

THE PERSPECTIVE OF IMPLEMENTING THE SMART
HOME LIVING CONCEPT AMONG POTENTIAL
HOMEBUYERS IN KLANG VALLEY

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FACULTY OF ACCOUNTANCY AND MANAGEMENT
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MANAGEMENT

JUNE 2024

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SMART HOME

BBP (HONS)

OCTOBER 2023

THE PERSPECTIVE OF IMPLEMENTING THE SMART HOME
LIVING CONCEPT AMONG POTENTIAL HOMEBUYERS IN
KLANG VALLEY

BY

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A research project submitted in partial fulfillment of the
requirement for the degree of

BACHELOR OF BUILDING AND PROPERTY
MANAGEMENT (HONS)

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF ACCOUNTANCY AND
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DEPARTMENT OF BUILDING AND PROPERTY
MANAGEMENT

APRIL 2024

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ACKNOWLEDGENTS

I am writing to express my gratitude for the invaluable support and assistance I received during the completion of my final year project, “The Perspective of Implementing the Smart Home Living concept among Potential Homebuyers in Klang Valley”.

First and foremost, I want to express my gratitude to my supervisor, Sr Dr. Elia Syarafina binti Abdul Shakur, for her assistance, and encouragement during the entire project duration. Her advice and guidance were instrumental in shaping the direction of my research to ensure that the report-writing process is right and on track. Besides that, I would like to thanks to my second examiner, Prof. Anuar bin Alias, his feedback, and suggestion that provide me a ton of ideas to improve my research.

In addition, I express my gratitude to all the participants who willingly shared their time and insights, contributing crucial data to this study. I am truly grateful for the opportunity to undertake this project and for the invaluable lessons learned throughout the process.

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LIST OF ABBREVIATIONS

IoT	Internet of Things
AI	Artificial Intelligence
MIDA	Malaysian Investment Development Authority
SHT	Smart Home Technology
USA	United States
UK	United Kingdom
MYR	Ringgit Malaysia
AVC	All View Cloud
TPB	Theory of Planned Behaviour
UI	User Interface
SERC	Scientific and Ethical Review Committee
SPSS	Statistical package social sciences
ANOVA	Analysis of Variance

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PREFACE

This research, titled “The Perspective of Implementing the Smart Home Living concept among Potential Homebuyers in Klang Valley” is submitted to complete the bachelor’s degree of Building and Property Management in UTAR. The aim of the research is to determine the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley, evaluate the most perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley, and recommend the improvement of implementing the Smart Home Living concept among potential homebuyers in Klang Valley. The result of the research is able to provide useful information and guideline for the developers and government on how to improve the implementation rate of Smart Home Living concept in Klang Valley.

The completed research is also providing some perspective from the potential homebuyers as a relevant information for enhancing the Smart Home Living concept in the future. Throughout the research process, consistency factor, user characteristics factor, user friendly factor, and attractiveness factor, economic performance factor, and consumer attitude factor towards the implementation of Smart Home Living concept in Klang Valley have been examined in detail to highlight the relevant and the most perspective towards the implementation of Smart Home Living concept.

ABSTRACT

As technology continues to evolve, humans have devised innovative systems like Smart Home Living to enhance comfort and living standards. This system has revolutionized traditional housing designs, aiming to provide a space that not only offers comfort but also maximizes benefits and convenience.

The study explores perspectives of potential homebuyers to understand the homebuyer's preferences toward the implementation of Smart Home Living concept in Klang Valley as a guideline to identify appropriate strategies and policies to attract more homebuyers implement Smart Home Living Concept and develop a Smart Home system that can meet the requirements of the homebuyers in Klang Valley. A total of six perspectives will be examined to determine the relevant and the most perspectives towards the implementation of Smart Home Living concept. Besides that, a total of 100 set of questionnaires are collected from Klang Valley district in Malaysia. For the collected data, Microsoft Excel and Software Package for Social Science (SPSS) will be used to analysis and examine each perspective in order to achieve the objectives of the research.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

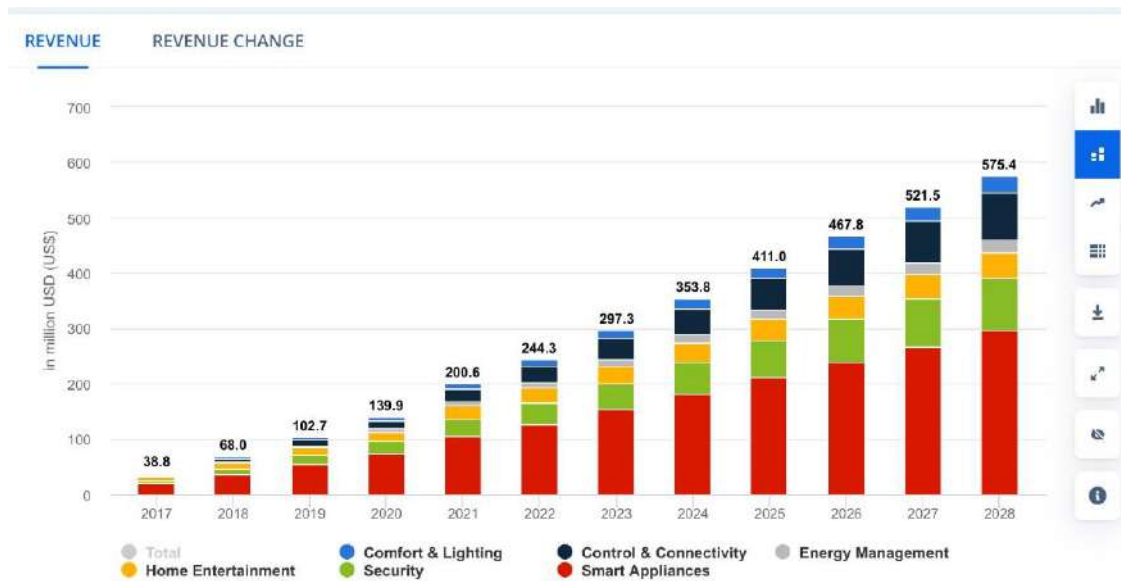
The purpose of this chapter is to provide a brief overview of the research and explain the background and objectives of the research to the readers. It will start with research background, problem statement, research question, research objective, significance of the study, and lastly the chapter layout.

1.1 Research Background

As the world's technology has continued to advance, human beings have developed innovative systems and technologies to create a comfortable home in order to improve their comfort and their living standard at the same time. One of the recent systems has been known as Smart Home Living system, which has disrupted existing housing designs in order to create a space that offers benefits as well as a comfortable environment with a focus on its benefits. A Smart Home Living concept was developed with the intention of enhancing various aspects of daily life in order to reduce human burdens and to enhance the quality of life (Marco, A, et al. 2011). The beginning of the Smart Home Living concept can be traced back to 20th century. It was in the year 1950, a popular mechanic named Emil Mathias in Jackson, Michigan who acquired mechanical skills at a young age created the first smart home, Button Manor for his family that provided convenience and comfort (Lamkin, 2021). The history of the smart home has provided several benefits that have contributed to the evolution and widespread implementation of smart home system over the past several decades. Throughout history of the Smart Home Living concept, the home has evolved from being a simple, automated system into an interconnected, intelligent system that enhances convenience and security, in addition to enhancing efficiency and comfort in daily life. As a result of these technologies and invention, modern smart housing developments have seen significant advancements and changes in recent years (Sara, G, 2023). Human beings have been exploring the concept of smart housing for nearly a century, and the present Smart Home Living system has been developed with budget-friendly and can be easily extended by the end user compared to the previous expensive and rigid smart home system. It has contributed to the housing development of all the countries around the globe, including Malaysia. During the recent years, demand for Smart Home Living concept is growing rapidly in Malaysia to ensure a safe, comfortable, and

pleasant living environment for the residents through the increase in the implementation of smart home system according to the Statista.com data in 2023 (Statista Research Department, 2023).

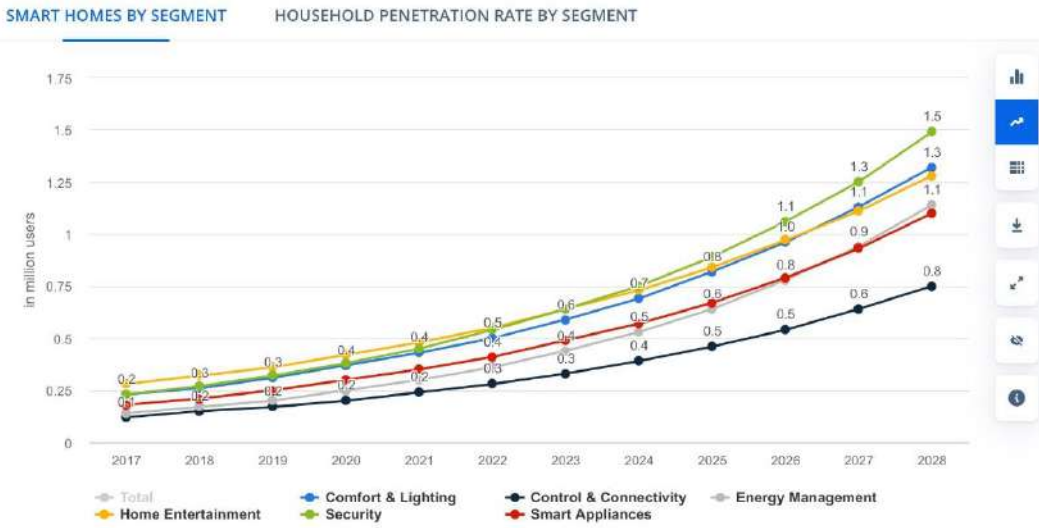
Figure 1.1: Revenue of the smart home market in Malaysia from 2017 to 2028



Source: Statista Market Insights (2023).

