AUGMENTED REALITY ADOPTION THROUGH METAVERSE AMONG GAMERS IN UTeM

NUR FATINI BINTI ZAMZARI

Faculty of Technology Management and Technopreneurship

Universiti Teknikal Malaysia Melaka

APPROVAL

I hereby acknowledge that this project paper has been accepted as part of fulfilment for the degree of Bachelor of Technology Management (Technology Innovation) with Honours

SIGNATURE :

NAME OF SUPERVISOR : DR. NUSAIBAH BINTI MANSOR

DATE : 3/2/2023

SIGNATURE :

NAME OF PANEL : DR. MURZIDAH BINTI AHMAD MURAD

DATE : 3/2/2023

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DECLARATION

I hereby declare that all the work of this thesis entitled “AUGMENTED REALITY ADOPTION THROUGH METAVERSE AMONG GAMERS IN UTeM” is original done by myself and no portion of the work encompassed in this research project proposal 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 : NUR FATINI BINTI ZAMZARI

DATE : 20 June 2022

DEDICATION

This research is lovingly dedicated to Almighty God for the Supremacy and Alhamdulillah for Everything in life were full with blessings. Especially to my parents, my siblings, my family, my housemate, my fellow friends and my supervisor Dr. Nusaibah Binti Mansor who have been my constant source of inspiration. They have given me their complete assistance and counsel during my research. Without their support and encouragement, it will be impossible to complete this research in a reasonable amount of time.

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I want to thank me for believing in me, I want to thank me for doing all this hard work. I want thank me for never quitting. I want to thank me for always being a giver and trying to give more than I receive. I want to thank me for trying to do more right than wrong. I want to thank me for being me at all times.

ABSTRACT

Adoption among gamers using metaverse is still in a new phase for gamers in Malaysia especially in university such as Malaysia. The perception and information of the real world are enhanced through augmented reality. The purpose of this research is to study augmented reality adoption through metaverse. Gamers live a more linked and worldwide culture, with unprecedented access to information, people, and ideas. As a result, new ways to access media via the Internet and other technological forms of communication have evolved. Allowing players to immerse themselves in imaginary worlds and influence events within those realms is one ways AR games can provide meaningful experiences for gamers. Several studies have looked into the use of collaboration technologies like voice mail, email group assistance systems, and other services. AR uses visual components and characters to transform the real world into a virtual reality. Users can transfer value in the 3D immersive environment of Metaverse using cryptocurrencies, which are real-world currencies. The utilisation of a metaverse technology to change the way we work through teleconferencing and hybrid meetings was one of Meta's primary pitches with its rebranding. The Metaverse is a web of social, networked immersive environments on persistent multiuser platforms that are interconnected. It began as a web of virtual worlds with the ability for avatars to teleport between them.

Keyword: augmented reality, adoption, metaverse, gamers

ABSTRAK

Penerimaan dalam kalangan pemain menggunakan metaverse masih dalam fasa baharu untuk pemain di Malaysia. Persepsi dan maklumat tentang dunia sebenar dipertingkatkan melalui realiti tambahan. Tujuan penyelidikan ini adalah untuk mengkaji penggunaan realiti tambahan melalui metaverse. Pemain menjalani budaya yang lebih berkaitan dan mendunia, dengan akses kepada maklumat, orang dan idea yang belum pernah terjadi sebelumnya. Akibatnya, cara baharu untuk mengakses media melalui Internet dan bentuk komunikasi teknologi lain telah berkembang. Membenarkan pemain melibatkan diri dalam dunia khayalan dan mempengaruhi acara dalam alam tersebut ialah salah satu cara permainan AR boleh memberikan pengalaman yang bermakna untuk pemain. Beberapa kajian telah mengkaji penggunaan teknologi kerjasama seperti mel suara, sistem bantuan kumpulan e-mel dan perkhidmatan lain. AR menggunakan komponen visual dan watak untuk mengubah dunia sebenar menjadi realiti maya. Pengguna boleh memindahkan nilai dalam persekitaran imersif 3D Metaverse menggunakan mata wang kripto, yang merupakan mata wang dunia sebenar. Penggunaan teknologi metaverse untuk mengubah cara kami bekerja melalui telesidang dan mesyuarat hibrid merupakan salah satu nada utama Meta dengan penjenamaan semulanya. Metaverse ialah web persekitaran sosial yang mengasyikkan rangkaian pada platform berbilang pengguna berterusan yang saling berkaitan. Ia bermula sebagai web dunia maya dengan keupayaan untuk avatar untuk teleport antara mereka.

Kata kunci: realiti tambahan, penerimaan, metaverse, pemain alam maya

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ABBREVIATION	MEANING
AR	Augmented Reality
UTeM	Universiti Teknikal Malaysia Melaka
MLR	Multiple Linear Regression

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The twenty-first century's digital revolution was marked by rapid advances in information and communication technologies. Gamers live a more linked and worldwide culture, with unprecedented access to information, people, and ideas. As a result, new ways to access media via the Internet and other technological forms of communication have evolved. Allowing players to immerse themselves in imaginary worlds and influence events within those realms is one ways AR games can provide meaningful experiences for gamers (Oliver et al., 2016).

Technologies that allow for electronic collaboration have become a significant part of daily life. Several studies have looked into the use of collaboration technologies like voice mail, email group assistance systems, and other services. Although collaborative technologies are not growing as quickly or as widely as planned, it appears that a new approach is required (Abu, Jabar and Yunus, 2015). Adoption among gamers using metaverse is still in a new phase for gamers in Malaysia. The perception and information of the real world are enhanced through augmented reality.

This knowledge is typically visual, but it can also be audible and haptic. Most AR apps allow users to see virtual images/models, for example, through smart glasses, headsets, video projectors, and mobile devices such as phones and tablets (Arnaldi et.al, 2018). Augmented reality plays an important role in learning player acceptance. The purpose of this research is to study augmented reality adoption through metaverse among games in UTeM. This chapter focuses on the background of study, problem statement, objectives and hypotheses of this research, conceptual framework, significance of study, limitations of study and definition of terms.

1.2 Background

AR uses visual components and characters to transform the real world into a virtual reality. It works with cell phone and other digital devices to provide users with immersive experiences while on the go (Leeway, 2022). Digital evidence of ownership, value transfer, digital collectability, and interoperability are all advantages. Users can transfer value in the 3D immersive environment of Metaverse using cryptocurrencies, which are real-world currencies. The major technologies driving Metaverse development are augmented reality (AR) and virtual reality (VR), which offer an immersive and thrilling 3D experience. The utilisation of 'metaverse' technology to change the way we work through teleconferencing and hybrid meetings was one of Meta's primary pitches with its rebranding.

Augmented reality (AR) is a technologically augmented version of the real world that is created by the use of digital visual elements, music, or other sensory stimulation. It's an increasing trend among businesses that deal with mobile computing and commercial apps. Augmented reality is evolving and becoming increasingly widely used in a variety of application. Metaverse is a persistent and immersive simulated world experienced in the first person by large groups of simultaneous users who share a strong sense of mutual presence. It can be entirely virtual (a virtual Metaverse) or be a rich virtual layer added to the real world (an augmented Metaverse).

The Metaverse is a web of social, networked immersive environments on persistent multiuser platforms that are interconnected. It allows for real-time embodied user communication and dynamic interactions with digital artefacts. It began as a web of virtual worlds with the ability for avatars to teleport between them (Modderman,2022). It's essentially an online virtual world where you can work, socialise, shop, and play because, you know, when Facebook, obviously one of the largest social media companies and companies in the United States, rebranded to metaverse, it caused a huge huge commotion if you look at the google search trends for the word metaverse (Sieber, 2022). The underlying AR and VR technologies provide a variety of issues for the Metaverse. Both technologies are persuasive and have the ability to affect users' thoughts, feelings, and behaviours (Slater et.al, 2020).

From text-based interactive games, virtual open worlds, Massively Multiplayer Online Game (MMOG), immersive virtual environments on smart phones and

wearables, to the current state of the metaverse, there have been four transitions. The appearance of new technologies, such as the birth of the Internet, 3D graphics, internet usage at scale, and hyper ledger, drives each transition (Haihan Duan et al, 2021). Social interactions take place in metaverse game worlds. For some, that means a story-driven adventure game like World of Warcraft from Activision Blizzard or the battle royale sensation Fortnite.

Others prefer world-building games such as Minecraft. The concept of social gaming is not new, although it predates the metaverse (Sherr, 2022). By superimposing digital data directly on real-world items or surroundings, AR allows individuals to process both physical and digital data at the same time, removing the need for mental bridges. The successful integration of new technology into the firm is known as technology adoption. Adoption entails more than simply putting technology to use (Altadonna, 2022). A Metaverse immersive simulated world that huge groups of people can encounter in the first person and share a strong sense of mutual presence (Modderman,2022).

1.3 Problem Statement

When an individual, corporation, or other agency uses new technology for the first time, this is known as technology adoption. Technology might refer to a new product, service, or managerial innovation in this context. The adoption of Augmented reality through modifies photos captured by a camera, most commonly a cell phone camera, to incorporate a digital shape into the "real-world" image. The "try with AR" tool, for example, allows customers to sample how particular things might look and fit in a specific area by using a smartphone camera and projecting a virtual representation of the product over the taken image in real-time. Following the adoption of augmented reality technology that led to one world in the metaverse and used by gamers. The metaverse is a hybrid of virtual reality, augmented reality, and video technology.

Nowadays, gamers are still in the process of recognising and understanding the function and application of Metaverse in games. Some people would go further and insist that a Metaverse must also be a general purposed world, and not application-

specific and that it includes rules of conduct and an economy. Whether add those limitations or not, the virtual Metaverse will be increasingly popular for gaming, entertainment, and socialising but will be limited to short-duration uses for most of the public. On the other hand, the augmented Metaverse will transform society, replacing phones and desktops as the central platform of our lives.

For a software programme, standards are akin to a universal language. It's one of the techniques to ensure its compatibility and contribution to the technology's general progress. This is the object that is currently being built for Augmented Reality. The application and acceptance of gamers on AR in the metaverse in UTeM is a question that needs to be resolved. The reason is simple: it is far too early. The reason is simple: it's too early. This technology is still in its infancy in Malaysia both in terms of hardware and software (although "technically" it already exists). This technology is what everyone especially gamers can adapt to it and accept in a good way. Due to the widespread general use of smartphones and tablets, as well as the growing availability of serious games, adults and even children can now learn a wide range of complex concepts in an interesting and easy way (Chao, 2019).

As the metaverse grows, in-game advertising will become more prevalent, with brands establishing branded presences in games like Fortnite and Roblox, which both feature metaverse components. Many companies are collaborating with game developers to create worlds in which their products can be seen. For example, Balenciaga created Afterworld: The Age of Tomorrow, a game in which players explore a futuristic world populated by characters dressed in Balenciaga clothing (Natashah, 2020).

1.4 Research Question

1. What are the factors affecting AR adoption among gamers?
2. What is the advantage of using AR through metaverse by gaming?
3. Can the usage of AR technologies in Metaverse give convenience to gamers

1.5 Research Objectives

1. To identify factor affecting AR adoption among gamers.
2. To analyse AR adoption relationship through metaverse among gamers in the gaming sector.
3. To determine the most significant adoption factor of AR through metaverse.

1.6 Scope and Limitation of Study

The scope of a study describes the depth to which the research area will be investigated and the parameters within the adoption of augmented reality in the gaming industry through a metaverse. This research involves the game industry and Malaysia has a major outsourcing player, with local game studios building a global reputation for developing original IP games and providing outsourced development for the biggest international publishers. The metaverse technology adoption qualities of augmented reality allow us to quickly incorporate virtual elements in the display modes that we have in real-time via smartphones and digital tablets. The E-sports Club, a small group with experience in playing games on a wide scale, was the subject of research at UTeM, the first technical university in Malaysia.

The question that was related to identifying the adoption of augmented reality among gamers in Malaysia was included in the scope of the research project. The researcher chose Malaysia as a study location because she wants to understand more about how Malaysian gamers are adopting augmented reality through a metaverse. The respondents in this survey will come from the target group, which comprises all Malaysian gamers because they are the ones who are most likely to be in this situation in relation to the study. The expected respondents ranged in age from 20 to 50 years old.

1.7 Summary

Consequently, the purpose of this study was to investigate the factors that influence gamers' adoption of augmented reality via metaverse in UTeM. This chapter covers the introduction, the study's background, the issue statement, the research

questions, the research objectives, and the scope. It was divided into three sections. Each chapter of this study has five sections: an introduction, a literature review, a methodology, a set of results and comments, and a conclusion and recommendations section. Previous researchers' results and data have highlighted the importance of this topic for future investigation. We'll go through everything in greater depth in the upcoming chapter

CHAPTER 2

LITERATURE REVIEW

2.1 Chapter Overview

In this chapter, the researcher will lay out all of the material needed for the reader to understand the study. Begin by commenting on the meaning of the title. Following that, a description of each framework provided by the researcher at the beginning of the study was provided. The whole framework for this research will be revealed at the end of this chapter.

2.2 Introduction

The concept of gamification has been notably used in corporate and became more useful to technology especially in this research. Simply described, the metaverse is a virtual interactive self-sufficient ecosystem of mobile networks, augmented reality, social media, gaming, virtual reality, e-commerce, cryptocurrency, and work environments that integrates immersive presence. This universe is being envisioned as the internet's future, with AR, VR, and physical worlds colliding in a single digital area. The gaming industry will be among the first to adopt augmented reality via metaverse, but it will also be the future for other industries such as education and training, tourism, and e-commerce. The core concept of augmented reality via metaverse upsets the current technological order by introducing new goods and services, as well as by establishing new organisational structures and exploiting new markets in a technological adoption revolution. It is then followed by a discussion of a theory used in this research. This chapter ended with summary of the chapter.

