INTENTION TO USE VOICE ASSISTANT TECHNOLOGY AMONG MALAYSIAN CONSUMERS

NURUL INTAN IZAINIE BINTI JAIDIN

BACHELOR OF TECHNOLOGY MANAGEMENT (INNOVATION TECHNOLOGY) WITH HONOURS
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

INTENTION TO USE VOICE ASSISTANT TECHNOLOGY AMONG MALAYSIAN CONSUMERS

NURUL INTAN IZAINIE BINTI JAIDIN

A report submitted
in partial fulfillment of the requirements for the degree of
Bachelor Of Technology Management (Innovation Technology) With Honours

Faculty of Technology Management and Technopreneurship

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

DECLARATION

I declare that this thesis entitled "INTENTION TO USE VOICE ASSISTANT TECHNOLOGY AMONG MALAYSIAN CONSUMERS is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature: …… ……...

Name: NURUL INTAN IZAINIE BINTI JAIDIN

Date: 31/01/2023

APPROVAL

I hereby declare that I have checked this report entitled “Intention To Use Voice Assistant Technology Among Malaysian Consumers” and in my opinion, this thesis it complies the partial fulfillment for awarding the award of the degree of Technology Management (Innovation Technology) with Honours

Signature	:	
Supervisor Name	:	DR JOHANNA BINTI ABUDLLAH JAAFAR
Date	:	31/01/2023
Signature	:	
Panel Name	:	PROFESOR MADYA DR MOHD SYAIFUL RIZAL BIN ABDUL HAMID
Date	:	31/01/2023

DEDICATION

To my parents, siblings, family, supervisor, lectures, and friends

This thesis paper would not have been done without their continuous support.

AKNOWLEGMENTS

Throughout this journey, I have gained amazing support. Words cannot explain how grateful I am to everyone who has inspired, aided, and supported me through this difficult time. I can only hope to pay it forward by offering similar assistance to those who may need my participation.

First and foremost, I want to thank my supervisor, Dr Johanna binti Abdullah Jaafar, for her enthusiasm, patience, insightful comments, valuable information, practical guidance, and never-ending ideas, which have greatly aided me during my study and writing of this research. Her vast knowledge, extensive experience, and professional competence helped me to effectively accomplish my study. This project would not have been feasible without her help and advice. I could not have asked for a better supervisor during my studies.

Furthermore, and perhaps most significantly, I am grateful to my father, Mr. Jaidin bin Abu Bakar, and mother, Mrs. Mashani binti Mohd Ariffin, as well as the rest of my family, for their unconditional loving support, financial support and consistent encouragement at every step that has led to my current position. Similarly, other relatives deserve special gratitude for their inspiration and participation in my research. I also would like to thanks to all my friends who directly and indirectly provide me inspiration and valuable suggestion throughout the course of this study.

ABSTRACT

Despite all available technology and capabilities, consumer awareness of voice technologies and assistants is still in its early stages. Voice assistant (VA) is a conversational AI technology that receives and interprets orders using voice commands. This study aims to determine the factors influencing Malaysian consumers' intention to use voice assistant technology. This study used the quantitative research method where the questionnaire that applied Likert Scales, was distributed to all smartphone consumers, especially those with the latest smartphone that has the latest technology. The underlying theory used in this study is UTAUT2 (Unified Theory of Acceptance and Use of Technology) by Venkatesh (2012). To answer the objectives, this research used descriptive and explanatory analysis to investigate the factors influencing consumer intention to use and to study the relationship between these factors and intention to use voice assistant technology among Malaysian consumers. The acquired data from 159 respondents were then analysed using SPSS software to carry out this research. The results indicate that two out of the six factors have a significant relationship with the intention to use voice-assistant technology. The facilitating condition and hedonic motivation are the two factors. The other four factors, namely performance expectancy, effort expectancy, social influence, and habit, had an insignificant relationship with the intention to use a voice assistant. In conclusion, some of the factors that influence consumers' intention to use voice assistants were noted in this study. The limitation of the study are discussed and recommendations are made for future research to explore more consumers' intentions to use a voice assistant

ABSTRAK

Walaupun semua teknologi dan keupayaan yang ada, kesedaran pengguna tentang teknologi suara dan pembantu masih di peringkat awal. Pembantu suara (VA) ialah teknologi AI perbualan yang menerima dan mentafsir pesanan menggunakan arahan suara. Kajian ini bertujuan untuk menentukan faktor-faktor yang mempengaruhi hasrat pengguna Malaysia untuk menggunakan teknologi pembantu suara. Kajian ini menggunakan kaedah kajian kuantitatif di mana soal selidik yang mengaplikasikan Skala Likert, telah diedarkan kepada semua pengguna telefon pintar khususnya yang mempunyai telefon pintar terkini yang mempunyai teknologi terkini. Teori asas yang digunakan dalam kajian ini ialah UTAUT2 (Teori Penerimaan dan Penggunaan Teknologi Bersepadu) oleh Venkatesh (2012). Bagi menjawab objektif, kajian ini menggunakan analisis deskriptif dan penjelasan untuk menyiasat faktor-faktor yang mempengaruhi niat pengguna untuk menggunakan dan mengkaji hubungan antara faktor-faktor ini dan niat untuk menggunakan teknologi pembantu suara dalam kalangan pengguna Malaysia. Data yang diperoleh daripada 159 responden kemudiannya dianalisis menggunakan perisian SPSS untuk menjalankan penyelidikan ini. Keputusan menunjukkan bahawa dua daripada enam faktor mempunyai hubungan yang signifikan dengan niat untuk menggunakan teknologi pembantu suara. Keadaan yang memudahkan dan motivasi hedonik adalah dua faktor. Empat faktor lain, iaitu jangkaan prestasi, jangkaan usaha, pengaruh sosial, dan tabiat, mempunyai hubungan yang tidak signifikan dengan niat untuk menggunakan pembantu suara. Kesimpulannya, beberapa faktor yang mempengaruhi niat pengguna untuk menggunakan pembantu suara telah diperhatikan dalam kajian ini. Batasan kajian dibincangkan dan cadangan dibuat untuk penyelidikan masa depan untuk meneroka lebih banyak niat pengguna untuk menggunakan pembantu suara.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This research has been divided into five chapters which are introduction, literature review, methodology, data analysis, and conclusion and recommendation. Following this introduction, the literature review in the second chapter explained the theoretical framework that researcher used in the study. The methodology section of the third chapter discusses the data collection process and the questionnaire utilised in the analysis. As previously stated, the fourth chapter, data analysis, examines the questionnaire's results. Finally, in the last chapter, chapter five, the investigation will come to a close with conclusions and suggestions.

1.2 Background of research

Smartphones are a relatively recent advancement, even though mobile phones have been regularly used for several decades. They are mobile phones that include not only typical features like voice and text communication but also sophisticated computation and communication capabilities such as Internet access and geo-positioning systems (Ajaegbu et al., 2018). According to an article written by Boulos (2011), due to their strong onboard processing capacity, capacious memory, huge displays, and open operating systems that stimulate application creation, the current generation of smartphones is increasingly seen as portable computers rather than phones.

Smart phones are phone gadgets that have innovative functions that go beyond the traditional functions of phones such as making calls and sending text messages and have greater capabilities of playing videos, surfing the web, sending and receiving emails, taking photos and editing them with embellishments, social interactions through chat groups, and enabling business transactions (Ajaegbu et al., 2018).

As stated in the article (Lincoln, n.d.), smartphones, such as iPhones and Android phones, are tiny, mobile computers that include phones, GPS, and cameras. And, like any other contemporary computer, they can connect to the Internet. That is the major role for

many people. In 2021, the number of mobile internet users was 4.32 billion, showing that mobile devices are used by more than 90% of the worldwide internet population. (L. Ceci, 2022). This growing trend in mobile internet usage is especially noticeable in developing digital economies where mobile networks are the predominant mode of internet access.

As stated in the Internet User Survey by MCMC (Komunikasi et al., 2020) , the percentage of Internet users in Malaysia in 2020 are 88.7 percent, a 1.3 percent rise from 87.4 percent in 2018 and half of Internet users (50%) spent 5 to 12 hours per day on the Internet, a 13 percent increase from 37 percent in 2018. They all used the Internet mostly for social purposes, such as conversing via text, interacting by voice/video, and browsing social networking sites.

Furthermore, according to Department of Statistics Malaysia Official Portal (2022), engagement in social networks was the most popular internet usage activity in 2021, properly accounted for 99.0 %, followed by downloading pictures, movies, videos, or music; playing or downloading games (91.8 %), finding information about goods or services (89.4 %), making phone calls via Internet/ VoIP (89.2 %), and downloading software or applications (86.3 %).

Mobile phones have been developing since their launch. The industry has now entered an era of superior-functioning cell phones by using internet. The characteristics of mobile devices have seen substantial developments in the last 20 years, particularly in artificial intelligence (AI). (TECNO, 2020). In IR 4.0 era, the emerging technologies such as virtual reality, augmented reality, and voice interaction has modifying people's interactions with the environment and altering digital experiences. (Terzopoulos & Satratzemi, 2020). Personal voice assistants (VAs) are the most popular and influential technical devices that employ AI, as evidenced by the large number of expert publications in the subject of AI as well as the market's growth. Voice assistant is a conversational AI technology that receives and interprets orders using voice commands. Devices using this technology can communicate with and react to human enquiries in natural language. (R. Chotia, 2022).

As mentioned in website page (Ramos, 2021) voice assistants allow us to perform a range of things without using our hands, which is why many people enjoy using them, particularly on their phones. Siri is available through Apple. Google phones and the majority of Android devices have Google. Bixby is available from Samsung. Cortana is available on

Windows phones. In May 2020, around one-third of Malaysians utilised voice search or voice command technologies. Voice search and voice command are also widely used by millennial aged 18-34, with a gender and ethnicity balance.(Farzana, 2020).

According website article, (Ramos, 2021) voice assistants can make calls, send text messages, look things up online, provide directions, open apps, set appointments on our calendars, and initiate or complete many other tasks. With the addition of separate apps on the phone, our voice can be a type of remote control for our lives. Many employees in firms that embrace technology utilise voice assistants for various functions during meetings. If the consumers wants to know a fact or an address, the voice assistant can look it up and respond. It can also take notes, record action items, schedule meetings, and build to-do and follow-up lists, all of which save time and keep everyone focused on the meeting (Lucas, 2021). Moreover, as mention in the article (Samuel, 2020), due to the obvious nature of speech technology, students may connect without using a screen and gain valuable life-skills practise in the areas of question formation and attentive listening.

When Siri, the first voice assistant, was introduced in 2011, no one could have guessed that this novelty would become a catalyst of technological progress (C. Bridge, n.d.). The voice assistant's technology initially became widely available in automobiles in 2000, smartphones in 2011, and smart speakers in 2015. As previously indicated, the rate of acceptance varied greatly amongst various gadgets (Bret, 2022). It also demonstrates that smart speaker adoption was swift, but not as fast as voice assistant on smartphone adoption when the Amazon Echo and Apple iPhone were introduced as starting points.

According to a research (Talukder, n.d.), a person's adoption of technology is influenced not just by individual attitudes but also by corporate policies, techniques, and actions. Organizations must create enabling conditions, which include the amount and type of assistance offered to individuals who impact their use of technology.

Previous research has established that the Technology Acceptance Model (TAM) is an acceptable model for understanding the adoption of preceding technologies. It has been often changed since its original appearance to meet the demands of newly-upcoming technologies. TAM was transformed into TAM 2, TAM 3, and finally the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which has been developed throughout time.

The UTAUT 2 model consists of several factors, which determine the total user

adoption of particular technologies. Because individual qualities and psychological aspects might impact technology adoption, it has been suggested that future study should look at the relevance of these elements in IoT value co-creation. As voice assistant technology might be considered as one application inside IoT, it is interesting exploring the UTAUT2 determining factors thoroughly. This research intends to examine the factors and intention to use voice assistant technology and acquire a more deep understanding

1.3 Problem Statement

Personal voice assistants (VAs) are the most popular and influential technical gadgets that employ AI, as evidenced by the large number of expert articles in the subject of AI as well as the market's growth. Voice assistants, which were first launched by Apple with "Siri" in 2011, have recently garnered fresh impetus, raising voice as a channel to a potentially disruptive level, (Kessler & Martin, 2017).

Typing is a time-consuming activity regardless of the device used. While typing, all faculties must be focussed, making multi-tasking extremely difficult. This redundancy is readily eliminated with voice AI technology. AI is capable of detecting speech signals needed to condense information and offer correct findings in real time. (Akshada, 2021)

Many employees in firms that embrace technology utilise voice assistants for various functions during meetings. If the consumers wants to know a fact or an address, the voice assistant can look it up and respond. It can also take notes, record action items, schedule meetings, and build to-do and follow-up lists, all of which save time and keep everyone focused on the meeting (Lucas, 2021). Moreover, as mention in the article (Samuel, 2020), due to the obvious nature of speech technology, students may connect without using a screen and gain valuable life-skills practise in the areas of question formation and attentive listening

Due to the fact that there are security and privacy concerns, as expressed in several studies (Pfeifle, 2018) since the voice assistant devices must be listening at all times so that they can respond to users. Many non-users believe that smartphones with voice assistant technology are not useful at all and can't be trusted.

On the other hand, smart speaker users have fewer privacy concerns and rely on companies to safeguard their personal data which think are not interesting to other. To meet the users' needs for voice assistant's technology applications in the future, the quantity of

private knowledge needed should increase, that at an identical time ends up in higher issues for the users concerning the protection of their data and privacy.(Klein et al., 2020)

According to a research studies, Amazon Alexa and Google Assistant have trouble comprehending persons with thick accents, regardless of how excellent their English is especially people with Indian accents were at a little disadvantage, but overall accuracy dropped by at least 2.6 percent for those with Chinese accents and as much as 4.2 percent for those with Spanish accents (Fingas, 2018).When people read news headlines out loud, voice assistants frequently misinterpreted them. Even the tiniest touch of a non-American accent for example, British would result in weird re-enactments of what consumers said.

Regardless, each of the voice assistants' replies is in some manner flawed. Alexa and Siri's speech capabilities are of little use to visually impaired persons who lack the technological know-how to sift through a slew of websites for reliable information since they provide irrelevant response to the users (Miller, 2021). Based on Baeza & Kumar, (2019) research, trust and cybersecurity are critical in this industry, as 16 percent of individuals who don't possess a voice assistant believe it's because of privacy worries, and none of these possible cybersecurity problems were addressed in the survey.

With all these existing problems and issues in this voice assistant technology, it will affect the user's intention to use this technology. Therefore this study investigate the intention and factors that influence the usage of voice assistant technology among Malaysian consumers to encourage more smartphone users to use voice assistant technology.

1.4 Research Question

In order to investigate the factors concerning the intention to use the voice assistant technology among consumers, below research questions are developed:

1. What determines the consumer's intention to use voice assistant technology?
2. Is there any relationship between the determined factors and consumers' intention to use the voice assistant technology?
3. Which are the factors that could highly influence the intention to use voice assistant technology among consumers?

1.5 Research Objectives

1. To identify factors affecting consumer's intentions to use voice assistant technology.
2. To investigate the relationship between the determined factors and consumers' intention to use the voice assistant technology.
3. To examine the factors that could highly influence the intention to use voice assistant technology among consumers.

1.6 Scope and Limitations

1.6.1 Scope

The study conducted is regarding factors influencing the usage of voice assistants in consumers' daily lives in Malaysia. The scope of this study focus on the users of voice assistant technology in Malaysia. In this study as well, researchers also focus on the consumer's intentions to use voice assistant technology, the relationship between the determining factors and the consumers' intention to use voice assistant technology, and the factors that could highly influence the intention to use voice assistant technology among consumers. The researcher select about 383 respondents among smartphone users in Malaysia, by distributing an online questionnaire to obtain information that is needed more clearly and in detail.

1.6.2 Limitations

There are some limitation in performing this study. The data collection might not accurate and can't represent the Malaysian consumers, since the study conducted focusing about voice assistant technology consumer in Malaysia, while the questionnaire are

distributed through online platform which is WhatsApp and Facebook and it is mostly respondent from Melaka and only 159 from 383 respondent responded to the online questionnaire.

The data obtained may be inaccurate as respondents may not feel motivated to deliver accurate and honest answers. In addition, respondents may also not feel comfortable offering responses that describe them negatively or disclose their privacy to the researcher.

Other than that, the data obtained is likely to be an error because prospective respondents might not interested in participating in this survey which will result in a low response rate and the time to finish the research is limited.

1.6 Significance of the Research

1.6.1 Theoretical Contribution

This research study will provide information on the factors that influence Malaysian consumers' willingness to use voice assistant technology. The study can also utilise this information to assess respondents' understanding of voice assistant technology. This research will also aim to investigate and expound on this area. Furthermore, this study might assist future researchers in obtaining more references on this subject. It may also assist other academics or researchers working on similar study areas, like as intention of consumers to use the voice assistant and factors that influencing the consumers.

1.6.2 Practical Contribution

This research will benefit the community, particularly those who utilise voice assistant technology in their everyday lives. This is done to encourage people to fully utilise voice assistants. The findings of this study will link the respondents' intention to use voice assistant technology with the factors that influence users to use the technology. This study will contribute to the developers of voice assistant technology to improve the voice assistant technology.

1.7 Summary

In short, voice assistants technology are rapidly advancing in a variety of industries, including banking, healthcare, government, security, construction, and retail. Context-based understanding has been a breakthrough in voice assistance technology over the past few years, and it is now becoming a crucial component in people's life. This chapter discussed the background of voice assistant technology. It also went through the issue description, research questions, research objectives, study scope and limitations, and importance. The literature review for this study are discussed in the next chapter. The information presented will be more comprehensive and understandable.

CHAPTER 2

LITERATURE REVIEW

2.1 Chapter Overview

This chapter attempts to review the relevant literature and research on the factors that affect consumer intention in using voice assistant technology. The chapter first discusses the definition of voice assistant technology, followed by factors affecting consumers' intention on voice assistant technology. The second part discusses the underpinning theory, UTAUT2 (Unified Theory of Acceptance and Use of Technology) developed by Venkatesh et al. (2012). The next part discussed the theoretical framework and hypothesis development, and the last part is a summary.

2.2 Voice assistant

Voice assistants are devices/apps that reply to humans using voice recognition technology, natural language processing, and AI technology (Aksheeta Tyagi, 2021). A voice assistant, also known as an intelligent personal assistant or a connected speaker, is a new type of device that is based on natural language speech recognition (Beaulieu, 2020). They let the user do a search using a speech command, as well as retrieve information via voice synthesis (K. Bridge, 2021).

In 1922, Radio Rex was the first voice-activated toy. It was a wooden dog toy that would come out of its house when its name was called. Bell Labs introduced "Audrey," the Automatic Digit Recognition machine, in 1952. The next decade witnessed incredible growth and research in the field of speech recognition, with most voice recognition systems progressing from knowing a few hundred words to comprehending thousands comprehending hundreds of people and gradually finding their way into customers' houses.(Maurya et al., 2021)

In IR 4.0 era, the emerging technologies such as virtual reality, augmented reality,

and voice interaction has modifying people's interactions with the environment and altering digital experiences. (Terzopoulos & Satratzemi, 2020). Personal voice assistants (VAs) are the most popular and influential technical devices that employ AI, as evidenced by the large number of expert publications in the subject of AI as well as the market's growth. Voice assistant is a conversational AI technology that receives and interprets orders using voice commands. Devices using this technology can communicate with and react to human enquiries in natural language. (R. Chotia, 2022).

Voice assistant programmes are built on the Automatic Speech Recognition (ASR) method (Raktim Midya, 2020). ASR systems take voice recordings and break them down into phonemes, which are subsequently processed into text. For human voice recognition, a phoneme is a basic unit of measurement. Whatever type of speech recognition software you choose, the ASR is where all the action takes place,(Haton, 2003). In a brief, the process begins with the device's microphone capturing speech. Speech waveforms are recorded and immediately sent to acoustic analysis, which is done on three levels.

Acoustic modelling is the initial level, and it depicts which phonemes were spoken and what words these phonemes completed. The next stage is Pronunciation modelling, which examines how phonemes are spoken, as well as if there is any accent or other vocal device peculiarities, in order to represent the phonetic variability of speech. Language modelling is the final stage, which aims to discover contextual probabilities based on which phonemes were collected.

