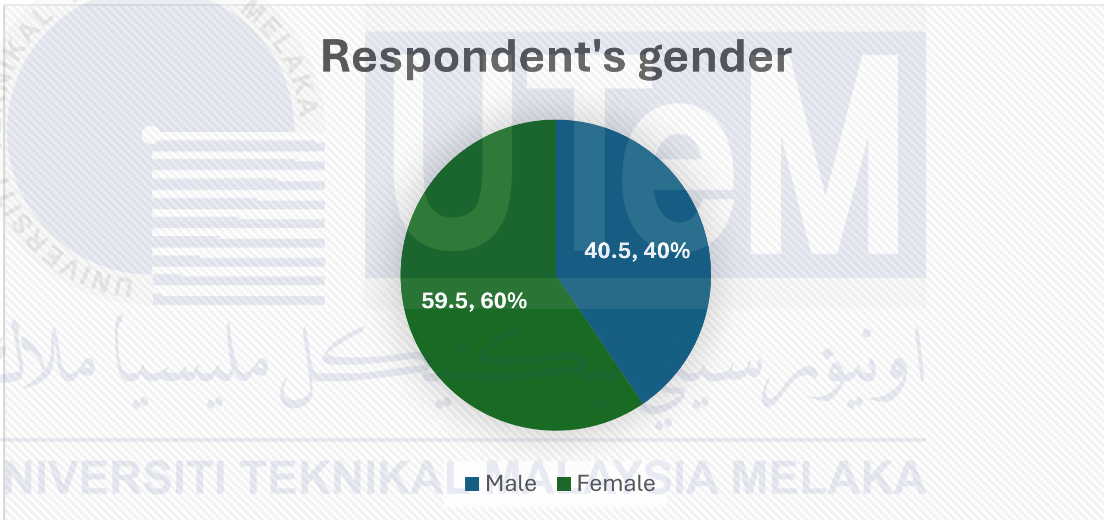


Figure 4.1 Respondent's gender

(Source: SPSS output)

Table 4.4 and Figure 4.1, shows the gender frequency distribution of respondents in this study. From the table above, there are 136 male respondents (40.5%) and 200 female respondents (59.9%) among the total 336 respondents. In this study, respondents were randomly selected and randomly assigned however the proportion of female respondents is slightly higher than that of male respondents in this research, with a difference of 19%.

4.2.1 Race

Table 4. 5 Respondent's race

(Source: SPSS output)

Respondent's race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	181	53.9	53.9	53.9
	Chinese	75	22.3	22.3	76.2
	Indian	71	21.1	21.1	97.3
	Others	9	2.7	2.7	100.0
	Total	336	100.0	100.0	

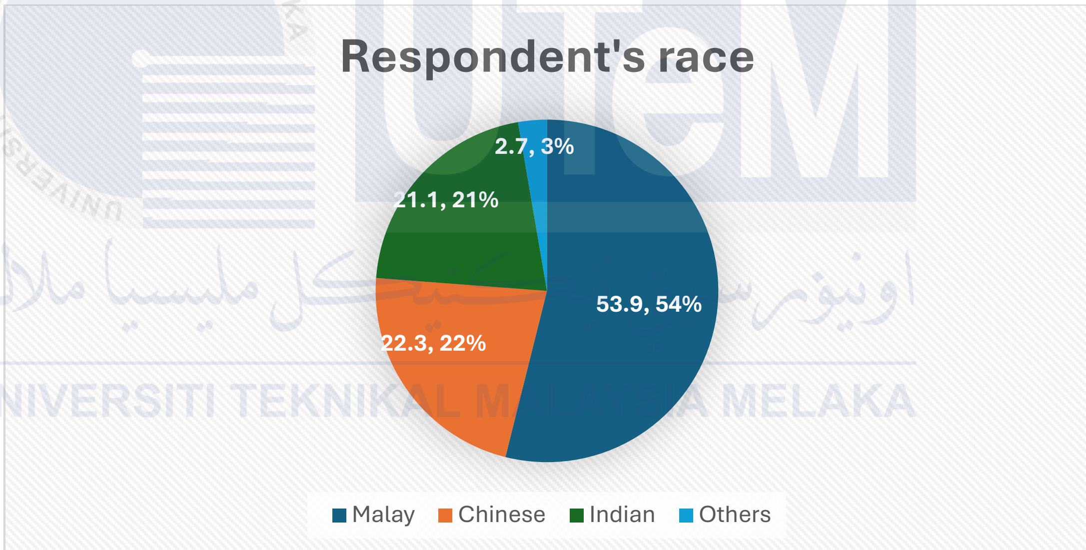


Figure 4.2 Respondent's race

(Source: SPSS output)

Based on Table 4.5 and Figure 4.2, the race frequency distribution shows that the majority of respondents are Malay, with 181 individuals, accounting for 53.9% of the total sample. Chinese respondents total 75, making up 22.3%, followed closely by Indian respondents at 71, representing 21.1%. Meanwhile, individuals from other ethnic backgrounds total 9, comprising 2.7% of the participants. This distribution reflects Malaysia's multicultural composition, where Malays form the largest ethnic group.

4.2.2 Age

Table 4. 6 Respondent's age

(Source: SPSS output)

Respondent's age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 20 years old	60	17.9	17.9	17.9
	20 - 29 years old	206	61.3	61.3	79.2
	30 - 39 years old	47	14.0	14.0	93.2
	40 - 49 years old	18	5.4	5.4	98.5
	50 years and above	5	1.5	1.5	100.0
	Total	336	100.0	100.0	

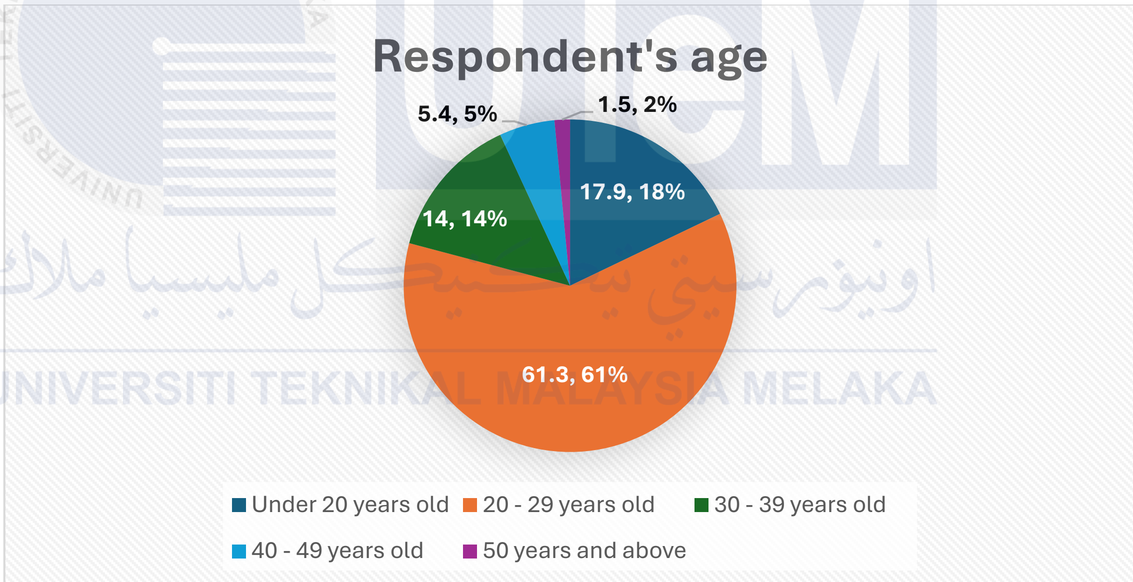


Figure 4.3 Respondent's age

Source: SPSS output

Based on Table 4.6 and Figure 4.3, the age frequency distribution reveals that the majority of respondents are between 20 and 29 years old, with 206 individuals, making up 61.3% of the total sample. This is followed by respondents under 20 years old, totaling 60, which accounts for 17.9%. Respondents aged between 30 and 39 years old comprise 14.0%, with 47 individuals. Meanwhile, 18 respondents fall within the 40 to 49 age group, representing 5.4%, and the smallest group consists of those aged 50 years and above, with only 5 respondents, making up 1.5%. This distribution suggests that younger individuals, particularly those in their 20s, are more engaged in adopting 5G technology.