2.3 Literature Review

2.3.1 Augmented Reality

Augmented Reality (AR) is a technology that overlays a computer-generated image over a user's view of the actual world, creating a composite view. It's a real-time blend of game images and audio information that takes into account the user's surroundings. In particular, augmented reality is a powerful technique for describing models that require visualisation (Singhal et al., 2012). Beyond virtual worlds, augmented reality (AR) provides alternate experiences to human users in their physical surroundings, with the goal of improving our physical well-being. In theory, computer-generated virtual material can be used for a variety of purposes. Delivered through a variety of perceptual information pathways, audio, sights, olfaction, and haptics. The initial generation the aesthetic aspects of AR system frameworks are the only ones that are taken into account. Innovations aimed at organising and displaying digital data overlays are visual representations of our physical surroundings that are superimposed on top of them. There are various types of AR systems, including helmets (as seen in Marvel's Iron Man), smart glasses with a head-up display (such as Google Glass), projection, and specialised systems. Wearable (helmets, contact lenses) and non-wearable (smartphones, PCs) AR systems are also classified (Peddie, 2017). A software application that uses one or more separate hardware components must be installed on the equipment in order to augment the real world with augmentations. Marker-based (QR codes, barcodes) and marker-less (no markers) are the two primary types of AR software implementation (Kamphuis et. al, 2014).

2.3.2 Gamers

According to Cambridge Dictionary, a gamer is someone who enjoys playing computer games. Players are an important part of video games. They are the key players in the video game industry, pressuring developers and businesspeople to enhance the quality of their work. When people enjoy a video game, it can last for decades and sell millions of copies. The term "online game" refers to a game in which the user installs the game programme and connects to the game server firm via the internet. All of the game's characters are stored on the gaming company's servers. The

players control the roles designed to enter the virtual environment in the online game (Wu & Tsai, 2013).

The following are some examples of internet games (Spohn, 2015):

1. A first-person shooter (FPS) is a game in which the player sees the game from the perspective of the player. The game is set up such that you may fight using military weaponry.

2. Real-Time Strategy (RTS) is a game in which the players' strategic abilities are emphasised. The majority of players have a lot of personality.

3. Cross-Platform Online (CPO) is an online game that may be played on a variety of devices. You can play online if your game hardware/console is connected to the internet.

4. Browser games are those that are played using a web browser such as Firefox. Opera and Internet Explorer are two of the most used browsers. Javascript, PHP, and Flash are usually supported by browsers.

5. Online games with a large number of players A massively multiplayer online role-playing game (MMORPG) is a game that simulates real-world interaction. Player interaction in a large-scale environment (>100 participants).

2.3.3 Metaverse

Metaverse is a hypothetical synthetic environment related to the physical world, defined by the prefix "meta" (implying transcending) and the word "universe." The term "metaverse" was originally used in Neal Stephenson's speculative fiction novel Snow Crash, published in 1992 (Judy Joshua,2017). People do not need to move in the actual world to use the metaverse system, and it maintains a constant link with the virtual world with no time limit. Similarly, the avatar feature introduces the avatar, which is infinite in the virtual world, resulting in a more realistically defined environment, as avatars' shapes are comparable to or superior to those of 3D games.

The persistence feature is critical because it allows users to save conversations, data, and items when they leave the virtual environment (Akour et. al, 2022). The

metaverse plan (Sparkes 2021) (Metaverse = Meta + Universe) calls for the creation of a digital counterpart of the physical world. The metaverse idea is continually evolving, with gaming worlds, social networks, virtual reality (VR), and augmented reality (AR) technologies all being connected to it. Creating metaverses necessitates the establishment of relationships and events. Most systems, on the other hand, generally define buddy or follower relationships.

2.3.4 Technology Adoption

Technologies that allow for electronic collaboration have become a significant part of daily life. Several studies have looked into the use of collaboration technologies like voice mail, email group assistance systems, and other services. Collaboration technologies, in particular, are not evolving as quickly as they should. As expected, it appears that a new strategy is required. Acceptance of new systems or technology necessitates input at the administrative or organisational level, as well as at the individual level It is critical for businesses to comprehend not only end-user perceptions, attitudes, and intentions, but also management plans and policies and acts that have a substantial impact on a technology's successful adoption (Bhattacherjee, 1998).

Furthermore, the adoption of technology is only successful for a driver of innovation or a technology provider when both individuals and organisations accept the innovation, and targeted adopters demonstrate their commitment by continuing to utilise the technology over time (Bhattaherjee 1998 and Rogers 2003). According to Renaud and Van Biljon (2008), when the technology acceptance process begins, the user becomes aware of the technology and has the intention to use it, and when the technology adoption process begins, the user becomes aware of the technology and has the intention to use it, and technology adoption stems from acceptance and results in the actual use of the technology (Premkumar and Bhattacherjee, 2008). The user's intention to utilise the technology may change, which will impact adoption and acceptability during the adoption process. As a result, technology acceptance and technology adoption are closely related and are frequently confused (Abu, Jabar and Yunus, 2015).

2.3.5 UTAUT (Unified Theory of Acceptance and Use of Technology)

The UTAUT Model is an explanation of user perception and acceptable behaviour based on the Unified Theory of Acceptance and Use of Technology. (Venkatesh et.al, 2003). Since its inception, the UTAUT model has been extensively deployed and validated for anticipating system utilisation and making technology adoption and technology-usage decisions in a variety of sectors such as gaming sector. Performance expectancy, effort expectancy, social influence, and conducive factors are identified as direct predictors of behavioural intention and use behaviour. This paradigm has been tested in a variety of educational settings, including virtual learning technology. It was expanded by integrating the variables of mobile self-efficacy and perceived enjoyment, as well as security-related factors (i.e., satisfaction, trust, and perceived risk). The UTAUT paradigm was altered by the addition of new variables such as perceived enjoyment, mobile self-efficacy, satisfaction, trust, and perceived risk.

2.3.6 Gen Z

Tjiptono, F. et. al,2020 stated that Generation Z in Malaysia is currently the largest age group representing 29% of the overall population in Malaysia. Generation Z is more acclimated to a "connected life," which may explain their interest in gaming. In this hyper-digital existence, people frequently seek community and a sense of belonging. Gaming allows individuals to express themselves, immerse themselves, interact with others, and unwind. Creating authentic virtual identities and determining their purpose and aim in the gaming environment is critical to effectively addressing Gen Z customers. In Malaysia, Generation Z is known for their high adoption rate of technology, including augmented reality (AR) and the metaverse. As students in universities, they are likely to be early adopters of these technologies, particularly within the gaming community.

The metaverse is an immersive virtual world where users can interact with each other, and it is expected to grow in popularity among Gen Z gamers in Malaysia. AR technology can enhance the gaming experience by providing a more realistic and interactive environment. As in-game advertising and the metaverse expand, there

remains a widespread lack of knowledge among brands when it comes to establishing a presence in the gaming arena. Gen Z is increasingly embracing gaming for the social and community aspects it provides, and believes the metaverse to be an extension of their physical existence.

2.3.7 Relationship Between Augmented Reality and Gaming

The integration of game visual and audio elements with the user's environment in real time is known as augmented reality gaming (AR gaming). Unlike virtual reality gaming, which frequently necessitates the use of a separate room or constrained space to create an immersive atmosphere, augmented reality gaming makes use of the current environment to create a playing field within it. While virtual reality games necessitate the usage of specialist VR goggles, augmented reality devices do not. Smartphones, tablets, and portable gaming systems are commonly used to play AR games. A user's actual environment is commonly superimposed on top of a pre-created scene in an augmented reality game. The game can be as simple as a tabletop game of virtual checkers. More advanced AR games may be able to create an environment based on the user's surroundings. In-game characters may, for example, climb from coffee tables to sofas on virtual bridges in such a game. In game development, environment building is a time-consuming operation, and there is a constant desire for new scenery since once a player has fully explored one setting, they want to move on to another. AR gaming broadens the playing field by utilising the variety of the real-world environment to keep games fresh. Pokémon GO, widely regarded as the first AR game app, makes use of a smartphone's camera, gyroscope, clock, and GPS to create a location-based augmented reality environment.

2.3.8 Relationship Between Augmented Reality and Metaverse

AR takes a unique approach to actual settings, using digital inputs and virtual features to enrich the physical environment. It physically connects the real and virtual worlds. The ultimate result is a spatially projected layer of digital artefacts mediated by transparent surfaces such as smart phones, tablets, glasses, contact lenses, and other

transparent surfaces. In virtual reality, augmentation usually refers to hardware-intensive technologies, whereas simulation refers to methods for altering reality, often in the form of parallel worlds. Users of intimate technologies can have avatars and digital profiles, giving them agency as agents in the system. External technologies are not focused on individuals, but rather on the external environment, such as society and economics. The need for high-quality, lifelike 3D material based on actual objects and settings has risen as a result of Augmented Reality (Zhao, et al, 2022).

The embodiment and realism of these worlds are assured in continuity with the real world according to some of the theoretical ideas stated in metaverses. Continuity with this environment, on the other hand, compromises ubiquity or persistence. Immersion is possible, but not permanence, because these filters prevent them from accumulating or sequencing with one another. What's accessible is the capacity to edit images or movies with these interfaces, as well as the prospect of cooperation in their creation and reuse. Augmented reality is being used by young people to enhance the material they share on social media (de la. et al, 2022). Celcom Axiata Berhad, in collaboration with Nonvoice, launches Nonvoice Metaverse, its first augmented reality (AR) content, allowing users to immerse themselves in the latest digital experience and lifestyle.

2.3.9 Augmented Reality in Malaysia Using Metaverse

The development of augmented reality (AR) in Malaysia using the metaverse is still in its early stages, but it is expected to grow in popularity in the near future. The Malaysian company has been investing in technology and innovation to promote the country's digital economy, and AR and the metaverse are considered to be key areas for future growth. For instance, all Celcom subscribers may now access the best augmented reality (AR) material, Nonvoice Metaverse, thanks to a partnership between Celcom Axiata Berhad and Nonvoice. This enables users to fully immerse themselves in the newest digital experiences and lifestyles.

Through this agreement, 10 consumer apps that span augmented reality gaming, education, digital collectibles and non-fungible tokens (NFTs), and sports are made available to Celcom consumers on a single platform. According to T. Kugan, Chief

Emerging Business Officer at Celcom Axiata Berhad, the metaverse is a revolutionary virtual environment that has the potential to revolutionise how we play, learn, and socialize. He added that they are excited about the possibilities of the AR experience made possible by this relationship and how it will affect a variety of industries, including education, entertainment, and business. Additionally, they are optimistic that Celcom's most recent project will equip Malaysians with the digital knowledge and skill sets they need to fully explore the metaverse's tremendous AR potential. (Ignatius Cynthia, 2022).

2.4 Theoritical Framework

According to UTAUT's theoretical paradigm, the actual usage of technology is determined by behavioural intention. Venkatesh, Morris, Davis, and Davis (2003) established the UTAUT model, which links performance expectancy, effort expectancy, social influence, and enabling factors as direct predictors of behavioural intention and use behaviour (see Figure 1).

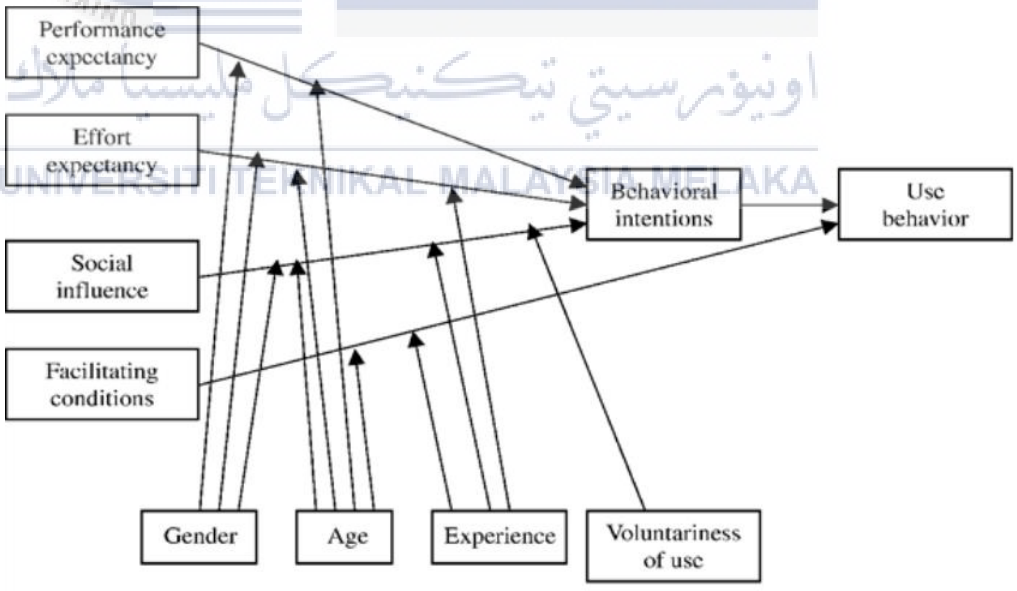

Figure 2.1: UTAUT Model (Venkatesh et al., 2003)

The suggested model for this study is shown in Figure 1, along with the four UTAUT dimensions that operate as drivers of use and intention behaviour. The role of key moderators will not be used in the remainder of this section (gender, age,

voluntariness, and experience). Given that the gamers' use of augmented reality and the metaverse was voluntary in this study, the moderating factors of gender and level of experience with augmented reality and the metaverse were also included in the research framework to improve the model's predictive validity. In terms of gamers' intention to use augmented reality and metaverse, it is hypothesised that gender and different levels of experience with augmented reality and metaverse result in different perceptions relating to performance expectancy, effort expectancy, social influence, and facilitating conditions.