The gadget uses technology to synthesise the user's message, break it down, assess it, and respond with a relevant response. The science fiction ideal of connecting with our computers by talking to them has come true with voice assistants. Siri from Apple, Cortana from Microsoft, Alexa from Amazon, and Assistant from Google are all software agents that operate on purpose-built speaker devices or smartphones. (Matthew, 2018)

According to the website of Amazon.com, Alexa is Amazon's voice artificial intelligence assistant. Alexa is a cloud-based service that can be used everywhere there is an internet connection and a device that can connect to Alexa. With the Google Pixel phone in 2016, Google Assistant was first launched to Android phones. According to Maggie (2022), after saying the "OK Google" or "Hey Google" wake words, Google Assistant provides voice commands, speech searches, and voice-activated device control, allowing users to execute a variety of activities. It is intended to allow users to engage in conversational

interactions. While Siri, which introduced as a feature of the iPhone 4S on October 4, 2011, was the first contemporary digital virtual assistant to be implemented on a smartphone. (Raul, 2021)

Voice assistants provide a number of intriguing features, including answering inquiries posed by users, use streaming music services to listen to music use timers or alarm clocks, make or receive phone calls or text messages, launch applications on the user's phone, obtain information from users' calendars as well as other personal data, and use the internet to get information on everything from meal reservations to directions and so on.

According to Hoy (2018), for most smartphone platforms, assistants are also available; Google's assistant is built into Android phones and may be downloaded as a separate app on the iPhone, but some functionalities are disabled. Amazon's Alexa app is available for Android and iOS, and Microsoft and Amazon are collaborating to bring Cortana to Amazon devices and Alexa to PCs. Siri is available on all Apple products, including iPhones, MacBook's, iPads, and the Apple Watch, however it is not available on non-iOS devices.

2.3 Review Literature

2.3.1 Consumer Intention to use

According to the vocalbulary.com, the word consumer is originated in Latin which is *consumere* and meant to use up, devour, or squander. (*Consumer - Definition, Meaning & Synonyms | Vocabulary.Com*, n.d.). As stated, consumers are individuals or organisations who purchase goods or services. Hiring products and services is also included in the definition. They are people or other economic entities who make use of a product or service. Furthermore, they do not sell the goods that they purchased.

They are the final consumers in the goods and services distribution chain. In truth, the customer is often not the purchaser. (MBN, n.d.). According to a website, (sumup, n.d.), consumers are not always the individuals who purchase a thing. For example, parents frequently purchase toys for their children. The parent is the client in this scenario, and the child is the consumer. Simply said, a customer is someone who buys a thing, while a consumer is someone who uses it. Because the customer is usually the consumer, the phrases are frequently used interchangeably.

Intention original word is derived from the Latin which is *intentus*, and later from the Old French, *entencion* (Intention; intent; aim.), (*Intention Etymology in English | Etymologeek.Com*, n.d.). According to Merriam-Webster Dictionaries, the definition of intention is a desire to act in a particular way. Aim, design, end, goal, intent, objective, object, and purpose are some synonyms for intention. While all of these phrases signify "what one aims to do or accomplish," intention suggests little more than what one intends to do or bring about. (*Intention Definition & Meaning - Merriam-Webster*, n.d.).

As stated in the article, (AndreyPopov, n.d.), consumer awareness of voice technologies and assistants is still in its early stages, despite all of the available technology and capabilities. However, there is no disputing that voice is the way of the future. Technology will continue to influence and modify customer behaviour, and businesses must plan and react accordingly. Search, advertising, content, and commerce are all being influenced by the way customers engage with companies as a result of speech technology.

According to a research (Talukder, n.d.), a person's adoption of technology is influenced not just by individual attitudes but also by corporate policies, techniques, and actions. Organizations must create enabling conditions, which include the amount and type of assistance offered to individuals who impact their use of technology.

2.3.2 Performance Expectancy

Performance Expectancy is defined as "the extent to which employing a technology would offer customers with benefits in executing specific tasks" (Venkatesh, Thong & Xu, 2012, p.159). Performance Expectancy is one of four major pillars of the first UTAUT, according to Venkatesh et al. (2012). According to them, Performance Expectancy "influences behavioural intention to employ a technology" (p.159). Already in 2003, Venkatesh, Morris, Davis, and Davis asserted that Performance Expectancy was the most powerful predictor of behavioural goals.

2.3.3 Effort Expectancy

As Performance Expectancy, Effort Expectancy, and two more basic columns may be discovered inside the UTAUT forecasting the factors that impact the behavioural reasons to manage and use a technology (Venkatesh et al., 2012). They claim that customers evaluate

time and effort when establishing an opinion on the total effort required to embrace and use technology. This means that before selecting to buy or use a technology, customers carefully consider the effort necessary to adopt and operate the technology. Based on their assessment, their chance of adopting the technology increased or decreased.

2.3.4 Social Influence

Researchers have thoroughly studied the principles of social influence and demonstrated the effects of social influence on altering users' actions (Huang & Kao, 2015). The Unified Theory of Acceptance and Use of Technology (UTAUT) element of social influence is described as a person feeling the importance that others believe he or she should use the new technology. Because it is impacted by the encouragement of the people and environment around them, social influence becomes the most important supporting component in a person's usage of a new system.(Brata, 2018).

2.3.5 Facilitating Condition

The degree to which a person feels that organisational and technological infrastructure exists to facilitate the usage of a system is referred to as facilitating conditions (Venkatesh et al., 2003). Facilitating condition are environmental elements that allow Malaysian customers to adopt voice assistants. Indicators such as perceived behavioural control and compatibility play a big role in determining facilitating environments.(Onaolapo & Oyewole, n.d.)

2.3.6 Hedonic Motivation

Hedonic motivation is defined as the desire to perform something because it gives one pleasure. Hedonic motivation is connected to the substance of an individual's psychological and emotive experiences, which may be generated by both individual qualities and cognitive states, according to the hedonic view of individual actions (Huang & Kao, 2015). According to (Tamilmani et al., 2019), hedonic motivation is regarded as the most significant theoretical addition to the UTAUT2 since it introduced a much-needed emotive component into the mostly cognition-based UTAUT. The hedonic motivation is critical factors in influencing technology intention among consumers.

2.3.7 Habit

According to Venkatesh et al. (2012), Habit refers to an individual's proclivity to perform behaviours automatically during the learning process. Consumers' habits are heavily impacted by prior experiences with that device or other technology products. It was said that prior usage is a strong predictor of future use of a technology. The habit construct was introduced for the following two reasons. To begin, the habit is considered antecedent behaviour. Second, habit might be defined as the extent to which individuals assume the action is automatic.

2.4 Underpinning Theory

Venkatesh et al. (2012) created this model as an extension of the original Unified Theory of Acceptance and Use of Technology. In addition, factors important to the consumer market that impact behavioural intentions to adopt new technology are included. It were developed to assess the adoption of a new technology in the consumer market. Model of the Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh et al., 2012: 160)this extended model are extracted factors from the original UTAUT model for the consumer context and enhanced it by integrating the three components listed below, which improved prediction of behavioural intention and use action. This unified theory will be able to verify the expanded UTAUT model in Malaysia since it is based on significant models that focus on the context of consumer usage of technology.

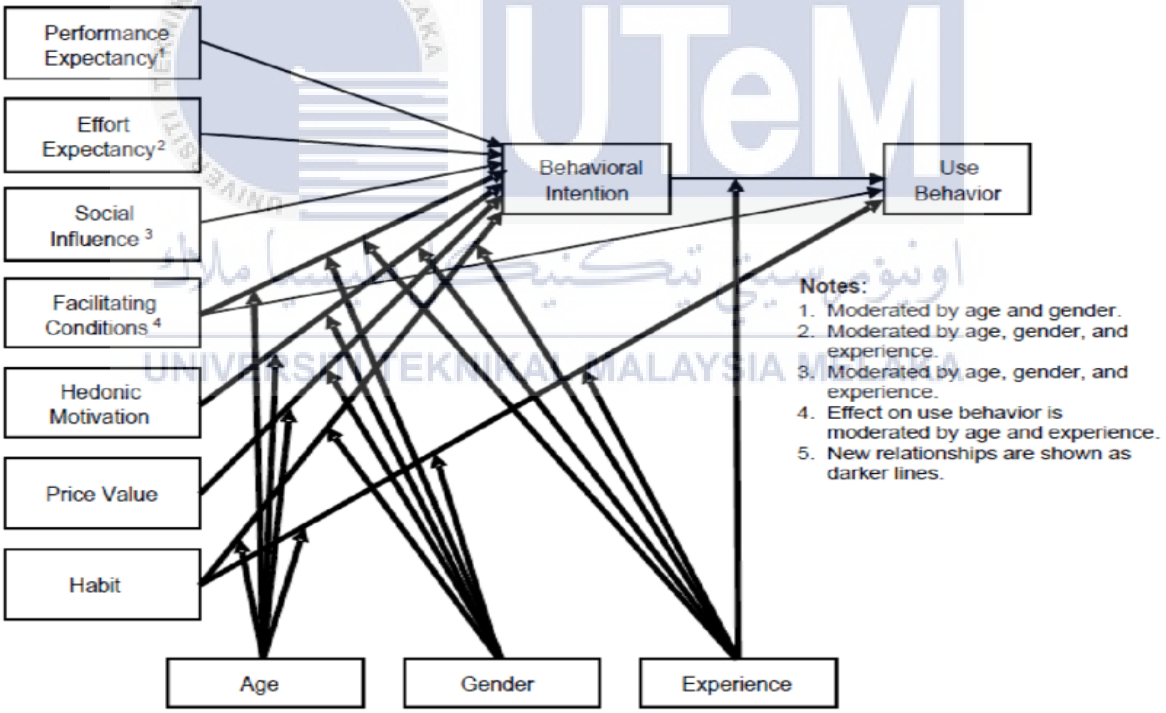

Figure 2.0.1 UTAUT2 (Unified Theory of Acceptance and Use of Technology)
Source from: Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2012)

2.5 Theoretical Framework

The theoretical framework were develop based on the framework Unified Theory of Acceptance and Use of Technology as this study is done in the perspective of Unified Theory of Acceptance and Use of Technology model by Venkatesh (2012). In Unified Theory of Acceptance and Use of Technology model, there are seven factors that will influence the consumer's intention which is performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, price value, and habit. The independent variable is performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, and habit which is the factors that would affect the dependent variable which is intention to use voice assistant technology.

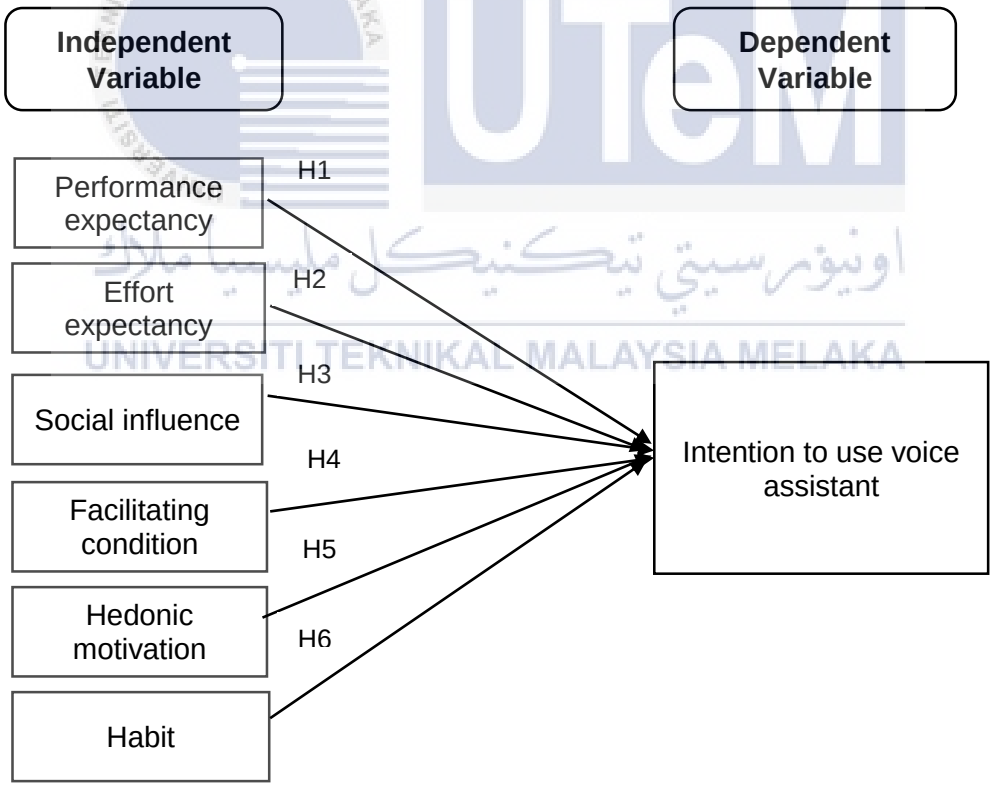

Figure 2.0.2 Research Framework

2.6 Hypothesis Development

From the framework designed, there are several hypotheses proposed to test the direct effects of independent variables and dependent variable. The hypotheses are constructed as below:

H1. There is significant relationship between performance expectancy and intention to use voice assistant technology

H2. There is significant relationship between effort expectancy and intention to use voice assistant technology

H3. There is significant relationship between social influence and intention to use voice assistant technology

H4. There is significant relationship between facilitating condition and intention to use voice assistant technology

H5. There is significant relationship between hedonic motivation and intention to use voice assistant technology

H6. There is significant relationship between habit and intention to use voice assistant technology

2.7 Summary

In short, this chapter defines the intention to use voice assistant before moving into the study's independent variables, which are performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, and habit. The research also explains the Unified Theory of Acceptance and Use of Technology. Finally, in the final section, a theoretical framework and hypothesis formation are included.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Chapter Overview

This chapter will discuss the methodology used in this study. In this chapter as well, researcher also will discuss every aspect of performing this research, including the research strategy, sampling design, population, population frame, and interview sample methodologies. Finally, this chapter describes in detail the chosen mode of analysis and data gathering procedure, time horizon and summary.

3.1 Research Design

According to Kuan (2014), a research design refers to the framework for planning and carrying out a specific research project. The research design is the most significant aspect of the study since it incorporates all four major considerations: the strategy, the conceptual framework, the identification of who and what to study and the instruments and methods to be utilised for data collection and analysis (Kuan et al., 2014).

In this research, a quantitative survey are conducted to investigate the intention of Malaysian consumers to use voice assistants. This study's main research approach is a survey. Survey research is described by Brant (2015) as "the collecting of information from a sample of persons through their replies to questions." This form of research provides for a range of approaches for recruiting individuals, collecting data, and utilising various instrumentation methods.(Brant et al., 2015). Descriptive research is used in this study to identify customers' intentions to use voice assistant technology and to analyse the link between the discovered parameters and consumers' plans to use voice assistant technology.

3.2 Research Design Method

3.2.1 Descriptive Research Design

A descriptive research design is a sort of research design that seeks data to systematically characterise a phenomena, situation, or population. It specifically assists in

answering the what, when, where, and how questions about the research challenge, rather than the why. To investigate the variables in question, the descriptive method of research may involve the use of a variety of research methods (Voxco, 2022). The descriptive research variable in this study is effects of performance and effort expectancy, social influence, facilitating conditions, habit and hedonic motivation.

3.2.2 Quantitative Research Design

The objective of quantitative research is to determine how many individuals believe, behave, or feel in a particular manner. Quantitative studies employ huge sample sizes, focusing on the amount of replies rather than the more focused or emotional understanding that qualitative research aims.(*Quantitative Research Design*, 2022). The typical format in quantitative research design is to ask each responder the same questions, ensuring that the entire data sample can be fairly analysed. The data is provided in numerical format and may be quantifiably analysed using statistical methods.

3.2.3 Explanatory Research Design

Explanatory research uses indirect connections to describe a context or problem. This form of study material in gaining new insights into a situation in order to construct, expand, extend, or test a hypothesis. (Rahi, 2017). According to Boru (2018), an explanatory research attempts to explain and account for the descriptive data. Explanatory studies strive to answer why and how questions. In this study, the researcher used explanatory analysis to study the hypotheses

3.3 Research Strategy

According to Johannesson (2014), a research strategy is a comprehensive plan for carrying out a research investigation. A research strategy directs a researcher's study design, execution, and monitoring.(Johannesson & Perjons, 2014). It is a step-by-step plan of action that directs ideas and efforts, allowing research to be conducted consistently and on time to yield excellent results and thorough reporting.

In this study, quantitative method will be used to collect data by distributing online questionnaire to investigate the intention to use voice assistant technology among Malaysian consumer.

This studies will applied the 5-point Likert Scale. A form of quantitative response scale in which respondents indicate their level of agreement with a statement using a five-point scale: (1) Strongly disagree; (2) Disagree; (3) undecided; (4) Agree; (5) Strongly agree.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
(1)	(2)	(3)	(4)	(5)

Figure 3.0.1 The 5-Point Likert Scale

3.3.1 Questionnaire Design

The questionnaire will be created using Google Forms and delivered through the internet. The questionnaire will be broken into two sections: section A will provide responder demographics, and section B will be separated into various sections.

3.4 Scientific Canon

3.4.1 Reliability

The consistency with which a method measures something is referred to as its reliability. The measurement is regarded trustworthy if the same result can be consistently obtained by using the same procedures under the same conditions.(Middleton, 2019). The qualities of measuring scales and the items that comprise the scales may be studied using reliability analysis.

The Reliability Analysis process computes a variety of regularly used measures of scale reliability as well as information on the relationships between particular scale items.(IBM, 2021). Cronbach's alpha is a statistic that is used to evaluate the reliability, or internal consistency, of a group of scale or test items.

Cronbach's alpha is normally between 0 and 1. Closer to 1.0 values suggest more internal consistency of the scale's variables. Higher Cronbach's alpha values indicate more scale dependability. A number of 1.0 implies that all test-score variability is attributable to real score differences (i.e., reliable variance) with no measurement error.(Howard, n.d.)

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Figure 3.0.2 Cronbach's Alpha Rule of Thumb

3.4.2 Validity

According to Middleton (2019), the accuracy with which a technique measures what it is designed to measure is referred to as validity. If research has high validity, it delivers conclusions that correlate to genuine physical or social features, traits, and variations.(Middleton, 2019). One sign that a measurement is legitimate is high dependability. If a technique is unreliable, it is most likely invalid. Internal validity is applied in this study to assess the scale items in the questionnaire.

3.4.3 Pilot Test

A pilot test is a small research stage that is used to test a planned research study before it is performed on a larger scale. This smaller research normally adheres to the same protocols and procedures as its larger version. A pilot research's principal goal is to assess the viability of the intended big investigation.(Saunders et al., 2007) A pilot test was undertaken among participants prior to the introduction of the questionnaire to confirm that the questionnaire works, the questions offered are usually intelligible, and the respondents are able to answer the questions requested and follow the directions given (Saunders et alia, 2019).

Researchers gathered and analysed data from 30 samples throughout this study. Each of these respondents has a unique viewpoint on the desire to utilise a voice assistant. All data from this pilot test was transferred into SPSS 28.0 for further analysis.

Table 3.0.1 Reliability Statistic of Each Variables in Pilot Test

Variable	Cronbach's Alpha	Number of Items	Strength of Association
Independent Variable			
PE	0.892	4	Good
EE	0.654	4	Questionable
SI	0.937	4	Excellent
FC	0.735	4	Good
HM	0.935	4	Excellent
HB	0.884	4	Good
Dependent Variable			
ITU	0.760	3	Good

According to the table above, the Cronbach Alpha value for independent variable which is performance expectancy scored 0.892 which falls under good reliability. Next, the Cronbach's Alpha result on effort expectancy is 0.654 which is considered as questionable reliability. However, a general accepted rule is that alpha of 0.6-0.7 indicates an acceptable level of reliability (Ursachi et al., 2015).

While, for social influence Alpha coefficient is 0.937, and hedonic motivation is 0.935 which both considered as an excellent reliability. For both facilitating condition and habit, the score for Alpha Coefficient respectively 0.735 and 0.884 which consider as good reliability test. Lastly, the only dependent variable, which is intention to use scored 0.760 and considered as good reliability.