4.2.4 Role at the institution

Table 4. 7 Respondent's role at the institution

(Source: SPSS output)

Respondent's role at the institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	259	77.1	77.1	77.1
	Academic Staff	77	22.9	22.9	100.0
	Total	336	100.0	100.0	

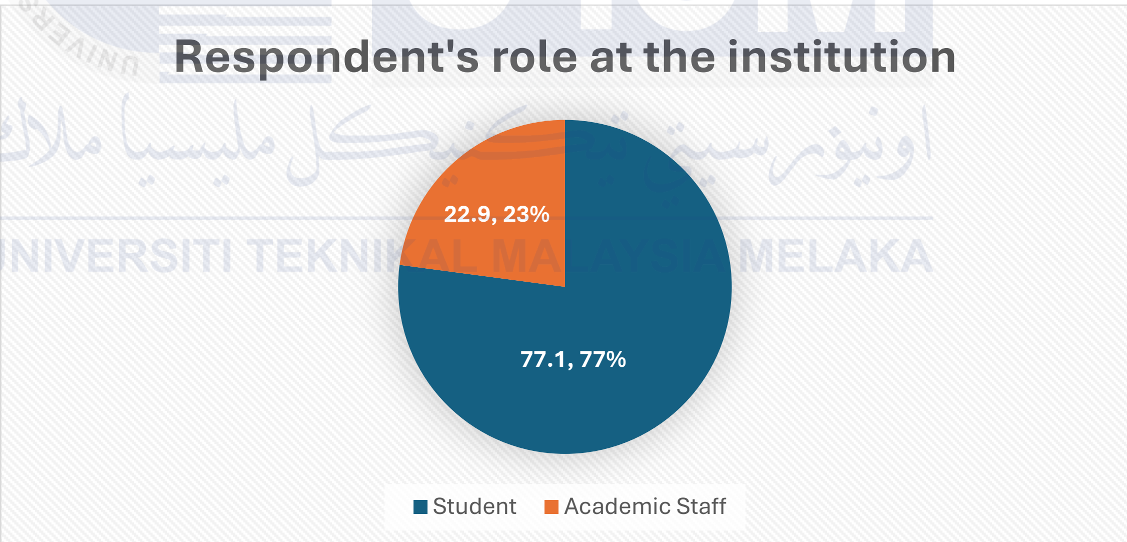


Figure 4.4 Respondent's role at the institution

(Source: SPSS output)

Based on Table 4.7 and Figure 4.4, shows the breakdown of respondents by role at the institution shows that a significant majority, 77.1% (259 individuals), are students. The remaining 22.9%, or 77 respondents, are academic staff. This distribution suggests that students have a higher engagement with the topic of 5G technology adoption in academic institutions.

4.2.5 Faculty

Table 4. 8 Respondent's faculty

(Source: SPSS output)

Respondent's faculty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Faculty of Electronic and Computer Technology and Engineering (FTKEK)	38	11.3	11.3	11.3
	Faculty of Electrical Technology and Engineering (FTKE)	46	13.7	13.7	25.0
	Faculty of Mechanical Technology and Engineering (FTKM)	37	11.0	11.0	36.0
	Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP)	30	8.9	8.9	44.9
	Faculty of Information and Communications Technology (FTMK)	38	11.3	11.3	56.3
	Faculty of Technology Management and Technopreneurship (FPTT)	147	43.8	43.8	100.0
	Total	336	100.0	100.0	

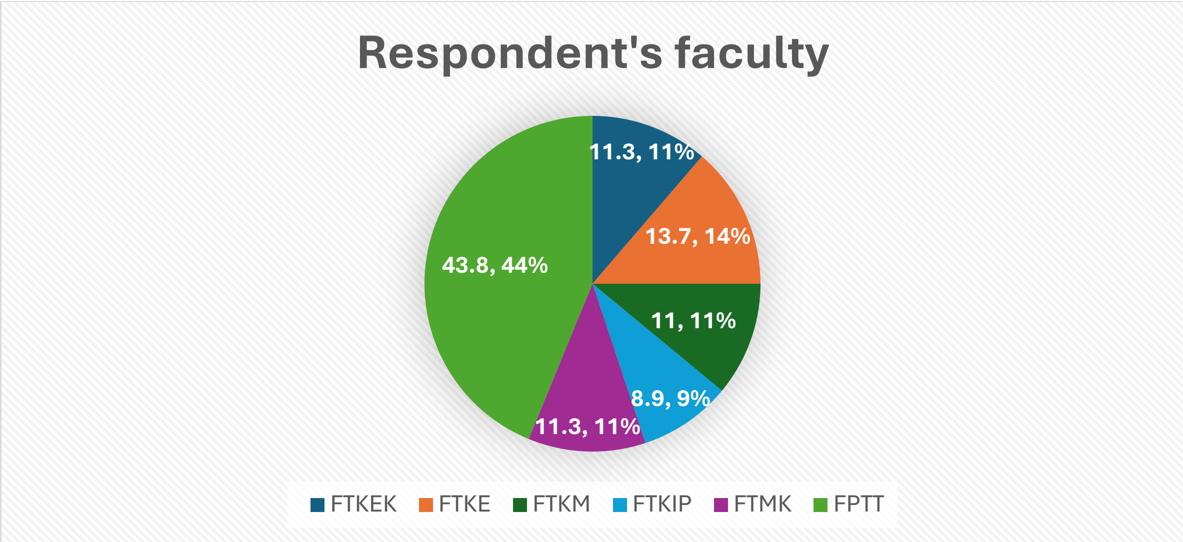


Figure 4.5 Respondents' faculty

(Source: SPSS output)

Based on Table 4.8 and Figure 4.5, the analysis of respondents' faculty distribution shows that the Faculty of Technology Management and Technopreneurship (FPTT) has the largest representation, with 147 respondents or 43.8% of the total sample. The Faculty of Electrical Technology and Engineering (FTKE) follows with forty-six respondents (13.7%), while the Faculty of Electronic and Computer Technology and Engineering (FTKEK) and the Faculty of Information and Communications Technology (FTMK) each have 38 respondents (11.3%). Other faculties, such as the Faculty of Mechanical Technology and Engineering (FTKM) and the Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP), have 37 respondents (11.0%) and 30 respondents (8.9%), respectively. This distribution indicates that the respondents come from a variety of academic disciplines, with a strong representation from FPTT, which aligns with the study's focus on technology and management.