According to Statista Market Insights, the total revenue of the smart home market in Malaysia will be approximately 244.3 million U.S. dollars in 2022, an increase of approximately 43.5 million U.S. dollars over the previous year (Statista Research Department, 2023). The expectation of the revenue in this market will continue to increase from 2023 to 2028 to reach 575.4 million U.S. (Statista Research Department, 2023). dollars. Mi Home, Amazon’s Alexa, and Google home are the common smart home system in Malaysia (imalaysiatech, 2022). The system's position is to provide benefit in order to meet all the needs and wants of the house owner for creating a comfortable housing living.

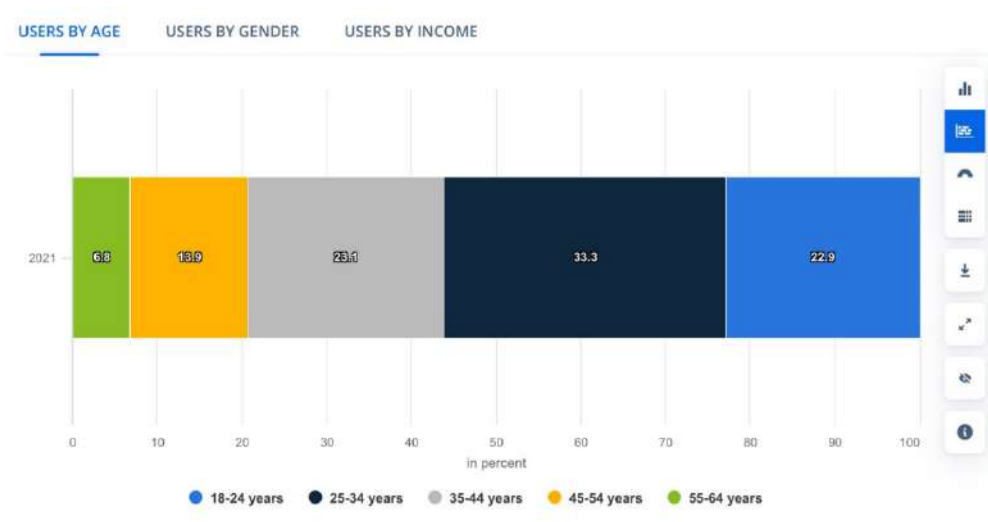
Figure 1.2: Total number of users for smart home system by segment



Source: Statista Market Insights (2023).

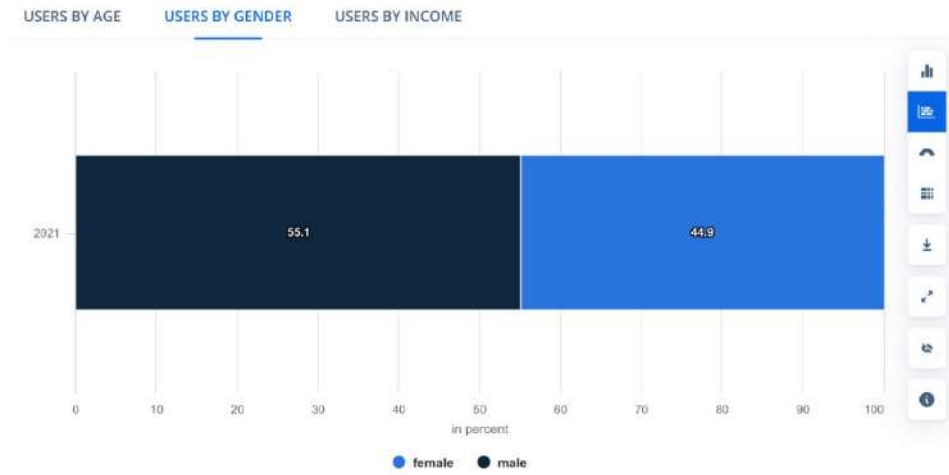
It has been observed that smart home systems are divided into several segments such as comfort and lighting, control and connectivity, energy management, home entertainment, security, and smart appliances. According to the latest studies, the number of users for the smart home system in 2023 will be around 3 million users. The segments with the highest numbers are comfort and lighting, home entertainment and security, which each have about 0.6 million users for each segment. Smart home systems are expected to continue to grow in the coming years and reaching approximately 7 million users in 2028.

Figure 1.3: Age distribution among smart home system users



Source: Statista Market Insights (2023).

Figure 1.4: Gender distribution of the smart home system users



Source: Statista Market Insights (2023).

In terms of demographics, the majority of smart home system users are between the ages of 25 to 34 years which is 33.3 percent. The usage rate of smart home system among the old generation aged between 55 to 64 years is the lowest at 6.8 percent. There is a 23.1 percent rate among the users who are aged 35 to 44 years, a 22.9 percent rate among the users who are aged 18 to 24 years, and a 13.9 percent rate among the users who are aged 45 to 44 years. Additionally, a majority of the users who prefer using smart home systems are males rather than females with 55.1 percent compared to 44.9 percent. In summary, it can be said that most of Malaysia's smart home system users are from the young generation. Since the younger age group has grown up in a technological environment, they are familiar at using digital devices and technology systems, in comparison to their older counterparts.

1.2 Problem Statement

The concept of Smart Home Living is a trend in modern architecture that allows the homeowner to have control over all of the appliances in the house at any time and from any location by using a smart device connected to the internet. By transforming the traditional home living concept into a Smart Home Living concept, we aim to maximize the quality of life for everyone by providing them with safety, security, comfort, sustainability, and convenience. A Smart Home Living concept utilizing a combination of technology, such as the Internet of Things [IoT], artificial intelligence [AI], big data, cloud computing to manage the housing conditions and make the building eco-friendlier through the use of internet of things (Frank Ato Ghansah, 2022). However, according to the Malaysian Investment Development Authority (MIDA), the implementation rate of smart home among homebuyers is often low, especially in emerging Asian nations

including Malaysia, due to a lack of awareness and understanding regarding smart house living knowledge (MIDA, 2021). Generally, the majority of homebuyers are unaware of the benefits and features of a smart home system and how it can enhance the quality of their lives. In addition, Malaysia is one of the countries that is significantly slow in adopting the Internet of Things (IoT) for the application of smart home technology (SHT). In Malaysia, the IoT-SHT penetration among households was only 12.2% in 2021. This rate is lower than the worldwide average (14.2%) and still far lower than the countries that have developed the most. For instance, the United States (USA) with 40.1%, the United Kingdom (UK) with 39.3%, the South Korea with 36.2%, and the Singapore with 28% are among the leading developed countries (Leong Yee Rock, 2022). Without IoT-SHT, the convenience of modern technology is lost, resulting in a reduced quality of life.

The greater purchasing cost in our country is another problem statements in this research study. At the first installation stage, the cost of the smart home system is rather high. The installation of smart home is more expensive than that of traditional homes. As reported in a recent research study by Jhun Kam, Jun Wei, Shwan Lim, and Sheikh Ilmi and Tatt Soon (2023), the high cost of the initial installation of the smart home system is the biggest challenge for homeowners (Kenn, et al. 2023) Furthermore, the Ringgit Malaysia (MYR) currency has been declining in recent years, causing the country's inflation rate to rise. Therefore, it is expected that the price of the smart home system will increase in the future. It is expected that this policy will increase the burden on homebuyers and reduce the market demand for smart home systems, resulting in the development of smart home pivoting in Malaysia being slowed down and hampered.

Research gap refers to a difference in impoverished people's access to information and resources, as well as in accessing, recognising, and promoting the developing world's innovation (Cadariu, 2012). The first Research gap is the knowledge of smart home system among the homebuyers in Klang Valley. Over the past few years, there has been an increase in awareness of smart home technologies in Klang Valley. The smart home in Klang Valley is also developing steadily. Potential homebuyers are become more comfortable with the idea as more information becomes accessible through marketing initiatives, media coverage, and word-of-mouth. However, there is still a lack of awareness among the older generation due to the effects of education on them and their traditional thinking. The media and government play an important role in providing a platform for older generations to see or experience smart home features in action in order to have a better understanding of the Smart Home Living concept.

The second research gap is cost of implementing smart home system in Klang Valley. A smart home system's implementation costs might vary significantly based on a number of variables. These variables involve the

kind and quantity of devices that homeowners choose to incorporate, the intricacy of the system, the brand and size of the smart home system, and the process for installation. Nevertheless, there is a significant rise in the inflation rate in Malaysia in the recent years and it may lead to an increase in the price of products and services which includes smart home systems. There may be an influence on the rate of implementation of smart home living concepts in Klang Valley.

1.3 Research Question

The primary aim of this research is to study the perspective of Smart Home Living among potential buyers in Malaysia. In relation to the problem statement, the following research topics were raised:

1. What is the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley?
2. What are the most perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley?
3. What are the recommendation to improve of implementing the Smart Home Living concept among potential homebuyers in Klang Valley?

1.4 Research Objective

The following propositions are connected to the aims of this research topics:

1. To determine the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley.
2. To evaluate the most perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley.
3. To recommend the improvement of implementing the Smart Home Living concept among potential homebuyers in Klang Valley.

1.5 Hypotheses development

The perspective of implement the Smart Home Living concept among potential homebuyers in Klang Valley will depend on a variety of factors, including user behaviour or environmental influences. Integrating smart home technology with smart city planning projects in Klang Valley may influence by the awareness of implement smart home concept and the feasibility of technology. These factors might have contributed to the development of the Smart Home Living concept in the Klang Valley, either positively or negatively. It is important to have a clear understanding of the living habits of Klang Valley potential homebuyers and their needs and wants in order to develop a smart home technology that enhances comfort, automates routine tasks, and gives seamless control over home systems so that their quality of life is improved. The hypothesis of the study that related to the research objective are as follows:

1.5.1 Hypothesis for Consistency Factor

H0: Consistency factor has a negative perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

H1: Consistency factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

1.5.2 Hypothesis for Users Characteristics Factor

H0: User characteristics factor has a negative perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

H1: User characteristics factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

1.5.3 Hypothesis for User-Friendly Interface Factor

H0: User-friendly interface factor has a negative perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

H1: User-friendly interface factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

1.5.4 Hypothesis for Attractiveness Factor

H0: Attractiveness factor has a negative perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

H1: Attractiveness factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

1.5.5 Hypothesis for Economic Performance Factor

H0: Economic performance factor has a negative perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

H1: Economic performance factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

1.5.6 Hypothesis for Consumer Attitude Factor

H0: Consumer attitude factor has a negative perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

H1: Consumer attitude factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.