Given that all of the variables had Cronbach alpha values more than 0.60, it is possible to conclude that the overall reliability test of all items in the questionnaires employed is acceptable and suitable for further research.

Table 3.0.2 Reliability Statistic of Pilot Test Based On Overall Variable

Reliability Statistics

Cronbach's Alpha	N of Items
.947	27

In this questionnaire, there are 27 items have been included to test the reliability of the variables. According to the following table, the Cronbach's Alpha of the entire questionnaire is 0.946. The strength of relationship was excellent reliability. As a result, the objects are said to have a significant amount of internal consistency.

3.5 Sampling Design

3.5.1 Target Population

In understanding intention to use voice assistant technology among Malaysian consumers, the target population for this study are smartphone device users among Malaysian especially those who are more likely to use advanced mobile phone services, commonly acquiring the latest technology of mobile phones and also possessing the IT knowledge for the use of voice assistant technology. Furthermore, the users of smartphones are targeted because they are more likely to use voice assistant technology than individuals who do not have smartphones

3.5.2 Sampling Techniques

Sampling technique is a method that allows researchers to infer information about a population based on data from a portion of the population rather than investigating every person. Reducing the number of participants in a research lowers costs and workload while also making it easier to acquire high-quality data. (McCombes, 2019)

In this research, the non-probability which is convenient sampling is chosen to carry out to carry out the survey. Non-probability sampling is a technique for picking units from a population that is subjective. Non-probability sampling is a quick, convenient, and economical approach to collect data since it does not require a complete survey frame.

According to Phast, convenience sampling is possibly the simplest technique of sampling since participants are chosen based on their availability and desire to participate. Although useful findings can be achieved, the results are subject to considerable bias since individuals who agree to participate may differ from those who do not (volunteer bias), and the sample may not be representative of other factors, such as age or gender.(Phast, n.d.)

3.5.3 Sampling Size

The number of individuals or observations included in a research is referred to as the sample size. This number is commonly represented by the symbol n. The sample size effects two statistical properties: the precision of our estimations and the study's ability to make conclusions. Proper sampling procedures are critical for removing bias from the selection process. It may also allow for a decrease in the cost or effort needed to collect samples. One of the most used method is the Krejcie and Morgan Sampling Method. To simplify the process of determining the sample size for a finite population, Krejcie & Morgan (1970), came up with a table using sample size formula for finite population.(*KREJCIE AND MORGAN SAMPLING METHOD*, 2017). Based on the table provided, the sampling size for this studies are 383 respondent since the total population is more than 1000,000. However, due to insufficient item, the respondent were only 159 that participated. A decent survey response rate, according to Lucia (2022), is between 5% and 30%. This research average response rate are 41.51%/ Thus, it is acceptable response rate to further this study.

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

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Figure 3.0.3 Krejcie and Morgan (1970) sampling size table

3.6 Data Collection Methods

3.6.1 Primary Data

The data for this study were gathered using structured questionnaires. It is a collection of closed-ended questions used to acquire information from individuals. The use of questionnaires has the benefit of covering a big sample at a low cost while being representative of its community.(Kuan et al., 2014). A structured questionnaire is a document that consists of a series of standardised questions with a predetermined strategy for getting information from respondents (Cheung, 2014). Since questions are designed and generated ahead of time, all responders are asked the identical questions in the same sequence. These questions were evaluated using a 7-point Likert scale, with responses

ranging from "strongly disagree" to "strongly agree" (Venkatesh et al. 2012). The survey methodology were altered to meet the needs of the present study, which is looking into customer intentions to employ voice assistant technology.

3.6.2 Secondary Data

Secondary data is data that has previously been gathered or created by others. Secondary data collected include government publications, books, internet, journal internal records, and so forth.(Ajayi, 2017) This data was used in the literature review for a better understanding

3.6.3 Measurement of Construct

Table 3.0.3 Measurement of Construct

Dependent Variable	**Measurement items**	**Source of measurement**
Intention to use voice assistant technology	I am willing to use voice assistant technology.	(*Voice Assistant Usability and User Experience Survey*, n.d.)
	In the future, I will frequently use voice assistant technology	
	I will highly recommend people to make use of voice assistant technology	(V. Tran et al., 2019)

Independent Variable	**Measurement items**	**Source of measurement**
Performance expectancy	The voice assistant always understand my question/command accurately	(Onaolapo & Oyewole, n.d.)
	The voice assistant always provides relevant and reliable response or feedback	
	It always do exactly what I thought it would do	

	I would find the voice assistant useful in performing my job.	(V. Tran et al., 2019)
Effort expectancy	It is simple for me to learn how to utilise voice assistants.	(Wagner et al., n.d.)
	The voice technology in my smartphone required less effort to activate	
	I would find the voice assistant on my smartphone is easy to use.	(V. Tran et al., 2019)
	I find voice assistant technology on my smartphone is flexible to interact with	
Social influence	People around (such as family and friends) influenced me to use voice assistants	(Kessler & Martin, 2017)
	People who influence my behaviour think that I should use the voice assistant technology	Salim, B. (2012)
	People whose opinions I value suggest that I use a voice assistant.	
	My peers think I should use a voice assistant.	
Facilitating condition	I am able to use voice assistant technology	(Xu & Gupta, 2009)
	Using voice assistant technology is entirely within my control	Salim, B. (2012)
	I have the necessary knowledge to use a voice assistant	

	I can get guidance and help regarding the use of voice assistant difficulties from the system and user's guide.	
Hedonic motivation	I feel happy and comfortable interacting with voice assistant technology	(McLean & Osei-Frimpong, 2019)
	The entire process of utilising my voice assistant is interesting.	
	Using voice assistant is enjoyable	
	Using voice assistant on my smartphone is very entertaining.	(V. Tran et al., 2019)
Habit	I've become habituated to the use of voice assistants.	(Wagner et al., n.d.)
	I often use a voice assistant to perform simple tasks (set alarms, playing songs, making calls)	
	I use voice assistants without even thinking about it.	(Tran et al., 2019)
	I've been using voice assistant on my smartphone for quite some time.	

3.7 Data Analysis Tools

According to Steven (2022), the process of analysing raw data to get relevant insights is known as data analysis.(STEVENS, 2022). The method listed are used in this research

3.7.1 Pearson's Correlation Coefficient

The correlation coefficient (ρ) is a metric that measures how closely two variables' movements are related. The Pearson moment correlation, which generates the most frequent correlation coefficient, is used to quantify the linear connection between two variables. A positive association is shown by a linear correlation coefficient larger than zero. A number

less than zero indicates a negative association. Finally, a value of 0 shows that there is no link between x and y.(Nickolas, 2021).

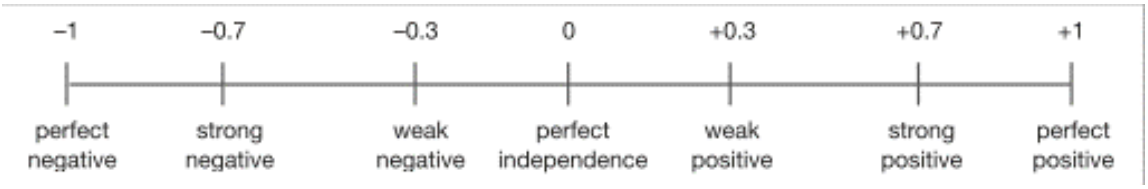

Figure 3.0.4 Values Of The Pearson's Correlation Coefficient
Source: (Saunders et al., 2007)

3.7.2 Regression Analysis

Regression analysis is a collection of statistical methods for estimating connections between one or more independent variables and a dependent variable. (*Regression Analysis - Formulas, Explanation, Examples and Definitions*, 2022). Multiple linear regression analysis is similar to basic linear regression analysis in that multiple independent variables are utilised in the model. Multiple regression is applied in this study as it has six independent variables and one dependent variable. Multiple linear regression is mathematically represented as follows where Y is the dependent variable (or response variable), while X is the independent variable (or covariate variable):

$$Y=\alpha+\beta_1X_1+ \beta_2X_{2+} \beta_3X_3$$

3.8 Time Horizon

According to Saunders et al. (2007), independent of the study technique applied, time horizons are required for the research design.(Saunders et al., 2007) Longitudinal and cross-sectional time frames are the two forms of time horizons. Longitudinal studies are repeated over a long period of time. Cross-sectional studies have a restricted time range. This study is also constrained by a time period, hence the cross-sectional time horizon is employed.

3.9 Summary

This chapter covered through the research design, sample processes, data collecting, and variable measurement. The interpretations of the data-driven outcomes are be addressed and presented in the next chapter.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.0 Introduction

In this chapter, the researcher presented the results of the analyses performed in this study, as stated in Chapter 3. A total of 159 from 383 respondents were collected for this study and are being analysed using SPSS software. This software was broadly utilized in order to examine the hypotheses for this study's validity. The results will be shown as pie charts and tabulated statistics.

Chapter 4 is divided into four parts, the first of which is a descriptive analysis of the demographic profile of the respondents. The next part will go through reliability analysis for pilot tests as well as measurement for valid reliability tests. Section 3 will present the results of inferential analysis, which will include Pearson Correlation analysis and Multiple Regression Analysis to assess the link between independent and dependent variables. This chapter will come to an end with a conclusion.

4.1 Descriptive Analysis

This part will explain the data collected from the questionnaire, primarily descriptive data analysis. This section will offer a brief overview of the sample and the results. The demographical information gathered from 159 respondents is disclosed through data analysis.

4.1.1 Demographic Respondent

Table 4.0.1 Demographic Background of Respondents

Demographic	Demographic Details	Frequency	Percentage (%)
Gender	Male (a)	63	39.6
	Female (b)	96	60.4
Age	19 years old and below (a)	7	4.4
	20 – 30 years old (b)	130	81.8
	31 – 40 years old (c)	7	4.4
	41 – 50 years old (d)	8	5.0
	51 years old and above (e)	7	4.4
Education	SPM (a)	18	11.3
	Diploma/STPM (b)	42	26.4
	Degree (c)	87	54.7
	Master (d)	12	7.5
Occupational Sector	Government sector (a)	11	6.9
	Private sector (b)	40	25.2
	Self-employed (c)	17	10.7
	Student (d)	86	54.1
	Others (e)	5	3.1
Do you familiar with voice assistant technology?	Yes (a)	138	86.8
	No (b)	21	13.2

What voice assistant do you use on your smartphone	Siri (a)	87	54.7
	Google Assistant (b)	65	40.9
	Bixby (c)	7	4.4
How often do you use a voice assistant on your smartphone	Never or rarely (a)	46	28.9
	At least once a month (b)	59	37.1
	Once a week (c)	38	23.9
	1-3 times daily (d)	16	10.1
	4-6 times daily (e)	0	0
What task do you assign to your voice assistant	Make calls, send text messages (a)	50	31.4
	Open apps on a smartphone (b)	26	16.4
	Look things up online (c)	26	16.4
	Provide directions(maps) (d)	18	11.3
	Set appointments on calendars (e)	10	6.3
	Play Music (f)	29	18.2
When do you often use the voice assistant on your smartphone	While cooking (a)	21	13.2
	While watching TV (b)	7	4.4
	When in bed (c)	48	30.2
	While working (d)	18	11.3
	While driving (e)	43	27.0
	While studying (f)	22	13.8

4.1.1.1 Gender

Table 4.0.2 Gender

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (male)	63	39.6	39.6	39.6
	b (female)	96	60.4	60.4	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

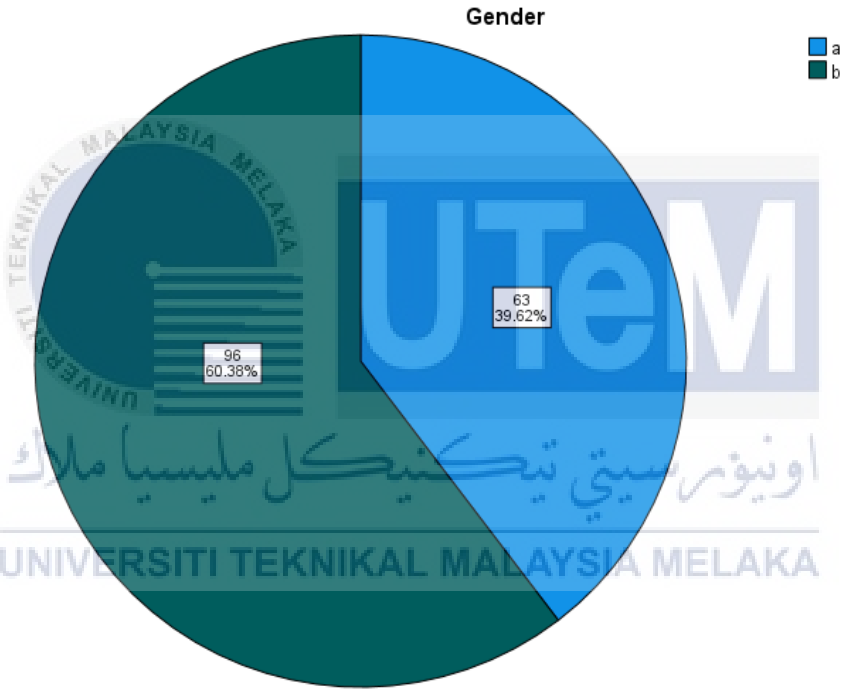

Figure 4.0.1 Gender

The whole sample of 159 respondents obtained from the survey is shown in table 4.2. From Figure 4.2.1.1, it can be seen that the number of female respondents, 96 (60.4%), exceeds the number male respondents, 63 (39.6%), out of a total sample of 159 respondents.

4.1.1.2 Age

Table 4.0.3 Age

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (19 years old and below)	7	4.4	4.4	4.4
	b (20 – 30 years old)	130	81.8	81.8	86.2
	c (31 – 40 years old)	7	4.4	4.4	90.6
	d (31 – 40 years old)	8	5.0	5.0	95.6
	e (51 years old and above)	7	4.4	4.4	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

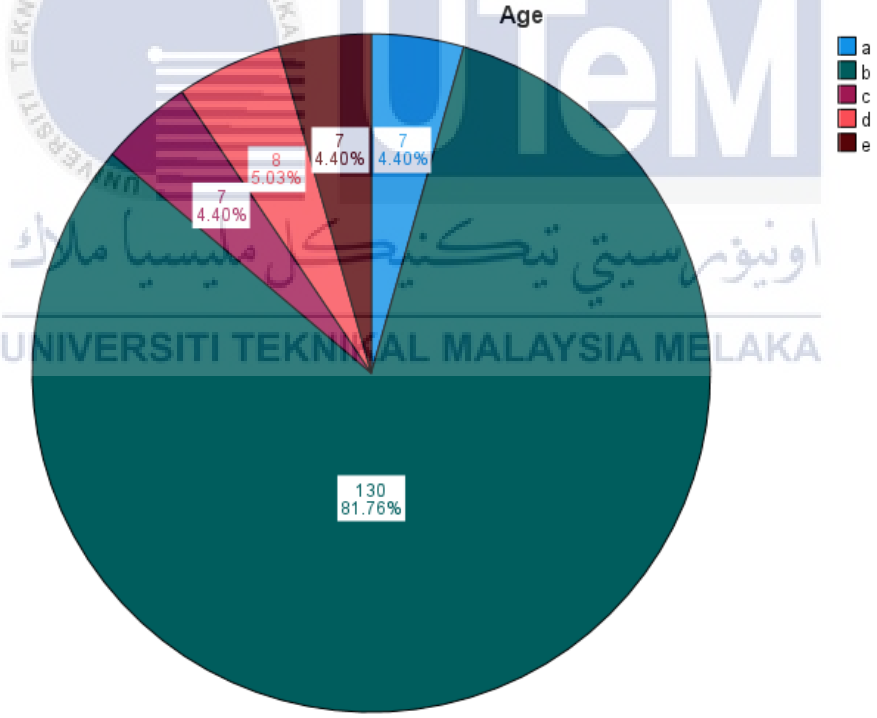

Figure 4.0.2: **Age**

From table 4.2 mentioned above, it can be seen that the respondents aged 19 years and below, 31 to 40 years and 51 years and above are 7 (4.4%) people respectively. While respondents who are 31 to 40 years old are as many as 8 (5.0%) people and it can be seen that respondents who are 20 to 30 years old are the highest which is a total of 130 people equal to 81.8%.

4.1.1.3 Education

Table 4.0.4: Education

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (SPM)	18	11.3	11.3	11.3
	b (Diploma/STPM)	42	26.4	26.4	37.7
	c (Degree)	87	54.7	54.7	92.5
	d (Master)	12	7.5	7.5	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

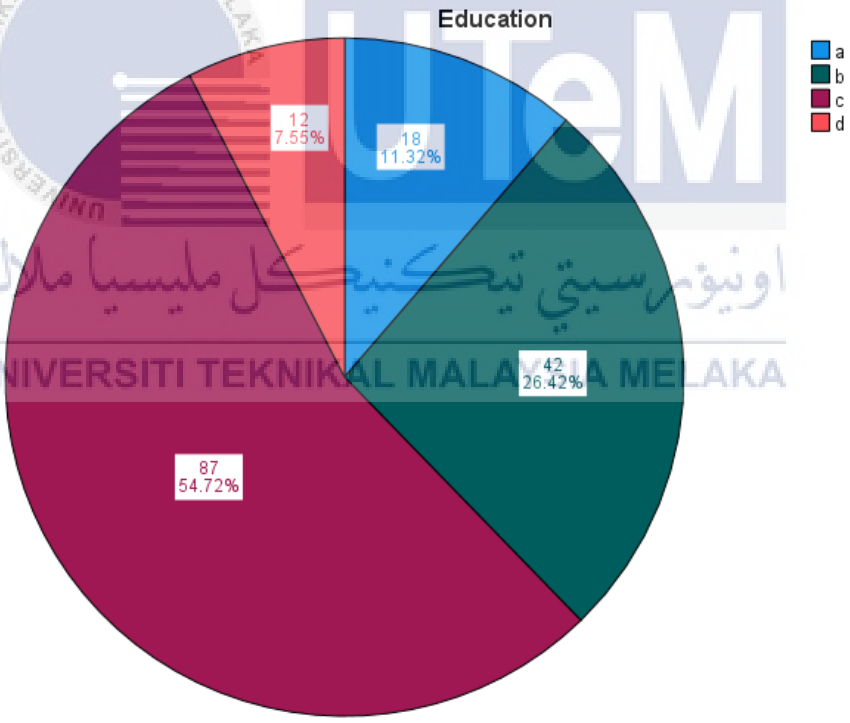

Figure 4.0.3: Education

Based on the table above, a total of 159 respondents have various levels of education. There are 18 (11.3%) respondents for the SPM level, while 42 (26.4%) respondents are diploma holders. Next, for degree and master respectively, there are 87 (54.7%) and 12 (7.5%) respondents.