4.2.6 Level of Education

Table 4. 9 Respondent's level of education

(Source: SPSS output)

Respondent's level of education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	70	20.8	20.8	20.8
	Degree	206	61.3	61.3	82.1
	Master	34	10.1	10.1	92.3
	PhD	26	7.7	7.7	100.0
	Total	336	100.0	100.0	

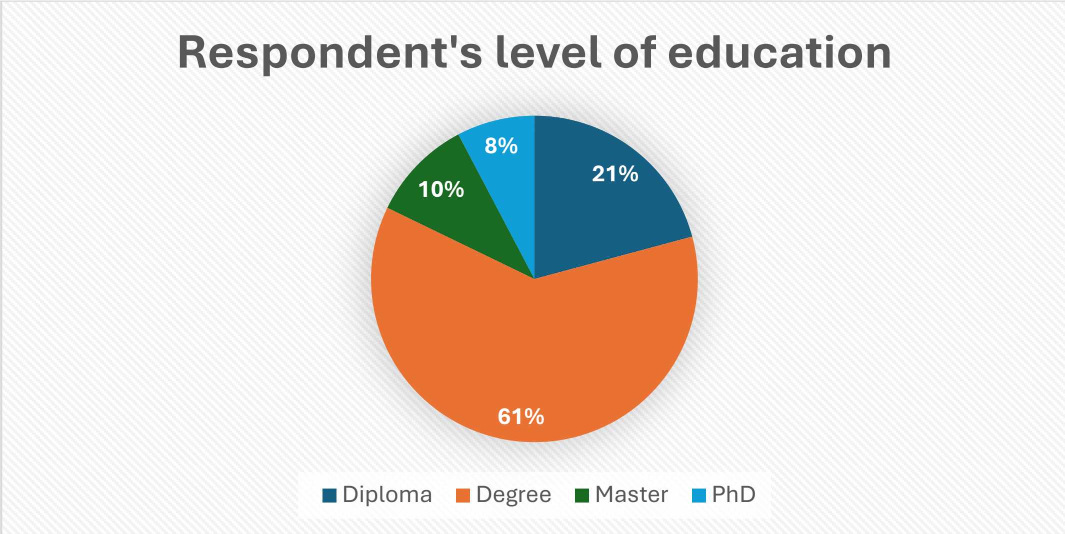


Figure 4.6 Respondent's level of education

(Source: SPSS output)

Based on Table 4.9 and Figure 4.6, the analysis of respondents' education levels shows that the majority hold a degree, with 206 individuals or 61.3% of the total sample. Diploma holders account for 70 individuals (20.8%), while 34 respondents (10.1%) have a master’s degree. Meanwhile, 26 respondents (7.7%) have attained a PhD. This distribution suggests that most respondents have a higher education background, aligning with the study's focus on academic institutions.

4.2.7 Level of familiarity with 5G technology

Table 4. 10 Respondent's level of familiarity with 5G technology

(Source: SPSS output)

Respondent's level of familiarity with 5G technology		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat familiar	5	1.5	1.5	1.5
	Moderately familiar	8	2.4	2.4	3.9
	Very familiar	323	96.1	96.1	100.0
	Total	336	100.0	100.0	

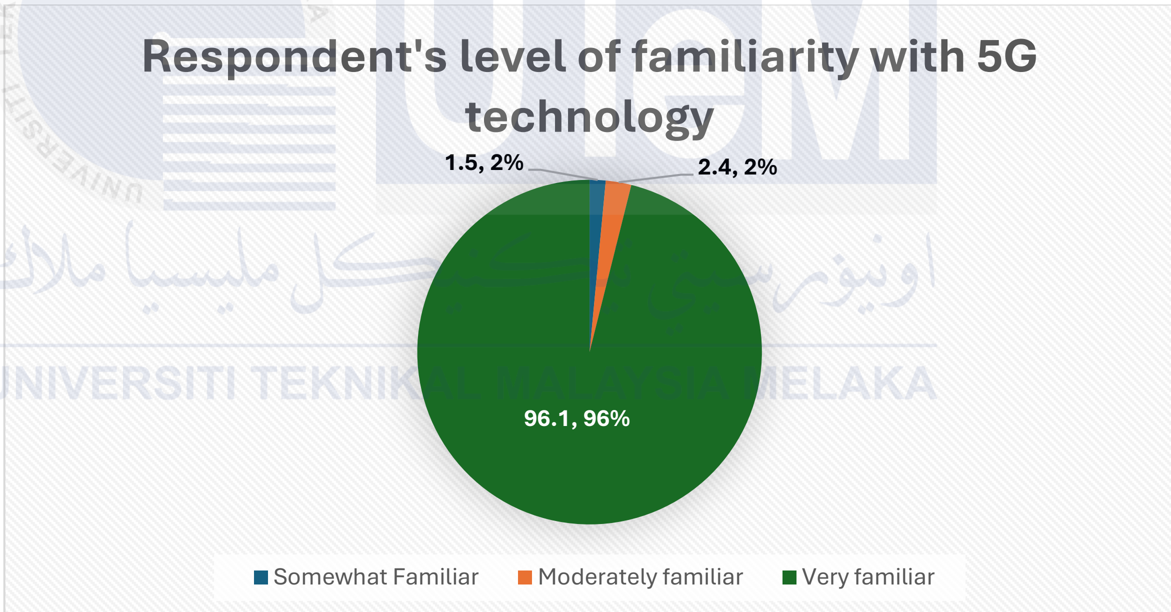


Figure 4.7 Respondent's level of familiarity with 5G technology

(Source: SPSS output)

Based on Table 4.10 and Figure 4.7, the analysis of respondents' familiarity with 5G technology reveals that the vast majority, 323 individuals or 96.1%, are very familiar with it. Meanwhile, 8 respondents (2.4%) are moderately familiar, and 5 respondents (1.5%) are somewhat familiar. This distribution indicates that most respondents have significant exposure to 5G technology, which is crucial for assessing its adoption in academic settings.

4.2.8 Frequency of using mobile data/internet for academic purposes

Table 4. 11 Frequency of using mobile data/internet for academic purposes. (Source: SPSS output)

Frequency of using mobile data/internet for academic purposes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Occasionally	2	.6	.6	.6
	Frequently	9	2.7	2.7	3.3
	Very Frequently	325	96.7	96.7	100.0
	Total	336	100.0	100.0	

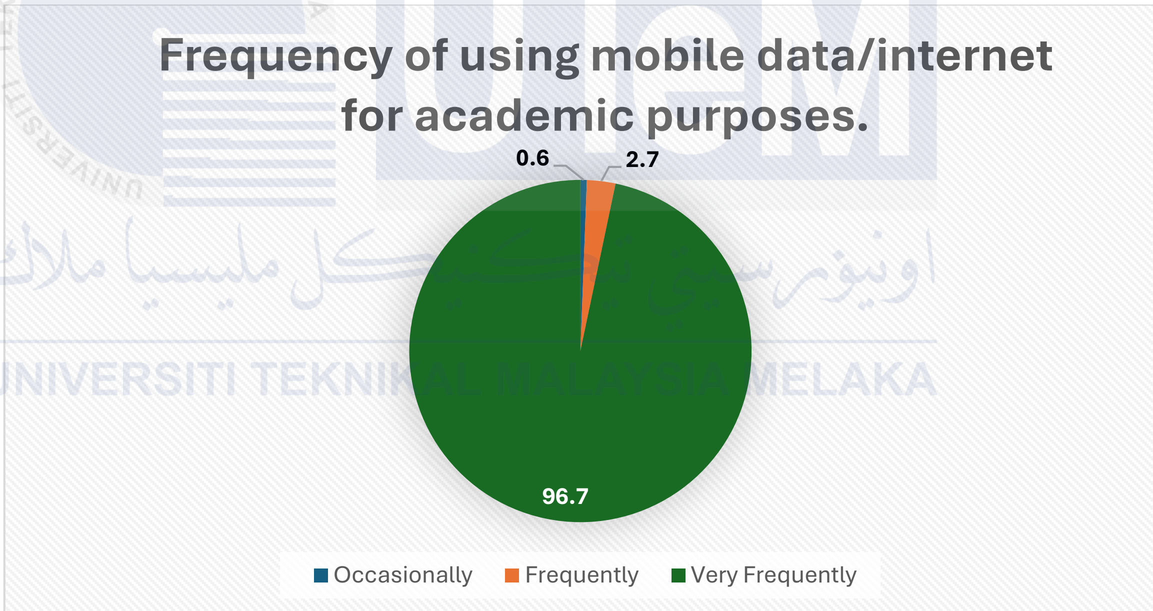


Figure 4.8 Frequency of using mobile data/internet for academic purposes. (Source: SPSS output)

Based on Table 4.11 and Figure 4.8, analysis of respondents' frequency of using mobile data/internet for academic purposes shows that the majority, 325 individuals or 96.7%, use it very frequently. Nine respondents (2.7%) use it frequently, while two respondents (0.6%) use it occasionally. This suggests that mobile data/internet plays a crucial and regular role in supporting academic activities at UTeM.