1.6 Significance of the Study

The significance of the research study is aimed to explore about the perspective of implementing the Smart Home Living among potential buyers in Malaysia as a way to understand the viewpoint of the potential buyers, preferences, and challenges in implementing Smart Home Living concept in Malaysia. It is expected that the findings of this research will contribute to the following areas:

Market comprehension - Based on the research of this study, it is possible to provide valuable information for the business market to help them understand the Malaysian market's viewpoint on smart home living concept, the problems, specific needs, and challenges of implementing smart home system in the future and how to overcome them. This is a great opportunity for the business market to develop a more complete smart home living concept that can boost the development of the smart home living market in Malaysia to a whole new level.

Product Development - By understanding homebuyers' needs and wants allows smart home system companies to design a new smart home system or to improve their existing system in order to make the product more useful, maximize the performance of the smart home system, and achieve a high level of consumer satisfaction. There is a possibility that this development will attract more homebuyers to know about the existence of this system, which will enable them to become more aware of the concept of smart home in the future.

Positive impacts of the environment - On the basis of the results of this study, it can be concluded that implementing Smart Home Living concept is an advantageous and useful way to improve human lifestyle by increasing the safety, health performance, and energy efficiency as well as achieve cost saving. Smart home system can also contribute to a reducing pollution in order to create a clean and healthy living environment for the humans.

1.7 Chapter Layout

Throughout the first chapter, the main objective of this chapter is to provide the readers a clear understanding of the research study, the objectives, and the general direction of the study so that the readers may gain a better understanding of the study. A research background, problem statement, research question, research objective, significance of the study, research flow chart, as well as the chapter layout are all presented in this chapter.

In the second chapter, the theoretical basis for the topic of the research study will be explained, as a review of existing literature and research related to the topic. The objective of this chapter is to provide theoretical foundation of the research study to the readers by gathering the secondary data, article, and journal from the internet.

In the third chapter, an overview of research methodology will be explained based on the research flow chart illustrated in the first chapter to determine research design and methods used for the data collection.

In the fourth chapter, the final results of data analysis will be present which is related to the research question from the first chapter.

Lastly, the last chapter of the study will summarize the main findings of the study and explains the limitations of this study as well as some suggestions for future researchers in relation to this study.

1.8 Conclusion

To sum up, the overview and objective of the research study is provided in this chapter. It is critical to summarise the key concepts, emphasise the significance of the study, and provide a feeling of closure. There will be a discussion about the literature review in the following chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The demand of smart home is growing rapidly around the world in recent year, representing the integration of modern technology into residential environments. The objective of the literature review is to provide an overview of the Smart Home Living concept, history and evolution of Smart Home, automation, benefit of the smart home system, smart home system and project in Klang Valley, advanced smart home system had implemented in other country, review of relevant theoretical models, and the perspective of implementing Smart Home Living concept among the potential homebuyers in Klang Valley.

2.1 Smart Home Living Concept

Smart Home Living Concept incorporates advanced technology and automation into a residential property to create a more comfortable living environment than traditional housing concepts. A smart home is a system that is designed to improve the quality of life for the human being by enhancing its efficiency and giving it a greater degree of control over various aspects of the home. The goal of smart homes is to help homeowners feel more comfortable and protected whether they are inside or outside the house. Smart homes were formerly considered the realm of the wealthy, but they are now becoming an essential for many people in urban areas due to their affordability (Amri, et al. 2018). Based on the study from Ng et al. (2019), smart home can be defined as a residential property that are connected with a communication network, advanced household devices, appliances, and sensors that can gather data from the resident's daily activities and it can be remotely accessed, monitored, and controlled by using smart device in any direction to provide services responding based on the resident's preferences to achieve their satisfaction. (Ng, et al. 2019). A smart home's control system capability provides enhanced energy management alternatives and provide benefit for residents of all ages. The core of the smart home concept is its significant influence on homebuyer's experience and overall lifestyle. In an automated smart home, routine tasks such as setting the thermostat or managing the lighting are carried out automatically due to the smart home products are connected to the network. As a result, homebuyers no longer have to deal with repetitive tasks and are free to focus on more important tasks. Smart homes are continually evolving with technology advancements in order to keep up with technological

discoveries. They provide homebuyers with more control, energy efficiency, safety, and customisation, demonstrating the convergence of digital innovation and daily life.

2.1.1 History and Evolution of Smart Home System

The evolution and advancement of smart home living concepts are the outcomes of human attempts and innovations. The beginning of the smart home living concept can be traced back to 20th century. It was in the year 1950, a popular mechanics named Emil Mathias in Jackson, Michigan, who acquired mechanical skills at a young age, created the first smart home, Button Manor for his family that provided convenience and comfort (Lamkin, 2021). This system realizes automation through mechanical structure and tool buttons. It is designed to control all the equipment with one button. It can control wind power functional dressers and smart window and so on. In 1957, Disneyland and Monsanto Company had corroborated to build a future home in USA (Lamkin, 2021). A glass-reinforced plastic concept was used to fabricate four symmetrical wings cantilevered from a central core (Hamilton, 2021). There are ultrasonic dishwashers, automated faucets, and telephone equipment within the house. It had almost 20 million visitors before it closed. The first home automated system had been created by an engineer, Jim Sutherland in 1966. The system, ECHO IV is an Electronic Computing Home Operator that allows the users to control all the appliances such as home's temperature, alarm clock and television through the central control panel. (Hendricks, 2014). In 1970, the first network protocol, X10 had been developed by a company in Glenrothes, Scotland. X10 is a communication protocol that allows compatible devices to communicate via existing electrical wire, allowing for remote control of different household products. X10 has gained traction, especially in the home automation use case, which remains the primary driver of consumer adoption (Bennett, et al. 2017). In 1985, an experimental home, Xanadu home created by Bob Master in United State based on the notion of creating dome-shaped dwellings out of rigid foam insulation (David, B. 2019). The house integrates all ergonomics and the most recent automation technologies. This form of construction is also easier, quicker, and more cost-effective than traditional construction method. Today, smart home technology is evolving with an emphasis on integration and interoperability. Smart home ecosystems strive for providing homebuyers with a uniform experience by allowing different devices to connect with one another to function at the same time.

2.1.2 Automation

Home automation system is a technology or device used to manage and automate various aspects of a home. The objective of the system is to improve the efficiency, convenience, security, and energy management of the house by linking and automating various devices and systems. To create a smart and interconnected living space in the home, home automation uses sensors, actuators, controllers, and communication technologies in order to create an intelligent and interconnected living space. The importance of developing a home automation system is growing by the day with several advantages. An automated system is not only provided efficient, but also reduces wastage by using the electricity and water in a more economical manner (Vaishnavi S. Gunge, 2016). Home automation system is built by using a single controller to operate all smart appliances such as lighting, temperature, electricity, security, and sensors (Muhammad Asadullah, 2016).

2.2 Benefit of Smart Home System

With a smart home system, homebuyers are able to transform their living environment into a secure, comfortable, and fully controlled environment. Smart home systems provide various advantages that lead to more convenience, efficiency, and security to create a comfortable living environment to enhance the quality of life. There are numerous benefits for homebuyers to incorporate smart home systems:

2.2.1 Energy Management

A smart home system is able to assist the homebuyers to save energy and money by controlling all the device in the house (El-Azab, 2021). The smart system may collect the homebuyer's preferences data and automatically modify the temperature to optimise energy use. Furthermore, the system can regulate the lighting system to eliminate energy waste and save the cost of electricity.

2.2.2 Convenience

Amazon Alexa and Google Assistant are the smart device that provide voice assistants for the users. Homebuyers may communicate with the smart devices for carrying out activities and obtain information about the housing. This enables convenient administration of every smart device in the house.

2.2.3 Safety

Safety is an important component for all the users to avoid any risk within the house. Smart home system such as smart cameras may help users keep an eye on homebuyer's home 24 hours a day. The homebuyers can stay connected anytime by using their smartphone or tablet to reduce risk and prevent accident in the house (Sudhir Chitnis, 2016). Some of the cameras can detect motion and notify homebuyers when the system notice any unusual activity.

2.2.4 Remote observation

Smart home system allows homebuyers to use their smartphones or tablets to keep an eye on their home and monitor home devices even when they are away. To keep homebuyers always informed about the state of their home, the system will gather all available data to the network and transfer it to their mobile device.

2.3 Smart Home System and Project in Klang Valley

In Malaysia, Mi Home, Amazon's Alexa, and Google home are the more commonplace smart home system in the country to improve the comfortable living environment for the users (imalaysiatech, 2022). There is a wide variety of third-party smart home devices that can be integrated with the smart systems which allowing users to create customised settings according to their own preferences based on the system they choose.

Figure 2.1: Mi Home Ecosystem



Source: imalaysiatech.com (n.d.).