4.1.1.4 Occupational Sector

Table 4.0.5 Occupational Sector

Occupational sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (Government sector)	11	6.9	6.9	6.9
	b (Private sector)	40	25.2	25.2	32.1
	c (Self-employed)	17	10.7	10.7	42.8
	d (Student)	86	54.1	54.1	96.9
	e (Others)	5	3.1	3.1	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

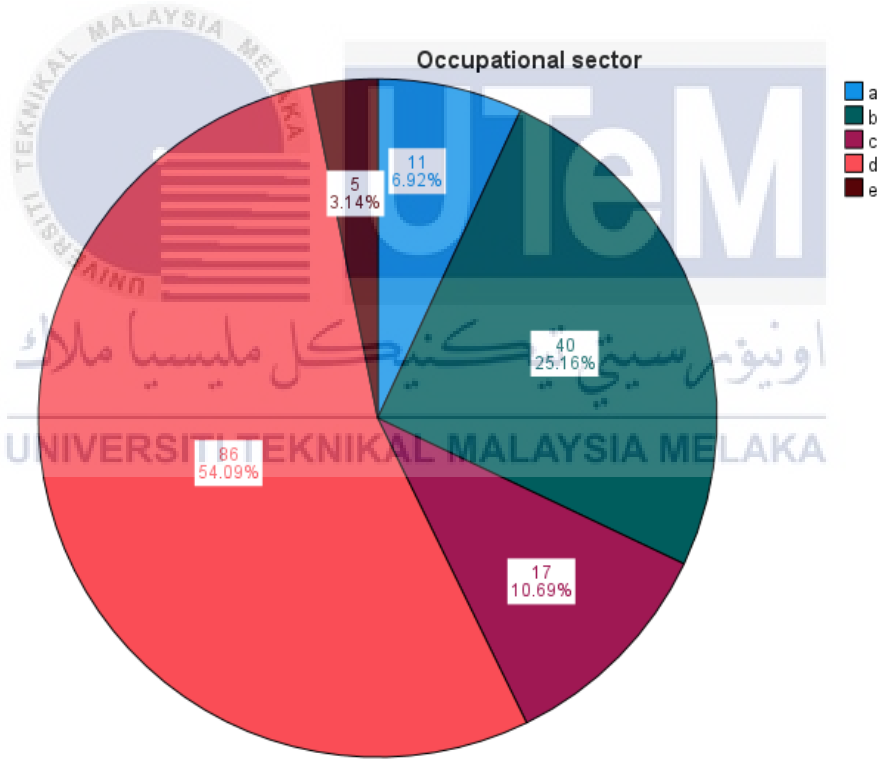

Figure 4.0.4 Occupational Sector

Based on the table above, it can be seen that a total of 11 (6.9%) of the 159 respondents work in the government sector while the respondents who work in the private sector are as many as 40 people which is equivalent to 25.2%. In addition, respondents who are self-employed and others 17 (10.7%) and 5 (3.1%) respectively. Lastly, for respondents who are students, it is as many as 86 (54.1%) which is the highest respondent.

4.1.1.5 Do you familiar with voice assistant technology

Table 4.0.6 Do you familiar with voice assistant technology

Do you familiar with voice assistant technology?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (yes)	138	86.8	86.8	86.8
	b (no)	21	13.2	13.2	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

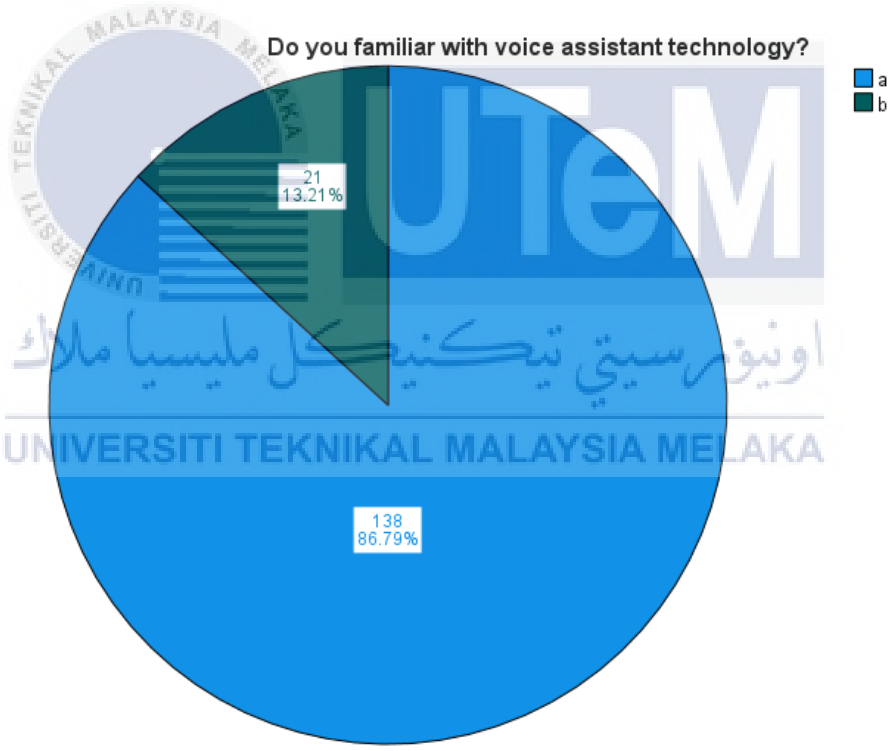

Figure 4.0.5 Do you familiar with voice assistant technology

According to the table above, it can be seen that the number of respondents who chose yes is a total of 138 people (86.8) which is higher than the number of respondents who choose no which is a total of 21 respondents equal to 13.2%.

4.1.1.6 What voice assistant do you use on your smartphone?

Table 4.0.7: What voice assistant do you use on your smartphone?

What voice assistant do you use on your smartphone?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (Siri)	87	54.7	54.7	54.7
	b (Google Assistant)	65	40.9	40.9	95.6
	c (Bixby)	7	4.4	4.4	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

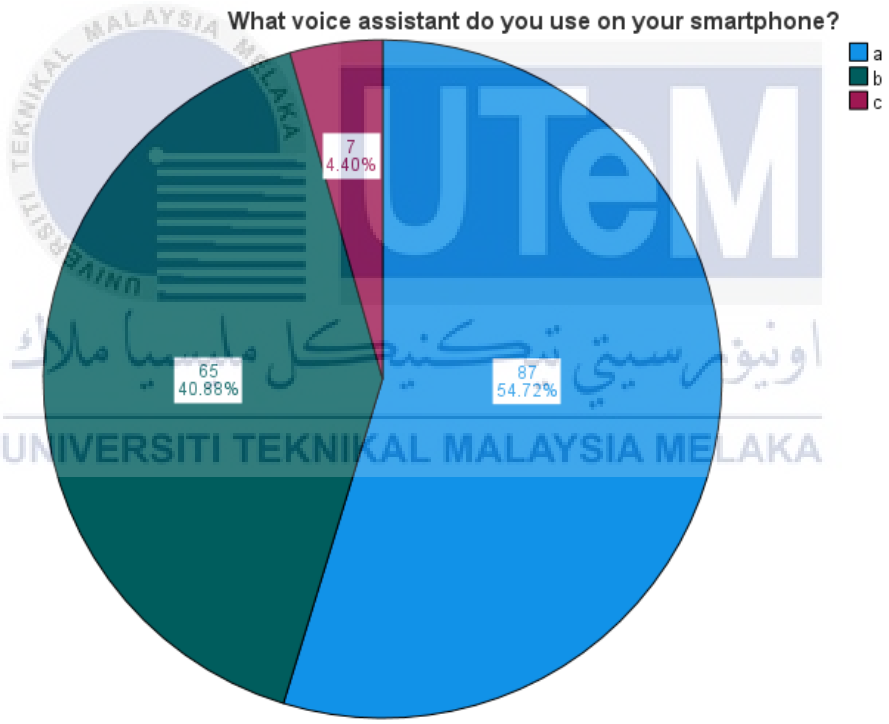

Figure 4.0.6: What voice assistant do you use on your smartphone?

Based on the table above, it can be seen that a total of 87 respondents, which is equivalent to 54.7%, use Siri as a voice assistant on their smartphones, which exceeds the number of respondents who use Google Assistant and Bixby. The respondents who use google assistant and Bixby are 65 (40.9%) and 7 (4.4%), respectively.

4.1.1.7 How often do you use a voice assistant on your smartphone?

Table 4.0.8: How often do you use a voice assistant on your smartphone?

How often do you use a voice assistant on your smartphone?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (Never or rarely	46	28.9	28.9	28.9
	b (At least once a month)	59	37.1	37.1	66.0
	c (Once a week)	38	23.9	23.9	89.9
	d (1-3 times daily)	16	10.1	10.1	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

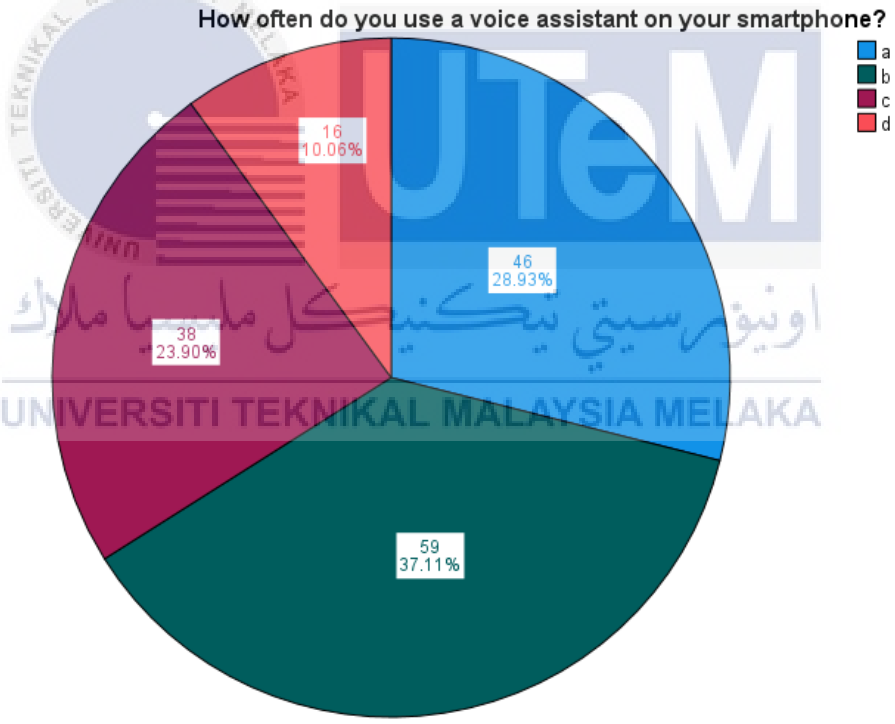

Figure 4.0.7: How often do you use a voice assistant on your smartphone?

Based on the table above, a total of 46 (28.9%) out of 159 respondents have chosen never or rarely for the question How often do you use a voice assistant on your smartphone. While a total of 59 (37.1%) respondents chose at least once a month for this question. In addition, for respondents who chose once a week and 1-3 times daily, respectively, there were 38 (23.9%) and 16 (10.1%) respondents.

4.1.1.8 What tasks do you assign to your voice assistant?

Table 4.0.9 What tasks do you assign to your voice assistant?

What tasks do you assign to your voice assistant?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (Make calls, send text messages)	50	31.4	31.4	31.4
	b (Open apps on a smartphone)	26	16.4	16.4	47.8
	c (Look things up online)	26	16.4	16.4	64.2
	d (Provide directions(maps)	18	11.3	11.3	75.5
	e (Set appointments on calendars)	10	6.3	6.3	81.8
	f (Play music)	29	18.2	18.2	100.0
	Total	159	100.0	100.0	

Source: Output SPSS

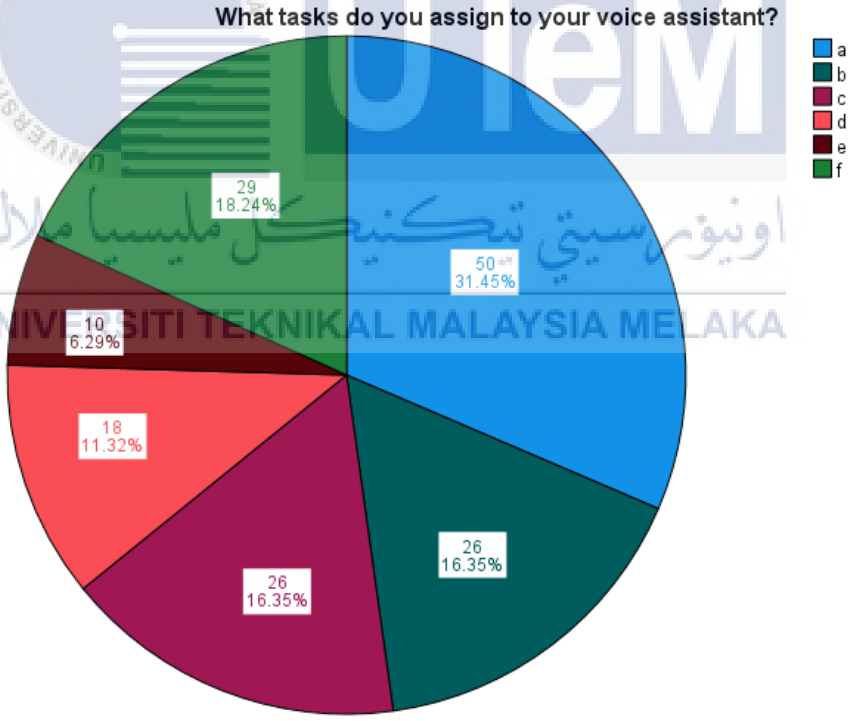

Figure 4.0.8: What tasks do you assign to your voice assistant?

Based on the table above, a total of 50 (31.4%) of the 159 respondents have chosen to make a call, send a text message for the question 'what tasks do you assign to your voice assistant?' Next the number of respondents who choose to open the application on their smartphone

and look things up online respectively is 26 respondents (16.4%). In addition, a total of 18 respondents which is equal to 11.3% chose to provide directions (maps) for this question. Lastly, 10 (6.3%) respondents chose set appointments on calendars while 29 (18.2%) respondents chose to play music.

4.1.1.9 When do you often use the voice assistant on your smartphone?

Table 4.0.10: When do you often use the voice assistant on your smartphone?

When do you often use the voice assistant on your smartphone?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a (While cooking)	21	13.2	13.2	13.2
	b (While watching TV)	7	4.4	4.4	17.6
	c (When in bed)	48	30.2	30.2	47.8
	d (While working)	18	11.3	11.3	59.1
	e (While driving)	43	27.0	27.0	86.2
	f (While studying)	22	13.8	13.8	100.0
	Total	159	100.0	100.0	

Source: SPSS Output

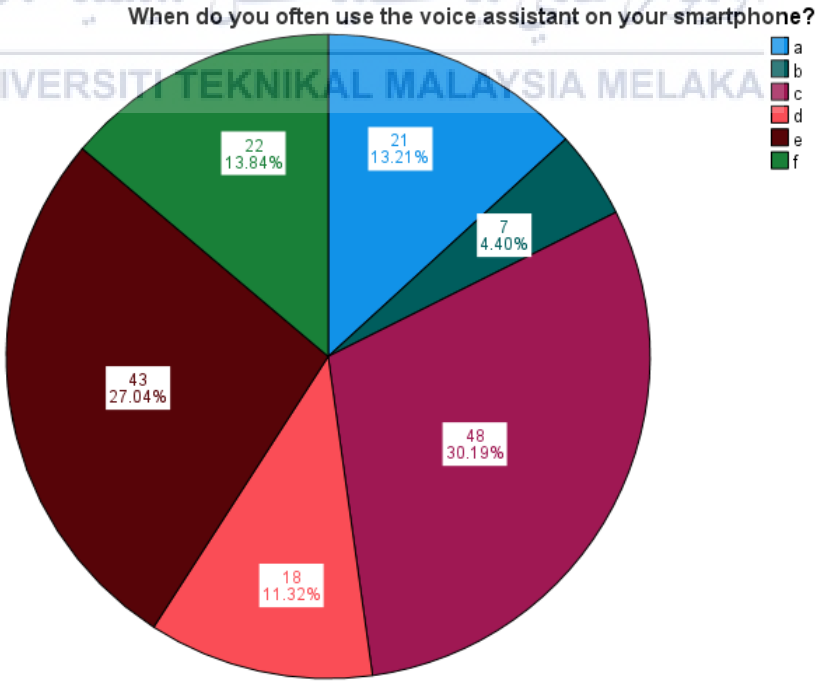

Figure 4.9: When do you often use the voice assistant on your smartphone?

Based on the table above, 21 (13.2%) of the 159 respondents who answered this survey chose when cooking for the question 'When do you often use the voice assistant on your smartphone?' while 7 (4.4%) respondents chose when watching TV. Next, while in bed is the highest answer choice compared to the other which is 48 respondents (30.2%). In addition, for while working and while driving are 18 (11.3%) and 43 (27.0%) respectively. Lastly, for the respondents who chose while studying there were 22 people which is equivalent to 13.8%.

4.1.2 Factors Influencing Consumers' Intention to Use Voice Assistant Technology

4.1.2.1 Performance Expectancy (PE)

Table 4.0.11: Performance Expectancy (PE) Descriptive Analysis

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
The voice assistant always understand my question/command accurately.	159	1	5	3.53	.973
The voice assistant always provides relevant and reliable response or feedback	159	1	5	3.75	.819
It always do exactly what I thought it would do	159	1	5	3.70	.946
I would find the voice assistant useful in performing my job	159	1	5	4.01	.904
Valid N (listwise)	159				

Source: SPSS Output

The table above shows the minimum and maximum value, mean and standard deviation scale for the performance expectancy factor collected from 159 respondents. It shows that most consumers find voice assistants useful in performing their work with a mean value of 4.01. Followed by consumers feeling that the voice assistant often provides a relevant and reliable response or feedback with a mean value of 3.75. Consumers also feel that the voice assistant always does precisely what they thought it would do with a mean

value of 3.70. The least agreed is that the voice assistant always understands the consumer's questions and instructions with a mean value of only 3.53.

4.1.2.2 Effort Expectancy (EE)

Table 4.0.12: Effort Expectancy (EE) Descriptive Analysis

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
It is simple for me to learn how to utilise voice assistants.	159	2	5	4.27	.777
The voice technology on my smartphone required less effort to activate	159	1	5	3.62	.870
I would find the voice assistant on my smartphone is easy to use	159	2	5	4.17	.789
I find voice assistant technology on my smartphone is flexible to interact with	159	1	5	4.11	.857
Valid N (listwise)	159				

Source: SPSS Output

The table above shows the minimum and maximum value, mean and standard deviation scale for the effort expectancy factor collected from 159 respondents. It shows that most consumers agree that it is simple to learn how to utilise voice assistants with a mean value of 4.27. Followed by consumers feel that the find the voice assistant on their smartphone is easy to use with a mean value of 4.17. Consumers also feel that the voice assistant is flexible to interact with a mean value of 4.11. The least agreed is that the voice technology on their smartphone required less effort to activate with a mean value of 3.62.

4.1.2.3 Social Influence (SI)

Table 4.0.13: Social Influence (SI) Descriptive Analysis

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
People who influence my behaviour think that I should use the voice assistant technology.	159	1	5	3.69	1.056
People around me (such as family and friends) influenced me to use voice assistants.	159	1	5	3.56	1.094
People whose opinions I value suggest that I use a voice assistant	159	1	5	3.60	1.091
My peers think I should use a voice assistant.	159	1	5	3.56	1.167
Valid N (listwise)	159				

Source: SPSS Output

The table above shows the minimum and maximum value, mean and standard deviation scale for the social influence factor collected from 159 respondents. It shows that most consumers agree that people who influence consumer's behaviour think that they should use the voice assistant technology with a mean value of 3.69. Followed by consumers feel that the people whose opinions they value suggest to use a voice assistant with a mean value of 3.60. The least agreed by users is that their family and friends do not influence them to use voice assistants, followed by peers who do not think users should use voice assistants with a mean value of both is 3.56.

4.1.2.4 Facilitating Condition (FC)

Table 4.0.14: Facilitating Condition (FC) Descriptive Analysis

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
I am able to use voice assistant technology.	159	2	5	4.35	.711
Using voice assistant technology is entirely within my control.	159	2	5	4.23	.826
I have the necessary knowledge to use a voice assistant.	159	1	5	4.10	.781
I can get guidance and help regarding the use of voice assistant difficulties from the system and user's guide	159	1	5	4.29	.798
Valid N (listwise)	159				

Source: SPSS Output

The table above shows the minimum and maximum value, mean and standard deviation scale for the facilitating condition factor collected from 159 respondents. It shows that most consumers agree that they are able to use voice assistant technology with a mean value of 4.35. Followed by consumers agree that they can get guidance and help regarding the use of voice assistant difficulties from the system and user's guide with a mean value of 4.29. Consumers also feel that the Using voice assistant technology is entirely within my control with a mean value of 4.23. The instrument I have the necessary knowledge to use a voice assistant score a mean value of 4.10.

4.1.2.5 Hedonic Motivation (HM)

Table 4.0.15: Hedonic Motivation (HM) Descriptive Analysis

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
I feel happy and comfortable interacting with voice assistant technology.	159	1	5	4.11	.824
The entire process of utilising my voice assistant is interesting	159	2	5	4.12	.806
Using voice assistant on my smartphone is enjoyable	159	2	5	4.08	.800
Using voice assistant on my smartphone is very entertaining	159	1	5	4.05	.833
Valid N (listwise)	159				

Source: SPSS Output

The table 4.15 shows the minimum and maximum value, mean and standard deviation scale hedonic motivation factor collected from 159 respondents. It shows that most consumers agree that the entire process of utilising voice assistant is interesting with a mean value of 4.12, and consumers agree that they feel happy and comfortable interacting with voice assistant technology with a mean value of 4.11. Consumers also feel that using voice assistant on enjoyable with a mean value of 4.08. The instrument using voice assistant on my smartphone is very entertaining score a mean value of 4.10.