2.5 Proposed Research Framework

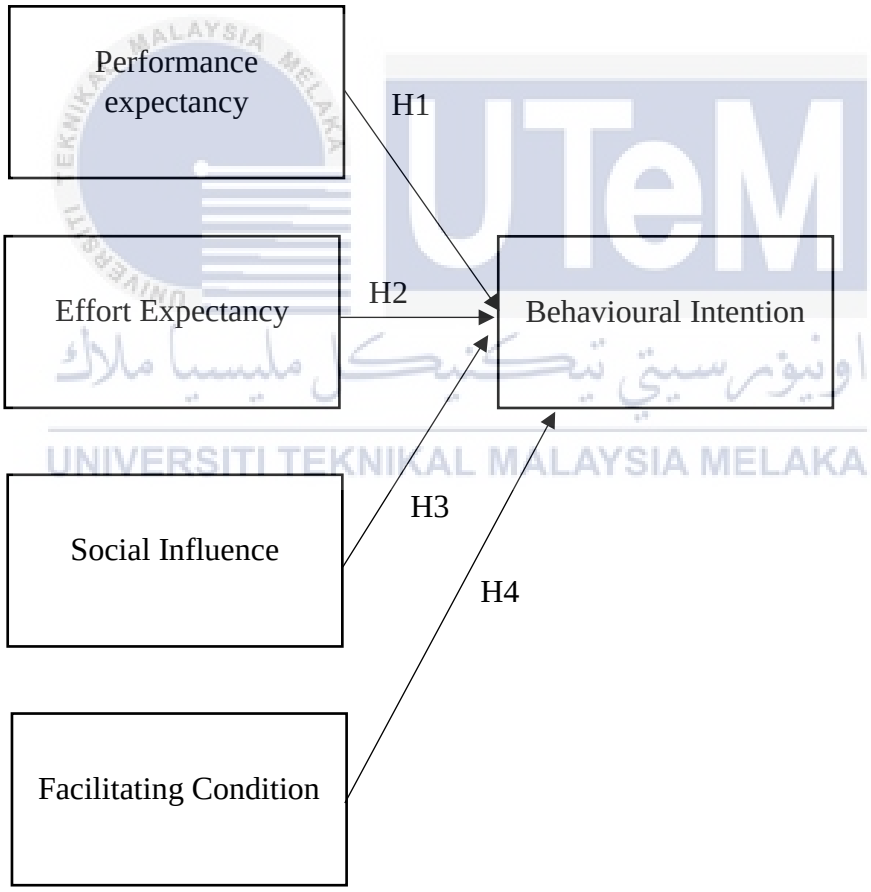

Figure 2.2: The unified theory of acceptance and use of technology (UTAUT) model.

Performance expectancy

Individuals' degree of anticipation or faith that employing a system/technology would increase their performance is referred to as performance expectancy (Venkatesh et al., 2003). The perceived probability of completing a behaviour that leads to usage intention is referred to as behavioural intention. As a result, motivational elements that generate intention show people's readiness to exert effort to engage in the behaviour. The readiness and intention of an individual to do certain behaviours is characterised as behaviour intention (Chua, 2018)

Effort Expectancy

"The degree of ease connected with the usage of the system" is how effort expectation is defined (Venkatesh et al., 2003). Using UTAUT frameworks, they have also demonstrated a clear link between effort expectancy and behavioural intention. If a new technology involves less effort to learn and understand how to utilise it, users are more likely to accept the technology (Chau, 2018).

Social Influence

The degree to which an individual believes important individuals feel he or she should utilise the new method is referred to as social influence (Venkatesh et al., 2003). Social influence is also defined as the amount to which an individual is concerned about the opinions and perceptions of people who are important to them. Individuals who want social acceptance are more prone to conform to the expectations of others (Venkatesh et al., 2012).

Facilitating Condition

"The degree to which an individual feels that organisational and technological infrastructure exist to facilitate usage of the system," as highlighted by (Venkatesh et al., 2003), is an indication of the presence or absence of enabling conditions. Facilitating conditions are defined in this study as the availability of an adequate gaming environment and infrastructure inside the gaming that can promote the adoption of the technologies under consideration.

Behavioural Intention

"The person's perceived probability that he or she will undertake the behaviour in issue" is how behavioural intention is defined. Behavioural intention has been discovered to be a major and reliable predictor of actual technology usage behaviour

(Venkatesh et al., 2003). The perceived probability of completing a behaviour that leads to usage intention is referred to as behavioural intention. As a result, motivational elements that generate intention show people's readiness to exert effort to engage in the behaviour. The readiness and intention of an individual to do certain behaviours is characterised as behaviour intention.

2.6 Research Hypothesis

These hypotheses were created based on the suggested research framework are based on model UTAUT Figure 2.1 to answer research questions and attain the research objectives:

Hypothesis 1

H0: There is no significance adoption between performance expectancy on gamer behavioural intention.

H1: There is a significance adoption between performance expectancy on gamer behavioural intention.

Hypothesis 2

H0: There is no significance adoption between effort expectancy on gamer behavioural intention.

H1: There is a significance adoption between effort expectancy on gamer behavioural intention.

Hypothesis 3

H0: There is no significance adoption between social influence on gamer behavioural intention.

H1: There is a significance adoption between social influence on gamer behavioural intention.

Hypothesis 4

H0: There is no significance adoption between facilitating condition on gamer behavioural intention.

H1: There is a significance adoption between facilitating condition on gamer behavioural intention.

2.7 Significance of Study

Benefits relate to the beneficial influence of research on people who were directly engaged (e.g., study participants and their families, researchers, and research organisations), as well as the verifiable contribution that research provides to knowledge, our economy, individuals, and society.

2.8 Operational Definition

Metrics	Operational Definition
Performance Expectancy	Individuals' degree of anticipation or faith that employing a system/technology would increase their performance (Venkatesh et.al, 2003)
Effort Expectancy	The degree of ease connected with the usage of the system (Venkatesh et.al, 2003)
Social Influence	The degree to which an individual believes important individuals feel he or she should utilise the new method (Venkatesh et.al, 2003)
Facilitating Condition	The degree to which an individual feels that organisational and technological infrastructure exist to facilitate usage of the system (Venkatesh et.al, 2003)
Behaviour Intention	The person's perceived probability that he or she will undertake the behaviour in issue" (Venkatesh et.al, 2003)
UTAUT Model	The UTAUT Model is an explanation of user perception and acceptable behaviour based on the Unified Theory of Acceptance and Use of Technology. (Venkatesh et.al, 2003)

Table 2.1: Operational Definition

2.9 Summary

This chapter, which was written by the researcher, explained and defined everything that may be related to this study in great depth. Gamers are example of the sorts of individuals that have been labelled. In addition, the study stated that their own subjective experiences and talents, as well as their own personal goals to step out into new revolution technologies, are among the characteristics that promote adoption enhanced by metaverse in UTeM. Finally, the researcher provides a framework diagram and operational description.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out the various steps that are necessary in executing this study and thereby satisfying its objectives. It aims to explain in detail all aspects of the research, with particular reference to all of the key theoretical and practical issues involved. This chapter discusses the research design and methodology and the survey. Various research philosophies and approaches presented in literature will be discussed with focuses on their application to this study. The data collection and analysis procedures used to answer the study's primary and secondary problems are discussed in this chapter. It explains how the study's data was analysed, as well as the research design, sample methodologies, and data collection methods used.

3.2 Research Design

The research design is the overall strategy for how the researcher will approach addressing the study questions. It is made up of specific objectives obtained from research questions. It also defines the sources from which the researcher intends to acquire data, as well as the method by which the researcher intends to collect and analyse the data. The research design is meant to give a suitable structure for a study. The decision to be made about research approach is a highly important decision in the research design process since it defines how relevant information for a study will be

gathered; nevertheless, the research design process contains several decisions (Sileyew, 2019).

An explanatory research seeks to learn about a scenario or problem in order to explain the relationships between variables. The purpose of an evaluative study is to determine the success of an organisational or business strategy, policy, programme, initiative, or procedure. The explanatory study was chosen by the researcher because it is suited for the nature of this investigation. An explanatory study, as the researcher previously stated, focuses on the relationships between variables. This study has five independent factors and one dependent variable. The researcher planned to investigate the adoption of AR through metaverse among gamers.

3.3 Methodology Choices

This is a quantitative study that employs a descriptive research design. According to Plano and Creswell (2015), quantitative research designs entail gathering, evaluating, and reporting numerical data to validate research hypotheses for specific variables. Correlational study design is a non-experimental method used by researchers to discover the association between two or more variables using the statistical process of correlational analysis (Plano & Creswell, 2015). For this research, quantitative research is to find the relationship between the adoption of augmented reality through metaverse among gamers in UTeM.

3.4 Primary and Secondary Data

This study included both primary and secondary data. Primary data are data acquired by the researcher through surveys, interviews, or experiments designed expressly for the study topics being studied (Ghauri et al., 2020). The questionnaires are distributed to the respondents by the researcher. Respondents were asked to answer questions based on their demographics, personality and lifestyle, awareness and knowledge, objectives, motives, and behaviours.

The three categories of secondary data were documents (text and non-text), surveys (censuses, continuous and regular surveys, and ad hoc surveys), and multiple source data (snapshot and longitudinal). Secondary resources for this study were gathered from a range of documents and other sources. Secondary data was gathered by the researcher using library databases such as Emerald Insight and Research Gate. The researcher searches the web page and library database for relevant articles, reports, and newspapers to support the purpose of this study. Secondary data for this study may be obtained from a variety of sources, including papers, online journals, and earlier researcher efforts. Primary data collection was more difficult, expensive, and time-consuming than secondary data collection. Secondary data analysis, on the other hand, may be ineffective in business research since the information may be obsolete or erroneous.

3.5 Research Location

The study will carry out in Malaysia, will be distributed to gamers especially among communities and esports club in Universiti Teknikal Malaysia Melaka (UTeM). The reason I chose UTeM is because they managed to grab the various esport championships they participated in and actively join league or any championship. According to the Utusan Malaysia newspaper, UTeM is the overall champion of the Uni League 2020 e-Sport Championship (Ahmad, 2020). The key objective for selecting the targeted respondent was to collect more accurate facts and perceptions from the respondent on the gamer topic Augmented Reality Adoption through Metaverse among Gamers in UTeM. The target group respondent would be chosen as respondents in this study since they were the persons who were in this setting relevant to the study. Furthermore, the target group respondents were gamers that were currently active in their business. The desired response age range was 20 to 50 years old.

3.6 Research Strategic

Study inquiry is a method of doing research using overviews that analysts give to study participants. Study investigate is defined as "the collection of data from a test of people's reactions to questions" (Check & Schutt, 2012). The study data is then quantitatively examined in order to draw key ponder conclusions. Non-probability testing is a type of testing in which the analyst creates tests based on his or her knowledge and experience.

3.6.1 Questionnaire

The instrument employed to perform this study is a questionnaire. Google Form will be use to disseminate the questionnaire. Previous research was used to adjust and modify the questionnaire. In the gaming industry, questionnaires were issued to players. The questionnaires were created in two languages: English and Malay. The questionnaire was classified into three sections which were Section A (Demographic Background), Section B and Section C were adoption augmented reality through metaverse among gamers

Closed-ended questions and Likert scale were used in the questionnaire. Close-ended question is a question that consists of present options for the respondent to answer and to ensure the uniformity of the data collected (Plano & Creswell, 2015). The respondents' gender, race, age, and occupation were all studied in the first section of the questionnaire, which was the first component of the questionnaire. The second section of the questionnaire evaluated independent criteria such as knowledge, perceived ease of use, and perceived usefulness. The third section of the questionnaire consisted of a survey of the dependent variables, which are the variables that contribute to the augmented reality through metaverse in gaming.

Table 2 shows the five-point Likert-Type Rating Scale and this scale will be used for Section B and Section C.

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

Table 3.1: Likert- Type Rating Scale

3.6.2 Sampling Design

A sample design is a specific strategy for selecting a sample from a specified population. It refers to the method or procedure used by the researcher to pick things for the sample. The researcher choose convenient sampling as every element in the population has a known and equal chance of being selected as a subject. As a result, the chance of any example being included in the sample can be specified. Non-probability sampling (also known as non-random sampling) encompasses a variety of sample selection methods, the bulk of which rely on subjective judgement (Saunders et al., 2019). A convenience sample will use in this research where the sample is taken from a group of gamers that are easy to contact or reach. Total population from 200 members of E-Sport club UTeM. The study recruited more than 100 gamers as responders.

3.6.3 Pilot Test

Prior to their ultimate distribution, pilot testing is conducted on members of the target population to assess their reliability. It is a small-scale trial, according to (Saunders et al.,2019), that allows the researcher to test and comment on the questionnaire in order to reduce problems with respondents responding to the questions and data capturing issues. This research will collect data from a pilot test before distributing the questionnaire to respondents. In one week, the researcher will select 20 responders to complete the pilot test. Their opinions and criticisms will be taken into account in the research's final survey questionnaire.

3.7 Time horizon

Examining the prevalence of disease, attitudes and knowledge among patients and health staff, in validation studies comparing, for example, different assessment

instruments, and in reliability studies, the cross-sectional design is the most appropriate. Cross-sectional research might be descriptive or analytical. While studying the prevalence of specific diseases or features, such as obesity and alcohol consumption, the term 'prevalence study' is frequently employed, although when assessing attitudes and opinions, the term 'survey' is occasionally used.