Xiaomi is one of the China technology giants and it is also one of the most popular smart home systems in Malaysia due to their convenient ecosystem and reasonable price. Xiaomi Smart Home, also known as Mi Home developed their own ecosystem to link all smart home devices to a huge network in order to making it easy for beginners to use and operate the Mi smart home system by using their Mi Home app (imt, 2022). According to the Malaysian Investment Development Authority (MIDA), there are several smart home projects developed around the Klang Valley including Andaman Residence, i-City, and Damansara Idaman (MIDA, 2021). The key point of these projects is the fusion of advanced smart technology in the property to achieve sustainability, energy efficiency and comfortable environment. Residents are able to control all the smart device in the property with an application on their smartphones. Smart home project is slowly increasing in Malaysia in the recent years to improve the human's living standards to achieve the standards of advanced country. Smart home provides various advantages including increased convenience, improved energy efficiency, higher safety, and the potential to create a personalised and pleasant living environment. As advancements in technology occur, smart home development project in Malaysia will keep increasing to giving homeowners more options to purchase smart and efficient homes in the future.

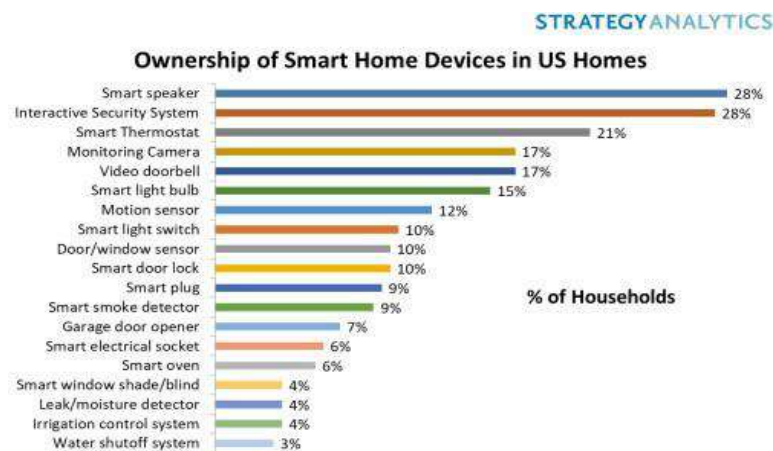
2.4 Advanced Smart Home Living System Had Implement in Other Country

The development of smart home system in the 20th century has significant variations in function and preferences throughout the various nations. For instance, a number of nations in Europe and Asia have adopted smart house system and implemented them into the residential real estate sector.

2.4.1 United States

In recent years, United States (US) has taken a lead role in the development and adoption of advanced smart home concepts. It has a robust technology industry, a culture of innovation, and a large market that allow smart home system to flourish in the country such as Amazon, Google, Philips, and Apple. These American companies are involved in the development and deployment of smart home solutions and have made great achievements and contributions to the development of smart home systems. According to the Statista Research Department in 2023, the estimation of the household who will own a smart home device in United State is around 75% in 2025, it is the third highest planned on smart house penetration rate worldwide. (Statista Research Department, 2023). Furthermore, based on the current estimation, it is estimated that 63.43 million houses in the United States currently use smart home system (Oberlo, 2023). It has been shown that American consumers have shown a willingness to adopt smart home living concept in recent years.

Figure 2.2: Ownership of Smart Home in US Homes



Source: [strategyanalytics.com](https://www.strategyanalytics.com) (2019).

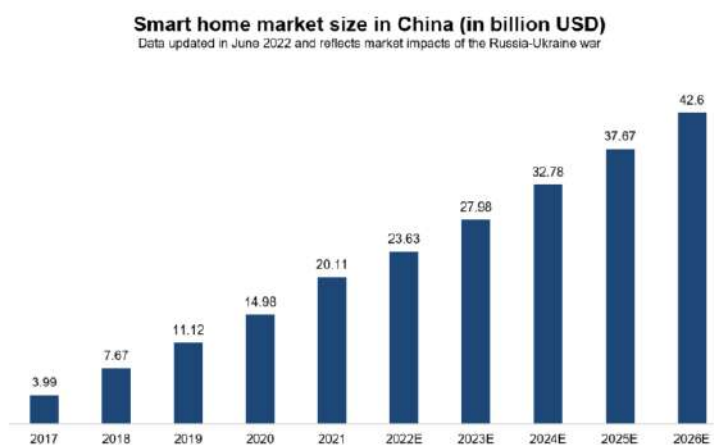
There is a growing trend towards the adoption of smart thermostats, security systems, smart speakers, and other smart home devices due to the demand for convenience, energy efficiency, and enhanced security (Onag, 2020). Smart TVs, smart speakers, and digital streaming devices were the most popular smart home equipment among American consumers in 2023. Google, one of the Tech Giants in the United States offers a variety of smart home products, such as thermostats, cameras, doorbells, and other intelligent gadgets. With the Google Home app, all the smart home products can be

controlled from anywhere in the house through a smart display, phone, tablet, or even a Wear OS watch, where the users can easily monitor their home's status and establish home automation through the Google app. (Google Home, n.d.). Apple and Amazon also developed voice assistants that can assist in controlling all the smart devices in a home. It is possible for the users to speak with the voice assistants in order to perform tasks and provide information about the housing to the users. Although the United States has been a leader in the field of smart home technology, it is important to keep in mind that other countries and regions are also contributing to the advancement of smart home technology in a significant way.

2.4.2 China

China is one of the countries with the fastest growth in the smart home sector in recent years, due to rapid and innovative development in a variety of sectors.

Figure 2.3: Smart home market size in China (in billion USD)



Source: Statista Market Insights (2023).

In 2023, the smart home market in China was estimated at approximately 27.98 billion US dollars, and it is predicted to grow to 42.6 billion US dollars by 2026 (Wu, 2022). With the advancement of intelligent science and technology, numerous smart technologies are gradually entering China's common home due to government assistance and awareness of advanced technology among China residents is growing. This has boosted the country's smart home sector and attracted a lot of businesses to join the market and develop various innovative smart home systems to dominate this

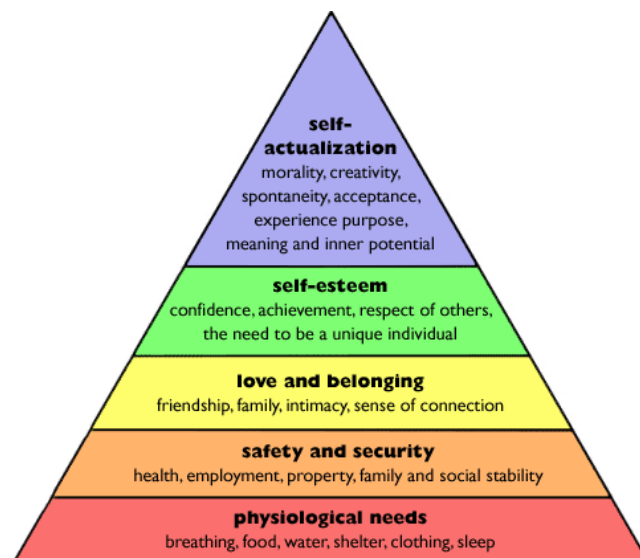
market. Several companies have been instrumental in the advancement of smart home technology, such as Huawei, Xiaomi, and Alibaba. According to the All-View Cloud's (AVC) data, a China company that provide big data applications, the smart lock segment is the most popular single product category in China, with a sales revenue of roughly 7 billion RMB in 2021 and a growth rate of 35.5%. (Wu, 2022). As well as the smart lock system, there is also a good demand for smart lighting, smart switches, and smart curtains in the China smart system market which are all showing a high level of demand. It should be noted that China has developed serious home assistants that can control compatible household appliances via voice control, such as Baidu's Xiaoyu, Alibaba's Tmall Genie X1, and Tencent's Xiaowei (O'Dwyer, n.d.). Many innovations are being implemented in China's smart home market and increased consumer adoption. Smart home technology is experiencing rapid growth in Chinese markets as a consequence of the integration of artificial intelligence, 5G connectivity, and a focus on building comprehensive ecosystems.

2.5 Review of Relevant Theoretical Models

Theoretical models are a foundation to develop conceptual framework for the study. Below are the relevant theoretical models that related to the study research.

2.5.1 Maslow's Hierarchy of Needs

Figure 2.4: Maslow's Hierarchy of Needs



Source: Maslow, A., & Lewis, K. J. (1987).

Maslow's hierarchy of needs is a theory of motivation in psychology that consists of a five-tier model of human needs, generally presented as hierarchical levels within a pyramid created by Abraham Harold Maslow, an American psychological (Mcleod, 2007). There are five hierarchical levels within a pyramid include physiological, safety, love/belonging, esteem, and self-actualization. Physiological needs include food, water, warmth, and rest. Looking up the pyramid, safety needs include security and health followed by belongingness and love needs which include relationships and friendships. The higher hierarchical levels in Maslow's hierarchy include esteem needs and self-actualization. Esteem needs include prestige and a sense of achievement, whereas needs and self-actualization refer to realising one's potential, self-fulfilment, pursuing personal advancement, and peak experiences. Lower needs such as food, water, and rest in the hierarchy must be satisfied before attending the higher need in the hierarchy (Mcleod, 2007). In the hierarchy of needs, the most basic needs are listed first followed by the most advanced needs (Sachdev, 2022).

By applying Maslow's Hierarchy of needs to the smart home concept, the smart home is the second level of human needs involves seeking security and protection from physical and mental damage. Applying this notion to the smart home involves integrating system that provide consistency and user-friendly interface for the human to enhance their standard of living. Smart home system provides convenience, safety and security for homebuyers of all ages whether they are young or old in recent years due to their important role in lowering and eliminating resource and human life losses caused by undesirable scenarios that may occur when homeowners are away from their homes (Sarhan, 2020). Smart home system such as smart locks, cameras, and sensors providing a sense of security and protection for the homeowners to maintain their living standard. By utilizing advanced system such as the Internet of Things (IoT), sensors, cameras, smart locks, and automation, smart security systems allow the homebuyers to monitor, alert, and control security features for their home in anytime through the smartphone or tablet. Smart homes become the dependence of young people offer many conveniences such as the ability to control various devices through the use of a smartphone or tablet to help them live a more comfortable life. Using smart home features, the elderly can be assisted with daily tasks, such as turning on lights, adjusting temperature or monitoring their health conditions through smart devices in any time to minimize the risk of injury when staying at home.