4.3 Research Question Analysis

Descriptive analysis helps us to study all the means of the questionnaires by running data into this analysis. According to Pisanburt (2007), the value of the mean and score were interpreted as follows:

4.3.1 Independent Variable: Factor 1: Performance Expectancy (PE)

Table 4:12 Factor 1: Performance Expectancy (PE)

(Source: SPSS output)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PE1: I believe that using 5G technology will improve my productivity in academic tasks	336	3	5	4.97	.194
PE2: I expect 5G to enhance my learning experience by providing faster access to educational content	336	3	5	4.95	.233
PE3: I believe that 5G will improve the quality of virtual meetings and online classes.	336	4	5	4.95	.213
PE4: 5G will make it easier to collaborate on academic projects in real-time.	336	3	5	4.95	.233
Valid N (listwise)	336				

Table 4.12 shows the descriptive statistics for the Performance Expectancy (PE) factors indicate a high level of agreement among respondents regarding the potential benefits of 5G technology in academic tasks. The mean scores for all four

statements are consistently close to 5, with PE1 (I believe that using 5G technology will improve my productivity in academic tasks) having the highest mean of 4.97, suggesting a strong perception of 5G's productivity-enhancing potential. The standard deviations are relatively low, ranging from 0.194 to 0.233, indicating that responses were generally consistent across participants. Overall, these results reflect a positive outlook on the impact of 5G on productivity, learning experiences, virtual meetings, and collaboration in academic settings.

3.3.2 Independent Variable: Factor 2: Effort Expectancy (EE)

Table 4.13: Factor 2: Effort Expectancy (EE)
(Source: SPSS output)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
EE1: 5G technology is easy to use in my daily academic activities	336	3	5	4.95	.227
EE2: Using 5G in my studies would not require too much technical knowledge	336	3	5	4.94	.249
EE3: Using 5G for academic purposes seems straightforward and simple to understand	336	4	5	4.94	.242
EE4: I am confident that I would quickly become skillful at using 5G in academic settings	336	4	5	4.94	.237
Valid N (listwise)	336				

Table 4.13 above revealed that descriptive statistics for the Effort Expectancy (EE) factors suggest that respondents generally perceive 5G technology as easy to use and accessible for academic purposes. The mean scores for all four statements are high,

ranging from 4.94 to 4.95, indicating strong agreement that 5G technology would not require much technical knowledge and is straightforward to use. The minimum scores ranged from 3 to 4, while the maximum scores were consistently 5, reflecting a relatively high level of confidence in the ease of using 5G. The standard deviations are all low, ranging from 0.227 to 0.249, which indicates a high level of agreement among participants regarding the ease of 5G adoption for academic activities.

4.3.3 Independent Variable: Factor 3: Social Influence (SI)

Table 4.14: Factor 3: Social Influence (SI)

(Source: SPSS output)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SI1: My academic network would expect me to use 5G to stay connected with them	336	3	5	4.95	.238
SI2: My peers and colleagues are likely to use 5G for academic purposes	336	4	5	4.95	.219
SI3: 5G technology is widely supported by students and staff at my university	336	4	5	4.94	.231
SI4: I am likely to adopt 5G technology if others in my academic environment are using it	336	4	5	4.95	.219
Valid N (listwise)	336				

Table 4.14 shows descriptive statistics for the Social Influence (SI) factors indicate a strong perception that 5G adoption is encouraged within the academic environment. The mean scores for all four statements are consistently high, ranging

from 4.94 to 4.95, suggesting that respondents believe their academic network, peers, and university community support and expect the use of 5G for academic purposes. The standard deviations, ranging from 0.219 to 0.238, indicate minimal variation in responses, reflecting a general consensus among participants. These findings suggest that social influence plays a significant role in shaping the adoption of 5G technology within the institution.

4.3.4 Independent Variable: Factor 4: Facilitating Conditions (FC)

Table 4.15 Factor 4: Facilitating Conditions (FC)

(Source: SPSS output)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FC1: I have the necessary tools (devices, software) to use 5G for academic purposes	336	3	5	4.93	.275
FC2: My university provides sufficient support for using 5G in academic settings	336	2	5	4.93	.310
FC3: I have access to a stable 5G network within the university	336	2	5	4.91	.339
FC4: I have access to resources (e.g., tutorials, IT support) that make transitioning to 5G easy	336	3	5	4.93	.295
Valid N (listwise)	336				

Table 4.15 revealed that descriptive statistics for the Facilitating Conditions (FC) factors indicate a generally positive perception of the availability of resources and support for adoption of 5G in UTeM. The mean scores range from 4.91 to 4.93,

suggesting that respondents largely agree that they have the necessary tools, university support, stable network access, and resources to transition to 5G. However, the slightly lower mean for FC3 (4.91) suggests that access to a stable 5G network may be perceived as slightly less adequate compared to other factors. The standard deviations, ranging from 0.275 to 0.339, indicate some variation in responses, particularly for university support and network stability. Overall, these results suggest that while facilitating conditions are generally favorable, there may be areas for improvement, particularly in ensuring stable 5G of access across the institution.

4.3.5 Dependent variable: Adopt to 5G technology.

Table 4.16: Adopt to 5G technology.

(Source: SPSS output)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
AGOPT1: I am likely to adopt 5G technology for academic or professional purposes	336	4	5	4.97	.162
ADOPT2: I am willing to invest time in learning how to use 5G-enabled tools or applications	336	4	5	4.95	.213
ADOPT3: I believe 5G technology would enhance my academic or work-related productivity	336	4	5	4.98	.153
ADOPT4: I expect 5G to improve the speed and quality of online academic resources	336	4	5	4.96	.193
ADOPT5: I would recommend adopting 5G technology to my peers or colleagues	336	4	5	4.98	.153
Valid N (listwise)	336				

Table 4.16 shows the descriptive statistics for the adoption of 5G technology among students and academic staff indicate a strong willingness to embrace 5G for academic and professional purposes. The mean scores for all five adoption-related statements are exceptionally high, ranging from 4.95 to 4.98, suggesting a strong positive inclination toward adopting 5G technology. ADOPT3 (belief that 5G would enhance productivity) and ADOPT5 (recommendation of 5G to peers) recorded the highest means at 4.98, indicating strong confidence in 5G's benefits. The standard deviations are relatively low, ranging from 0.153 to 0.213, showing minimal variation in responses and a high level of agreement among participants. These findings suggest that students and academic staff at UTeM are highly receptive to adopting 5G technology, recognizing its potential to enhance productivity, improve online resources, and benefit the academic environment.

4.4 Reliability Analysis

The researcher also used Cronbach's Alpha analysis to perform reliability analysis because it was the best tool for measuring the reliability and internal consistency of variables. Moreover, the researcher used SPSS to perform the Cronbach’s Alpha analysis. The reliability test would display Cronbach's Alpha, where a result of 0.7 and above was considered good reliability, while a result below 0.6 is considered poor or unacceptable. Thus, the Cronbach’s alpha value of this research was shown in the table below:

Case Processing Summary

		N	%
Cases	Valid	336	100.0
	Excluded[a]	0	.0
	Total	336	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.946	.949	21

Table 4.17: Reliability Statistics

(Source: SPSS Output)

Table 4.17 above shows the reliability test of the questionnaire among 336 respondents. According to Table, Cronbach’s Alpha value is 0.946, which is greater than 0.7. Therefore, it can be concluded that all items in the questionnaire had very high reliability as Cronbach’s Alpha value was greater than 0.90.