3.8 Data Analysis Method

After the data are obtained through questionnaire, Statistical Package of Social Sciences (SPSS) is applied to analyse the data collected from the respondents. Descriptive analysis, Pearson's correlation analysis and multiple regression analysis are used in this research.

3.8.1 Descriptive Analysis

According to (Saunders et al., 2019), descriptive analysis employs numerical description and comparison of variables with a focus on central tendency and dispersion. Means, medians, modes, and standard deviation are common ways to measure descriptive statistics. In this study, descriptive analysis is utilised to examine the respondents' gender, age, occupation, and educational level. The raw data is transformed into a more understandable format in order to better describe the demographics of respondents.

3.8.2 Pearson's Correlation Analysis

The linear relationship intensity between the dependent variable and independent variables will be computed using Pearson's Correlation analysis in this study. Perfect negative and perfect positive correlations are represented by Pearson's correlation coefficient, which ranges from -1 to +1. Meanwhile, a score of 0 indicates that there is no association correlation (Saunders et al., 2019).

Correlation Coefficient Value (*r*)	Direction and Strength of Correlation
-1	Perfectly negative
-0.8	Strongly negative
-0.5	Moderately negative
-0.2	Weakly negative
0	No association
0.2	Weakly positive
0.5	Moderately positive
0.8	Strongly positive
1	Perfectly positive

Figure 3.1: Value of the correlation coefficient

Sources: Saunders et al. (2019)

3.8.3 Multiple Regression Analysis

Multiple regression analysis is a statistical tool that allows researchers to evaluate the strength of a cause-and-effect relationship between five independent variables and one dependent variable (Saunders et al., 2019). The researcher must comprehend the relationship between the adoption augmented reality through metaverse among gamers (independent variable) and the dependent variable in this study (user behaviour). The researcher can use multiple regression analysis to identify which independent factors have the largest impact on the dependent variable. The equation for multiple regression analysis is as follows Equation of MRA: $Y = a + bX1 + cX2$

Where:

Y = Dependent Variable (Consumer Behaviour)

a = Constant value or Intercept

b = Influence of X1 (IMC tools)

c = Influence of X2 (types of media)

X1, X2 = Independent variables

3.9 Summary

In summary, this chapter described the methodology employed in performing the study, as well as the research instrument used. This chapter also covers the population, sample size, and sampling technique. Furthermore, the data analysis and data gathering procedures are explained. The findings will be discussed in the following chapter.

CHAPTER 4

ANALYSIS AND RESULTS

4.1 INTRODUCTION

In this chapter, the researcher elaborates on the various statistical test and interpretation of the analyse results by using the IBM SPSS Statistics Version 27.0. This chapter also shows the results obtained through the questionnaires were distributed. Pilot test was carried on the 20 respondents from UTeM E-sports club members of samples to test the validity and reliability of the questionnaires before proceeded for 180 respondents from UTeM E-sports club members. For this chapter, the results will be elaborated further in the different part that cover the analysis of pilot test, response rate, descriptive variables, analysis of the real test and analysis technique (simple linear regression, Pearson correlation coefficient, multiple linear regression analysis) used to achieve the research objectives.

4.2 ANALYSIS OF PILOT TEST

A pilot test study (N=20) with 20 respondents was carried out before the target audience received the survey questionnaire. Members of the UTeM E-sports club were the target audience. The pilot test study was carried out in October 2022. The Cronbach's alpha scores for each individual variable and the entire collection of variables are used to evaluate the surveys' reliability.

4.2.1 Test Reliability

The range of reliability for the Cronbach's alpha value is shown in Table 4.1 below. As a further stage in determining the consistency and reliability of the questionnaires, the researcher evaluates the validity of the pilot testing.

Table 4.1: Range of reliability

Coefficient of Cronbach`s Alpha	Reliability Level
More than 0.90	Excellent
0.80 – 0.89	Good
0.70 – 0.79	Acceptable
0.60 – 0.69	Questionable
0.5 – 0.59	Poor
Less than 0.59	Unacceptable

Sources: Zikmud (2003). Business Research Method.

Table 4.2: Result of Test Reliability for the Pilot Test (Each Variable)

	Variable	Cronbach`s Alpha	Number (N) of Items	Result
Independent Variables	Performance Expectancy (PE)	0.894	4	Good Reliability
	Effort Expectancy (EE)	0.823	4	Good Reliability
	Social Influence (SI)	0.822	4	Good Reliability
	Facilitating Condition (FC)	0.867	4	Good Reliability
Dependent Variable	Behaviour Intention (BI)	0.854	4	Good Reliability

Source: Primary data from SPSS Statistics Output

Table 4.2 above shows the results of the test reliability for the pilot test based on each variable. For the independent variables, performance expectancy, effort expectancy, social influence, facilitating condition respectively have good reliability result with Cronbach`s alpha value of 0.894, 0.823, 0.822 and 0.867. For the dependent variable, behaviour intention also got good reliability with Cronbach`s alpha value of 0.854. Based on the count value derived by Cronbach's alpha value for each variable, which ranges from 0.822 to 0.894, it can be determined that this research instrument is reliable, with very high reliability.

Table 4.3: Case Processing Summary

		N	%
Case	Valid	20	100.0
	Excluded[a]	0	0
	Total	20	100.0

Source: Original data of SPSS Statistics Output

Table 4.3 above shows the first output results of case processing summary for the pilot test. N or the number of valid data (valid for a process) is 20 units, while the missing data is zero. Hare means that all data is processed.

Table 4.4: Reliability Statistics

Cronbach`s Alpha	N of Items
.942	20

Source: Original data of SPSS Statistics Output

Table 4.4 above shows the second output results of reliability statistics for the pilot test based on the overall variables. The test reliability is analysed for the total of 20 items; 4 items of performance expectancy, 4 items of effort expectancy, 4 items of social influence, 4 items of facilitating condition and 4 items of behaviour intention. From the output results of reliability statistics obtained the Cronbach`s alpha value of 0.942 > 1.000, based on the basis of decision making in the test reliability can be concluded that this research instrument reliable, in which as a very high of reliability. The validated outcome of the questionnaires is reliable when the reliability of the pilot test is tested.

4.3 DESCRIPTIVE STATISTICS OF DEMOGRAPHIC VARIABLES

In this section, the researcher elaborates on the descriptive statistics of demographic variables includes gender, race, age, educational level and current programme in university about augmented reality in metaverse among gamers in UTeM. Table 4.5 below demonstrate the data analysis of demographic variables that were collected from 180 respondents in selected population.

Table 4.5: Data Analysis of Demographic Variables

		Frequency	Percent (%)
Gender	Male	98	54.4
	Female	82	45.6
Race	Malay	129	71.7
	Chinese	30	16.7
	Indian	15	8.3
	Others	6	3.3
Age	18-22 years old	78	43.3
	23-27 years old	96	53.3
	28 years old and above	6	3.3
Education Level	Diploma	53	29.4
	Bachelor degree	122	67.8
	Master	4	2.2
	PhD	1	0.6
Current Programme in University	Engineering	89	49.4
	Non-Engineering	91	50.6

Source: Original data of SPSS Statistics Output

4.3.1 Gender

Table 4.6: Gender of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	98	54.4	54.4	54.4
	Female	82	45.6	45.6	100.0
	Total	180	100.0	100.0	

Source: Original data of SPSS Statistics Output

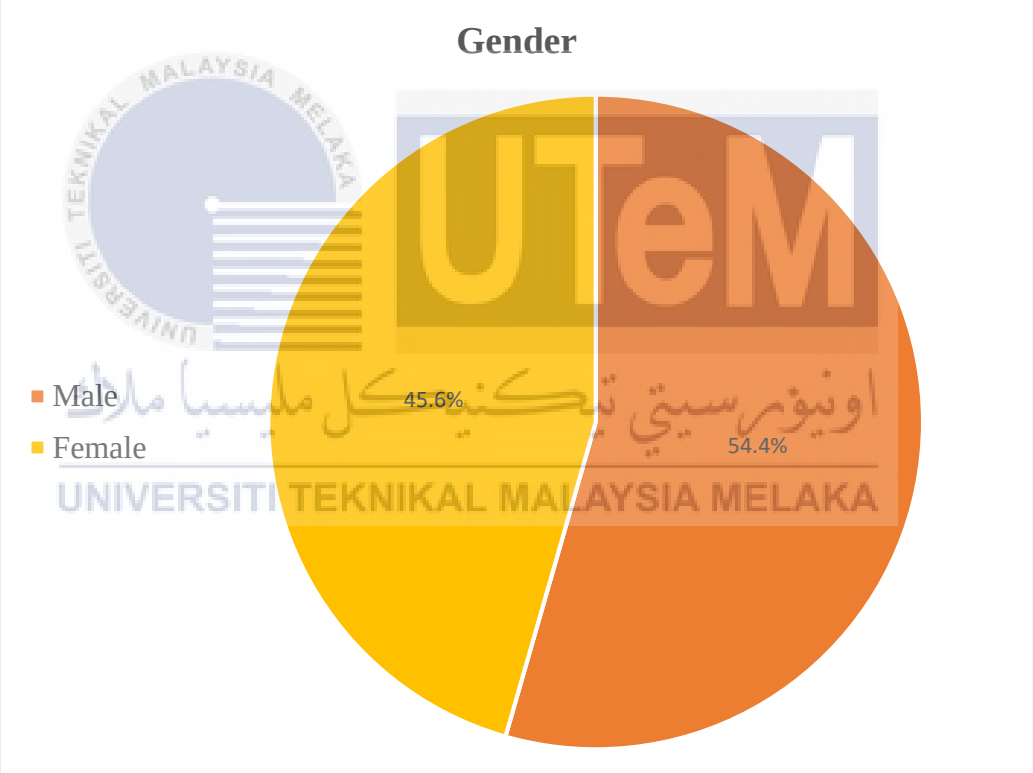

Figure 4.1: Gender of Respondent

Figure 4.1 and Table 4.6 above shows that from the 180 respondents (100%), 98 respondents (54.4%) are male, while another 82 respondents (45.6%) are female. Based on the result, it states that male respondents are more than female respondents. This is because UTeM students are more male than female because it is a technical university more focused on male students.

4.3.2 Race

Table 4.7: Race of Respondents

		Frequency	Percent (%)	Valid Percent	Cumulative Percent
Valid	Malay	129	71.7	71.7	71.7
	Chinese	30	16.7	16.7	88.3
	Indian	15	8.3	8.3	96.7
	Others	6	3.3	3.3	100.0
	Total	180	100.0	100.0	

Source: Original data of SPSS Statistics Output

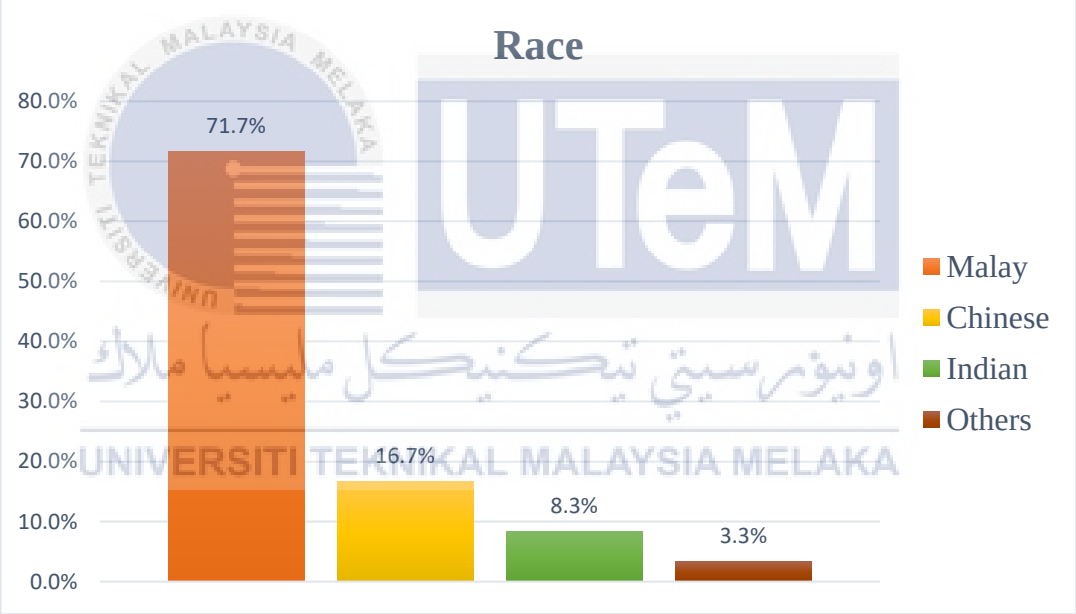

Figure 4.2: Race of Respondents

There are four race groups: Malay, Chinese, Indian and Others. Based on Figure 4.2 and Table 4.7 above, it shows that majority of respondents, 129 respondents or 71.1% were malay. Chinese with 16.7% equal to 30 respondents. Meanwhile for indian it shows that 15 respondents (8.3%) and for others race with 6 respondent or 3.3%. As we can see that the majority race student in UTeM is malay.