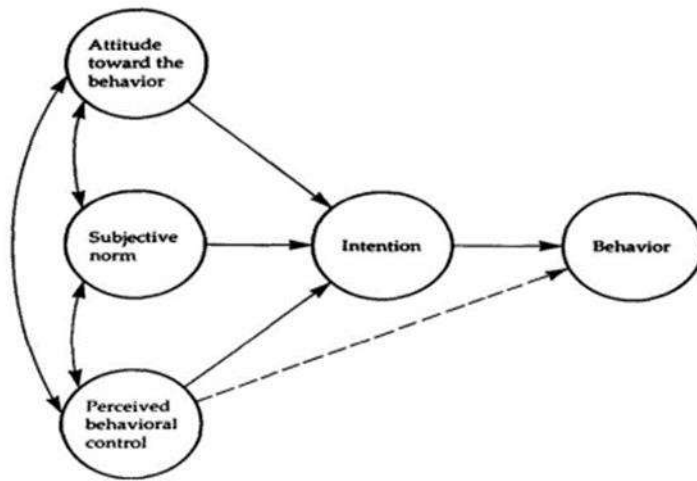
Smart home concept can also contribute to the fulfilment of the homeowners' needs and wants by assisting them to achieve their goals and enhancing their productivity to attend the highest needs,

self-fulfilment needs on the Maslow's Hierarchy. A smart home system incorporates the use of technology to enable humans to live their best lives, achieve personal objectives, and nurture personal growth. Based on the research study, Smart home technologies refer to a network of sensors, monitors, interfaces, appliances, and devices that are linked together in order to automate as well as manage the domestic environment locally and remotely (Charlie, et al. 2017). Smart home technology provides homeowners with ease and convenience, and energy savings by allowing them to control smart appliances via an app on their smartphone or another networked device. Besides, smart home systems with friendly and attractive interface may make it simpler for prospective homeowners to comprehend how to use the system in order to apply the automate basic tasks including shutting off lights, modifying temperature settings, managing home security, saving time and mental energy as well as provide a comfortable living environment. Homeowners may concentrate more on their key tasks and increasing productivity.

2.5.2 Theory of Planned Behaviour

In 1985, Icek Ajzen developed the Theory of Planned Behaviour (TPB), which is a theory of social psychology based on the concept of planned behaviour. A theory of reasoned action can be seen as an extension of the theory of planned behaviour, which is used in various areas of study, such as health, psychology, marketing, and environmental studies, to explain and predict human behaviour (Masukujjaman, M et al. 2023). A person's perception of behavioural control and its influence on their actions and intentions is crucial since a person's resources and opportunities are limited and will determine the possibility of achieving a certain action or behaviour (Ajzen, 1911). The Theory of Planned Behaviour asserts that the intention of an individual to engage in a specific behaviour is by far the strongest predictor of whether they are actually going to engage in that behaviour in the future.

Figure 2.5: Theory of planned behaviour



Source: Ajzen (1991).

Applying the Theory of Planned Behaviour (TPB) to the implementation of the Smart Home Living concept among potential homebuyers in Klang Valley, potential homeowners' intents to use smart home technology are influenced by their attitudes, subjective norms, and perceived behavioural control. This assessment is formed by the potential homeowner's perceptions of the benefits and drawbacks of using smart house technology. The combination of information, functionality, consistency, user-friendly interface are the important element that make the smart home system attractive to potential homebuyers, which will positively impact their attitude towards the technology. In a study, the attitude of a household toward electricity savings was determined based on its assessment of its preference for electricity saving and the availability of information (Wei, Y. J. & Chan, H. W. 2019). To encourage prospective homeowners to accept the idea of smart home living, it is essential to comprehend and form attitudes towards the smart home concept.

2.6 The Perspective of Implementing the Smart Home Living Concept among the Potential Homebuyers

There are a variety the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley. Below are the number of perspectives of implementing the Smart Home living concept among the potential homebuyers.

2.6.1 Consistency Factor

Consistency has significance in smart home technology since it influences the user's willingness to implement it. For smart home systems, consistency in the user interface (UI) and overall user experience is critical. This involves maintaining a consistent design across multiple devices and apps in the smart home ecosystem, such as naming, the language, navigation, and interaction patterns. As part of the smart home concept, a variety of devices from a number of manufacturers are often incorporated to the home that can be monitored via a smartphone or tablet application. It is important that the smart home devices are consistent with one another, regardless of who developed the device. In the smart home sector, a standard and procedures for the consistency device should be implemented to contribute to a more consistent and smooth experience for users. This may allow it easier for users of all ages to understand the smart home system and utilise it to make their lives more comfortable (Ng, et al. 2019).

2.6.2 Users Characteristics Factor

Users Characteristics have a major role in influencing smart home system implementation and acceptance such as age, gender, and education (Chang, 2021). Different demographic groups may have different demands, preferences, and levels of technical literacy. As living in a modern age, the majority of smart home system users in Malaysia nowadays are young generation who tend to be more tech-savvy and receptive to adopting new technologies, including smart home devices. However, older generations may be more cautious or require simpler interfaces for technology adoption. A Study results show that the older population has a generally positive response to most smart gadgets and sensors related to health issues, especially when it comes to the sense of automation when using them (Chang, 2021). Furthermore, due to their lower education level, the majority of the older generation is unfamiliar with smart home systems and prefers the traditional house concept. Smart home system must create a simple page design and operation in order to attract older generation to implement this system in the future. In addition, income level may also influence smart home implementation. The people with lower income are not able the afford the higher installation cost of the Smart home technology.

2.6.3 User-Friendly Interface Factor

User Interface (UI) refers to the software application that designed to interact with the users such as control, graphical elements, navigations (Debble, S. et al. 2005). All smart home systems should have a clear and straightforward user interface. If the interface is simple and easy, users are more likely to adopt and continue using a smart home system. A clear interface is an important feature in user experience design as it allows users to rapidly understand the meaning of each interface part and allowing them to utilise the system more effectively (Ng, et al. 2019). A clear interface provides straightforward information, icons, and buttons that allow users to operate the system quickly and comfortably. This is particularly important in smart homes where users may need to operate many devices at the same time. Clear design contributes to provide an enjoyable experience for users and making smart home systems more accessible and appealing to a wider variety of consumers.

2.6.4 Attractiveness Factor

One of the key components in attracting potential homebuyers and convincing them to implement a smart home system in their house is attractiveness. The visual design, colour schemes and graphical features contribute to the smart system's attractiveness. An attractive interface has the power to attract interest in users and create a positive emotional reaction. Based on study research, a successful smart system should be not only straightforward and easy to use, but also visually appealing in order to draw the user's attention (Ng, et al. 2019). An appealing and well-planned interface enables homebuyers have a positive impression of smart home technology. Homebuyers more prefer a smart system with a modern, innovative, and user-friendly design.

2.6.5 Economic Performance Factor

Economic performance such as cost effective and energy saving is an important element that will influence the potential homebuyers to implement the smart home system. The implementation rate of the smart home living concept in the Klang Valley will depend on the perception of the profitability and cost-effectiveness of smart home system energy (Wei, Y. J. & Chan, H. W. 2019). Prospective homebuyers will often evaluate the return on investment (ROI) of the smart home system. They will

evaluate the initiation cost of the smart home system, long-term energy savings and other advantages that smart home system will provide for the homebuyers.

2.6.6 Consumer Attitude Factor

Consumer attitudes play a crucial role to influence the implementation of Smart Home Living among potential homebuyers in the Klang Valley. Different consumer perspectives will influence a homebuyer's perspective on the implementation of the smart home living concept. Based on a study, consumer behaviour in recent years has indeed shown a growing inclination towards sustainable consumer products that incorporate smart technology to reduce household burdens (Ferreira, L et al. 2023). Thus, the implementation of smart home systems that provide sustainable behaviours for the households may become an area of interest for potential homebuyers.

Table 2.1: Lists of the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley

Ng et al. 2019	Mark et al. 2000	Wei, Y. J. & Chan, H. W. 2019	Chang, S. 2021	Kenn et al. 2023
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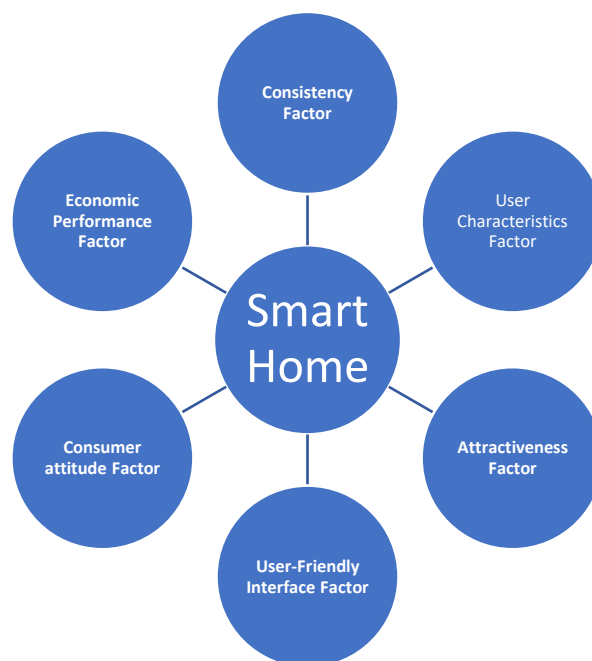
<u>Consistency Factor</u>			
Performance	*		
System Displays	*		
Design	*		
<u>User Characteristics</u>			
<u>Factor</u>			
Demographic Group		*	
Income Level		*	
Education level		*	
<u>User-Friendly Interface</u>			
<u>Factor</u>			
Clear navigation	*		
Readability	*		
Customization Option	*		*
<u>Attractiveness Factor</u>			
Visual Appeal	*		
Simplicity	*		*
User experience	*		*
Personalization	*		*
<u>Economic Performance</u>			
<u>Factor</u>			
Cost effective		*	
Expense saving		*	
Economic condition		*	
<u>Consumer Attitude</u>			
<u>Factor</u>			
Skill and knowledge		*	
Attitude towards smart system		*	
Media publicity		*	

Source: Developed for the research

2.7 Proposed Theoretical/ Conceptual Framework

The design and development of smart homes technology in Klang Valley can be guided by the conceptual framework that considers a variety of factors such as consistency factor, user-friendly interface factor, attractiveness factor, users characteristics factor, consumer attitude factor, and economic performance factor. This conceptual framework offers an organised method to guarantee that smart home system is aesthetically pleasing, consistent, easy to use and aligned with the interests and demographics of the target homeowners. In the process of developing and deploying smart home system, this conceptual framework can serve as a guide for designers, developers, and decision makers to enhance their system and improve it in the future.