4.5 Pearson Correlation Analysis

Table 4.18: Pearson Correlation Analysis
(Source: PSS output)

Correlations

		PerformanceExpectancy	EffortExpectancy	SocialInfluence	FacilitatingConditions	Adopt
PerformanceExpectancy	Pearson Correlation	1	.774**	.734**	.489**	.462**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	336	336	336	336	336
EffortExpectancy	Pearson Correlation	.774**	1	.786**	.686**	.512**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	336	336	336	336	336
SocialInfluence	Pearson Correlation	.734**	.786**	1	.682**	.620**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	336	336	336	336	336
FacilitatingConditions	Pearson Correlation	.489**	.686**	.682**	1	.505**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	336	336	336	336	336
Adopt	Pearson Correlation	.462**	.512**	.620**	.505**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	336	336	336	336	336

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.18 presents the Pearson Correlation Analysis between the independent variables (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) and the dependent variable, which is the adoption of 5G technology among students and academic staff. The results indicate that all independent variables positively correlate with the dependent variable at a statistically significant level ($p < 0.01$).

Firstly, the correlation analysis reveals that the relationship between Social Influence and 5G adoption is strong, with an r-value of 0.620, $n = 336$, $p < 0.01$. This suggests that the opinions and behaviors of peers, colleagues, and academic networks play a significant role in influencing the adoption of 5G technology.

Next, the correlation between Effort Expectancy and 5G adoption is moderate, with an r-value of 0.512, $n = 336$, $p < 0.01$. This indicates that the ease of use and simplicity of 5G technology impact students' and staff's willingness to adopt it. If individuals perceive that using 5G requires minimal effort, they are more likely to integrate it into their academic activities.

Additionally, the Facilitating Conditions variable has a moderate positive correlation with 5G adoption, with an r-value of 0.505, $n = 336$, $p < 0.01$. This suggests that access to necessary resources, technical support, and infrastructure significantly influences the adoption of 5G technology. When students and staff have the required tools and support, they are more likely to adopt 5G for academic purposes.

Lastly, the correlation between Performance Expectancy and 5G adoption is the weakest among the four factors but still statistically significant, with an r-value of 0.462, $n = 336$, $p < 0.01$. This implies that while individuals recognize the benefits of 5G in improving academic productivity and learning experiences, this perception alone is not the primary determinant of adoption.

In conclusion, all independent variables demonstrate statistically significant positive correlations with 5G adoption. Social Influence ($r = 0.620$) exhibits the strongest relationship, followed by Effort Expectancy ($r = 0.512$) and Facilitating Conditions ($r = 0.505$), while Performance Expectancy ($r = 0.462$) has the weakest correlation. Since all correlation coefficients are significant at the 0.01 level (2-tailed), this confirms that these factors play an essential role in influencing students and academic staff in adopting 5G technology at UTeM.

4.6 Multiple Regression Analysis

A technique for estimating a value based on two or more independent and dependent variables is known as multiple regression analysis. The effect of the independent variables on the dependent variable is analyzed by multiple regression analysis in this study, with four independent variables (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) and one dependent variable (the adoption readiness of 5G technology among students and academic staff.). Therefore, the table below presents the results of the multiple regression analysis.

Table 4.19: Model Summary Multiple Regression Analysis

(Source: SPSS output)

Model	R	R Square	Adjusted R Square
1	.630[a]	.397	.390

a. Predictors: (Constant), FacilitatingConditions,

b. Dependent Variable: Adopt

Table 4.19 shows the model summary results of multiple regression analysis. Table 4.19 shows a R value of 0.630, showing a moderate link between the dependent variable (5G adoption) and the independent factors (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions). Next, the R square value is 0.397, indicating that these four independent factors account for 39.7% of the variation in 5G uptake. This suggests that Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions all contribute to the adoption of 5G technology among UTeM students and academic staff, with the remaining 60.3% of the variation potentially influenced by factors not included in this study.

Table 4.20: ANOVA

(Source: SPSS output)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.849	4	.712	54.510	<.001[b]
	Residual	4.324	331	.013		
	Total	7.173	335			

a. Dependent Variable: Adopt

b. Predictors: (Constant), FacilitatingConditions, PerformanceExpectancy, SocialInfluence, EffortExpectancy

From Table 4.20 above, the result shows that the F-test value from this multiple regression analysis is 54.510, and the significance level is 0.000. The p-value of 0.000 is less than the threshold of 0.05 ($p < 0.05$), indicating that the regression model is statistically significant. This means that Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions have a significant influence on 5G adoption among students and academic staff at UTeM. In other words, these independent variables collectively contribute to predicting the adoption of 5G technology in academic institutions.

Table 4.21: Coefficients of Multiple Regression Analysis

(Source: SPSS output)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2.573	.181		14.235	<.001
	PerformanceExpectancy	.020	.060	.024	.331	.741
	EffortExpectancy	-.007	.062	-.010	-.114	.909
	SocialInfluence	.386	.060	.502	6.399	<.001
	FacilitatingConditions	.086	.034	.158	2.500	.013

a. Dependent Variable: Adopt

Based on Table 4.21, the beta coefficient for Performance Expectancy is 0.024, for Effort Expectancy is -0.010, for Social Influence is 0.502, and for Facilitating Conditions is 0.158. Among these variables, Social Influence has the highest beta value (0.502), indicating that it has the strongest influence on 5G adoption, while Effort Expectancy has the lowest beta value (-0.010), suggesting an insignificant impact. The constant value is 2.573, meaning that when all independent variables are zero, the base level of 5G adoption remains at this value. Therefore, the multiple regression equation is formed as follows:

5G Adoption=2.573+0.020(Performance Expectancy) −0.007(Effort Expectancy)+0.386(Social Influence)+0.086(Facilitating Conditions)+ϵ

Social Influence and Facilitating Conditions have a positive relationship with 5G adoption, whereas Performance Expectancy shows a weak influence, and Effort Expectancy has a negative but insignificant impact. The significance values indicate that Social Influence ($p = 0.000$) and Facilitating Conditions ($p = 0.013$) have a significant effect on 5G adoption, as their p-values are less than 0.05. However, Performance Expectancy ($p = 0.741$) and Effort Expectancy ($p = 0.909$) are not statistically significant in predicting 5G adoption.

4.7 Hypothesis Testing

Hypothesis 1 (H1)

H_0: There is no significant relationship between Performance Expectancy and the adoption of 5G technology in UTeM.
H_1: There is a significant relationship between Performance Expectancy and the adoption of 5G technology in UTeM

<u>Decision Rule: Reject H_0 if p-value < 0.05 and t-value > 1.96.</u>
Result: Based on Table 4.21, the p-value for Performance Expectancy is 0.741, which is higher than 0.05, and the t-value is 0.331, which is lower than 1.96.
Conclusion: **H_0 is not rejected**. There is no significant relationship between Performance Expectancy and 5G adoption.

Hypothesis 2 (H2)

H_0: There is no significant relationship between Effort Expectancy and the adoption of 5G technology in UTeM

H_1: There is a significant relationship between Effort Expectancy and the adoption of 5G technology in UTeM.

Decision Rule: Reject H_0 if p-value < 0.05 and t-value > 1.96.

Result: Based on Table 4.21, the p-value for Effort Expectancy is 0.909, which is higher than 0.05, and the t-value is -0.114, which is lower than 1.96.

Conclusion: **H_0 is not rejected**. There is no significant relationship between Effort Expectancy and 5G adoption.