4.3.3 Age

Table 4.8: Age of Respondent

		Frequency	Percent (%)	Valid Percent	Cumulative Percent
Valid	18-22 years old	78	43.3	43.3	43.3
	23-27 years old	96	53.3	53.3	96.7
	28 years old and above	6	3.3	3.3	100.0
	Total	180	100.0	100.0	

Source: Original data of SPSS Statistics Output

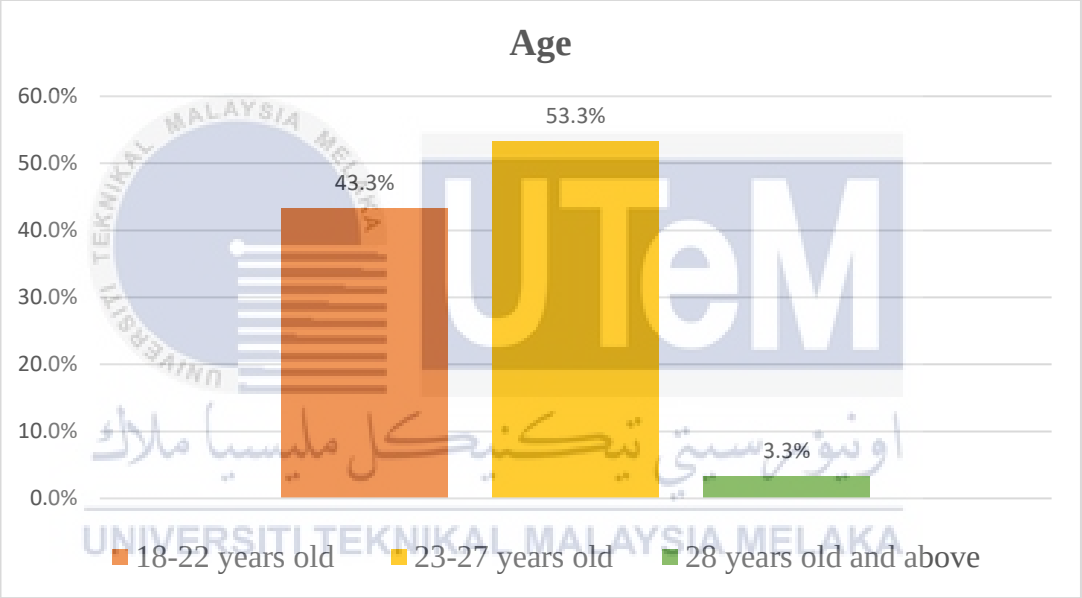

Figure 4.3: Age of Respondents

Table 4.8 and Figure 4.3 shows the age of 180 respondents. The highest age of respondents come from 23-27 years old with 96 respondents (53.3). Its follow with 18-22 years old with 78 respondents (43.3) and 28 years old and above were 6 respondents equal to 3.3%. Statistics of Citizen Students at Public Universities (PU) By Gender, Age, And Level of Study Year 2019 - 2021 from Malaysia Youth Development Research Institute shows that in 2021, there will be 108 249 students between the ages of 19 and 24, and 36 807 students out of a total of 168831 students. As a result, it is clear from the data why so many responders are between the ages of 18 and 27

4.3.4 Educational Level

Table 4.9: Educational Level of Respondent

		Frequency	Percent (%)	Valid Percent	Cumulative Percent
Valid	Diploma	53	29.4	29.4	29.4
	Bachelor Degree	122	67.8	67.8	97.2
	Master	4	2.2	2.2	99.4
	PhD	1	0.6	0.6	100.0
	Total	180	100.0	100.0	

Source: Original data of SPSS Statistics Output

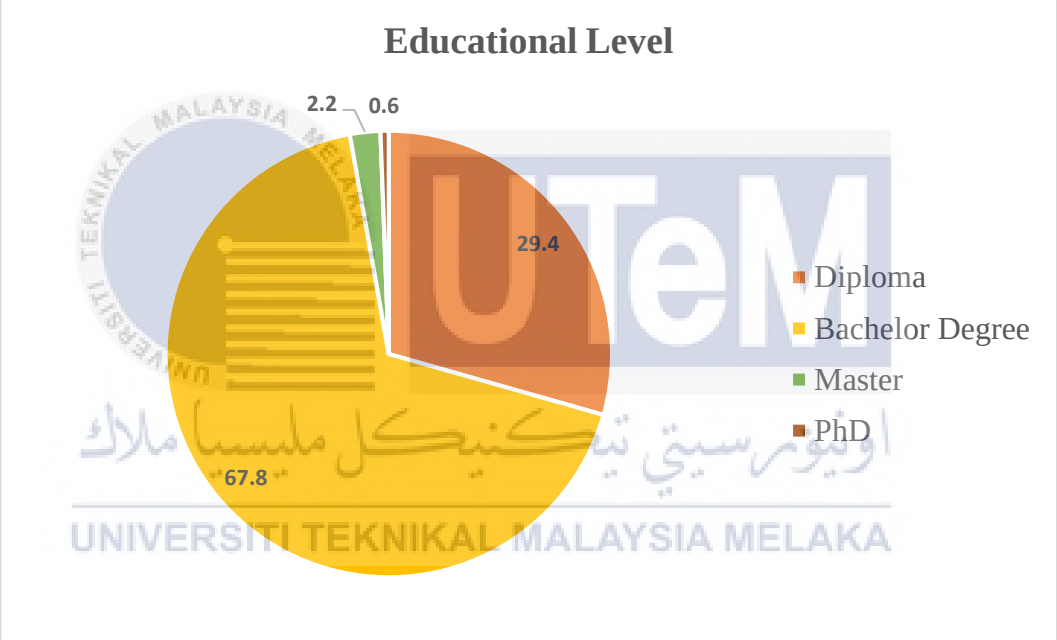

Figure 4.4: Educational Level of Respondents

Figure 4.4 and Table 4.9 presents the percentage of the education level of the respondents. The majority of the respondents are Bachelor Degree holders, with 67.8% or 122 Bachelor Degree holders participating in this study. This is followed by Diploma with 29.4% equal to 53 respondents. Master Degree respondents, with 4 respondents representing 2.2% in this study. The minority of the respondents is PhD 1 respondent or 0.6%. UTeM provides more undergraduate programmes than master degrees and doctoral degrees.

4.3.5 Current Progamme in University

Table 4.10: Current progamme in university of respondents

		Frequency	Percent (%)	Valid Percent	Cumulative Percent
Valid	Engineering	89	49.4	49.4	49.4
	Non-Engineering	91	50.6	50.6	96.7
	Total	180	100.0	100.0	

Source: Original data of SPSS Statistics Output

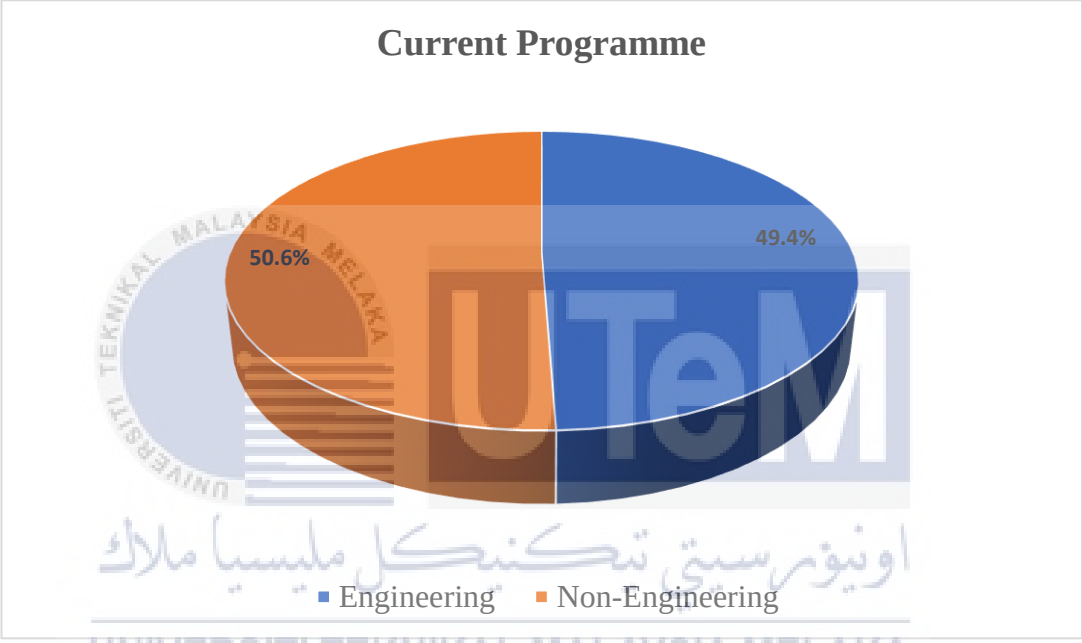

Figure 4.5: Current Programme in University of Respondents

Based on Figure 4.5 and Table 4.10, it shows that non-engineering is majority for current programme with 91 respondents or 50.6%. But don't miss out either it followed by engineering with 89 respondents or 49.4%. UTeM has 8 faculties, 6 faculties for engineering courses and 2 non-engineering faculties, namely communication information technology and technopreneur technology management.

4.4 INFERENTIAL STATISTICS

Inferential statistics are calculated to generalise the results of a sample to the overall population of interest. For example, an investigator might use inferential statistics to assess if differences across groups (ie, treatment and control groups) are due to chance or are the consequence of true differences between the populations represented by group 1 and group 2 (or whatever many groups are involved). To achieve maximum representation of the population of interest, inferential statistics rely on appropriate sampling strategies (see part 5 of this series2). Inferential statistics are based on probability theory and the hypothesis testing process. (Allua, 2009)

4.4.1 Regression Analysis

A regression model is an application of the linear model where the response (dependent) variable is identified with numeric values of one or more quantitative variables called factor or independent variables (Freund, 2006).

4.4.2 Independent Variables: Performance Expectancy (IV 1)

Table 4.11: Inferential Statistics for Performance Expectancy

	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
Q1: I find that using augmented reality in the metaverse would help better performance in gaming.	180	3	5	4.09	.674
Q2: I realize that using augmented reality in the metaverse would	180	1	5	4.08	.713

be helpful in notifying upcoming events.					
Q3: I discovered that using augmented reality through gaming in the metaverse is easy.	180	2	5	4.06	.710
Q4: I notice that using augmented reality through gaming in the metaverse would be helpful in daily life.	180	2	5	4.03	.712
Valid N (listwise)	180				

Source: Original data of SPSS Statistics Output

Table 4.11 above shows indicate the mean and standard deviation of all items under the independent variables, Performance Expectancy. The highest mean for performance expectancy is Q1 which is 4.09 while the lowest is Q4 which is 4.03. As for the standard deviation the highest is Q2 which is 0.713 and the lowest is Q1 which is 0.674.

4.4.3 Independent Variables: Effort Expectancy (IV 2)

Table 4.12: Inferential Statistics for Effort Expectancy

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
	Statistic	Statistic	Statistic	Statistic	Statistic
Q1: I realize that augmented reality in the metaverse is easy to use and not complicated.	180	1	5	3.94	.785

Q2: I perceive that augmented reality in the metaverse is easy to learn and use.	180	1	5	4.02	.787
Q3: I find that augmented reality in the metaverse could be learned how to use by the gamers themselves.	180	2	5	4.13	.758
Q4: I discover that the metaverse could be used in all games.	180	1	5	3.98	.862
Valid N (listwise)	180				

Source: Original data of SPSS Statistics Output

Table 4.12 above shows indicate the mean and standard deviation of all items under the independent variables, Effort Expectancy. The highest mean for effort expectancy is Q3 which is 4.13 while the lowest is Q1 which is 3.94. As for the standard deviation the highest is Q4 which is 0.862 and the lowest is Q3 which is 0.758.

4.4.4 Independent Variables: Social Influence (IV 3)

Table 4.13: Inferential Statistics for Social Influence

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
	Statistic	Statistic	Statistic	Statistic	Statistic
Q1: I will use the system if my gamer members encourage and need me to use it.	180	2	5	4.12	.662

Q2: I will use the system if my gamer members use it.	180	2	5	4.18	.697
Q3: I will use the system if people around me use it.	180	1	5	4.16	.723
Q4: I will use the system if other game streamers use it.	180	1	5	4.04	.750
Valid N (listwise)	180				

Source: Original data of SPSS Statistics Output

Table 4.13 above shows indicate the mean and standard deviation of all items under the independent variables, Social Influence. The highest mean for social influence is Q2 which is 4.18 while the lowest is Q4 which is 4.04. As for the standard deviation the highest is Q4 which is 0.750 and the lowest is Q1 which is 0.662.

4.4.5 Independent Variables: Facilitating Condition (IV 4)

Table 4.14: Inferential Statistics for Facilitating Condition

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
	Statistic	Statistic	Statistic	Statistic	Statistic
Q1: I have enough necessary resources to use augmented reality through the metaverse in gaming.	180	1	5	3.96	.912
Q2: I have enough necessary knowledge to use augmented reality through the metaverse in gaming.	180	1	5	3.90	.866

Q3: Metaverse could launch augmented reality when the game is turned on.	180	2	5	4.02	.713
Q4: Metaverse could launch augmented reality when the game is turned on through any device.	180	1	5	4.01	.791
Valid N (listwise)	180				

Source: Original data of SPSS Statistics Output

Table 4.14 above shows indicate the mean and standard deviation of all items under the independent variables, Facilitating Condition. The highest mean for facilitating condition is Q3 which is 4.02 while the lowest is Q2 which is 3.90. As for the standard deviation the highest is Q1 which is 0.912 and the lowest is Q3 which is 0.713.

4.4.6 Dependent Variables: Behavioural Intention (DV)

Table 4.15: Inferential Statistics for Behavioural Intention

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
	Statistic	Statistic	Statistic	Statistic	Statistic
Q1: I am willing to use augmented reality through the metaverse in gaming.	180	1	5	4.14	.768
Q2: In the future, I expect/intend to use augmented reality through the metaverse in gaming	180	1	5	4.07	.740

Q3: I predict I will use the metaverse in my next gaming.	180	2	5	4.08	.758
Q4: As soon as I am able to gaming, I will use augmented reality through the metaverse	180	2	5	4.04	.708
Valid N (listwise)	180				

Source: Original data of SPSS Statistics Output

Table 4.15 above shows indicate the mean and standard deviation of all items under the dependent variables, Behavioural Intention. The highest mean for behavioural intention is Q1 which is 4.14 while the lowest is Q4 which is 4.04. As for the standard deviation the highest is Q1 which is 0.768 and the lowest is Q4 which is 0.708.