Figure 2.6: Proposed Conceptual Framework



Source: Developed for the research

2.8 Conclusion

To sum up, this chapter provides an overview of the Smart Home Living concept, smart home system and project in Klang Valley and advanced smart home technology in other country. It also defined the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley which include consistency factor, user characteristics factor, user-friendly interface factor, attractiveness factor, consumer attitude and economic performance.

CHAPTER 3: METHODOLOGY

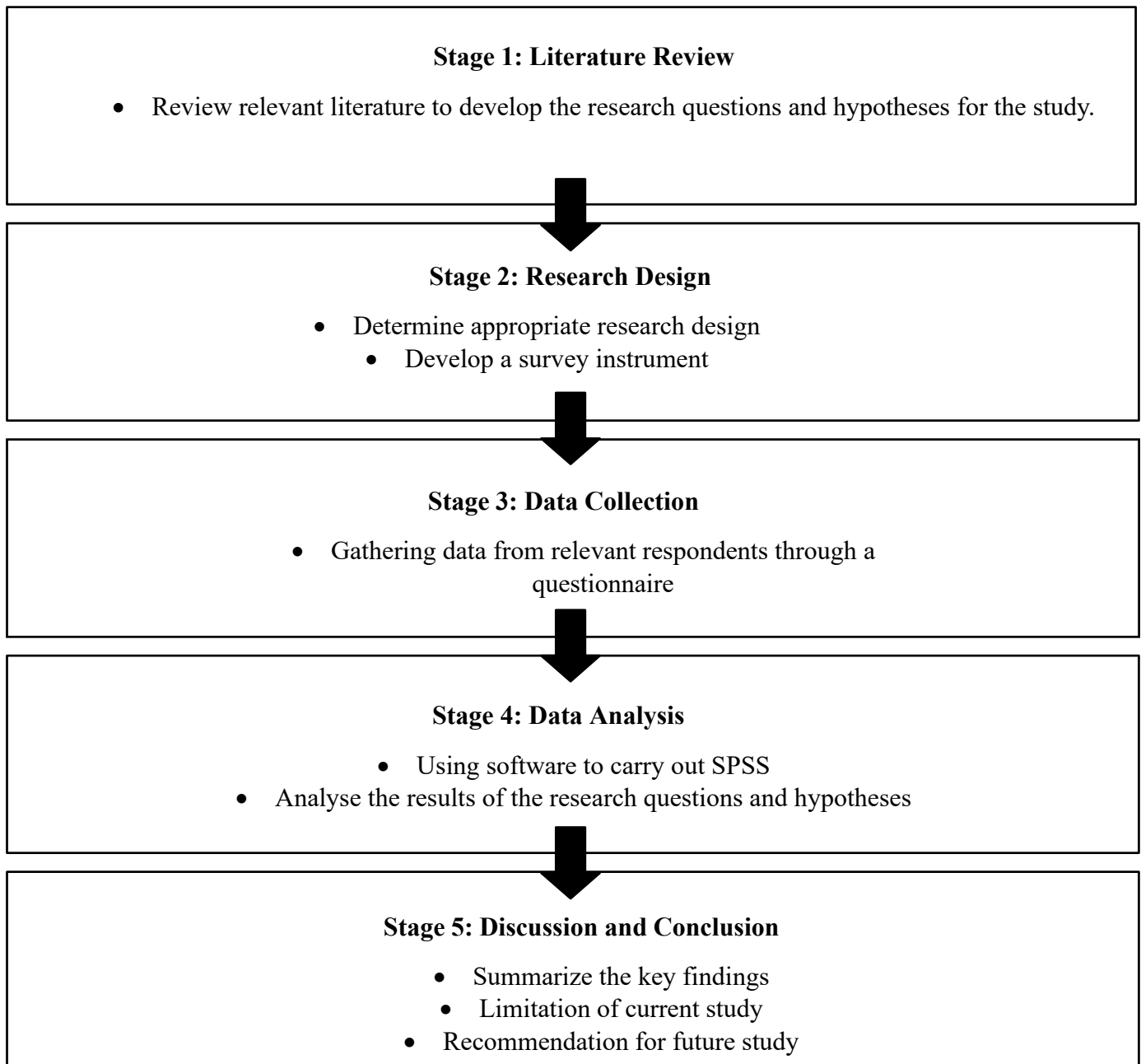
3.0 Introduction

This section provides an overview of the research methodology for the study. Its primary objective is to establish the methods and techniques utilized for the collection, analysis, and interpretation of data. The sequence will commence with the research design, followed by the data collection method, sampling design, research instrument, constructs measurement, data processing, and data analysis.

3.1 Research Design

The concept of a research design offers a systematic and structured approach to collecting observations for the purpose of conducting research (Abbott et al, 2013). It is designed for obtaining the right data and providing a clear and concise direction to the researcher for conduct study research (Islamia, 2016). Qualitative research and quantitative research are the methods that can be applied for the researcher to conduct research. These methods provide different ways for the data collection, analysis, and interpretation. Based on the study, quantitative research can be particularly suitable for investigating the perspective of implementing the Smart Home living concept among potential homebuyers in Klang Valley because quantitative method of research involves many respondents to ensure that the data is collected efficiently and to increase the reliability of the study. A survey will be employed in this study to collect the primary data from potential homebuyers in Klang Valley to examine the research hypotheses and provides valuable insights into the perspectives of potential homebuyers in Klang Valley regarding the Smart Home living concept. The following is the research flow chart for the study:

Figure 3.1: Research Flow Chart for the perspective of implement Smart Home Living concept among potential homebuyers in Klang Valley



Source: Developed for the research

3.2 Data Collection Methods

Data collection methods are the tools for gathering the information and data from the relevant respondents include survey, interviews, observations, or experiments (William, G & Lisa, D, 2016). For conducting a successful research, data collection is an essential stage for the investigation of research problems and the verification of hypothesis. Primary data and secondary data are the types of data collection methods that will be used for the research.

3.2.1 Primary Data

The study will employ a primary data collection method to gather pertinent information and data for addressing the hypothesis and research questions related to the perspective of implementing the smart home living concept among potential homebuyers in Klang Valley. Primary data collected method is an important element for the research process by gathering firsthand materials from the public (Sekaran & Bougie, 2016). This study has proposed precise research questions and hypotheses concerning the interrelationships among Smart Home living concepts, smart home users, and satisfaction. Additionally, this study aims to comprehend the perspectives of implementing smart home living concept among potential homebuyers. Likert scale survey method is utilized in this data collection to gather primary data. Survey participants will convey the intensity of their emotions by expressing their agreement or disagreement in response to the survey question. This process captures the varying level of their feelings during the survey section (Barua, 2013).

3.2.2 Secondary Data

Secondary data set is a collection of past research data that has been collected by the researchers during an earlier period (Vartanian, 2011). Websites, books, and journal articles are all considered as secondary data sources. Secondary data can provide greater information for researchers through the websites, books, and journal articles they find online and assisting the researcher in their research. (Vartanian, 2011). Researchers who are limited on time or resources may be able to take advantage of secondary data by using it to supplement their research (Johnston, 2014). Secondary data can be a valuable and efficient way to gather information and can also serve as a cost and time effective method for collecting information and data, especially when it is compared with the primary data collection.

3.3 Sampling Design

Sampling design refers to the method that will be used to acquire a sample from the target population. The primary aim of the sampling design is to ensure that the selected sample is a true reflection of the entire population and allowing researchers to make valid and confident generalizations from the findings (Szczerbinski, 2007). Obtaining a sample from the population is frequently a more practical approach and enabling the collection of data in a shorter timeframe and at a reduced cost (Dana, 2020). There are several elements that comprise the sampling process including the target population, sampling frame and sampling location, sampling elements, sampling technique and the size of the sampling.

3.3.1 Target Population

Target population is defined as a specific group of individuals in a specific location who will serve as a representative sample of the overall population and meet the requirements established by the research in order to be the intended audience for the study (Casteel & L., 2021). A potential homebuyer population in the Klang Valley will be the target population for the research. The target demographic for the study consisted of all adults in Klang Valley between the ages of 18 and 60 and willingness to partake in property transactions.

3.3.2 Sampling Frame and Sampling Location

Sampling frame is the actual collection of units from the target population. In this research, the target respondents will be the adult who have the potential to purchase a house within the Klang Valley. Klang Valley is known as urban conglomeration located at the center of the west coast of Peninsular Malaysia. Federal Territory of Kuala Lumpur, Gombak, Hulu Langat, Klang and Petaling, Sepang and Kuala Langat are the major areas of Klang Valley. As part of the research process, the questionnaire will be distributed to the respondents who live in Klang Valley in order to gather data that will be used to address the hypothesis and research questions.

3.3.3 Sampling Element

The respondents that will be take part in this research will be the adults in Klang Valley between the ages of 18 and 60. Respondents must fulfil the criteria of possessing the necessary financial capacity

to purchase property to ensure accurate information collection for the research objectives. The selection of respondents according to these standards attempts to obtain a representative sample that reflects the features of the population that is being studied, enabling significant insights for the research.