4.1.2.6 Habit (HT)

Table 4.0.16: Habit (HT) Descriptive Analysis

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
I've become habituated to the use of voice assistants on my smartphone.	159	1	5	3.62	1.113
I often use a voice assistant to perform simple tasks (setting alarms, playing songs, and making calls).	159	1	5	3.79	1.137
I use voice assistants without even thinking about it	159	1	5	3.48	1.158
I've been using voice assistant on my smartphone for quite some time.	159	1	5	3.72	1.143
Valid N (listwise)	159				

Source: SPSS Output

The table 4.16 above shows the minimum and maximum value, mean and standard deviation scale for the habit factor collected from 159 respondents. It shows that most consumers agree that they often use a voice assistant to perform simple tasks with a mean value of 3.79 Followed by users who agreed that they had used the voice assistant for quite some time with a mean value of 3.72. For the statement I've become habituated to the use of voice assistants on my smartphone, the mean value is 3.62. The least agreed by respondents is that they don’t use voice assistants without even thinking about it mean value is 3.48.

4.1.2.7 Descriptive Analysis Mean Score

	N	Minimum	Maximum	Mean	Std. Deviation
Performance Expectancy (PE)	159	1.50	5.00	3.7453	.75707
Effort Expectancy (EE)	159	2.50	5.00	4.0425	.57726
Social Influence (SI)	159	1.00	5.00	3.6022	.97647
Facilitating Condition (FC)	159	2.00	5.00	4.2406	.63013
Hedonic Motivation (HM)	159	2.50	5.00	4.0881	.68560
Habit (HB)	159	1.00	5.00	3.6525	.99043

Table 4.0.17: Descriptive Analysis Mean Score for Each Variable

Source: SPSS Output

Based on table 4.17 shown above, the results obtained are from the data of a questionnaire involving 159 respondents with all mean scores are 3.0 and above. The highest mean score among the variables is the facilitating condition with a mean value of 4.2406 and a standard deviation of 0.63013. The second highest mean score is for the hedonic motivation variable, with a mean score of 4.0881 and a standard deviation of 0.68560. Next is the mean value of 4.0425 for the effort expectancy variable and standard deviation 0.57726. Followed by a mean score of 3.7453 and a standard deviation of 0.75707 for performance expectancy. In addition, for the habit variable, the mean score is 3.6525 while the standard deviation is 0.99043. Finally, the lowest mean score among all variables is social influence with a mean value of 3.6022 and a standard deviation of 0.97647.

4.1.2 Normality Test

The normality tests support the graphical analysis of normality. The tests compare the sample scores to a set of normally distributed scores with the same mean and standard deviation.(Ghasemi & Zahediasl, 2012). According to (Kristian Klima, 2021), normality tests in statistics are used to determine whether a data set is defined for normal distribution. It is used to fulfil the regression assumption. Many statistical methods employ that a distribution be normal or nearly normal. In this research, researcher use Skewness and Kurtosis to test the normality.

Skewness is a measure of the degree of asymmetry in our graph. It quantifies the asymmetry that happens when the data differs from the norm.(Dugar, 2018) A highly skewed distribution is indicated by a skewness value larger than 1 or less than -1. A number between 0.5 and 1 or -0.5 and -1 is skewed considerably. A number in the range of -0.5 to 0.5 suggests that the distribution is fairly symmetrical. (Kartik, 2021).

Kurtosis is performed to recognize the existence of outliers in the data. (Kartik, 2021). The data might be heavy-tailed, and the peak can be flatter. This is known as Negative Kurtosis (Platykurtic). Positive Kurtosis occurs when the distribution is light-tailed and the top curve is steeper, (Leptokurtic).

Table 4.0.18: Skewness and Kurtosis Analysis

	N	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic
PE	159	3.7453	.75707	-.674	-.131
EE	159	4.0425	.57726	-.450	-.237
SI	159	3.6022	.97647	-.810	.162
FC	159	4.2406	.63013	-.966	1.013
HM	159	4.0881	.68560	-.388	-.745
HB	159	3.6525	.99043	-.864	.117

Source: SPSS output

According to the table below, the skewness of the majority independent variable are nearly symmetrical which is the values are between -0.5 and 0.5 with PE= -0.674, SI=-0.810, FC=-0.966, and HB=-0.864. While EE=-0.450 and HM=0.388 which indicates that the skewness are negatively skewed.

4.2 Results of Reliability

The table below shows the Cronbach alpha value for each independent variable and dependent variable.

Table 4.0.19 Reliability Statistic of Variables

Variable	Cronbach's Alpha	Number of Items	Strength of Association
Independent Variable			
PE	0.849	4	Good
EE	0.654	4	Questionable
SI	0.908	4	Excellent
FC	0.822	4	Good
HM	0.861	4	Good
HB	0.894	4	Good
Dependent Variable			
ITU	0.886	3	Good

Source: SPSS Output

According to the table above, the Cronbach Alpha value for independent variable which is performance expectancy scored 0.849 which falls under good reliability. Next, the Cronbach's Alpha result on effort expectancy is 0.654 which is considered as questionable reliability. However, a general accepted rule is that alpha of 0.6-0.7 indicates an acceptable level of reliability (Ursachi et al., 2015).

While, for social influence Alpha coefficient is 0.908, and hedonic motivation is 0.861 which both respectively considered as an excellent and good reliability. For both facilitating condition and habit, the score for Alpha Coefficient respectively 0.822 and 0.894 which consider as good reliability test. Lastly, the only dependent variable, which is intention to use scored 0.886 and considered as good reliability. Since variables had Cronbach alpha values more than 0.60, it is possible to conclude that the overall reliability test of all items in the questionnaires employed is acceptable and suitable for further research.

4.3 Pearson Moment Correlation Analysis

Table 4.0.20: Correlation Result Based On Independent Variable and Dependent Variable

Correlations

		PE	EE	SI	FC	HM	HB	ITU
PE	Pearson Correlation	1	.709**	.514**	.601**	.665**	.675**	.544**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001
	N	159	159	159	159	159	159	159
EE	Pearson Correlation	.709**	1	.470**	.657**	.668**	.624**	.571**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001
	N	159	159	159	159	159	159	159
SI	Pearson Correlation	.514**	.470**	1	.456**	.476**	.637**	.428**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001
	N	159	159	159	159	159	159	159
FC	Pearson Correlation	.601**	.657**	.456**	1	.657**	.542**	.646**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001
	N	159	159	159	159	159	159	159
HM	Pearson Correlation	.665**	.668**	.476**	.657**	1	.651**	.619**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001
	N	159	159	159	159	159	159	159
HB	Pearson Correlation	.675**	.624**	.637**	.542**	.651**	1	.551**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001
	N	159	159	159	159	159	159	159
ITU	Pearson Correlation	.544**	.571**	.428**	.646**	.619**	.551**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	
	N	159	159	159	159	159	159	159

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

Source: SPSS Output

All variable is being tested in order to identify the strongest and significant relationship between independent variable and dependent variable. Six independent variable that being tested are performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation and habit while the dependent variable is intention to use.

Based on table 4.3 above, it can be seen clearly that there are various relationships that exist between the independent variables and the dependent variable where all variables have a positive correlation. The correlation between performance expectancy (PE) and intention to use (ITU) is 0.544 which considered as moderate relationship between the independent variable and dependent variable. Second is the relationship between effort expectancy (EE) and intention to use where it has a moderate relationship of 0.571. Next, the relationship between social influence (SI) and intention to use is moderate as well (0.428).

Besides, the relationship between the facilitating condition (FC) and the intention to use is 0.646 where it holds a strong relationship between the independent variable and the dependent variable. In addition, the relationship between hedonic motivation (HM) and intention to use is also has strong relationship (0.619). Lastly is the relationship between habit and intention to use. Both variables have a moderate relationship which is 0.551.

4.4 Multiple Regression Analysis

A multiple regression analysis was performed to investigate the association between both the factors influencing consumers and intention to use voice assistant technology. As a result, because this study involves more than one independent variable, the researchers opted to use multiple regression analysis to examine the relationship between performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, and habit and intention to use, which represents as the dependent variable.

4.4.1 R-square

Table 4.0.21: Multiple Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.712[a]	.506	.487	.56147

Source: SPSS Output

a. Predictors: (Constant), PERFORMANCE EXPECTANCY, EFFORT EXPECTANCY, SOCIAL INFLUENCE, FACILITATING CONDITION, HEDONIC MOTIVATION, HABIT

Based on the table 4.5 shown above, the regression value is R=0.712, which shows that all six independent variable (performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, habit) has strong correlation to intention to use voice assistant technology which is the dependent variable. The R square (R^2) is 0.506 which is a good amount of variances explained and it indicates all six independent variable is 50.6% that affected intention to use voice assistant technology.

4.4.2 F-value

Table 4.0.22 ANOVA result

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49.137	6	8.189	25.978	<.001[b]
	Residual	47.917	152	.315		
	Total	97.054	158			

Source: SPSS Output

a. Dependent Variable: INTENTION TO USE

b. Predictors: (Constant), PERFORMANCE EXPECTANCY, EFFORT EXPECTANCY, SOCIAL INFLUENCE, FACILITATING CONDITION, HEDONIC MOTIVATION, HABIT

Based on the ANOVA table above, the value of F is F=25.978 with a significant level 0.001 which is less than 0.05. Therefore this result shows that performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, and habit has significant relationship with intention to use voice assistant technology.

4.4.3 T-value

Table 4.0.23: Multiple Regression Analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.285	.354		.805	.422
	PE	.031	.096	.030	.326	.745
	EE	.108	.125	.079	.861	.391
	SI	.023	.060	.028	.376	.707
	FC	.433	.104	.348	4.177	<.001
	HM	.248	.103	.217	2.396	.018
	HB	.106	.073	.134	1.449	.149
a. Dependent Variable: ITU						

Source: SPSS Output

As shown in the table 4.5.3, the facilitating condition has highest variation of coefficients in both unstandardized and standardize B-value which has values of B=0.433, 0.348 respectively. It has the highest of respondent's coefficient among all six independent variables. Followed by hedonic motivation, the β-value=0.248 which make this variable as second highest unstandardized coefficients. Next, effort expectancy, the third highest value with B=0.108. Followed by effort expectancy is habit, with the unstandardized coefficients B-value of 0.106. Besides, the B-value for the performance expectancy is B=0.031, which make it the second lowest score. Lastly, the B-value of social influence variable only 0.023 which make it as the lowest coefficient score among all six variables.

For the p-value interpretation, the value must be less than 0.05 for the variable to be significant. From the table above, the significant value of facilitating condition and hedonic

motivation score 0.001, and 0.018, respectively. The *p*-value is less than 0.05 which means this variables are significant.

However, for performance expectancy, effort expectancy, social influence and habit is not significant since the p-values is bigger than 0.05. The score for the variables is 0.745, 0.391, 0.707 and 0.149. The *p*-value for these variables is bigger than actual score. This resulting a negative significant with intention to use voice assistant technology which is the dependent variable.

4.5 Summary of Hypothesis Testing Result

Table below shows a summary of hypotheses testing results

Table 4.24: Summary of Hypothesis Testing Result

Hypothesis	Result	Hypothesis Verification
H1. There is no significant relationship between performance expectancy and intention to use voice assistant technology	0.745	Not supported
H2. There is no significant relationship between effort expectancy and intention to use voice assistant technology	0.391	Not supported
H3. There is no significant relationship between social influence and intention to use voice assistant technology	0.707	Not supported
H4. There is significant relationship between facilitating condition and intention to use voice assistant technology	0.001	Supported
H5. There is significant relationship between hedonic motivation and intention to use voice assistant technology	0.018	Supported
H6. There is no significant relationship between habit and intention to use voice assistant technology	0.149	Not supported

4.6 Summary

In this chapter, each of the hypotheses outlined in Chapter 3 have been successfully tested by the researcher. The data obtained from 159 respondents is computed and analysed using SPSS 28.0. The data gathered is analysed using Descriptive Analysis, Pearson Correlation Analysis, and Multiple Regression Analysis. Hypotheses are also tested at the conclusion of the chapter.

CHAPTER 5

DISCUSSION AND RECOMMENDATION

5.0 Introduction

This chapter summarises the research that has been conducted. First, a summary of the research is provided. The research aims are briefly outlined the findings and outcomes from chapter 4 in this section. Following that, the study's primary results are discussed. The results of the empirical test produced from data analysis are reported in this section. The study's contributions are then presented. Finally, a discussion of the limitations and suggestions for further studies is presented.

5.1 Summary of Findings

5.1.1 RO 1: To identify factors affecting consumer's intentions to use voice assistant technology.

Based on the analysis in Chapter 4, this objective were achieved. Six factors that influence the intention of users in Malaysia to use voice assistants have been identified in this study are the extracted from UTAUT 2 model (Venkatesh et al. 2012), namely performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit. In addition, the mean score, which is a descriptive analysis, was used to test all six variables. According to (Rodrigues et al., 2017), the mean is an essential indicator since it reflects the results of all samples in the research study. In this study, the researcher used the responses of 159 survey participants to calculate the mean score to achieve objective 1. According to table 4.17 in chapter 4, the mean score for the six variables is 3.50 and above, where the majority of respondents agree that these six factors influence the intention to use voice assistants.

The highest mean score among the variables is the facilitating condition with a mean value of 4.2406. According to Venkatesh (2013), this facilitating condition is concerned

with the availability of sufficient resources and assistance for individuals to use the technology. In accordance with a previous study, the researcher addresses the facilitating conditions where it is necessary for consumers in order to accept voice assistant technology (Kessler & Martin, 2017). The second highest mean score is for the hedonic motivation variable, with a mean score of 4.0881. Based on the past study, hedonic motivation has been characterised as subjective enjoyment and has been found to have a direct influence on technology usage.(Ain et al., 2016). Next, the third highest is the mean value of 4.0425 for the effort expectancy factor. Effort expectation, in accordance with Venkatesh et al., (2003), is a determining factor that indicates users' views about the convenience or effort related with technology usage.

Followed by a mean score of 3.7453 for performance expectancy. Performance expectancy is related with people's ideas about the utility of technology in performing certain tasks (Venkatesh et al., 2003). According to the findings of this study, consumers' intention to use voice assistants is based on their positive perception of voice assistant utility in their everyday lives. In addition, for the habit factor, the mean score is 3.6525. In previous studies, most researchers did not include the habit factor as a determinant to measure user intention to use a voice assistant. Finally, the lowest mean score among all these factors is social influence with a mean value of 3.6022. The degree to which a person believes it is necessary for others to think that he or she should use new technology is classified as social influence.(Tran et al., 2019). The previous study by Kessler (2017) also include all these factors in their research. Therefore, all six factors that influence consumer's intention to use voice assistant has been identified in this study.

5.1.2 RO 2: To investigate the relationship between the determined factors and consumers' intention to use the voice assistant technology.

The UTAUT2 component was employed for hypotheses development to fulfil objective two as it is effective for exploring the relationship between the determined factors and consumers' intention to use voice assistant technology. Based on the results of the analysis in chapter 4, only two of the six factors have a significant relationship with the user's intention to use the voice assistant, namely the facilitating condition factor and hedonic motivation, while the other four factors show no significant relationship with the user's intention to use the voice assistant. Based on table 4.6, the facilitating condition has

the highest significance level p=<0.001. This factor has significant relationship with dependent variable. According to past study, it show no relationship between facilitating condition and dependent variable. (Kessler & Martin, 2017). This might be because the prior study's respondents were Swedish nationals, since Sweden is one of the most developed countries. They may have been using voice assistant technology for a long time and believe they do not require guide or support while using a voice assistant. Meanwhile, this survey included Malaysians, a country that has slow rate in considering the IR 4.0 technologies such as AI.

Next, hedonic motivation factor. There is significant relationship between hedonic motivation and dependent variable. It is the second highest significant level p=0.18. According to previous study, hedonic motivation has no significant relationship with consumer's intention to use (García & Sebastián, n.d.). This might be because the percent of the previous study's participants were Spanish responders aged 41 and up, who may not enjoy utilising a voice assistant. According to (Calvo-Porral & Pesqueira-Sanchez, 2020), people from Generation Y (born between 1981 and 1996) are considered tech-savvy since they grew up with the emergence of many sorts of technology; these individuals are aware of the types of technology but may not be able to feel the fun and pleasure as they can't navigate disparate platforms without detailed guidance. Meanwhile, the majority of respondents in this survey are between the ages of 20 and 30. Emily (2019) argued that with the rise of social media, smartphones, and immediate access to information, Gen Z are the first digital natives, born between 1997 and 2012, into a world of immense technical breakthroughs and innovations. Which make sense that they enjoy using voice assistant technology.

However, for performance expectancy, it has no significant relationship since p= 0.745. Based on past study, this factor has a significant relationship with dependent variable. (Kessler & Martin, 2017). The reasonable reason behind that may be the scope of the previous study, which it covers wide spectrum of users; smart speakers and smartphones users. Thus, they found that voice assistant provides benefits that influence the intention to use them. While this study only covers smartphone users in Malaysia. Followed by effort expectancy, which has insignificant relationship with intention to use voice assistant with the significant level higher than 0.05, p=0.391. Referring to previous studies, effort expectancy does not have a significant relationship with the dependent variable. As the

previous study (Ain et al., 2016), the researcher have argued that effort expectancy is an irrelevant factor for voice assistant studies. This may be that voice assistant is not a complex system which require an effort to use.

Habit factor was not significant since p-values is bigger than 0.05, (p=0.149). Based on past study, habit factor show a significant relationship with dependent variable.(Ain et al., 2016). That may be because the scope of the previous study was the smart speakers and smartphone users which it is more convenient to use smart speaker as it can perform a wide range of task such switching of lights and control other devices in home, while this study was only limited to smartphone users where they may not feel the need to use it habitually. Lastly, social influence factor. There is no significant relationship with dependent variable since it has the highest p-value where (p=0.707). According to past study, the social influence has significant relationship with the dependent variable which is online learning management system since it was mandatory for their respondents.(Ain et al., 2016). However, in this research, the researcher presumes that voice assistant does not need social influence as a factor to influence the intention to use the voice assistant because it is only a decision whether to use it or not depends on the individual himself.

5.1.3 RO 3: To examine the factors that could highly influence the intention to use voice assistant technology among consumers

Referring to the results of the analysis in chapter 4, there are two factors that highly influence the intention to use voice assistant technology among users, namely facilitating condition and hedonic motivation. These two factors have a significant relationship with the consumer's intention to use the voice assistant, where the p-value is below 0.05. The facilitating condition has the highest variation of coefficients, where values of β=0.433, t=4.177 and the significance level <0.001. Venkatesh et al. (2016) define facilitating condition as consumers' judgement of the resources and assistance available to complete an action. Based on most past studies, the facilitating has no significant relationship with consumer's behavioural intention to use voice assistant. The previous study's survey participant argues that she is not willing to put in additional effort to study how to use a voice assistant (Kessler & Martin, 2017). However, some has significant relationship with the intention to use voice assistant. This factor has the highest significant level which highly influence consumers intention to use voice assistant is because every individual or

organization needs resources and guidance to do every job, including the usage of voice assistant technology, especially for new and infrequent users.

The second factor that could highly influence the intention to use voice assistant technology among users is hedonic motivation, where it is the second highest coefficient with β=0.248, t=2.396 and significant level *p*=0.18. In accordance with Venkatesh et al., (2012), hedonic motivation refers to the enjoyment or satisfaction received from utilising technology. Based on the past study, relationship between hedonic motivation and consumer's intention was supported. The reasonable reason behind that may be because the interaction process between the user and the voice assistant is entertaining and pleasant. This is said to be so because, the voice assistant sometimes answers all the questions and instructions directed by the user even though it is just a silly question that does not make sense. Therefore, this objective has been achieved.