4.5 CORRELATION ANALYSIS

A correlation coefficient is a number between -1 and 1 that tells you the strength and direction of a relationship between variables (Bhandari.P, 2022). The correlation coefficient, a statistic that quantifies the strength of the seeming linear link between the variables under consideration, is used to quantify correlation (Mukaka M., 2012).

The purpose of the correlation analysis is to determine whether there is a significant relationship between independent variables; performance expectancy (hypothesis 1), effort expectancy (hypothesis 2), social influence (hypothesis 3), facilitating condition (hypothesis 4) and dependent variables that is behavioural intention. This will be accomplished by examining Pearson's correlation when the level of significance is significant: p 0.05 and p 0.01 will be selected.

Correlation Coefficient Value (*r*)	Direction and Strength of Correlation
-1	Perfectly negative
-0.8	Strongly negative
-0.5	Moderately negative
-0.2	Weakly negative
0	No association
0.2	Weakly positive
0.5	Moderately positive
0.8	Strongly positive
1	Perfectly positive

Figure 4.6: Value of the correlation coefficient

Sources: Saunders et al. (2019)

4.5.1 Relationship Between Adoption and Behavioural Intention on using Augmented Reality through Metaverse Among Gamers in UTeM.

Table 4.16: Correlation Analysis

CORRELATIONS		
		DV
IV 1: Performance Expectancy	Pearson Correlation	.515**
IV 2: Effort Expectancy	Pearson Correlation	.531**
IV 3: Social Influence	Pearson Correlation	.573**
IV 4: Facilitating Condition	Pearson Correlation	.572**

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

Source: Original data of SPSS Statistics Output

The table 4.16 shows the correlation between independent variables and dependent variable. All correlation is shown significant ($p < 0.05$). The Pearson's Correlation of performance expectancy to behavioural intention is $r = 0.515$. This shows that performance expectancy is correlate to behavioural intention in moderate relationship. Next, the relationship between effort expectancy to behavioural intention is $r = 0.531$ with moderate positive relationship. Moreover, the relationship between social influence to behavioural intention shown the most correlation $r = 0.573$ which is moderate correlation. In addition, facilitating condition to behavioural intention with $r = 0.572$. Correlation analysis used to determine value of variable based on the value of the other is moderate positive relationship to all variable. All variable is significant

with behavioural intention as the result analysed using linear regression are also significant at level <0.001.

4.6 MULTIPLE LINEAR REGRESSION ANALYSIS

4.6.1 Model Summary

Table 4.17: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.684[a]	.468	.456	.42203

a. Predictors: (Constant), IV4, IV1, IV3, IV2

Source: Original data of SPSS Statistics Output

Table 4.17 presents the results of multiple linear regression, with a correlation coefficient (R) of 0.684 indicating a strong relationship between independent variables in this study. A good link between independent variables and dependent variables is a positive indicator of R. It is demonstrated that the respondent's value contains these factors. However, the R square value is 0.468, indicating that 46% of the variables influenced the behavioural intention.

4.6.2 ANOVA

Table 4.18: ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.455	4	6.864	38.536	<.001[b]
	Residual	31.170	175	.178		
	Total	58.625	179			

a. Dependent Variable: DV

b. Predictors: (Constant), IV4, IV1, IV3, IV2

Source: Original data of SPSS Statistics Output

Table 4.18 shown a probability level of value 0.001. However, the probability 0.001 lower than 0.05. Results shows that statistically significant because ANOVA for compare means and determine the significance. That mean the multiple regression models can be used to predict the perfect expectancy, effort expectancy, social influence, facilitating condition on behavioural intention. To summarize, all independent variables significantly affect the behavioural intention.

4.7 COEFFICIENTS ANALYSIS

Table 4.19 Coefficients Analysis for all independent and dependent variables

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.641	.286		2.240	.026
	IV 1	.210	.078	.189	2.693	.008
	IV 2	.077	.078	.079	.991	.323
	IV3	.267	.080	.259	3.353	<.001
	IV 4	.269	.065	.315	4.550	<.001

a. Dependent Variable: DV

Source: Original data of SPSS Statistics Output

Based on Table 4.19 above, it shown the results coefficients analysis between independent and dependent variables. All variables are significant except for independent variables 2 (effort expectancy) because lower than others significant. Standard coefficients show with the values close to 1 indicating a strong positive relationship between the predictor and outcome variables. However independent variables 2 is close to 0 indicate a weak or nonexistent relationship.

4.8 HYPOTHESIS TESTS

The validity of the hypothesis is determined via regression analysis. When the t-value reaches 1.96 and the p-value is less than 0.05, the hypothesis is accepted. When the p-value is less than 0.05, it indicates that the independent factors have no effect on the dependent variable.

Hypothesis 1

H0: There is no significance adoption between performance expectancy on gamer behavioural intention.

H1: There is a significance adoption between performance expectancy on gamer behavioural intention.

According to the findings, the variable performance expectancy has impact on behavioural intention. Performance expectancy has a significant value of 0.008, which is less than 0.05. The null hypothesis (H0) was rejected by the researcher, whereas the alternative hypothesis (H1) was accepted (H1).

Hypothesis 2

H0: There is no significance adoption between effort expectancy on gamer behavioural intention.

H1: There is a significance adoption between effort expectancy on gamer behavioural intention.

Based on the result, the variable effort expectancy has significant with behavioural intention. The significant value of effort expectancy is 0.323 which is more than 0.05. Researcher will accept the null hypothesis (H0) and the alternative hypothesis is rejected (H1). This indicates that the hypothesis is rejected because t-value don't reach 1.96.

Hypothesis 3

H0: There is no significance adoption between social influence on gamer behavioural intention.

H1: There is a significance adoption between social influence on gamer behavioural intention.

According to the results of the regression for social influence as the independent variable and behavioural intention as the dependent variable. If the significant value of social influence is 0.001 < 0.05, then the association between social influence and behavioural intention is substantial. As a result, the researcher accepted the alternate hypothesis (H1) while rejecting the null hypothesis (H0).

Hypothesis 4

H0: There is no significance adoption between facilitating condition on gamer behavioural intention

H1: There is a significance adoption between facilitating condition on gamer behavioural intention

According to the results of the regression for facilitating condition as the independent variable and behavioural intention as the dependent variable. If the significant value of facilitating condition is 0.001 < 0.05, then the association between facilitating condition and behavioural intention is substantial. As a result, the researcher accepted the alternate hypothesis (H1) while rejecting the null hypothesis (H0).

Table 4.20: Summary finding of hypothesis testing

Hypothesis	Interpretation
Hypothesis 1	Accept
Hypothesis 2	Reject
Hypothesis 3	Accept
Hypothesis 4	Accept

4.9 SUMMARY

This chapter has revealed the result from the data analysis by using IBM Statistical Package for Social Science (SPSS) that there is positive correlation between independent variables (performance expectancy, effort expectancy, social influence and facilitating condition) and dependent variable (behavioural intention). The significant and the correlation between dependent variable and independent variables has been analyze by using SPSS.

For the hypothesis analysis results show that three of the hypotheses accepted which is performance expectancy, social influence and facilitating condition. While there only one hypothesis rejected which is effort expectancy. The independent variable which is social influence and facilitating condition had been identifying as the most adoption factor that adopt the behavioural intention gamers using augmented reality through metaverse.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 INTRODUCTION

The following report presents the findings of a study on the adoption of augmented reality (AR) and metaverse technology among gamers in UTeM. The study aimed to understand the current state of AR adoption in the gaming industry in UTeM and to identify the factors that are driving or hindering its adoption. To achieve this, a literature review to gain an understanding of the current state of AR and metaverse technology in the gaming industry, and also conducted a survey to gather data from gamers in the E-sport club UTeM, Malaysia. The findings of the study indicate that the gaming industry in UTeM student is growing rapidly and that there is a growing interest in AR and metaverse technology among gamers. The potential for AR and metaverse technology to enhance the gaming experience is clear, and it's likely that the technology will become increasingly adopted by gamers in Malaysia in the future.

This chapter will discuss the outcome of the previous chapter which is chapter 4. A summary of the pilot test, descriptive analysis, correlation, regression and hypothesis test was justified in the previous chapter. Recommendations will be given in this chapter for future reference and research in related research. Finally, a conclusion will be contributed in this chapter to summarize all the research.

5.2 DISCUSSION OF FINDINGS

Based on chapter 4 above, the findings that the researcher met, studies have shown that males are more likely to play video games than females and that males are also more likely to be avid gamers (Winn, J. et al, 2009). For males, a high level of

involvement in gaming may be associated with a number of positive outcomes, such as improved spatial skills, problem-solving abilities, and coordination. However, excessive gaming has been linked to negative outcomes, such as poor academic performance, social isolation, and addiction. For females, a lower level of involvement in gaming may mean that they miss out on the potential benefits of gaming, such as improved cognitive skills and increased self-esteem. Additionally, women who are gamers may be subject to discrimination and sexism within the gaming community, which can be detrimental to their mental and emotional well-being. The gender gap in gaming has been shrinking in recent years, but men still make up a larger proportion of the gaming population than women.

Students in a technical university such as UTeM, who have a background or interest in technology and engineering, may be more likely to be involved in gaming than students in other types of universities. This is because students in technical universities more likely to have access to and be proficient with the technology required to play games, and may also have an interest in the technology and design aspects of gaming. Additionally, students in UTeM involved in competitive gaming and may be more likely to participate in gaming communities and tournaments. E-sports club UTeM keep update their activities such as tournament and championship in their account Instagram. This could also be due to a more competitive mindset of technical students, who may seek out competition in games to showcase their technical and gaming skills.

According to the research, there have four independent variables and one dependent variable. All were accepted but one factor was rejected which is independent variable 2, effort expectancy. The metaverse is still a relatively new and rapidly evolving concept, and there is still a lot of uncertainty about how people will interact with and use it. This can make it difficult to predict how people will perceive the effort required to use AR in the metaverse and can make it difficult to design user-friendly interfaces and interactions.

Those factors were accepted as performance expectancy, social influence and facilitating conditions. According to performance expectancy, in a role-playing game set in a fantasy world, AR could be used to display digital landscapes and creatures that blend seamlessly with the real world. Another way that AR could be used in the

metaverse to notify users about events and can help to create a more engaging and immersive experience, as well as provide new opportunities for marketers and event organizers. overlaying digital elements on top of the physical world to create a "mixed reality" experience in gaming sounds straightforward, creating a seamless and responsive AR experience that keeps up with user interactions. In daily life, augmented reality can also be used for entertainment and socializing. For example, people can play games with their friends and family from anywhere in the world, and even in real-time, even if they are geographically far away from each other, by using augmented reality.

AR and metaverse technology could be used to create virtual social spaces where users can interact with each other in a more natural and intuitive way. This can lead to more authentic social interactions and can help to overcome some of the limitations of traditional online social spaces, such as the lack of physical presence and non-verbal cues. If other gamer members are encouraged to use AR and metaverse technology, it could be an indication that they see the potential benefits of the technology for the gaming experience. In this case, great idea to explore the technology further and see how it could be implemented in the gaming community.

Facilitating conditions using AR technology to create a more seamless and immersive experience in the virtual world, making it easier for users to interact with digital objects and other users. AR can be used to create a more realistic and engaging user interface, such as virtual buttons or sliders that are overlaid on real-world objects. It can be easier for users to navigate and control digital objects, making the overall experience more intuitive and user-friendly. Another way that AR, facilitate conditions in the metaverse by providing users with a more immersive and realistic experience. For example, using AR, virtual objects and environments can be blended seamlessly with the real world, making it feel as though the virtual world is a part of the real world. This can help to create a more engaging and immersive experience, as users feel like they are truly interacting with digital objects in a shared space.

Behavioural intention towards performance expectancy, effort expectancy, social influence, and facilitating conditions in AR through the metaverse by willingness of users to use AR technology in the virtual world, and the factors that can influence the willingness. Understanding how these factors influence behavioural

intention can help in the design and development of the metaverse to improve the user experience and enhance the overall design.

This research is done based on the three main objectives that are developed by the researcher in order to solve the research questions stated at the beginning of this research. The result findings and their justification according to previous research will be briefly discussed in this section, where three subsections will be formed to discuss the following research objectives:

1. To identify factors affecting AR adoption among gamers.

2. To analyse AR adoption relationship through metaverse among gamers in the gaming sector.

3. To determine the most significant adoption factor of AR through metaverse.

Following part is futhure discuss the findings through objective.

5.2.1 To Identify Factor Affecting AR Adoption Among Gamers.

To identify the most significant adoption a questionnaire was developed for member E-Sport Club in UTeM. The IBM SPSS Statistics Version 27.0 is used to calculate the statistics result. The Unified Theory of Acceptance and Use of Technology (UTAUT) is a theoretical framework that aims to explain how individuals adopt and use technology. Researchers use four factors that influence a person's decision to adopt technology: performance expectancy, effort expectancy, social influence, and facilitating conditions.

Technology will help to perform a task more effectively or efficiently by performance expectancy. In the context of augmented reality (AR) in gaming, player enhance their gaming experience by providing more immersive gameplay or more accurate in-game information. Through effort expectancy, as student it won't take a lot of time or effort to learn how to use and grasp AR games and technology because it is easy to use and understand. Social influence refers to the influence of others on a person's decision to adopt a technology. In the context of AR gaming, this might refer

to a player's decision to try AR gaming because they see their friends or family using it, or because they see positive reviews or testimonials from other gamers.