3.3.4 Sampling Technique

Sampling technique refers to the selection of a relatively smaller number of representative individuals within a larger population for the purpose of the research study from the target population (Sharma, 2017). In the study of data collection, there are two common sampling techniques that commonly used for the research study which are probability sampling and non-probability sampling. In order to collect the data that are reliability of the study, the respondents that take part in this research must be chosen at random. As a result, non-probability sampling will be applied in this study to gather data. Convenience sampling, which is one of the types of non-probability sampling methods will be used as part of the process of collecting the data through the questionnaire. Convenience sampling is a method that requires researchers to go to public locations to invite individuals to participate in the research (Jawad, G, et al. 2022). The reason of using this method is to provide an easier, faster, and more cost-effective way to gather data from the respondents. For efficient data collection, Kampung Baru, train station and public park around the Klang Valley are the ideal location. This is due to its diverse population which includes individuals from various ethnic and social backgrounds, as well as residents of all ages who meet the questionnaire's requirements.

3.3.5 Sampling Size

Sampling size refers to the number of participants who will be selected from a larger population to take part in the research (Naresh, 2009). It is important for the reliability and applicability of study findings. As reported by the My Census, the estimated population between the ages of 15 and 64, eligible for employment under the Employment Act of 1995 in the Klang Valley, is approximately 6,065,750 (My Census, 2023). This comprises specific figures for various regions within the Klang Valley, including the Federal Territory of Kuala Lumpur (1,399,020), Gombak (965,600), Hulu Langat (1,036,458), Klang (809,952), Petaling (1,673,621), Sepang (238,304) and Kuala Langat (224,210). Since there is a lack of information and data available on the website for the estimated

population between the ages of 18 and 60 in the Klang Valley, the estimated population between the ages of 15 and 64 will be used for the purpose of this study.

Figure 3.2: Taro Yamane Formula

$$n = \frac{N}{1 + N(e)^2}$$

n = Sample size
N = Population size
e = Acceptable margin of error

Source: Developed for the research

Taro Yamane method is a mathematical formula that was created by Taro Yamane in 1967 and is commonly used to calculate the sample size from a target population (Yamane, 2016). The formula will be used when the size of the population is relatively large. The purpose of this method is to estimate the sample size necessary to achieve a desired level of precision in the results of a survey.

Figure 3.3: Sample size calculation process

$$n = \frac{6,065,750}{1 + 6,065,750 (0.10)^2}$$
$$n = \frac{6,065,750}{1 + 6,065,750 (0.01)}$$
$$n = \frac{6,065,750}{1 + 60,657.50}$$

$$n = \frac{6,065,750}{60,658.50}$$

$$n = 99.90$$

$$n \approx 100 \text{ (rounded)}$$

Source: Developed for the research

Based on the calculations for the sample size, the estimated sample size is approximately 99.90 respondents. The respondents will be rounded up to 100 respondents in order to facilitate the research process and make it as simple and practical as possible. Based on the sampling size, a total of 100 sets of questionnaires will be collected from the target population within the Klang Valley area.

3.4 Research Instrument

Research instrument is a method that is used to collect data relating to the research (Munir, 2017). The questionnaire will be designed using Google Form for this research. The survey instrument will be distributed to respondents located in the Klang Valley region either through email or a provided link. Below is the layout of questionnaire:

Table 3.1: Questionnaire Layout

Section	Description
A	Demographic information
	Part A: Consistency Factor Part B: User Characteristics Factor

B	Part C: User-Friendly Factor Part D: Attractiveness Factor Part E: Economic Performance Factor Part F: Consumer Attitude Factor
C	Opinions on smart home living concept among potential homebuyers

Source: Developed for the research

The survey will be divided into three sections. The first section of the survey will collect the demographic information of the respondents within the Klang Valley which include gender, age group, ethnicity, education level, monthly income, location, occupation, and planning of installing smart home living. In the second section of the survey, questions will be divided into six sections including consistency factor, user characteristics factor, user-friendly interface factor, attractiveness factor, economic performance factor and consumer attitude factor and formulated using a five-point Likert Scale. Respondents will provide their feedback on the satisfaction level regarding the perspective of implement Smart Home Living concept in Klang Valley. In the third section of the survey, opinion on installing smart home system will be collected from the participants for the research purpose. Below is the summary of the survey questionnaire:

Table 3.2: Summary of the survey questionnaire

Particulars	Construct/ Items	Section	List of Reference
Demographic Information	<ul style="list-style-type: none"> - Gender - Age Group - Ethnicity - Education level - Monthly income - Location - Occupation - Plans for installing smart home living 	Section A	J.X. Fong (2021)
Consistency Factor	<ul style="list-style-type: none"> - I believe that the performance of smart home system can provide convenience and efficiency in my daily living. 		

	<ul style="list-style-type: none"> - I believe that the system displays consistently can help me understand the information quickly. - I believe that simple design style of smart home device allows me to adapt the usage faster. 		Ng et al. (2019)
User Characteristics Factor	<ul style="list-style-type: none"> - I believe that generational differences impact the acceptance and adoption of Smart Home Living concept. - I believe that education level may influence the acceptance and adoption of Smart Home Living concept. - The adoption of smart home system can influence my standard of living. 	Section B	Chang (2021)
User-Friendly Interface Factor	<ul style="list-style-type: none"> - I believe that ease of use and accessibility play an important role in smart home system to make the system more comfortable. - I believe that clarity and intuitiveness of navigation in smart home system will meet my satisfaction. - Readability of information is important for a smart home system. 		Ng et al. (2020) & Kenn et al. (2023)
Attractiveness Factor	<ul style="list-style-type: none"> - I believe that the attractive visual design of smart home interfaces can entice me to adopt the system. - Simplicity of the Smart Home interface design make it easier for me to use the system. - Personalized features provided by smart home system can increase my satisfaction. 		Ng et al (2019) & Kenn et al. (2023)

Economic Performance Factor	<ul style="list-style-type: none"> - I believe that smart home system will not need high maintenance costs. - Adoption of smart home system may help me to save energy bills. - I believe that good economic conditions will increase the rate of adoption Smart Home living concept around Klang Valley. 		Wei, Y. J. & Chan, H. W. 2019
Consumer Attitude Factor	<ul style="list-style-type: none"> - I might feel more confident if I were aware of the advantages of smart home system. - I believe that using smart home system will provide me positive experience in my daily living. - I believe the marketing and the advertisement information from mass media will entice me to adopt the smart home system. 		Wei, Y. J. & Chan, H. W. 2019
Opinion	<ul style="list-style-type: none"> - In your opinion, do you have any other factors that could significantly and positively change your view on the smart home living concept? 	Section C	-

Source: Developed for the research

3.5 Constructs Measurement

Scale of measurement is a method to measure the data that have been collected for the research purposes (Brown, J. D. 2011). The four types of scales that can be used for measurement include nominal scale, ordinal scale, interval scale, and ratio scale. In section A of the questionnaire, the data will be collected using a nominal scale, while in section B, the data will be collected using an ordinal scale.

Figure 3.4 Example of Section A Question 1 (Nominal Scale)

1. Gender
<input type="radio"/> Male
<input type="radio"/> Female

Source: Developed for the research

Figure 3.5 Example of Section B Question 1 (Ordinal Scale)

1. I believe that the performance of Smart Home technology can provide convenience and efficiency in my daily living.
<input type="radio"/> 1 - Strongly Disagree
<input type="radio"/> 2 - Disagree
<input type="radio"/> 3 - Neutral
<input type="radio"/> 4 - Agree
<input type="radio"/> 5 - Strongly Agree

Source: Developed for the research

Likert Scale measurement method will be applied for the section B survey question to assess participants' attitudes, opinions, or preferences. Likert Scale is one of the measurement methods that applied in survey that offering multiple categories from which participants can choose to express their thoughts, attitudes, or feelings about a given topic (Nemoto, 2013). The format of the Likert scale survey method allowed the systematic collection of quantitative data, providing a measurable and standardized method to measure respondents' perspectives. In the survey, there are five level of Likert Scale that are included in the survey:

(1) Strongly Disagree

(2) Disagree

(3) Neutral

(4) Agree

(5) Strongly Agree

3.6 Data Processing

Data processing is a crucial step in ensuring the validity and reliability of the data utilized in research. To lower the possibility of errors, the questionnaire will be reviewed by the UTAR Scientific and Ethical Review Committee (SERC) through an ethical review procedure before the survey process conducted. Following the examination, a questionnaire will be carried out to find possible issues. This will guarantee that the questionnaire is understandable and produces correct responds.

3.7 Data Analysis

Data analysis refers to the process which researchers can obtain valuable information and data to make better decisions (Ching, 2022). This valuable information and data will be used for the purposes of answering the research question and testing hypotheses that has been developed for the study. Statistical package social sciences (SPSS), is a software package that will be applied for this research study to assist research, test hypotheses, and complex the data (Arifa, R & Golam, M. 2021).

3.7.1 Descriptive analysis

Descriptive analysis is a guide outlines strategies for enhancing the effectiveness of quantitative descriptive analysis by systematically identifying patterns in data to address inquiries concerning the who, what, where, when, and to what extent (Reber, 2017). Descriptive analysis of the questionnaire focuses on examining respondents' demographic profiles which include gender, age group, ethnicity, education level, monthly income, location, occupation, and planning of installing smart home living. It assists researchers to make well-informed conclusions by assisting in summarizing and comprehending the features of dataset.

3.7.2 Reliability test

The consistency and stability of a measuring tool or instruments that researchers intend to evaluate for reliability are referred to as reliability tests. One of the most used reliability metrics in the social

and organizational sciences is Cronbach's Alpha (Wright, 2014). It may determine how closely connected a group of items is to one another.

Figure 3.6: Cronbach's Alpha Rule of Thumb

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

Source: Lavrakas (2008).