5.2 Contribution of the Study

5.2.1 Theoretical

This research study investigate the factors that influence Malaysian consumers' willingness to use voice assistant technology. Two of the six hypotheses demonstrate a significant relationship with the intention to use voice-assistant technology, based on the results. The two factors are the facilitating condition and hedonic motivation. The other four criteria, namely performance expectancy, effort expectancy, social influence, and habit, seemed to have no relationship on the intention to use a voice assistant. Furthermore, this study might assist future researchers in obtaining more references on this subject. It may also assist other academics or researchers working on similar study areas, like as intention of consumers to use the voice assistant and factors that influencing the consumers.

5.2.2 Practical

This research will benefit the community, particularly those who utilise voice assistant technology in their everyday lives. This is done to encourage people to fully utilise voice assistants. The findings of this study link the respondents' intention to use voice assistant technology with the factors that influence users to use the technology. This study will contribute to the developers of voice assistant technology to improve the voice assistant

technology. Voice assistant developers and companies should continue to refine AI systems in voice assistant user engagement that provides social benefits to consumers.

5.3 Limitation of Study

This study has several limitations. The first limitation faced by the researcher while performing this study was the inclusion of respondents from certain categories. This study's sample size is smartphone users in Malaysia between the ages of 19 and 51. However, the majority of respondents who participated in the online questionnaire were between the ages of 20 and 30, and the majority of them were students. The results of this study may not be accurate because they do not represent smartphone users in Malaysia as a whole. The researcher's second limitation is the problem of the respondents' honesty when answering the questionnaire. Respondents may not feel motivated to provide precise and genuine responses, and respondents may not fully understand their reasoning for any given answer owing to a lack of understanding of the topic or boredom, resulting in erroneous data. In addition, another limitation faced by the researcher while conducting the study was during the data collection process. The original sample size was 383, however, due to insufficient time during data collection, the total number of respondents obtained was only 159. A small number of participants may hinder the ability to determine whether a specific outcome is a real discovery, and an error may arise in some situations.

5.4 Recommendations for Future Research

To increase the quality of the results and the relevance of the study issue, the researcher has made some recommendations for future research. In this study, the factors identified that influence the intention to use voice assistants are taken from UTAUT2, namely performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit. The researcher suggests that in future studies, the price-value factor component of UTAUT2 (Venkatesh et al. 2012), which researcher did not measure in this study, to be used as an additional factor to investigate consumers' intention to use the voice assistant. Furthermore, in this study, the researcher only focused on smartphone users in Malaysia. Future studies should include a large sample size, including smart speaker users, to obtain more accurate and valid data.

5.5 Conclusion

In conclusion, the objectives of this research are to investigate the factors that influence customers' intentions to use voice assistant technology. All data was collected by distributing online questionnaires to respondents via Google Forms. The acquired data was then analysed using SPSS software to carry out this research. The data also indicate that two of the six characteristics have a significant relationship with the intention to use voice-assistant technology. The facilitating condition and hedonic motivation are the two factors. The other four factors, namely performance expectancy, effort expectancy, social influence, and habit, had an insignificant relationship with the intention to use a voice assistant. As a result, the researcher expects that this research will be beneficial to future researchers.

REFERENCES

Ain, N. U., Kaur, K., & Waheed, M. (2016). The influence of learning value on learning management system use: An extension of UTAUT2. *Information Development*, *32*(5), 1306–1321. https://doi.org/10.1177/0266666915597546

Ajaegbu, O. O., Ajaegbu, C., & Adewunmi S, O. (2018). Smartphone Technological Advancement Trends: A Scheme for Knowledge Acquisition Towards Societal Development. *Information Technology Journal*, *18*(1), 1–7. https://doi.org/10.3923/ITJ.2019.1.7

Ajayi, V. O. (2017). *Primary Sources of Data and Secondary Sources of Data*. *September*, 1–6. https://doi.org/10.13140/RG.2.2.24292.68481

Akshada, B. (2021, September 2). *6 Top Benefits of AI Voice Technology | Engagely*. https://www.engagely.ai/blog-6-top-benefits-of-ai-voice-technology/

Aksheeta Tyagi. (2021, August 25). *What Are AI Voice Assistants All About? - Verloop.io*. Verloop.Io. https://verloop.io/blog/all-about-voice-assistants/

AndreyPopov. (n.d.). *Consumer Intelligence Series: Prepare for the voice revolution*.

Baeza, R. R., & Kumar, A. R. (2019). Perceived Usefulness of Multimodal Voice Assistant Technology. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *63*(1), 1560–1564. https://doi.org/10.1177/1071181319631031

Beaulieu, D. (2020). *What Benefits in a Personal Voice Assistant Technology | by Dominic Beaulieu | Chatbots Journal*. Chatbots Journal. https://chatbotsjournal.com/what-benefits-in-a-personal-voice-assistant-technology-5365b31b3637

Boru, T. (2018). *Research Methodology*. https://doi.org/10.13140

Boulos, M. N. K., Wheeler, S., Tavares, C., & Jones, R. (2011). How smartphones are changing the face of mobile and participatory healthcare: An overview, with example from eCAALYX. *BioMedical Engineering Online*, *10*. https://doi.org/10.1186/1475-925X-10-24

Brant, J. M., Haas-Haseman, M. L., Wei, S. H., Wickham, R., & Ponto, J. (2015). Understanding and Evaluating Survey Research. *Journal of the Advanced Practitioner in Oncology*, *6*(2), 168. https://doi.org/10.6004/jadpro.2015.6.2.9

Brata, A. H. (2018, June). *Impact Analysis of Social Influence Factor on Using Free Blogs as Learning Media for Driving Teaching Motivational Factor | Proceedings of the 4th International Conference on Frontiers of Educational Technologies*.

https://dl.acm.org/doi/abs/10.1145/3233347.3233360

BRET, K. (2022, April 15). *Voice Assistant Adoption Clustering Around 50% of the Population - Voicebot.ai*. Voicebot.Ai. https://voicebot.ai/2022/04/15/voice-assistant-adoption-clustering-around-50-of-the-population/

Bridge, C. (n.d.). *7 Key Predictions For The Future Of Voice Assistants And AI | Clearbridge*. Retrieved June 14, 2022, from https://clearbridgemobile.com/7-key-predictions-for-the-future-of-voice-assistants-and-ai/

Bridge, K. (2021, June 24). *Speech interactions - Windows apps | Microsoft Docs*. https://docs.microsoft.com/en-us/windows/apps/design/input/speech-interactions

Calvo-Porral, C., & Pesqueira-Sanchez, R. (2020). Generational differences in technology behaviour: comparing millennials and Generation X. *Kybernetes*, *49*(11), 2755–2772. https://doi.org/10.1108/K-09-2019-0598

Cheung, A. K. L. (2014). Structured Questionnaires. *Encyclopedia of Quality of Life and Well-Being Research*, 6399–6402. https://doi.org/10.1007/978-94-007-0753-5_2888

Consumer - Definition, Meaning & Synonyms | Vocabulary.com. (n.d.). Retrieved June 17, 2022, from https://www.vocabulary.com/dictionary/consumer

Diva Dugar. (2018, August 24). *Skew and Kurtosis: 2 Important Statistics terms you need to know in Data Science | by Diva Dugar | codeburst*. Codeburst. https://codeburst.io/2-important-statistics-terms-you-need-to-know-in-data-science-skewness-and-kurtosis-388fef94eeaa

DOSM. (2022, April 28). *Department of Statistics Malaysia Official Portal*. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=395&bul_id=bCs4UlNSQktybTR3THZ3a0RzV2RkUT09&menu_id=amVoWU54UTl0a21NWmdhMjFMMWcyZz09

FARZANAH FARVEEN. (2020, June 10). *5 myths about voice marketing among marketers in Malaysia*. https://www.marketing-interactive.com/5-myths-about-voice-marketing-among-marketers-in-malaysia

Fingas, J. (2018). *Voice assistants still have problems understanding strong accents*. Endgadget. https://www.engadget.com/2018/07/19/voice-assistant-problems-understanding-accents/

García, M., & Sebastián, D. B. (n.d.). *Application and extension of the UTAUT model for determining behavioral intention factors in use of the artificial intelligence virtual*

assistants.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489. https://doi.org/10.5812/ijem.3505

Haton, J. P. (2003). Automatic speech recognition: A Review. *ICEIS 2003 - Proceedings of the 5th International Conference on Enterprise Information Systems*, *1*(September), IS5–IS10. https://doi.org/10.5120/9722-4190

Howard, M. (n.d.). *Introduction to Cronbach's Alpha – Dr. Matt C. Howard*. Retrieved June 19, 2022, from https://mattchoward.com/introduction-to-cronbachs-alpha/

Huang, C. Y., & Kao, Y. S. (2015). UTAUT2 Based Predictions of Factors Influencing the Technology Acceptance of Phablets by DNP. *Mathematical Problems in Engineering*, *2015*. https://doi.org/10.1155/2015/603747

IBM. (2021). *Reliability Analysis - IBM Documentation*. https://www.ibm.com/docs/en/spss-statistics/25.0.0?topic=features-reliability-analysis

Intention Definition & Meaning - Merriam-Webster. (n.d.). Retrieved June 16, 2022, from https://www.merriam-webster.com/dictionary/intention

Intention etymology in English | Etymologeek.com. (n.d.). Retrieved June 16, 2022, from https://etymologeek.com/eng/intention

Johannesson, P., & Perjons, E. (2014). Research Strategies and Methods. *An Introduction to Design Science*, 39–73. https://doi.org/10.1007/978-3-319-10632-8_3

Kessler, S. K., & Martin, M. (2017). *How do potential users perceive the adoption of new technologies within the field of Artificial Intelligence and Internet-of-Things? A revision of the UTAUT 2 model using Voice Assistants*. *May*, 1–90. http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=8909840&fileOId=8909844

Klein, A. M., Hinderks, A., Rauschenberger, M., & Thomaschewski, J. (2020). Exploring voice assistant risks and potential with technology-based users. *WEBIST 2020 - Proceedings of the 16th International Conference on Web Information Systems and Technologies*, *November*, 147–154. https://doi.org/10.5220/0010150101470154

Komunikasi, S., Multimedia, D. A. N., Communications, M., & Commission, M. (2020). *Internet Users Survey*.

KREJCIE AND MORGAN SAMPLING METHOD. (2017, October 5). http://in-troh-

spective.blogspot.com/2017/10/krejcie-and-morgan-sampling-method.html

Kristian Klima. (2021). *Normality Testing - Skewness and Kurtosis | The GoodData Community*. Good Data. https://community.gooddata.com/metrics-and-maql-kb-articles-43/normality-testing-skewness-and-kurtosis-241

Kuan, A., Kit, L., Ni, A. H., Nur, E., Binti, F., Tang, M. B., Yee, K., Tunku, U., & Rahman, A. (2014). *UTAUT2 INFLUENCING THE BEHAVIOURAL INTENTION TO ADOPT MOBILE APPLICATIONS*.

L. Ceci. (2022). *Mobile Internet - Statistics & Facts | Statista*. https://www.statista.com/topics/779/mobile-internet/

Maurya, R., Koutikkar, P., Gulekar, S., & Shetty, G. (2021). EVOLUTION OF VOICE ASSISTANT. *International Research Journal of Engineering and Technology*. https://voicebot.ai/2019/12/31/the-decade-of-voice-

MBN. (n.d.). *Consumers - definition and meaning - Market Business News*. Market Business News. Retrieved June 17, 2022, from https://marketbusinessnews.com/financial-glossary/consumers-definition-meaning/

McCombes, S. (2019, September 19). *Sampling Methods | Types and Techniques Explained*. https://www.scribbr.com/methodology/sampling-methods/

McLean, G., & Osei-Frimpong, K. (2019). Hey Alexa … examine the variables influencing the use of artificial intelligent in-home voice assistants. *Computers in Human Behavior*, *99*(April), 28–37. https://doi.org/10.1016/j.chb.2019.05.009

Middleton, F. (2019, July 3). *Reliability vs Validity in Research | Differences, Types and Examples*. https://www.scribbr.com/methodology/reliability-vs-validity/

Miller, K. (2021). *Are Voice Assistants a Reliable Source of Health Information?* https://hai.stanford.edu/news/are-voice-assistants-reliable-source-health-information

Nickolas, S. (2021, May 31). *Correlation Coefficients: Positive, Negative, & Zero*. Investopedia. https://www.investopedia.com/ask/answers/032515/what-does-it-mean-if-correlation-coefficient-positive-negative-or-zero.asp

Onaolapo, S., & Oyewole, O. (n.d.). *Performance Expectancy, Effort Expectancy, and Facilitating Conditions as Factors Influencing Smart Phones Use for Mobile Learning by Postgraduate Students of the University of Ibadan, Nigeria*. https://doi.org/10.28945/4085

Phast. (n.d.). *Methods of sampling from a population | Health Knowledge*. Retrieved June

18, 2022, from https://www.healthknowledge.org.uk/public-health-textbook/research-methods/1a-epidemiology/methods-of-sampling-population

Quantitative Research Design. (2022). DJS Research. https://www.djsresearch.co.uk/glossary/item/Quantitative-Research-Design

Rachana Chotia. (2022, April 28). *Voice AI: Learn How it Works (with Example)*. Verloop.Io. https://verloop.io/blog/how-voice-ai-works/

Rahi, S. (2017). Research Design and Methods: A Systematic Review of Research Paradigms, Sampling Issues and Instruments Development. *International Journal of Economics & Management Sciences*, *06*(02). https://doi.org/10.4172/2162-6359.1000403

Ramos, D. (2021, July 26). *How Voice Assistants Are Changing Our Lives | Smartsheet*. Smartsheet. https://www.smartsheet.com/voice-assistants-artificial-intelligence

Regression Analysis - Formulas, Explanation, Examples and Definitions. (2022, April 26). https://corporatefinanceinstitute.com/resources/knowledge/finance/regression-analysis/

Samuel, M. (2020, November 24). *Using Voice Assistants as Learning Aids for Students*. https://www.ebsco.com/blogs/ebscopost/using-voice-assistants-learning-aids-students

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research Methods for Buniess Students. In *Pearson*. https://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development

Spector Lincoln. (n.d.). *What you need to know about accessing the Internet on a smartphone | Greenbot*. PCWorld . Retrieved June 13, 2022, from https://www.greenbot.com/article/2013181/what-you-need-to-know-about-accessing-the-internet-on-a-smartphone.html

STEVENS, E. (2022, March 21). *The 7 Most Useful Data Analysis Techniques [2022 Guide]*. https://careerfoundry.com/en/blog/data-analytics/data-analysis-techniques/

sumup. (n.d.). *Consumer – What is a consumer? | SumUp Invoices*. Retrieved June 17, 2022, from https://sumup.co.uk/invoices/dictionary/consumer/

Talukder, M. (n.d.). *Factors affecting the adoption of technological innovation by individual employees: An Australian study*. *40*, 52–57. Retrieved June 16, 2022, from

https://pdf.sciencedirectassets.com/277811/1-s2.0-S1877042812X00119/1-s2.0-S1877042812006271/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEK7%2F%2F%2F%2F%2F%2F%2F%2F%2F%2FwEaCXVzLWVhc3QtMSJHMEUCIFaTSdqIKEUI5SryZGs%2F1C7k78QxbGS%2FpBlPH3wANkNaAiEAw9HDncyZ

Tamilmani, K., Rana, N. P., Prakasam, N., & Dwivedi, Y. K. (2019). The battle of Brain vs. Heart: A literature review and meta-analysis of "hedonic motivation" use in UTAUT2. *International Journal of Information Management*, *46*, 222–235. https://doi.org/10.1016/J.IJINFOMGT.2019.01.008

TECNO. (2020). *Smartphone innovation in the third decade of the 21st century | MIT Technology Review*. MIT TECHNOLOGY RIVIEW. https://www.technologyreview.com/2020/03/05/905500/smartphone-innovation-in-the-third-decade-of-the-21st-century/

Terzopoulos, G., & Satratzemi, M. (2020). Voice assistants and smart speakers in everyday life and in education. *Informatics in Education*, *19*(3), 473–490. https://doi.org/10.15388/infedu.2020.21

Tran, V., Zhao, S., Diop, E. B., & Song, W. (2019). Travelers' acceptance of electric carsharing systems in developing countries: The case of China. *Sustainability (Switzerland)*, *11*(19). https://doi.org/10.3390/SU11195348

Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How Reliable are Measurement Scales? External Factors with Indirect Influence on Reliability Estimators. *Procedia Economics and Finance*, *20*(15), 679–686. https://doi.org/10.1016/s2212-5671(15)00123-9

Voice assistant usability and user experience survey. (n.d.). Retrieved June 19, 2022, from https://www.surveymonkey.com/r/Z8796PD?survey_format=CLASSIC

Voxco. (2022). *Descriptive Research Design - Voxco*. https://www.voxco.com/blog/descriptive-research-design/

Wagner, K., Nimmermann, F., & Schramm-Klein, H. (n.d.). *Is It Human? The Role of Anthropomorphism as a Driver for the Successful Acceptance of Digital Voice Assistants*. Retrieved June 19, 2022, from https://hdl.handle.net/10125/59579

Xu, H., & Gupta, S. (2009). *The effects of privacy concerns and personal innovativeness on potential and experienced customers' adoption of location-based services*.

https://doi.org/10.1007/s12525-009-0012-4

Tyagi, A. (2021, November 11). *What Are AI Voice Assistants All About?* Verloop.Io. Retrieved May 27, 2022, from https://verloop.io/blog/all-about-voice-assistants/#:%7E:text=Voice%20assistants%20are%20devices%2Fapps,a%20meaningful%20response%20in%20return.

Ain, N. U., Kaur, K., & Waheed, M. (2016). The influence of learning value on learning management system use: An extension of UTAUT2. *Information Development*, *32*(5), 1306–1321. https://doi.org/10.1177/0266666915597546

Ajaegbu, O. O., Ajaegbu, C., & Adewunmi S, O. (2018). Smartphone Technological Advancement Trends: A Scheme for Knowledge Acquisition Towards Societal Development. *Information Technology Journal*, *18*(1), 1–7. https://doi.org/10.3923/ITJ.2019.1.7

Ajayi, V. O. (2017). *Primary Sources of Data and Secondary Sources of Data*. *September*, 1–6. https://doi.org/10.13140/RG.2.2.24292.68481

Akshada, B. (2021, September 2). *6 Top Benefits of AI Voice Technology | Engagely*. https://www.engagely.ai/blog-6-top-benefits-of-ai-voice-technology/

Aksheeta Tyagi. (2021, August 25). *What Are AI Voice Assistants All About? - Verloop.io*. Verloop.Io. https://verloop.io/blog/all-about-voice-assistants/

AndreyPopov. (n.d.). *Consumer Intelligence Series: Prepare for the voice revolution*.