In fact, the appeal of AR technology comes from its capacity to increase engagement, evoke positive sensory reactions, feelings, and impacts that are simple for people to experience and produce motivating outcomes for brand acceptance and adoption (C. Hinsch et al, 2020). Facilitating conditions by the availability and accessibility of resources that make it easy to use technology. The availability of AR devices, such as headsets or smartphones, and the availability of compatible games. Behavioural intention intends the user to perform the behaviour in the future, UTAUT suggests that if a user has positive views on the above factors then their behavioural intention towards adopting and using the technology will be higher.

AR and the metaverse providing students with access to virtual learning environments and resources that might not have access to in the physical world. the accessibility of education to students increasing, regardless of their location or background. The adoption of AR and the metaverse in universities encourages innovation and creativity among students. The development of new and exciting technologies lead benefit society. In the context of augmented reality through the metaverse, the above factors could play a critical role in the adoption of the technology among gamers, as the metaverse concept is relatively new and unknown to most people, thus, the performance expectancy and effort expectancy would be low for most of the users. However, the social influence and facilitating conditions align properly, it could lead to increased intention and acceptance of the metaverse.

In conclusion, the literature review suggests that the UTAUT model can be applied to understanding user behaviour towards AR through the metaverse by considering their performance expectancy, effort expectancy, social influence, and facilitating conditions. It has been found that these variables are significant predictors of behavioural intention towards using AR technology in the virtual world.

5.2.2 To Analyse AR Adoption Relationship Through Metaverse Among Gamers in The Gaming Sector.

Based on Multiple Linear Regression (MLR), obtained successfully to achieve the 2nd objective. The data shows that the expected effort exceeds the set value of 0.05 with a significance of 0.323 which is higher than other analysis results. The t-value also shows the lowest which is 0.991 compared to others. The t-value must exceed 1 to show that the t-value is significant. Therefore, from the analysis of the results, the second hypothesis is rejected. Of all the 4 hypotheses that were done, all were accepted except for one, which is for the null hypothesis, there is no significant adoption between effort expectancy on gamer behavioural intention and there is significant adoption between effort expectancy on gamer behavioural intentions was rejected.

In the context of AR gaming in the metaverse, players believe that the technology is easy to learn and use and that it won't require a lot of time or effort to get started. A low effort expectancy for AR in the metaverse might indicate that players perceive the technology to be difficult to use or understand. This could be due to a lack of familiarity with the technology or a perception that the technology is too complex. In this case, gamers may be less likely to adopt AR through the metaverse, as they believe it will be too much work. Utilizing inspiration to raise innovation attitude and intention, which in turn leads to acceptance of the innovation, game makers must take advantage of AR's capacity to encourage innovation awareness and engagement (C. Hinsch et al, 2020). However, the metaverse platform should providers invest in a clear and user-friendly interface and resources, the effort expectancy would decrease and more players are likely to adopt the technology, as they believe it to be easy to use and understand. Private businesses can invest through universities by doing research on augmented reality efforts through the metaverse, which improves the attention of university students like those at UTeM. Additionally, by social influence, performance expectancy and facilitating conditions align to the favour of AR in the metaverse, then which will overcome the low effort expectancy issue.

The other hypothesis was accepted, for the first hypothesis with 0.008 for significance and 2.693 for t-value. For the third hypothesis from the analysis shows <.001 for significant and t-value, 3.353. The fourth hypothesis with significance, <.001 and 4.550 for t-value.

5.2.3 To Determine The Most Significant Adoption Factor of AR Through Metaverse

All correlation is shown significant ($p < 0.05$). Pearson's Correlation of performance expectancy to behavioural intention is $r = 0.515$. This shows that performance expectancy is correlated to behavioural intention in a moderate relationship. Next, the relationship between effort expectancy to behavioural intention is $r = 0.531$ with a moderate positive relationship. Moreover, the relationship between social influence to behavioural intention showed the most correlation $r = 0.573$ which is a moderate correlation. In addition, facilitating condition to the behavioural intention with $r = 0.572$. All variable is significant with behavioural intention as the result analysed using linear regression are also significant at level <0.001.

Based on the UTAUT framework, all four factors (performance expectancy, effort expectancy, social influence, and facilitating conditions) are considered to be important in determining whether gamers will adopt AR through the metaverse. In the case of facilitating conditions, the most significant factor by the analysis is <.001 and for t-value is higher than others with 4.550. Facilitating conditions refer to the availability and accessibility of resources that make it easy to use technology. Most UTeM students own multiple electronic devices, including smart phones, computers, and tablets. Particularly for members of the E-sports club who have equipment that makes it simpler for them to play and study at the same time while they are students.

In the context of AR gaming in the metaverse, this might refer to the availability of AR devices, such as headsets or smartphones, and the availability of games that are compatible with those devices. The adoption through the enhancing gaming experience by AR and the metaverse provide a more immersive gaming experience by allowing players to interact with their virtual environment in a more realistic way. This enhances the overall gaming experience and can lead to increased engagement and enjoyment.Adrian Ma from nft now,said that the metaverse's ability to realise its full potential may be enabled via augmented reality (AR) experiences. With AR, users may tap into a virtual world while still feeling present in this one by using their smartphone (or another device) to digitally augment what they see in the actual world in real time. If AR devices and games are not easily available or accessible, it may be difficult for gamers to adopt the technology.

It's also important to consider that, different factors could play a more significant role for different groups of people. Facilitating conditions are required to determine whether people have the appropriate mobile devices, which permit the use of AR apps, and also whether they are aware of how to utilise them. They are anticipated to use AR technologies more readily after these requirements have been addressed (Chung et al, 2015). Some people may be more influenced by social influence, while others may be more influenced by performance expectancy or effort expectancy. Therefore, understanding specific factors that drive or impede adoption among different groups can be also important.

In summary, facilitating conditions are considered one of the most significant factors in determining the adoption of AR through the metaverse among gamers as they play a critical role in the availability and accessibility of the technology.

5.3 CONTRIBUTION TO KNOWLEDGE

Contributions to knowledge in understanding how users interact with AR through the metaverse, and how it can enhance their gaming experience. Researchers are examining how AR can be used to create more immersive and interactive gaming environments, and how it can provide players with more accurate in-game information. Additionally, researchers are also looking into how the metaverse can impact the social aspect of gaming, how players especially as student UTeM interact with each other and how this can change the way players engage with the games and the games themselves also with other university. Another contribution to knowledge is investigating the potential impact of AR through the metaverse on the broader society.

For instance, how it can help to improve people's ability to collaborate and communicate with each other, or how it can be used to provide remote education and training. Furthermore, researchers are also focusing on the technical aspects of AR through the metaverse, such as developing and improving the required hardware, software and network infrastructure to make AR gaming experiences as smooth as possible.

Overall, the contributions to knowledge for AR through the metaverse are diverse, and it requires research from various fields such as computer science,

psychology, sociology, and media studies to fully understand it. This can help to ensure that the technology is developed and used in ways that are beneficial for society and players in the long run.

5.3.1 Contribution to developers

By this research, it is suggested that the contribution of developers in using augmented reality through the metaverse can be significant in several ways. Discussion of the findings on the adoption of augmented reality (AR) technology through the use of metaverse platforms among gamers in UTeM by performance expectancy, effort expectancy, social influence, and facilitating conditions to behavioural intention can contribute to game developers.

Understanding the factors that influence the adoption of AR technology can help game developers to design and develop games that will be more appealing to gamers in UTeM, and that will be more likely to be adopted by the gaming community. Reducing the effort expectancy and making AR technology more accessible and user-friendly, game developers can help to increase the adoption of AR technology among gamers in UTeM student.

Game developers can also contribute to the increase of social influence by creating online communities and encouraging users to share their AR-enhanced gaming experiences on social media, which can help to create a sense of community and social influence around the technology. Game developers can also contribute to the country's economy by creating new jobs and opportunities for game development in Malaysia. Also, understanding the needs of the market and the users, game developers can create games that not only offer entertainment but also can be used for educational and training purposes.

In summary, the discussion of the findings can help game developers to better understand the factors that influence the adoption of AR technology, and to develop games that are more likely to be adopted by gamers in Malaysia, which can contribute to the growth of the gaming industry in the country.

5.4 IMPLICATION

The analyses and findings of this study have revealed that performance expectancy, effort expectancy, social influence and facilitating condition are the factors that are significant towards behavioural intention for gamers. The implication of AR adoption in the metaverse among gamers in UTeM is that it could also lead to the development of new gaming experiences and game genres that are unique to AR. As the metaverse platforms allow players to interact with each other and with virtual objects in a shared virtual space, it opens up new possibilities for game developers to create new and innovative gaming experiences that were not possible before.

Furthermore, the adoption of AR in the metaverse among gamers in UTeM could also lead to advancements in technology, as game developers will likely push the limits of what is possible with AR, which could lead to the development of new and more advanced AR hardware and software. The researcher feels that the technology becomes more accessible and user-friendly through social influence and as more games and applications are developed for AR, individuals will likely spend more time using the technology.

Researchers believe that the results vary because they depend on the location, economy, politics, and culture of the country in question, even though many studies have been examined. The findings of this study may be helpful to the institution in question in determining how to effectively embrace augmented reality through the metaverse. The clarity and dependability of the outcome may serve as a reference for behavioural intention research.

5.5 LIMITATION OF THE RESEARCH

In conducting the research there are several limitations happen. One of them is that respondents didn't fully respond to the questionnaire's requirements. Due to the fact that many people lack expertise with augmented reality through the metaverse, it is challenging to gather respondents, which is the constraint discovered. Additionally, it is challenging to get respondents to complete the survey because a lot of them are impatient and don't take the time to fill it out owing to time constraints. Because they

have less time to devote to this survey, the number of respondents obtained from students who in programme engineering where slightly low that non-engineering.

5.6 RECOMMENDATIONS

After conducting a study on the behavioural intention on performance expectancy, effort expectancy, social influence and facilitating conditions. There are several suggestions and recommendations that future researchers might use to conduct a better research than the previous one. In order to increase the adoption of augmented reality (AR) technology through the use of metaverse platforms among gamers in UTeM, it may be helpful to focus on factors that influence behavioural intention, such as performance expectancy, effort expectancy, and social influence, as well as facilitating conditions that can help drive adoption.

According to the findings of this study, there is no significant association between effort expectancy and behavioural intention. In addition, it is suggested that future studies provide more reliable results by sampling the metaverse users from small populations to large populations such as workers. Next, future researcher can include to investigate the impact of COVID-19 on the adoption of AR technology through metaverse platforms among gamers in UTeM and how this may have changed the user's behaviour and expectations.

Future research generated by future researchers might have a larger sample covering another country. Researcher also recommends partnering with educational institutes to introduce the technology to students, who will later spread the word among their peers and families. Utilize public-private partnerships to provide funding for AR development, research and education. The result would be more accurate and provide better factors to the developer. Besides, the suggestion for future research is to add variables either from UTAUT or UTAUT 2 to improve the acceptance of students and users using metaverse.

5.7 CONCLUSION

In conclusion, the adoption of augmented reality (AR) technology through the use of metaverse platforms among gamers in UTeM is influenced by a number of factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy refers to the degree to which an individual believes that using AR enhance their gaming experience. Effort expectancy refers to the degree to which an individual believes that using AR be easy or difficult. Social influence refers to the degree to which an individual's decision to use AR is influenced by the actions and opinions of others. Facilitating conditions refer to the regulatory and infrastructure support available for the technology, as well as the cost and availability of devices. Finally, to facilitate the adoption, it is necessary to develop infrastructure and regulations to support the technology, as well as to make the technology affordable and accessible by providing incentives for companies and individuals to invest in AR technology.

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APPENDIX A

Gantt Chart of Final Year Project (FYP) 1

WEEK/ ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FYP talk																
Search for FYP topic									M							
Meeting with supervisor									I							
Topic discussion									D							
Title confirmation																
RO & RQ Construction									S							
Submission Chapter 1									E							
Submission Chapter 2									M							
Submission Chapter 3									E							
First draft of FYP 1									S							
Submission of FYP 1									T							
Presentation 1									E							
Revised of FYP 1									R							
									B							
									R							
									E							
									A							
									K							

APPENDIX B

Gantt Chart of Final Year Project (FYP) 2

WEEK/ ACTIVITIES	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Create Questionnaire									MID SEMESTER BREAK							
Distribute Questionnaire																
Collect Questionnaire																
Analysis Data																
Submission Chapter 4																
Submission Chapter 5																
Proposal Correction																
Slide Preparation																
Submission of FYP 2																
Presentation 2																

APPENDIX C

Questionnaire

Research Title: Augmented Reality Adoption Through Metaverse Among Gamers in UTeM

Dear Sir/Miss/Madam,

Thank you all for your willingness to answer my questions. I am a Bachelor Degree student from the Faculty of Technology Management and Technopreneurship (FPTT), University Technical Malaysia, Malacca. The main objective of this survey is to analysing augmented reality (AR) adoption relationships through metaverse among gamers especially UTeM student. Metaverse in simple terms is a new world for the internet nowadays. If the early 1970s was introduced to the virtual world of the internet and is now updated with advanced technology that is the metaverse. The information obtained from this survey will be confidential and solely used for academic purposes. The result of this study is to determine how much use and awareness of augmented reality and the metaverse there is among gamers.

This questionnaire comprises three sections. Please read the questions carefully before you answer them and with a tick or in the space provided. The survey will take approximately 10 minutes to complete, and your participation is highly appreciated. Thank you very much for your willingness and cooperation. If you have any questions or concerns about the study, you may contact me Nur Fatini Binti Zamzari at: 013-438 2580 or b061910335@student.utem.edu.my.