Hypothesis 3 (H3)

H_0: There is no significant relationship between Social Influence and the adoption of 5G technology in UTeM

H_1: There is a significant relationship between Social Influence and the adoption of 5G technology in UTeM

Decision Rule: Reject H_0 if p-value < 0.05 and t-value > 1.96.

Result: Based on Table 4.21, the p-value for Social Influence is 0.000, which is lower than 0.05, and the t-value is 6.399, which is higher than 1.96.

Conclusion: **H_0 is rejected**, and H_1 is accepted. There is a significant positive relationship between Social Influence and 5G adoption.

Hypothesis 4 (H4)

H_0: There is no significant relationship between Facilitating Conditions and the adoption of 5G technology in UTeM

H_1: There is a significant relationship between Facilitating Conditions and the adoption of 5G technology in UTeM

Decision Rule: Reject H_0 if p-value < 0.05 and t-value > 1.96.

Result: Based on Table 4.X, the p-value for Facilitating Conditions is 0.013, which is lower than 0.05, and the t-value is 2.500, which is higher than 1.96.

Conclusion: **H_0 is rejected**, and H_1 is accepted. There is a significant positive relationship between Facilitating Conditions and 5G adoption.

Table 4.21 Hypotheses Results

Hypothesis	t-value	p-value	Decision
H1: Performance Expectancy → 5G Adoption	0.331	0.741 (>0.05)	Not Accepted
H2: Effort Expectancy → 5G Adoption	-0.114	0.909 (>0.05)	Not Accepted
H3: Social Influence → 5G Adoption	6.399	0.000 (<0.05)	Accepted
H4: Facilitating Conditions → 5G Adoption	2.500	0.013 (<0.05)	Accepted

4.8 Summary

In conclusion, this chapter presented the results of the study, including descriptive statistics reliability analysis, Pearson correlation analysis, and multiple regression analysis, conducted using SPSS version 27. The findings identified the relationship between the dependent variable (5G adoption) and four independent variables (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions). The hypothesis testing revealed that Social Influence and Facilitating Conditions have a significant impact on adoption of 5G, while Performance Expectancy and Effort Expectancy do not. The next chapter will discuss recommendations and the overall conclusion of the research.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Introduction

In chapter 5, the researcher will discuss the results from the collected data and give a conclusion about the overall study. The discussion of research hypotheses and the discussion of research objectives are based on the results generated by SPSS Version 27. Furthermore, this chapter will also list the limitations faced when conducting the research and provide a few recommendations for future research and the overall conclusions of the study.

5.1 Summary of Descriptive Analysis

A total of 336 respondents participated in this study, with a majority being female (59.5%). This aligns with national trends, as in 2022, there were more than 681,000 female students in higher education in Malaysia, surpassing male enrollment Statista. (2022). The predominant age group among participants was 20-29 years old, accounting for 61.3% of respondents. his is consistent with the demographic distribution in Malaysian higher education institutions, where a significant portion of students fall within this age range. Most respondents were students (77.1%), primarily from the Faculty of Information and Communication Technology (FPTT) (43.8%) and pursuing a degree-level education (61.3%). Notably, a significant portion of respondents identified as Malay (53.9%), which is reflective of Malaysia's demographic composition, where Malays and Bumiputera comprise approximately 69.9% of the total population

Table 5.1: Summary of Descriptive Analysis of Demographic Respondents (Source: SPSS output)

Demographic	Demographic Details	Frequency	Percentage (%)
Gender	Female	200	59.5
Race	Malay	181	53.9
Age	20 - 29 years old	206	61.3
Role at the institution	Student	259	77.1
Faculty	FPTT	147	43.8
Level of education	Degree	206	61.3
Level of familiarity with 5G technology	Very familiar	323	96.1
Frequency of using mobile data/internet for academic purposes	Very Frequently	325	96.7

Regarding technological engagement, an overwhelming 96.1% of respondents reported being very familiar with 5G technology. Additionally, 96.7% indicated using mobile data or the internet for academic purposes very frequently. This high level of familiarity and usage underscores the pervasive integration of digital technologies in the academic routines of Malaysian university students, highlighting the critical role of internet connectivity in supporting their educational activities.

5.2 Summary of the Study

The focus of this research was to examine the adoption of 5G technology in academic institutions, specifically in Universiti Teknikal Malaysia Melaka (UTeM), by leveraging the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The study aimed to identify key factors influencing the adoption of 5G technology and assess the level of readiness of students and academic staff toward its adoption.

The independent variables in this study are Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions were selected based on prior research and the UTAUT model to understand their impact on 5G adoption. These variables were used to address the research problem and provide insights into technology acceptance in an academic setting.

The research objectives were as follows:

- **RO1**: To identify the factors influencing the adoption of 5G technology in UTeM using the UTAUT model.
- **RO2**: To evaluate the level of readiness of 5G technology adoption among students and academic staff in UTeM.

To evaluate the relationships between the independent variables and the dependent variable (adoption of 5G technology), hypotheses were developed and analyzed using statistical methods. The findings contribute to understanding the readiness and influencing factors of adoption of 5G, providing valuable insights for academic institutions in implementing advanced technological infrastructure.

5.3 Discussion of Objectives and Hypothesis Testing

5.3.1 Objective 1: To Identify the Factors Influencing the Adoption of 5G Technology in UTeM Using the UTAUT Model

Hypotheses focus on Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions influencing 5G adoption, they are aligned with objective 1. The hypotheses were developed based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003).

Hypothesis 1: There is a relationship between Performance Expectancy and 5G Adoption in UTeM

Based on the results, Performance Expectancy was found to have no significant relationship with 5G adoption, with a p-value of 0.741 (>0.05). This suggests that the perceived benefits of 5G, such as faster data speeds or enhanced performance, do not significantly influence UTeM students and academic staff in adopting the technology. This contradicts prior research, where Venkatesh et al. (2003) found that Performance Expectancy was a key factor in the adoption of technology. Similarly, Mensah et al. (2020) suggested that Performance Expectancy significantly impacts attitudes toward adoption of e-government services. However, in this study, the insignificance of Performance Expectancy could be due to the existing 4G infrastructure already meeting users' needs, making the improvements from 5G seem less critical.

In conclusion, **H1 is rejected**. This study finds that Performance Expectancy does not have a significant influence on the adoption of 5G technology in UTeM.

Hypothesis 2: There is a relationship between Effort Expectancy and 5G Adoption in UTeM

Effort Expectancy also showed no significant effect on 5G adoption, with a p-value of 0.909 (>0.05). This indicates that the perceived ease of use of 5G technology does not play a critical role in determining its adoption among UTeM students and academic staff. This finding contrasts with earlier studies, such as Venkatesh et al. (2003) and Barry et al. (2024), which found that Effort Expectancy positively influenced the adoption of mobile and wireless technologies. However, recent research by Al-Maroof et al. (2021) suggests that Effort Expectancy may not significantly impact the adoption of new technologies in certain contexts. One possible reason for this inconsistency is that students and academic staff may already be familiar with mobile internet technologies, making ease of use less of a concern. Additionally, the transition from 4G to 5G may not require significant adjustments, reducing the influence of Effort Expectancy.

In conclusion, **H2 is rejected**. This study finds that Effort Expectancy does not have a significant influence on the adoption of 5G technology in UTeM.

Hypothesis 3: There is a relationship between Social Influence and 5G Adoption in UTeM

The hypothesis testing confirms that Social Influence has a significant effect on 5G adoption, with a p-value of 0.000 (<0.05). This suggests that the opinions of peers, lecturers, and institutional policies play an essential role in encouraging adoption. This result is consistent with the findings of Venkatesh et al. (2003), who emphasized the role of Social Influence in technology adoption, particularly in environments where users rely on peer recommendations. Additionally, Graf-Vlachy et al. (2017) reviewed how social influence has been conceptualized in technology adoption research, highlighting its significant impact on individuals' decisions to embrace new technologies. This suggests that promoting awareness campaigns and peer-driven discussions could further enhance 5G adoption among UTeM students and academic staff.