Baeza, R. R., & Kumar, A. R. (2019). Perceived Usefulness of Multimodal Voice Assistant Technology. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *63*(1), 1560–1564. https://doi.org/10.1177/1071181319631031

Beaulieu, D. (2020). *What Benefits in a Personal Voice Assistant Technology | by Dominic Beaulieu | Chatbots Journal*. Chatbots Journal. https://chatbotsjournal.com/what-benefits-in-a-personal-voice-assistant-technology-5365b31b3637

Boru, T. (2018). *Research Methodology*. https://doi.org/10.13140

Boulos, M. N. K., Wheeler, S., Tavares, C., & Jones, R. (2011). How smartphones are changing the face of mobile and participatory healthcare: An overview, with example from eCAALYX. *BioMedical Engineering Online*, *10*. https://doi.org/10.1186/1475-925X-10-24

Brant, J. M., Haas-Haseman, M. L., Wei, S. H., Wickham, R., & Ponto, J. (2015). Understanding and Evaluating Survey Research. *Journal of the Advanced*

Practitioner in Oncology, *6*(2), 168. https://doi.org/10.6004/jadpro.2015.6.2.9

Brata, A. H. (2018, June). *Impact Analysis of Social Influence Factor on Using Free Blogs as Learning Media for Driving Teaching Motivational Factor | Proceedings of the 4th International Conference on Frontiers of Educational Technologies*. https://dl.acm.org/doi/abs/10.1145/3233347.3233360

BRET, K. (2022, April 15). *Voice Assistant Adoption Clustering Around 50% of the Population - Voicebot.ai*. Voicebot.Ai. https://voicebot.ai/2022/04/15/voice-assistant-adoption-clustering-around-50-of-the-population/

Bridge, C. (n.d.). *7 Key Predictions For The Future Of Voice Assistants And AI | Clearbridge*. Retrieved June 14, 2022, from https://clearbridgemobile.com/7-key-predictions-for-the-future-of-voice-assistants-and-ai/

Bridge, K. (2021, June 24). *Speech interactions - Windows apps | Microsoft Docs*. https://docs.microsoft.com/en-us/windows/apps/design/input/speech-interactions

Calvo-Porral, C., & Pesqueira-Sanchez, R. (2020). Generational differences in technology behaviour: comparing millennials and Generation X. *Kybernetes*, *49*(11), 2755–2772. https://doi.org/10.1108/K-09-2019-0598

Cheung, A. K. L. (2014). Structured Questionnaires. *Encyclopedia of Quality of Life and Well-Being Research*, 6399–6402. https://doi.org/10.1007/978-94-007-0753-5_2888

Consumer - Definition, Meaning & Synonyms | Vocabulary.com. (n.d.). Retrieved June 17, 2022, from https://www.vocabulary.com/dictionary/consumer

Diva Dugar. (2018, August 24). *Skew and Kurtosis: 2 Important Statistics terms you need to know in Data Science | by Diva Dugar | codeburst*. Codeburst. https://codeburst.io/2-important-statistics-terms-you-need-to-know-in-data-science-skewness-and-kurtosis-388fef94eeaa

DOSM. (2022, April 28). *Department of Statistics Malaysia Official Portal*. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=395&bul_id=bCs4UlNSQktybTR3THZ3a0RzV2RkUT09&menu_id=amVoWU54UTl0a21NWmdhMjFMMWcyZz09

FARZANAH FARVEEN. (2020, June 10). *5 myths about voice marketing among marketers in Malaysia*. https://www.marketing-interactive.com/5-myths-about-voice-marketing-among-marketers-in-malaysia

Fingas, J. (2018). *Voice assistants still have problems understanding strong accents*.

Endgadget. https://www.engadget.com/2018/07/19/voice-assistant-problems-understanding-accents/

García, M., & Sebastián, D. B. (n.d.). *Application and extension of the UTAUT model for determining behavioral intention factors in use of the artificial intelligence virtual assistants*.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489. https://doi.org/10.5812/ijem.3505

Haton, J. P. (2003). Automatic speech recognition: A Review. *ICEIS 2003 - Proceedings of the 5th International Conference on Enterprise Information Systems*, *1*(September), IS5–IS10. https://doi.org/10.5120/9722-4190

Howard, M. (n.d.). *Introduction to Cronbach's Alpha – Dr. Matt C. Howard*. Retrieved June 19, 2022, from https://mattchoward.com/introduction-to-cronbachs-alpha/

Huang, C. Y., & Kao, Y. S. (2015). UTAUT2 Based Predictions of Factors Influencing the Technology Acceptance of Phablets by DNP. *Mathematical Problems in Engineering*, *2015*. https://doi.org/10.1155/2015/603747

IBM. (2021). *Reliability Analysis - IBM Documentation*. https://www.ibm.com/docs/en/spss-statistics/25.0.0?topic=features-reliability-analysis

Intention Definition & Meaning - Merriam-Webster. (n.d.). Retrieved June 16, 2022, from https://www.merriam-webster.com/dictionary/intention

Intention etymology in English | Etymologeek.com. (n.d.). Retrieved June 16, 2022, from https://etymologeek.com/eng/intention

Johannesson, P., & Perjons, E. (2014). Research Strategies and Methods. *An Introduction to Design Science*, 39–73. https://doi.org/10.1007/978-3-319-10632-8_3

Kessler, S. K., & Martin, M. (2017). *How do potential users perceive the adoption of new technologies within the field of Artificial Intelligence and Internet-of-Things? A revision of the UTAUT 2 model using Voice Assistants*. *May*, 1–90. http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=8909840&fileOId=8909844

Klein, A. M., Hinderks, A., Rauschenberger, M., & Thomaschewski, J. (2020). Exploring voice assistant risks and potential with technology-based users. *WEBIST 2020 - Proceedings of the 16th International Conference on Web Information Systems and*

Technologies, *November*, 147–154. https://doi.org/10.5220/0010150101470154

Komunikasi, S., Multimedia, D. A. N., Communications, M., & Commission, M. (2020). *Internet Users Survey*.

KREJCIE AND MORGAN SAMPLING METHOD. (2017, October 5). http://in-troh-spective.blogspot.com/2017/10/krejcie-and-morgan-sampling-method.html

Kristian Klima. (2021). *Normality Testing - Skewness and Kurtosis | The GoodData Community*. Good Data. https://community.gooddata.com/metrics-and-maql-kb-articles-43/normality-testing-skewness-and-kurtosis-241

Kuan, A., Kit, L., Ni, A. H., Nur, E., Binti, F., Tang, M. B., Yee, K., Tunku, U., & Rahman, A. (2014). *UTAUT2 INFLUENCING THE BEHAVIOURAL INTENTION TO ADOPT MOBILE APPLICATIONS*.

L. Ceci. (2022). *Mobile Internet - Statistics & Facts | Statista*. https://www.statista.com/topics/779/mobile-internet/

Maurya, R., Koutikkar, P., Gulekar, S., & Shetty, G. (2021). EVOLUTION OF VOICE ASSISTANT. *International Research Journal of Engineering and Technology*. https://voicebot.ai/2019/12/31/the-decade-of-voice-

MBN. (n.d.). *Consumers - definition and meaning - Market Business News*. Market Business News. Retrieved June 17, 2022, from https://marketbusinessnews.com/financial-glossary/consumers-definition-meaning/

McCombes, S. (2019, September 19). *Sampling Methods | Types and Techniques Explained*. https://www.scribbr.com/methodology/sampling-methods/

McLean, G., & Osei-Frimpong, K. (2019). Hey Alexa … examine the variables influencing the use of artificial intelligent in-home voice assistants. *Computers in Human Behavior*, *99*(April), 28–37. https://doi.org/10.1016/j.chb.2019.05.009

Middleton, F. (2019, July 3). *Reliability vs Validity in Research | Differences, Types and Examples*. https://www.scribbr.com/methodology/reliability-vs-validity/

Miller, K. (2021). *Are Voice Assistants a Reliable Source of Health Information?* https://hai.stanford.edu/news/are-voice-assistants-reliable-source-health-information

Nickolas, S. (2021, May 31). *Correlation Coefficients: Positive, Negative, & Zero*. Investopedia. https://www.investopedia.com/ask/answers/032515/what-does-it-mean-if-correlation-coefficient-positive-negative-or-zero.asp

Onaolapo, S., & Oyewole, O. (n.d.). *Performance Expectancy, Effort Expectancy, and*

Facilitating Conditions as Factors Influencing Smart Phones Use for Mobile Learning by Postgraduate Students of the University of Ibadan, Nigeria. https://doi.org/10.28945/4085

Phast. (n.d.). *Methods of sampling from a population | Health Knowledge*. Retrieved June 18, 2022, from https://www.healthknowledge.org.uk/public-health-textbook/research-methods/1a-epidemiology/methods-of-sampling-population

Quantitative Research Design. (2022). DJS Research. https://www.djsresearch.co.uk/glossary/item/Quantitative-Research-Design

Rachana Chotia. (2022, April 28). *Voice AI: Learn How it Works (with Example)*. Verloop.Io. https://verloop.io/blog/how-voice-ai-works/

Rahi, S. (2017). Research Design and Methods: A Systematic Review of Research Paradigms, Sampling Issues and Instruments Development. *International Journal of Economics & Management Sciences*, *06*(02). https://doi.org/10.4172/2162-6359.1000403

Ramos, D. (2021, July 26). *How Voice Assistants Are Changing Our Lives | Smartsheet*. Smartsheet. https://www.smartsheet.com/voice-assistants-artificial-intelligence

Regression Analysis - Formulas, Explanation, Examples and Definitions. (2022, April 26). https://corporatefinanceinstitute.com/resources/knowledge/finance/regression-analysis/

Samuel, M. (2020, November 24). *Using Voice Assistants as Learning Aids for Students*. https://www.ebsco.com/blogs/ebscopost/using-voice-assistants-learning-aids-students

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research Methods for Buniess Students. In *Pearson*. https://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development

Spector Lincoln. (n.d.). *What you need to know about accessing the Internet on a smartphone | Greenbot*. PCWorld . Retrieved June 13, 2022, from https://www.greenbot.com/article/2013181/what-you-need-to-know-about-accessing-the-internet-on-a-smartphone.html

STEVENS, E. (2022, March 21). *The 7 Most Useful Data Analysis Techniques [2022 Guide]*. https://careerfoundry.com/en/blog/data-analytics/data-analysis-techniques/

sumup. (n.d.). *Consumer – What is a consumer? | SumUp Invoices*. Retrieved June 17, 2022, from https://sumup.co.uk/invoices/dictionary/consumer/

Talukder, M. (n.d.). *Factors affecting the adoption of technological innovation by individual employees: An Australian study*. *40*, 52–57. Retrieved June 16, 2022, from https://pdf.sciencedirectassets.com/277811/1-s2.0-S1877042812X00119/1-s2.0-S1877042812006271/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEK7%2F%2F%2F%2F%2F%2F%2F%2F%2F%2FwEaCXVzLWVhc3QtMSJHMEUCIFaTSdqIKEUI5SryZGs%2F1C7k78QxbGS%2FpBlPH3wANkNaAiEAw9HDncyZ

Tamilmani, K., Rana, N. P., Prakasam, N., & Dwivedi, Y. K. (2019). The battle of Brain vs. Heart: A literature review and meta-analysis of "hedonic motivation" use in UTAUT2. *International Journal of Information Management*, *46*, 222–235. https://doi.org/10.1016/J.IJINFOMGT.2019.01.008

TECNO. (2020). *Smartphone innovation in the third decade of the 21st century | MIT Technology Review*. MIT TECHNOLOGY RIVIEW. https://www.technologyreview.com/2020/03/05/905500/smartphone-innovation-in-the-third-decade-of-the-21st-century/

Terzopoulos, G., & Satratzemi, M. (2020). Voice assistants and smart speakers in everyday life and in education. *Informatics in Education*, *19*(3), 473–490. https://doi.org/10.15388/infedu.2020.21

Tran, V., Zhao, S., Diop, E. B., & Song, W. (2019). Travelers' acceptance of electric carsharing systems in developing countries: The case of China. *Sustainability (Switzerland)*, *11*(19). https://doi.org/10.3390/SU11195348

Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How Reliable are Measurement Scales? External Factors with Indirect Influence on Reliability Estimators. *Procedia Economics and Finance*, *20*(15), 679–686. https://doi.org/10.1016/s2212-5671(15)00123-9

Voice assistant usability and user experience survey. (n.d.). Retrieved June 19, 2022, from https://www.surveymonkey.com/r/Z8796PD?survey_format=CLASSIC

Voxco. (2022). *Descriptive Research Design - Voxco*. https://www.voxco.com/blog/descriptive-research-design/

Wagner, K., Nimmermann, F., & Schramm-Klein, H. (n.d.). *Is It Human? The Role of*

Anthropomorphism as a Driver for the Successful Acceptance of Digital Voice Assistants. Retrieved June 19, 2022, from https://hdl.handle.net/10125/59579

Xu, H., & Gupta, S. (2009). *The effects of privacy concerns and personal innovativeness on potential and experienced customers' adoption of location-based services*. https://doi.org/10.1007/s12525-009-0012-4

Ain, N. U., Kaur, K., & Waheed, M. (2016). The influence of learning value on learning management system use: An extension of UTAUT2. *Information Development*, *32*(5), 1306–1321. https://doi.org/10.1177/0266666915597546

Ajaegbu, O. O., Ajaegbu, C., & Adewunmi S, O. (2018). Smartphone Technological Advancement Trends: A Scheme for Knowledge Acquisition Towards Societal Development. *Information Technology Journal*, *18*(1), 1–7. https://doi.org/10.3923/ITJ.2019.1.7

Ajayi, V. O. (2017). *Primary Sources of Data and Secondary Sources of Data*. *September*, 1–6. https://doi.org/10.13140/RG.2.2.24292.68481

Akshada, B. (2021, September 2). *6 Top Benefits of AI Voice Technology | Engagely*. https://www.engagely.ai/blog-6-top-benefits-of-ai-voice-technology/

Aksheeta Tyagi. (2021, August 25). *What Are AI Voice Assistants All About? - Verloop.io*. Verloop.Io. https://verloop.io/blog/all-about-voice-assistants/

AndreyPopov. (n.d.). *Consumer Intelligence Series: Prepare for the voice revolution*.

Baeza, R. R., & Kumar, A. R. (2019). Perceived Usefulness of Multimodal Voice Assistant Technology. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *63*(1), 1560–1564. https://doi.org/10.1177/1071181319631031

Beaulieu, D. (2020). *What Benefits in a Personal Voice Assistant Technology | by Dominic Beaulieu | Chatbots Journal*. Chatbots Journal. https://chatbotsjournal.com/what-benefits-in-a-personal-voice-assistant-technology-5365b31b3637

Boru, T. (2018). *Research Methodology*. https://doi.org/10.13140

Boulos, M. N. K., Wheeler, S., Tavares, C., & Jones, R. (2011). How smartphones are changing the face of mobile and participatory healthcare: An overview, with example from eCAALYX. *BioMedical Engineering Online*, *10*. https://doi.org/10.1186/1475-

925X-10-24

Brant, J. M., Haas-Haseman, M. L., Wei, S. H., Wickham, R., & Ponto, J. (2015). Understanding and Evaluating Survey Research. *Journal of the Advanced Practitioner in Oncology*, *6*(2), 168. https://doi.org/10.6004/jadpro.2015.6.2.9

Brata, A. H. (2018, June). *Impact Analysis of Social Influence Factor on Using Free Blogs as Learning Media for Driving Teaching Motivational Factor | Proceedings of the 4th International Conference on Frontiers of Educational Technologies*. https://dl.acm.org/doi/abs/10.1145/3233347.3233360

BRET, K. (2022, April 15). *Voice Assistant Adoption Clustering Around 50% of the Population - Voicebot.ai*. Voicebot.Ai. https://voicebot.ai/2022/04/15/voice-assistant-adoption-clustering-around-50-of-the-population/

Bridge, C. (n.d.). *7 Key Predictions For The Future Of Voice Assistants And AI | Clearbridge*. Retrieved June 14, 2022, from https://clearbridgemobile.com/7-key-predictions-for-the-future-of-voice-assistants-and-ai/

Bridge, K. (2021, June 24). *Speech interactions - Windows apps | Microsoft Docs*. https://docs.microsoft.com/en-us/windows/apps/design/input/speech-interactions

Calvo-Porral, C., & Pesqueira-Sanchez, R. (2020). Generational differences in technology behaviour: comparing millennials and Generation X. *Kybernetes*, *49*(11), 2755–2772. https://doi.org/10.1108/K-09-2019-0598

Cheung, A. K. L. (2014). Structured Questionnaires. *Encyclopedia of Quality of Life and Well-Being Research*, 6399–6402. https://doi.org/10.1007/978-94-007-0753-5_2888

Consumer - Definition, Meaning & Synonyms | Vocabulary.com. (n.d.). Retrieved June 17, 2022, from https://www.vocabulary.com/dictionary/consumer

Diva Dugar. (2018, August 24). *Skew and Kurtosis: 2 Important Statistics terms you need to know in Data Science | by Diva Dugar | codeburst*. Codeburst. https://codeburst.io/2-important-statistics-terms-you-need-to-know-in-data-science-skewness-and-kurtosis-388fef94eeaa

DOSM. (2022, April 28). *Department of Statistics Malaysia Official Portal*.

https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=395&bul_id=bCs4UlNSQktybTR3THZ3a0RzV2RkUT09&menu_id=amVoWU54UTl0a21NWmdhMjFMMWcyZz09

FARZANAH FARVEEN. (2020, June 10). *5 myths about voice marketing among marketers in Malaysia*. https://www.marketing-interactive.com/5-myths-about-voice-marketing-among-marketers-in-malaysia

Fingas, J. (2018). *Voice assistants still have problems understanding strong accents*. Endgadget. https://www.engadget.com/2018/07/19/voice-assistant-problems-understanding-accents/

García, M., & Sebastián, D. B. (n.d.). *Application and extension of the UTAUT model for determining behavioral intention factors in use of the artificial intelligence virtual assistants*.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489. https://doi.org/10.5812/ijem.3505

Haton, J. P. (2003). Automatic speech recognition: A Review. *ICEIS 2003 - Proceedings of the 5th International Conference on Enterprise Information Systems*, *1*(September), IS5–IS10. https://doi.org/10.5120/9722-4190

Howard, M. (n.d.). *Introduction to Cronbach's Alpha – Dr. Matt C. Howard*. Retrieved June 19, 2022, from https://mattchoward.com/introduction-to-cronbachs-alpha/

Huang, C. Y., & Kao, Y. S. (2015). UTAUT2 Based Predictions of Factors Influencing the Technology Acceptance of Phablets by DNP. *Mathematical Problems in Engineering*, *2015*. https://doi.org/10.1155/2015/603747

IBM. (2021). *Reliability Analysis - IBM Documentation*. https://www.ibm.com/docs/en/spss-statistics/25.0.0?topic=features-reliability-analysis

Intention Definition & Meaning - Merriam-Webster. (n.d.). Retrieved June 16, 2022, from https://www.merriam-webster.com/dictionary/intention

Intention etymology in English | Etymologeek.com. (n.d.). Retrieved June 16, 2022, from

https://etymologeek.com/eng/intention

Johannesson, P., & Perjons, E. (2014). Research Strategies and Methods. *An Introduction to Design Science*, 39–73. https://doi.org/10.1007/978-3-319-10632-8_3

Kessler, S. K., & Martin, M. (2017). *How do potential users perceive the adoption of new technologies within the field of Artificial Intelligence and Internet-of-Things? A revision of the UTAUT 2 model using Voice Assistants*. *May*, 1–90. http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=8909840&fileOId=8909844

Klein, A. M., Hinderks, A., Rauschenberger, M., & Thomaschewski, J. (2020). Exploring voice assistant risks and potential with technology-based users. *WEBIST 2020 - Proceedings of the 16th International Conference on Web Information Systems and Technologies*, *November*, 147–154. https://doi.org/10.5220/0010150101470154

Komunikasi, S., Multimedia, D. A. N., Communications, M., & Commission, M. (2020). *Internet Users Survey*.

KREJCIE AND MORGAN SAMPLING METHOD. (2017, October 5). http://in-troh-spective.blogspot.com/2017/10/krejcie-and-morgan-sampling-method.html

Kristian Klima. (2021). *Normality Testing - Skewness and Kurtosis | The GoodData Community*. Good Data. https://community.gooddata.com/metrics-and-maql-kb-articles-43/normality-testing-skewness-and-kurtosis-241

Kuan, A., Kit, L., Ni, A. H., Nur, E., Binti, F., Tang, M. B., Yee, K., Tunku, U., & Rahman, A. (2014). *UTAUT2 INFLUENCING THE BEHAVIOURAL INTENTION TO ADOPT MOBILE APPLICATIONS*.