Tuan/Puan yang dihormati,

Terima kasih semua kerana sudi menjawab soalan saya. Saya merupakan pelajar Ijazah Sarjana Muda dari Fakulti Pengurusan Teknologi dan Teknousahawan (FPTT), Universiti Teknikal Malaysia Melaka. Objektif utama tinjauan ini adalah untuk menganalisis hubungan penggunaan realiti tambahan (AR) melalui metaverse dalam kalangan pemain terutama sekali kepada pelajar UTeM. Metaverse dalam istilah mudah adalah dunia baru untuk internet pada masa kini. Jika awal 1970-an diperkenalkan kepada dunia maya internet dan kini dikemaskini dengan teknologi canggih iaitu metaverse. Maklumat yang diperolehi daripada tinjauan ini akan menjadi sulit dan digunakan untuk tujuan akademik semata-mata. Hasil kajian ini adalah untuk menentukan sejauh mana penggunaan dan kesedaran tentang realiti tambahan dan metaverse yang terdapat dalam kalangan pemain.

Soal selidik ini mengandungi tiga bahagian. Sila baca soalan dengan teliti sebelum anda menjawabnya dan dengan tandakan atau pada ruang yang disediakan. Tinjauan akan mengambil masa 10 minit untuk diselesaikan dan penyertaan anda amat dihargai. Terima kasih atas kesudian dan kerjasama anda.

Jika anda mempunyai sebarang pertanyaan atau kebimbangan mengenai kajian ini, anda boleh menghubungi saya Nur Fatini Binti Zamzari di talian:

Section A/ *Bahagian A*: Demography Profile/ *Profil Demografi*

This section aims to obtain your personal information with several questions listed. Please select the answer options provided. *Bahagian ini bertujuan untuk mendapatkan maklumat peribadi anda dengan beberapa soalan yang disenaraikan. Sila pilih pilihan jawapan yang disediakan.*

1. Gender/*Jantina*

- ☐ Male/ *Lelaki*
- ☐ Female/ *Perempuan*

2. Race/*Bangsa*

- ☐ Malay/*Melayu*
- ☐ Chinese/*Cina*
- ☐ Indian/*Indian*
- ☐ Others/*Lain-lain*: _____

3. Age/*Umur*

- ☐ 18-22 years old/*18-22 tahun*
- ☐ 23-27 years old/*23-27 tahun*
- ☐ 28 years old and above/*28 dan keatas*

4. Educational level/ *Tahap pendidikan*

- ☐ Diploma
- ☐ Bachelor degree
- ☐ Master
- ☐ PhD

5. Current programme in university/ *Progam di universiti*

- ☐ Engineering/ *Kejuruteraan*
- ☐ Non-Engineering/ *Bukan Kejuruteraan*

Section B/ *Bahagian B*: Adoption Augmented Reality Through Metaverse Among Gamers/ *Penerimaan Realiti Tambahan Melalui Metaverse Dalam Kalangan Pemain*

Please indicate the extent scale to each of the following statements by click ( ) in the provided box for the most appropriate response based on the following statements./ *Sila nyatakan skala takat bagi setiap pernyataan berikut dengan klik ( ) dalam kotak yang disediakan untuk jawapan yang paling sesuai berdasarkan pernyataan berikut.*

Opinions/*Pendapat*	**Strongly Disagree (SD)/ *Sangat Tidak Setuju***	**Disagree (D)/ *Tidak Setuju***	**Neutral (N)/ *Neutral***	**Agree (A)/ *Setuju***	**Strongly Agree (SA)/ *Sangat Setuju***
Scale/ *Skala*	**1**	**2**	**3**	**4**	**5**

	Section B1/ *Bahagian B1*: Performance Expectancy/ *Jangkaan Prestasi*	1	2	3	4	5
1.	I find that using augmented reality in the metaverse would help better performance in gaming. / *Saya mendapati bahawa menggunakan realiti tambahan dalam metaverse akan membantu prestasi yang lebih baik dalam permainan.*					
2.	I realize that using augmented reality in the metaverse would be helpful in notifying upcoming events. / *Saya sedar bahawa menggunakan realiti tambahan dalam metaverse akan membantu dalam memberitahu acara akan datang.*					
3.	I discovered that using augmented reality through gaming in the metaverse is easy. / *Saya mendapati bahawa menggunakan realiti tambahan melalui permainan dalam metaverse adalah mudah.*					
4.	I notice that using augmented reality through gaming in the metaverse would be helpful in daily life. / *Saya perhatikan bahawa menggunakan realiti tambahan melalui permainan dalam metaverse akan membantu dalam kehidupan seharian.*					

	Section B2 / *Bahagian B2*: Effort Expectancy / *Jangkaan Usaha*	1	2	3	4	5
1.	I realize that augmented reality in the metaverse is easy to use and not complicated. / *Saya menyedari bahawa realiti tambahan dalam metaverse mudah digunakan dan tidak rumit.*					
2.	I perceive that augmented reality in the metaverse is easy to learn and use. / *Saya merasakan bahawa realiti tambahan dalam metaverse mudah dipelajari dan digunakan.*					
3.	I find that augmented reality in the metaverse could be learned how to use by the gamers themselves. / *Saya mendapati bahawa realiti*					

	tambahan dalam metaverse boleh dipelajari cara digunakan oleh pemain sendiri.					
4.	I discover that the metaverse could be used in all games. / *Saya mendapati bahawa metaverse boleh digunakan dalam semua permainan.*					

	Section B3/ *Bahagian B3*: Social Influence / *Pengaruh Sosial*	1	2	3	4	5
1.	I will use the system if my gamer members encourage and need me to use it. / *Saya akan menggunakan sistem jika ahli pemain kenalan saya menggalakkan dan memerlukan saya menggunakannya.*					
2.	I will use the system if my gamer members use it. / *Saya akan menggunakan sistem jika ahli pemain kenalan saya menggunakannya.*					
3.	I will use the system if people around me use it. / *Saya akan menggunakan sistem jika orang sekeliling saya menggunakannya.*					
4.	I will use the system if other game streamers use it. / *Saya akan menggunakan sistem itu jika penstrim permainan lain menggunakannya.*					

	Section B4 / *Bahagian B4*: Facilitating Condition / *Keadaan Memudahkan*	1	2	3	4	5
1.	I have enough necessary resources to use augmented reality through the metaverse in gaming. / *Saya mempunyai sumber yang diperlukan untuk menggunakan realiti tambahan melalui metaverse dalam permainan.*					
2.	I have enough necessary knowledge to use augmented reality through the metaverse in gaming. / *Saya mempunyai pengetahuan yang diperlukan untuk menggunakan realiti tambahan melalui metaverse dalam permainan.*					
3.	Metaverse could launch augmented reality when the game is turned on. / *Metaverse boleh melancarkan realiti tambahan apabila permainan dihidupkan.*					
4.	Metaverse could launch augmented reality when the game is turned on through any device. / *Metaverse boleh melancarkan realiti tambahan apabila permainan dihidupkan melalui mana-mana peranti.*					

Section C/ *Bahagian C*: Significant Convenience Towards Gamers/ *Kemudahan Penting untuk Pemain*

Please indicate the extent scale to each of the following statements by click ( ) in the provided box for the most appropriate response based on the following statements./ *Sila nyatakan skala takat bagi setiap pernyataan berikut dengan klik ( ) dalam kotak yang disediakan untuk jawapan yang paling sesuai berdasarkan pernyataan berikut.*

Opinions/*Pendapat*	**Strongly Disagree (SD)/ *Sangat Tidak Setuju***	**Disagree (D)/ *Tidak Setuju***	**Neutral (N)/ *Neutral***	**Agree (A)/ *Setuju***	**Strongly Agree (SA)/ *Sangat Setuju***
Scale/ *Skala*	**1**	**2**	**3**	**4**	**5**

	Section C / *Bahagian C*: Behavioural Intention / *Niat Tingkah Laku*	1	2	3	4	5
1.	I am willing to use augmented reality through the metaverse in gaming. / *Saya bersedia menggunakan realiti tambahan melalui metaverse dalam permainan.*					
2.	In the future, I expect/intend to use augmented reality through the metaverse in gaming. / *Pada masa hadapan, saya menjangkakan/berhasrat untuk menggunakan realiti tambahan melalui metaverse dalam permainan.*					
3.	I predict I will use the metaverse in my next gaming. / *Saya meramalkan saya akan menggunakan metaverse dalam permainan saya yang seterusnya.*					
4.	As soon as I am able to gaming, I will use augmented reality through the metaverse. / Sebaik sahaja saya boleh akses permainan, saya akan menggunakan realiti tambahan melalui metaverse.					

APPENDIX D

Result from IBM SPSS Version 27.0

PILOT TEST

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.942	20

Scale: IV1

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.894	4

Scale: IV2

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.823	4

Scale: IV3

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.822	4

Scale: IV4

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.867	4

Reliability

Scale: DV1

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.854	4

Correlations

		IV1	IV2	IV3	IV4	DV1
IV1	Pearson Correlation	1	.775**	.221	.649**	.843**
	Sig. (2-tailed)		<.001	.350	.002	<.001
	N	20	20	20	20	20
IV2	Pearson Correlation	.775**	1	.257	.773**	.832**
	Sig. (2-tailed)	<.001		.275	<.001	<.001
	N	20	20	20	20	20
IV3	Pearson Correlation	.221	.257	1	.553*	.240
	Sig. (2-tailed)	.350	.275		.011	.308
	N	20	20	20	20	20
IV4	Pearson Correlation	.649**	.773**	.553*	1	.745**
	Sig. (2-tailed)	.002	<.001	.011		<.001
	N	20	20	20	20	20
DV1	Pearson Correlation	.843**	.832**	.240	.745**	1
	Sig. (2-tailed)	<.001	<.001	.308	<.001	
	N	20	20	20	20	20

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

*. Correlation is significant at the 0.05 level (2-tailed).

DESCRIPTIVE ANALYSIS FOR DEMOGRAPHIC

Frequencies

Statistics

		Gender	Race	Age	Edu level	Program
N	Valid	180	180	180	180	180
	Missing	0	0	0	0	0
Mean		1.46	1.43	1.60	1.74	1.51
Std. Deviation		.499	.785	.555	.522	.501
Minimum		1	1	1	1	1
Maximum		2	4	3	4	2

Frequency Table

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	98	54.4	54.4	54.4
	Female	82	45.6	45.6	100.0
	Total	180	100.0	100.0	

Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	129	71.7	71.7	71.7
	Chinese	30	16.7	16.7	88.3
	Indian	15	8.3	8.3	96.7
	Others	6	3.3	3.3	100.0
	Total	180	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-22 years old	78	43.3	43.3	43.3
	23-27 years old	96	53.3	53.3	96.7
	28 years old and above	6	3.3	3.3	100.0
	Total	180	100.0	100.0	

Edu level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma/Foundation/STPM/Matriks	53	29.4	29.4	29.4
	Bachelor Degree	122	67.8	67.8	97.2
	Master	4	2.2	2.2	99.4
	PhD	1	.6	.6	100.0
	Total	180	100.0	100.0	

Program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Engineering	89	49.4	49.4	49.4
	Non-Engineering	91	50.6	50.6	100.0
	Total	180	100.0	100.0	

DECRIPTIVE ANALYSIS FOR VARIABLES

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PE1	180	3	5	4.09	.674	-.114	.181	-.788	.360
PE2	180	1	5	4.08	.713	-.582	.181	1.077	.360
PE3	180	2	5	4.06	.710	-.183	.181	-.696	.360
PE4	180	2	5	4.03	.712	-.321	.181	-.162	.360
EE1	180	1	5	3.94	.785	-.382	.181	.120	.360
EE2	180	1	5	4.02	.787	-.724	.181	1.204	.360
EE3	180	2	5	4.13	.758	-.461	.181	-.425	.360
EE4	180	1	5	3.98	.862	-.656	.181	.424	.360
SI1	180	2	5	4.12	.662	-.248	.181	-.276	.360
SI2	180	2	5	4.18	.697	-.366	.181	-.521	.360
SI3	180	1	5	4.16	.723	-.692	.181	1.111	.360
SI4	180	1	5	4.04	.750	-.465	.181	.406	.360
FC1	180	1	5	3.96	.912	-.818	.181	.653	.360
FC2	180	1	5	3.90	.866	-.901	.181	1.168	.360
FC3	180	2	5	4.02	.713	-.305	.181	-.183	.360
FC4	180	1	5	4.01	.791	-.568	.181	.405	.360
BI1	180	1	5	4.14	.768	-.992	.181	2.083	.360
BI2	180	1	5	4.07	.740	-.701	.181	1.154	.360
BI3	180	2	5	4.08	.758	-.442	.181	-.274	.360
BI4	180	2	5	4.04	.708	-.350	.181	-.083	.360
Valid N (listwise)	180								

CORRELATIONS

Correlations

		Mean_IV1	Mean_IV2	Mean_IV3	Mean_IV4	Mean_DV1
Mean_IV1	Pearson Correlation	1	.549**	.561**	.436**	.515**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	180	180	180	180	180
Mean_IV2	Pearson Correlation	.549**	1	.644**	.574**	.531**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	180	180	180	180	180
Mean_IV3	Pearson Correlation	.561**	.644**	1	.498**	.573**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	180	180	180	180	180
Mean_IV4	Pearson Correlation	.436**	.574**	.498**	1	.572**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	180	180	180	180	180
Mean_DV1	Pearson Correlation	.515**	.531**	.573**	.572**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	180	180	180	180	180

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