In conclusion, **H3 is accepted**. This study finds that Social Influence has a significant impact on the adoption of 5G technology in UTeM.

Hypothesis 4: There is a relationship between Facilitating Conditions and 5G Adoption in UTeM

Facilitating Conditions was found to have a significant effect on 5G adoption, with a p-value of 0.013 (<0.05), confirming the acceptance of H4. This finding aligns with Venkatesh et al. (2003), who highlighted that access to resources, infrastructure, and technical support plays a crucial role in influencing technology adoption. In the context of UTeM, Facilitating Conditions may include the availability of 5G infrastructure, compatible devices, and institutional support. When these resources are easily accessible, it becomes more convenient for students and academic staff to transition to 5G technology, leading to greater adoption rates. Similarly, a study by Al-Maroof et al. (2021) found that facilitating conditions significantly influenced students' adoption of Google Classroom during the COVID-19 pandemic, emphasizing the importance of accessible resources and support in technology adoption within educational settings.

In conclusion, **H4 is accepted**. This study finds that Facilitating Conditions have a significant impact on the adoption of 5G technology in UTeM.

In conclusion, the results of this study indicate that social influence and facilitating conditions significantly impact the adoption of 5G technology among UTeM students and academic staff. On the other hand, performance expectancy and effort expectancy were found to be insignificant in influencing 5G adoption. This suggests that while UTeM users may not yet fully appreciate the anticipated benefits or ease of use of 5G, social factors and the availability of infrastructure play a more decisive role in adoption of driving. These findings highlight the importance of creating a supportive environment and promoting 5G through peer influence and resource availability to enhance adoption rates within the university.

5.3.2 Objective 2: To evaluate the level of readiness of 5G technology adoption among students and academic staff in UTeM.

To achieve this objective 2, the research applied the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which consists of key factors influencing technology adoption, namely Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. These independent variables were used to analyze the extent to which they contribute to the adoption of 5G technology in an academic setting. Understanding adoption readiness is crucial as universities increasingly integrate advanced digital infrastructures to enhance teaching, learning, and research activities (Venkatesh et al., 2003).

Following the evaluation of Research Objective 1, which identified the key factors influencing 5G adoption, Analysis of Variance (ANOVA) from Table 4.20 was conducted using SPSS to assess Objective 2. ANOVA is a widely used statistical method for examining significant differences between groups and determining the impact of multiple independent variables on a dependent variable (Field, 2018). In this study, the ANOVA results revealed a significant relationship ($p < 0.05$) between the independent variables (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) and the dependent variable (5G adoption readiness). The

F-value of 54.510 indicates that these factors contribute to the level of readiness among UTeM students and academic staff.

The findings suggest that individuals who perceive higher performance benefits, lower effort requirements, and greater social influence and support are more likely to be ready for adoption. Facilitating Conditions, such as institutional infrastructure and technical support, also play a vital role in determining readiness. These results align with previous studies on technology acceptance, which emphasize that both perceived usefulness and external influences significantly impact technology adoption in educational settings (Davis, 1989; Venkatesh et al., 2012). As higher education institutions transition toward digital transformation, ensuring strong technological infrastructure and awareness among students and faculty becomes essential.

In conclusion, the statistical analysis confirms that key UTAUT factors significantly influence the readiness of 5G adoption in UTeM. The study highlights the importance of addressing barriers and enhancing supportive conditions to improve technology adoption in academic environments.

5.4 Implication of Study

This research examined the factors influencing the adoption of 5G technology in academic institutions, specifically at UTeM. The data was collected from students and academic staff who are familiar with or use 5G technology. By identifying these factors, the study helps universities understand the key elements that affect 5G adoption and how they can improve technological infrastructure to support learning and teaching.

Moreover, the findings provide useful insights for institutions to enhance digital education by addressing challenges such as accessibility, cost, and infrastructure readiness. Understanding these factors can help universities and policymakers create better strategies to encourage the use of 5G technology in academic settings. Therefore, the results of this study are valuable in promoting the effective adoption of 5G, ensuring that students and academic staff can fully benefit from its advantages.

5.4.1 Managerial Implication

The findings of this study offer several managerial implications for enhancing 5G adoption among UTeM students and academic staff. Understanding the factors that influence technology acceptance can guide university administrators and policymakers in implementing effective strategies to promote 5G utilization within the academic community. Given the significant role of Social Influence and Facilitating Conditions in 5G adoption, universities should leverage peer-driven initiatives and institutional support to enhance technology acceptance. This can be achieved through awareness campaigns, integrating 5G-related applications into academic and administrative functions, and encouraging early adopters to share their experiences. Additionally, collaboration between universities and telecommunication providers can help ensure that students and academic staff have access to reliable, high-speed 5G connectivity.

Policy Support and Infrastructure Investment

To facilitate 5G adoption, it is crucial for university management to invest in the necessary infrastructure and provide robust policy support. This includes upgrading campus networks to support 5G connectivity and ensuring that students and staff have access to compatible devices. For instance, Telefónica's recent announcement to invest $500 million in Venezuela over the next two years aims to expand 4G coverage and deploy 5G networks, highlighting the importance of substantial investment in telecommunications infrastructure. Similarly, Nokia's multi-year expansion deal with AT&T to upgrade voice carriage and 5G network automation underscores the significance of collaborative efforts between institutions and technology providers to enhance network capabilities. By prioritizing infrastructure development and establishing supportive policies, UTeM can create an environment conducive to seamless 5G integration, thereby encouraging its adoption among the university community.

Regulation and Public Awareness

Effective regulation and heightened public awareness are pivotal in adoption of driving 5G. University administrators should collaborate with governmental bodies to establish clear guidelines that facilitate the deployment of 5G technology while addressing potential concerns related to data privacy and security. A study by the RAND Corporation emphasizes that public perception can significantly influence the adoption of new technologies, suggesting that understanding and addressing public concerns is essential for successful implementation. Additionally, promoting awareness campaigns that educate students and staff about the benefits and safety of 5G can mitigate apprehensions and foster a positive attitude toward its use. Highlighting real-world applications and success stories can further illustrate the transformative potential of 5G, thereby encouraging its adoption within the academic setting.

5.4.2 Theoretical Implication

This research contributes to the theoretical understanding of 5G technology adoption within academic institutions by applying the UTAUT model. The study highlights key factors such as Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions influence the adoption process among UTeM students and academic staff. While factors like Performance Expectancy and Effort Expectancy did not show a significant relationship with 5G adoption, Social Influence and Facilitating Conditions emerged as crucial determinants, emphasizing the role of social contexts and available infrastructure in encouraging technology adoption. These findings extend the UTAUT model by demonstrating that the adoption of 5G technology in academic settings can be influenced more by external factors, such as peer influence and support systems, than by the perceived ease of use or performance improvements.

Furthermore, this study adds valuable insights into the readiness for 5G adoption in higher education institutions. It underscores the importance of facilitating conditions such as the availability of 5G infrastructure and access to compatible devices highlighting the need for institutions to provide the necessary resources for successful adoption. These theoretical implications suggest that in order to increase 5G adoption, academic institutions like UTeM should focus on building strong support systems and promoting awareness through social influence, while ensuring that the necessary technological infrastructure is in place. This enriches the body of knowledge on technology adoption and offers practical guidance for universities looking to integrate 5G into their educational and administrative functions.