L. Ceci. (2022). *Mobile Internet - Statistics & Facts | Statista*. https://www.statista.com/topics/779/mobile-internet/

Maurya, R., Koutikkar, P., Gulekar, S., & Shetty, G. (2021). EVOLUTION OF VOICE ASSISTANT. *International Research Journal of Engineering and Technology*. https://voicebot.ai/2019/12/31/the-decade-of-voice-

MBN. (n.d.). *Consumers - definition and meaning - Market Business News*. Market

Business News. Retrieved June 17, 2022, from https://marketbusinessnews.com/financial-glossary/consumers-definition-meaning/

McCombes, S. (2019, September 19). *Sampling Methods | Types and Techniques Explained*. https://www.scribbr.com/methodology/sampling-methods/

McLean, G., & Osei-Frimpong, K. (2019). Hey Alexa … examine the variables influencing the use of artificial intelligent in-home voice assistants. *Computers in Human Behavior*, *99*(April), 28–37. https://doi.org/10.1016/j.chb.2019.05.009

Middleton, F. (2019, July 3). *Reliability vs Validity in Research | Differences, Types and Examples*. https://www.scribbr.com/methodology/reliability-vs-validity/

Miller, K. (2021). *Are Voice Assistants a Reliable Source of Health Information?* https://hai.stanford.edu/news/are-voice-assistants-reliable-source-health-information

Nickolas, S. (2021, May 31). *Correlation Coefficients: Positive, Negative, & Zero*. Investopedia. https://www.investopedia.com/ask/answers/032515/what-does-it-mean-if-correlation-coefficient-positive-negative-or-zero.asp

Onaolapo, S., & Oyewole, O. (n.d.). *Performance Expectancy, Effort Expectancy, and Facilitating Conditions as Factors Influencing Smart Phones Use for Mobile Learning by Postgraduate Students of the University of Ibadan, Nigeria*. https://doi.org/10.28945/4085

Phast. (n.d.). *Methods of sampling from a population | Health Knowledge*. Retrieved June 18, 2022, from https://www.healthknowledge.org.uk/public-health-textbook/research-methods/1a-epidemiology/methods-of-sampling-population

Quantitative Research Design. (2022). DJS Research. https://www.djsresearch.co.uk/glossary/item/Quantitative-Research-Design

Rachana Chotia. (2022, April 28). *Voice AI: Learn How it Works (with Example)*. Verloop.Io. https://verloop.io/blog/how-voice-ai-works/

Rahi, S. (2017). Research Design and Methods: A Systematic Review of Research Paradigms, Sampling Issues and Instruments Development. *International Journal of Economics & Management Sciences*, *06*(02). https://doi.org/10.4172/2162-

6359.1000403

Ramos, D. (2021, July 26). *How Voice Assistants Are Changing Our Lives | Smartsheet*. Smartsheet. https://www.smartsheet.com/voice-assistants-artificial-intelligence

Regression Analysis - Formulas, Explanation, Examples and Definitions. (2022, April 26). https://corporatefinanceinstitute.com/resources/knowledge/finance/regression-analysis/

Samuel, M. (2020, November 24). *Using Voice Assistants as Learning Aids for Students*. https://www.ebsco.com/blogs/ebscopost/using-voice-assistants-learning-aids-students

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research Methods for Buniess Students. In *Pearson*. https://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development

Spector Lincoln. (n.d.). *What you need to know about accessing the Internet on a smartphone | Greenbot*. PCWorld . Retrieved June 13, 2022, from https://www.greenbot.com/article/2013181/what-you-need-to-know-about-accessing-the-internet-on-a-smartphone.html

STEVENS, E. (2022, March 21). *The 7 Most Useful Data Analysis Techniques [2022 Guide]*. https://careerfoundry.com/en/blog/data-analytics/data-analysis-techniques/

sumup. (n.d.). *Consumer – What is a consumer? | SumUp Invoices*. Retrieved June 17, 2022, from https://sumup.co.uk/invoices/dictionary/consumer/

Talukder, M. (n.d.). *Factors affecting the adoption of technological innovation by individual employees: An Australian study*. *40*, 52–57. Retrieved June 16, 2022, from https://pdf.sciencedirectassets.com/277811/1-s2.0-S1877042812X00119/1-s2.0-S1877042812006271/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEK7%2F%2F%2F%2F%2F%2F%2F%2F%2F%2FwEaCXVzLWVhc3QtMSJHMEUCIFaTSdqIKEUI5SryZGs%2F1C7k78QxbGS%2FpBlPH3wANkNaAiEAw9HDncyZ

Tamilmani, K., Rana, N. P., Prakasam, N., & Dwivedi, Y. K. (2019). The battle of Brain

vs. Heart: A literature review and meta-analysis of “hedonic motivation” use in UTAUT2. *International Journal of Information Management*, *46*, 222–235. https://doi.org/10.1016/J.IJINFOMGT.2019.01.008

TECNO. (2020). *Smartphone innovation in the third decade of the 21st century | MIT Technology Review*. MIT TECHNOLOGY RIVIEW. https://www.technologyreview.com/2020/03/05/905500/smartphone-innovation-in-the-third-decade-of-the-21st-century/

Terzopoulos, G., & Satratzemi, M. (2020). Voice assistants and smart speakers in everyday life and in education. *Informatics in Education*, *19*(3), 473–490. https://doi.org/10.15388/infedu.2020.21

Tran, V., Zhao, S., Diop, E. B., & Song, W. (2019). Travelers’ acceptance of electric carsharing systems in developing countries: The case of China. *Sustainability (Switzerland)*, *11*(19). https://doi.org/10.3390/SU11195348

Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How Reliable are Measurement Scales? External Factors with Indirect Influence on Reliability Estimators. *Procedia Economics and Finance*, *20*(15), 679–686. https://doi.org/10.1016/s2212-5671(15)00123-9

Voice assistant usability and user experience survey. (n.d.). Retrieved June 19, 2022, from https://www.surveymonkey.com/r/Z8796PD?survey_format=CLASSIC

Voxco. (2022). *Descriptive Research Design - Voxco*. https://www.voxco.com/blog/descriptive-research-design/

Wagner, K., Nimmermann, F., & Schramm-Klein, H. (n.d.). *Is It Human? The Role of Anthropomorphism as a Driver for the Successful Acceptance of Digital Voice Assistants*. Retrieved June 19, 2022, from https://hdl.handle.net/10125/59579

Xu, H., & Gupta, S. (2009). *The effects of privacy concerns and personal innovativeness on potential and experienced customers’ adoption of location-based services*. https://doi.org/10.1007/s12525-009-0012-4

TITLE: INTENTION TO USE VOICE ASSISTANT TECHNOLOGY AMONG MALAYSIAN CONSUMERS

TAJUK: NIAT MENGGUNAKAN TEKNOLOGI PEMBANTU SUARA DALAM KALANGAN PENGGUNA MALAYSIA

Mr/Mrs,

I am Nurul Intan Izainie Binti Jaidin, a final year student at Universiti Teknikal Malaysia Melaka (UTeM) under the Faculty of Technology Management and Technopreneurship (FPTT), studying Bachelor of Technology Management with Honours (Technology Innovation).

I am researching to determine the factors that could influence consumers' intention to use voice assistant technology. The following questionnaire will require approximately 5 to 10 minutes to complete. Instructions on how to answer are provided before the survey questionnaires. Please carefully read the instruction before selecting the one that best reflects your response.

Finally, I assure you that I will keep the information confidential and only use it for academic purposes.

Thank you for your participation.

Tuan/Puan yang dihormati,

Saya Nurul Intan Izainie Binti Jaidin, pelajar tahun akhir di Universiti Teknikal Malaysia Melaka (UTeM) di bawah Fakulti Pengurusan Teknologi dan Keusahawanan Tekno (FPTT), mengikuti pengajian Sarjana Muda Pengurusan Teknologi dengan Kepujian (Inovasi Teknologi).

Saya sedang menyelidik untuk menentukan niat dan faktor pengguna untuk menggunakan teknologi pembantu suara. Soal selidik berikut memerlukan lebih kurang 5 hingga 10 minit untuk dilengkapkan. Arahan tentang cara menjawab disediakan sebelum soal selidik tinjauan, sila baca dengan teliti arahan sebelum memilih yang paling menggambarkan respons anda.

Akhir sekali, saya memberi jaminan bahawa saya akan merahsiakan maklumat tersebut dan hanya menggunakannya untuk tujuan akademik.

Terima kasih atas penyertaan anda.

Nurul Intan Izainie Binti Jaidin
Faculty of Technology Management & Technopreneurship (FPTT)
Universiti Teknikal Malaysia Melaka, Malaysia
Phone No:
Email:

SECTION A: DEMOGRAPHIC AND GENERAL INFORMATION

BAHAGIAN A: DEMOGRAFI DAN MAKLUMAT AM

This section consists of personal information. Please tick (/) in the appropriate boxes for your response.

Bahagian ini terdiri daripada maklumat peribadi. Sila tandakan **(/)** dalam kotak yang sesuai untuk jawapan anda

1. Gender/ *Jantina*

Male/Lelaki		Female/Perempuan	

2. Age/*Umur*

19 years old and below	
20 – 30 years old	
31 – 40 years old	
41 – 50 years old	
51 years old and above	

3. Education level/ *Tahap pengajian*

SPM	
Diploma/STPM	
Degree/*Ijazah*	
Master	
Other/*Lain-lain*	

4. Occupational sector/ *Sektor pekerjaan*

Government sector/*sektor kerajaan*	
Private sector/*sektor swasta*	
self-employed/ *bekerja sendiri*	
Student/*pelajar*	
Other/*Lain-lain*	

5. Do you familiar with voice assistant technology? / *Adakah anda biasa dengan teknologi pembantu suara?*

Yes/*Ya*	
No/*Tidak*	

6. What voice assistant do you use on your smartphone? / *Apakah pembantu suara yang anda gunakan pada telefon pintar anda?*

Siri (iPhone)	
Google Assistant	
Bixby	
Cortana	
Other/*Lain-lain*	

7. How often do you use a voice assistant on your smartphone? /*Berapa kerap anda menggunakan pembantu suara pada telefon pintar anda?*

Never or rarely/ *Tidak pernah atau jarang*	
At least once a month/*Sekurang-kurangnya sebulan sekali*	
Once a week/ *seminggu sekali*	
1-3 times daily/ *1-3 kali sehari*	
4-6 times daily/ *4-6 kali sehari*	

8. What tasks do you assign to your voice assistant? / *Apakah tugas yang anda berikan kepada pembantu suara anda?*

Make calls, send text messages/*Buat panggilan, hantar mesej teks*	
Open apps on a smartphone / *Buka aplikasi pada telefon pintar*	

Look things up online/ *Cari perkara dalam talian*	
Provide directions(maps)/*Sediakan arah (peta)*	
Set appointments on calendars/*Tetapkan janji temu pada kalendar*	
Play Music/*memainkan muzik*	

9. When do you often use the voice assistant on your smartphone? / *Bilakah anda sering menggunakan pembantu suara pada telefon pintar anda?*

While cooking/ *semasa memasak*	
While watching TV/*semasa menonton TV*	
When in bed/*apabila di atas katil*	
While working/ *semasa bekerja*	
While driving/ *semasa memandu*	
While studying/*semasa belajar*	

SECTION B: INTENTION TO USE VOICE ASSISTANT TECHNOLOGY

BAHAGIAN B: NIAT MENGGUNAKAN TEKNOLOGI PEMBANTU SUARA

The following questions provide information on consumers' intention to use voice assistant technology. Please provide your agreement or disagreement with each statement honestly and objectively.

The questions will consist of 5 Likert scales, which include (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. Please tick (/) the appropriate response below.

Soalan berikut bertanya tentang maklumat tentang niat pengguna untuk menggunakan teknologi pembantu suara Sila berikan persetujuan atau ketidaksetujuan anda dengan setiap pernyataan secara jujur dan objektif.

Soalan akan terdiri daripada 5 skala Likert yang merangkumi (1) Sangat Tidak Setuju, (2) Tidak Setuju, (3) Berkecuali, (4) Setuju, dan (5) Sangat Setuju. Sila tandakan (/) pada jawapan yang sesuai di bawah.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
(1)	(2)	(3)	(4)	(5)

Intention to Use (ITU)

In the literature on technology adoption, an intention to use represents a user's willingness to employ technology in the future. The degree to which a person has formed conscious plans to conduct or not perform a specific future behaviour is described as intention to utilise.

Dalam literatur tentang penggunaan teknologi, niat untuk menggunakan mewakili kesediaan pengguna untuk menggunakan teknologi pada masa hadapan. Tahap di mana seseorang telah membentuk rancangan sedar untuk menjalankan atau tidak melakukan tingkah laku masa depan yang khusus digambarkan sebagai niat untuk digunakan.

No.	Item	1	2	3	4	5
ITU 1	I am willing to use voice assistant technology. / *Saya bersedia menggunakan teknologi pembantu suara.*					
ITU 2	In the future, I will frequently use voice assistant technology. / *Pada masa hadapan, saya akan kerap menggunakan teknologi pembantu suara.*					
ITU 3	I will highly recommend people to make use of voice assistant technology. / Saya akan sangat menyarankan orang ramai untuk menggunakan teknologi pembantu suara.					

SECTION C: FACTORS INFLUENCING CONSUMERS' INTENTION TO USE VOICE ASSISTANT TECHNOLOGY

BAHAGIAN C: FAKTOR-FAKTOR YANG MEMPENGARUHI NIAT PENGGUNA UNTUK MENGGUNAKAN TEKNOLOGI PEMBANTU SUARA

The following questions ask about the factors influencing consumer's intention to use voice assistant technology. Please provide as much information as you can honestly and objectively. Use the scales provided to express your agreement or disagreement with each statement.

The questions will consist of 5 scales which include **(1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree.** Please tick (/) the appropriate response below.

Soalan berikut menanyakan tentang faktor yang mempengaruhi niat pengguna untuk menggunakan teknologi pembantu suara. Sila berikan seberapa banyak maklumat yang anda boleh secara jujur dan objektif. Gunakan skala yang disediakan untuk menyatakan persetujuan atau ketidaksetujuan anda dengan setiap pernyataan.

*Soalan akan terdiri daripada 5 skala yang merangkumi **(1) Sangat Tidak Setuju, (2) Tidak Setuju, (3) Berkecuali, (4) Setuju, dan (5) Sangat Setuju.** Sila tandakan (/) pada jawapan yang sesuai di bawah.*

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
(1)	(2)	(3)	(4)	(5)

Performance expectancy (PE)

Performance Expectancy (PE) is defined as the extent to which employing a technology would offer customers benefits in executing specific tasks

Jangkaan Prestasi (PE) ditakrifkan sebagai sejauh mana penggunaan teknologi akan menawarkan faedah kepada pelanggan dalam melaksanakan tugas tertentu

No.	Item	1	2	3	4	5
PE 1	The voice assistant always understand my question/command accurately. / *Pembantu suara sentiasa memahami soalan/arahan saya dengan tepat.*					
PE 2	The voice assistant always provides relevant and reliable response or feedback/ *Pembantu suara sentiasa memberikan respons atau maklum balas yang relevan dan boleh dipercayai*					
PE 3	It always do exactly what I thought it would do/ *Ia sentiasa melakukan apa yang saya fikir ia akan lakukan*					
PE 4	I would find the voice assistant useful in performing my job. / *Saya akan mendapati pembantu suara berguna dalam melaksanakan tugas saya*					

Effort expectancy (EE)

An effort expectation (EE) is described as a perception that using a given technology would be simple and straightforward. It is the degree of ease with which a system or procedure is used.

Jangkaan usaha (EE) digambarkan sebagai persepsi bahawa menggunakan teknologi tertentu adalah mudah. Ini ialah tahap kemudahan sistem atau prosedur digunakan.

No.	Item	1	2	3	4	5
EE 1	It is simple for me to learn how to utilise voice assistants. / *Mudah untuk saya belajar cara menggunakan pembantu suara.*					

No.	Item	1	2	3	4	5
EE 2	The voice technology on my smartphone required less effort to activate/ *Teknologi suara pada telefon pintar saya memerlukan sedikit usaha untuk mengaktifkannya*					
EE 3	I would find the voice assistant on my smartphone is easy to use. / *Saya mendapati pembantu suara pada telefon pintar saya mudah digunakan*.					
EE 4	I find voice assistant technology on my smartphone is flexible to interact with. / *Saya mendapati teknologi pembantu suara pada telefon pintar saya fleksibel untuk berinteraksi.*					

Social influence (SI)

Social influence (SI) is an individual's belief that the new system is important enough that others believe he or she should utilise it.

Pengaruh sosial (SI) ditakrifkan sebagai kepercayaan individu bahawa sistem baru itu cukup penting sehingga orang lain percaya dia harus menggunakannya.

No.	item	1	2	3	4	5
SI 1	People who influence my behaviour think that I should use the voice assistant technology. / *Orang yang mempengaruhi tingkah laku saya berpendapat bahawa saya harus menggunakan teknologi pembantu suara*					
SI 2	People around me (such as family and friends) influenced me to use voice assistants. / *Orang di sekeliling saya (seperti keluarga dan rakan) mempengaruhi saya untuk menggunakan pembantu suara*					
SI 3	People whose opinions I value suggest that I use a voice assistant. / *Orang yang pendapatnya saya hargai mencadangkan saya menggunakan pembantu suara*					
SI 4	My peers think I should use a voice assistant. / *Rakan sebaya saya berpendapat saya harus menggunakan pembantu suara.*					

Facilitating condition (FC)

The degree to which a person feels that the current organisational and technological infrastructure can support the application of technology is referred to as facilitating conditions (FC). Facilitating conditions are objective factors in the environment that boost people's willingness to utilise technology.

Keadaan memudahkan (FC) merujuk kepada tahap di mana seseorang percaya bahawa infrastruktur organisasi dan teknikal sedia ada boleh menyokong penggunaan teknologi. Keadaan yang memudahkan adalah faktor objektif dalam persekitaran yang meningkatkan kesediaan orang ramai untuk menggunakan teknologi.

No.	Item	1	2	3	4	5
FC 1	I am able to use voice assistant technology. */ Saya boleh menggunakan teknologi pembantu suara.*					
FC 2	Using voice assistant technology is entirely within my control. / Menggunakan teknologi pembantu suara berada dalam kawalan saya sepenuhnya.					
FC 3	I have the necessary knowledge to use a voice assistant. / *Saya mempunyai pengetahuan yang diperlukan untuk menggunakan pembantu suara.*					
FC 4	I can get guidance and help regarding the use of voice assistant difficulties from the system and user's guide. */ Saya boleh mendapatkan bimbingan dan bantuan mengenai kesukaran pembantu suara daripada sistem dan panduan pengguna*					

Hedonic motivation (HM)

Hedonic Motivation (HM) is the degree to which a person enjoys utilising technology, notwithstanding the repercussions of performance. It is also defined as enjoyment or pleasure derived through the use of technology, regardless of the end outcome.

Motivasi Hedonik (HM) ialah tahap keseronokan seseorang menggunakan teknologi tanpa mengira kesan prestasi. Ia juga ditakrifkan sebagai keseronokan atau keseronokan yang diperoleh melalui penggunaan teknologi, tanpa mengira hasil akhirnya.

No.	Item	1	2	3	4	5
HM 1	I feel happy and comfortable interacting with voice assistant technology. / *Saya berasa gembira dan selesa berinteraksi dengan teknologi pembantu suara*					
HM 2	The entire process of utilising my voice assistant is interesting. / *Keseluruhan proses menggunakan pembantu suara saya adalah menarik*					
HM 3	Using voice assistant on my smartphone is enjoyable. / *Menggunakan pembantu suara pada telefon pintar saya adalah menyeronokkan*					
HM 4	Using voice assistant on my smartphone is very entertaining. / Menggunakan pembantu suara pada telefon pintar saya sangat menghiburkan.					

Habit (HT)

Habit (HT) refers to an individual's degree of inclination to execute behaviours automatically in the learning process. Habit is measured as the extent to which an individual believes the behaviour to be automatic (because of learning), and it is a predictor of both intention and technology use.

Tabiat (HT) merujuk kepada tahap kecenderungan seseorang individu untuk melaksanakan tingkah laku secara automatik dalam proses pembelajaran. Tabiat diukur sebagai sejauh mana individu percaya tingkah laku itu automatik (kerana pembelajaran), dan ia adalah peramal niat dan penggunaan teknologi.

No.	Item	1	2	3	4	5
HB 1	I've become habituated to the use of voice assistants on my smartphone. / *Saya sudah terbiasa menggunakan pembantu suara pada telefon pintar saya.*					
HB 2	I often use a voice assistant to perform simple tasks (setting alarms, playing songs, and making calls). / *Saya sering menggunakan pembantu suara untuk melaksanakan tugas mudah (menetapkan penggera, memainkan lagu dan membuat panggilan).*					

No.	Item	1	2	3	4	5
HB 3	I use voice assistants without even thinking about it. / *Saya menggunakan pembantu suara tanpa memikirkannya.*					
HB 4	I've been using voice assistant on my smartphone for quite some time. / *Saya telah menggunakan pembantu suara pada telefon pintar saya untuk sekian lama.*					

-END OF QUESTIONS-

-SOALAN TAMAT-

Thank you so much for your participation!

Terima kasih banyak atas penyertaan anda!