5.5 Limitation of the Study

The researcher faced some challenges while conducting this study. One of the main limitations was that the questionnaire was only distributed through Google Forms. Not all students and academic staff may always have access to the internet or be familiar with using online survey forms. This could result in biased responses, as those with limited internet access or less experience with technology might not participate.

Another challenge was the limited time available to complete the research, including data collection, analysis, and discussion of findings. Due to time constraints, the researcher could only use an online survey to gather responses. Even though it was difficult to reach many respondents using only Google Forms, the researcher was still able to collect useful data for this study.

5.6 Recommendation for Future Research

Although the research findings were useful, there are some limitations that future studies can address. To improve the study, several recommendations are suggested. Future researchers are encouraged to conduct qualitative research on 5G technology adoption to gain a deeper understanding of students' and academic staff's experiences, perceptions, and challenges. Using interviews with open-ended questions can provide more detailed insights into their motivations and difficulties in using 5G technology.

Additionally, future researchers should consider using both online and face-to-face questionnaire distribution to collect data. Meeting respondents in person or conducting interviews can ensure more accurate responses and a better understanding of their opinions. This method can also help reach those who may not have easy access to online surveys.

Lastly, future studies should explore 5G adoption in a wider range of institutions beyond UTeM. Expanding research into other universities or academic settings can provide a broader perspective on the challenges and factors influencing 5G adoption. This would help in developing better strategies to support the use of 5G technology in education.

5.8 Conclusion

In conclusion, this research focused on understanding the acceptance of 5G technology and its impact on business growth in UTeM. The objectives of the study were clearly explained in this chapter. Additionally, the chapter discussed the implications of the study, including its managerial implications, to highlight the research's contribution to future studies and its practical use. The limitations of the study and recommendations for future research were also provided to guide further work in this area. Finally, the researcher believes that the findings of this study will be useful for various parties in understanding the readiness of the adoption of 5G technology and its influence on business growth in UTeM.

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APPENDIX A

GANTT CHART PSM 1 (BPTU 4072)

WEEK/ ACTIVITIES	PSM 1 Weeks (Target within 15 weeks)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing PSM 1															
Topic Selection															
Write up Chapter 1: Introduction															
Completion of Chapter 1: Introduction															
Write up Chapter 2: Literature Review								SEMESTER BREAK							
Write up Chapter 2: Literature Review															
Write up Chapter 3: Research Method															
Completion of chapter3: Research Method															
Final Draft submission															
Report amendment															
Slide preparation															
Presentation Video PSM 1 preparation															
Presentation Video PSM 1 preparation															

Appendix B

GANTT CHART PSM 1 (BPTU 4072)

Time / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Brainstorming for data analysis														
Briefing for FYP 2														
Discussion of questionnaire														
Questionnaire development														
Correction and additional														
Submission of questionnaire														
Data collection (Pilot Test)														
Discussion of sample size														
Submission of Pilot Test														
Data collection														
Run data using SPSS														
Do analysis														
Do findings														
Recheck data analysis														
Chapter 5														
Full report														
Preparing slide for Viva presentation														
Compiling proposal														
FYP 2 Presentation														
Correcting report based on Panel’s comments														
Submission of FYP 2														

Appendix C

Questionnaire

BACHELOR OF TECHNOLOGY MANAGEMENT (HIGH TECHNOLOGY MARKETING) WITH HONOURS

Research by Project Survey Questionnaire:

5G TECHNOLOGY ADOPTION IN UTeM: LEVERAGING THE UTAUT MODEL FOR ANALYSIS.

Dear Valued Respondents

I am an undergraduate student from the Faculty of Technology Management and Techno-Entrepreneurship at Universiti Teknikal Malaysia Melaka (UTeM), pursiung Bachelor of Technology Management (High Technology Marketing) with Honours. I am conducting a survey on "5G Technology Adoption in UTeM: Leveraging the UTAUT Model for Analysis". Unified Theory of Acceptance and Use of Technology (UTAUT) is a model used to analyze why and how people decide to use new technologies. The purpose of this research is to understand the key factors that influence the adoption and use of technology and to evaluate how these factors affect student and academic staff in adapting to new technology like 5G.

This survey is divided into three sections and will only require a few minutes of your time:

Section A: General information.
Section B: The factors from the UTAUT model that influence 5G adoption.

Section C: The readiness to adoption of 5G technology by students and academic staff.

All information collected will remain confidential and be used solely for academic purposes. Your participation is invaluable, and I sincerely appreciate your time and input. Thank you for your contribution!
If you have any questions or need more information about this study, please do not hesitate to contact me:

Section A: General Information

This section provides basic background information.

1) Gender
    - Male
    - Female
2) Race
    - Malay
    - Chinese
    - Indian
    - Other:
3) Age
    - Under 20 years old
    - 20 - 29 years old
    - 30 - 39 years old
    - 40 - 49 years old
    - 50 years and above
4) Role at the institution
    - Student
    - Academic Staff
5) Faculty
    - Faculty of Electronic and Computer Technology and Engineering (FTKEK)
    - Faculty of Electrical Technology and Engineering (FTKE)
    - Faculty of Mechanical Technology and Engineering (FTKM)

- o Faculty of Industrial and Manufacturing Technology and Engineering (FTKIP)
- o Faculty of Information and Communications Technology (FTMK)
- o Faculty of Technology Management and Technopreneurship (FPTT)

6) Level of Education
- o Diploma
- o Degree
- o Master
- o PhD

7) Level of familiarity with 5G technology
- o Not familiar at all
- o Somewhat familiar
- o Moderately familiar
- o Very familiar

8) How often do you use mobile data or internet services for academic purposes?
- o Never
- o Rarely
- o Occasionally
- o Frequently
- o Very Frequently

Section B: The factors from the UTAUT model that influence 5G adoption.

In this section, respondents are asked to indicate their level of agreement or disagreement with each statement by selecting ONE response for each question.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

5G technology is the fifth generation of wireless network that enables quicker internet speeds, strong connections, and smoother online experiences on devices

FACTOR 1: Performance Expectancy (PE)

- The expected benefits of using 5G for productivity.

	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
I believe that using 5G technology will improve my productivity in academic tasks					
I expect 5G to enhance my learning experience by providing faster access to educational content					
I believe that 5G will improve the quality of virtual meetings and online classes.					
5G will make it easier to collaborate on academic projects in real-time.					

FACTOR 2: Effort Expectancy (EE)

- The ease of learning and using 5G

	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
I believe that 5G technology will be easy to use in my daily academic activities.					
Using 5G in my studies would not require too much technical knowledge.					
Using 5G for academic purposes seems straightforward and simple to understand.					
I am confident that I would quickly become skillful at using 5G technology in academic settings					

FACTOR 3: Social Influence (SI)

- The encouragement from others to use 5G.

	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
My academic network would expect me to use 5G to stay connected with them.					
My peers and colleagues would likely use 5G for academic purposes.					
5G technology is widely supported by students and staff at my university.					
I am likely to adopt 5G technology if others in my academic environment are using it					

FACTOR 4: Facilitating Conditions (FC)

- The support and resources available for using 5G

	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
I have the necessary tools (devices, software) to use 5G technology for academic purposes.					
The university provides sufficient support for using 5G in academic settings.					
I have access to a stable 5G network within the university.					
I have access to resources (e.g., tutorials, IT support) that make it easy to transition to 5G.					

Section C: The adoption to adopt 5G technology by students and academic staff.

In this section, respondents will indicate their likelihood and readiness to adopt 5G technology

	(1) Strongly Disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly Agree
I am likely to adopt 5G technology for academic or professional purposes					
I am willing to invest time in learning how to use 5G-enabled tools or applications					
I believe 5G technology would enhance my academic or work-related productivity.					
I expect 5G to improve the speed and quality of online academic resources.					
I would recommend adopting 5G technology to my peers or colleagues.					