The average of Cronbach's alpha is between 0 to 1. The greater the internal consistency of the scale's elements, the closer the value is to 1. According to research finding by Dr. Matt C. Howard (2019), A Cronbach's alpha score of 0.70 or greater is often regarded as appropriate for research purposes, showing a reasonable level of internal consistency reliability. However, a Cronbach's alpha of 0.60 or lower would be considered deemed acceptable. This lower requirement acknowledges that achieving high levels of internal consistency reliability may be more difficult in the early phases of research.

3.7.3 Inferential Analysis

Inferential analysis involves making conclusions and comparing the variations among the groups of individuals. It will used in this research to determine the perspective of implement Smart Home Living concept among potential homebuyers in Klang Valley. In this study, regression analysis will be employed in this study. Regression analysis is a method to determine the functional relationship among variables (Chatterjee, S. & Ali, S. 2013). In essence, this study determines which variables is related to the perspective of implementing the Smart Home living concept among potential homebuyers in Klang Valley. Multiple linear regression allows the researchers to understanding the strength of the relationship among variables. Based on the study research, multiple linear regression will be adopted for the process of testing hypotheses.

3.8 Conclusion

To sum up, this chapter provides an overview of the research methodology for the study which include research design, followed by the data collection method, sampling design, research instrument, constructs measurement, data processing, and data analysis. The data analysis will be presented in the next chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

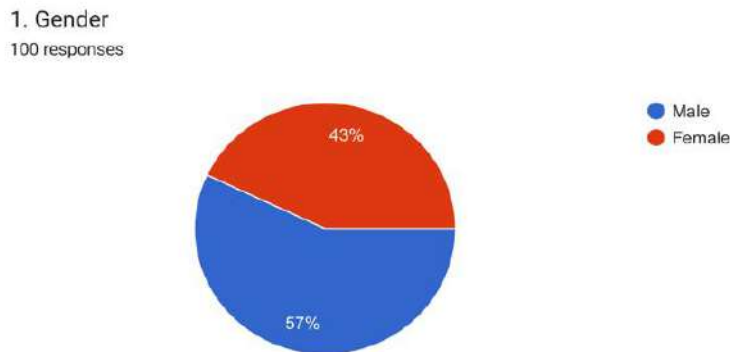
This chapter is aimed at discussing the results of the survey questionnaire. The data analysis will involve descriptive analysis, scale measurement, inferential analysis, and conclusions. Descriptive analysis will encompass the respondent demographic profile and measurements of central tendencies of constructs.

4.1 Descriptive analysis

Descriptive analysis of the questionnaire focuses on examining respondents' demographic profiles, including gender, age group, ethnicity, education level, monthly income, location, occupation, and plans for installing smart home living. The survey involved 100 participants from seven distinct districts within the Klang Valley region.

4.1.1 Gender

Figure 4.1: Respondents' Gender Distribution

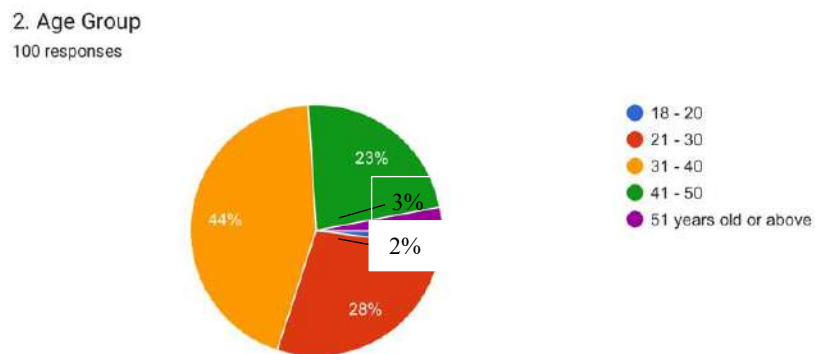


Source: Developed for the research

Based on Figure 4.1, the research involved a total of 100 respondents. Among them, males constituted the majority, accounting for 57% of the total, equivalent to 57 respondents, while females comprised 43%, totalling 43 respondents. In summary, the majority of the respondents participating in this research are male.

4.1.2 Age Group

Figure 4.2: Respondents' Age Distribution



Source: Developed for the research

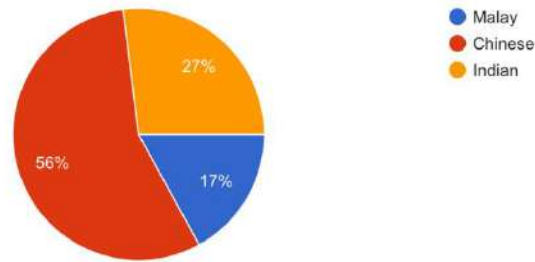
In terms of age group, respondents' ages have been categorized into five different groups. The majority of respondents fall between the ages of 31 to 40, comprising 44%, followed by respondents aged between 21 to 30 and 41 to 50 with 28% and 23% of respondents respectively. Only 3% of respondents are aged 51 years or above. The lowest age group consists of respondents aged 18 to 20, accounting for only 2%.

4.1.3 Ethnicity

Figure 4.3: Respondents' Ethnicity Distribution

3. Ethnicity

100 responses



Source: Developed for the research

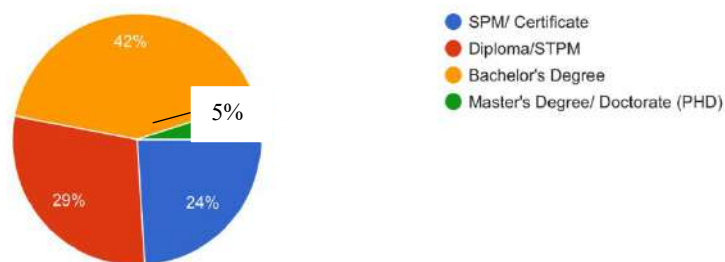
Regarding ethnicity, the research includes three groups including Malay, Chinese, and Indian. The largest proportion of respondents are Chinese, totalling 56%, followed by Indian ethnicity with 27% of participants. The smallest representation is from the Malay ethnicity, with 17% of respondents.

4.1.4 Education Level

Figure 4.4: Respondents' Education Level Distribution

4. Education Level

100 responses

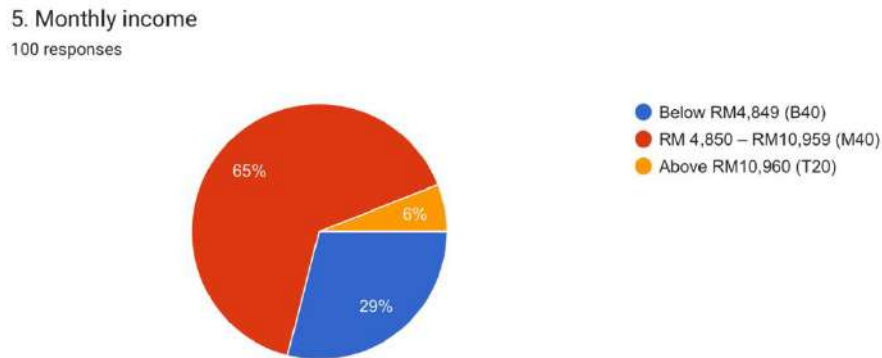


Source: Developed for the research

This section will discuss the education levels of the respondents and it will be categorized into four groups. The majority of respondents hold a bachelor's degree, totalling 42% of respondents, followed by diploma/STPM and SPM with 29% and 24% of respondents respectively. The lowest percentage is attributed to those holding a Master's degree/Doctorate (PhD), with only 5% of respondents.

4.1.5 Monthly Income

Figure 4.5: Respondents' Monthly Income Distribution



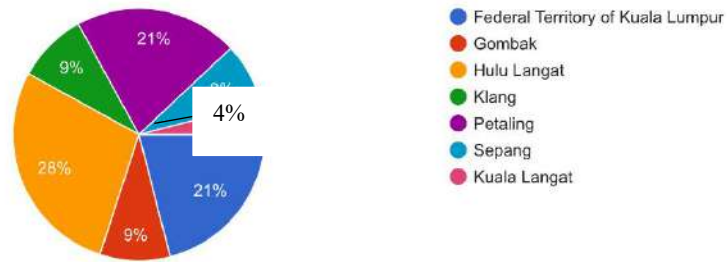
Source: Developed for the research

In terms of monthly income, respondents are divided into three categories including B40 (below RM4,849), M40 (RM4,850 – RM10,959), and T20 (above RM10,960). Among them, 65% of respondents fall into the M40 category, with a monthly income between RM4,850 and RM10,959. For the B40 monthly income group, there are 29% respondents, followed by the T20 group, which only has 6% of respondents.

4.1.6 Location (District)

Figure 4.6: Respondents' Location Distribution

6. Location (District)
100 responses



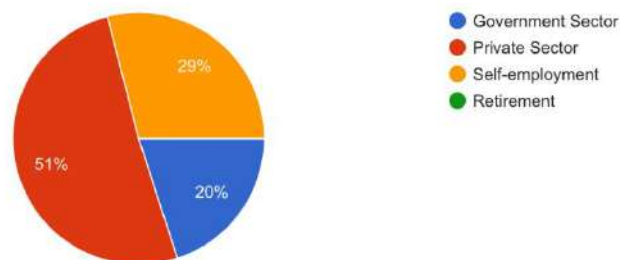
Source: Developed for the research

According to the research, the target respondents for the study are potential homebuyers in the Klang Valley. Referring to Figure 4.6, the majority of respondents are located in Hulu Langat (28%), followed by the Federal Territory of Kuala Lumpur (21%), and Petaling (21%). Additionally, respondents from Klang and Gombak each represent 9% of the total, while Sepang constitutes 8%. The location with the lowest percentage of respondents is Kuala Langat, accounting for 4%.

4.1.7 Occupation

Figure 4.7: Respondents' Occupation Distribution

7. Occupation
100 responses

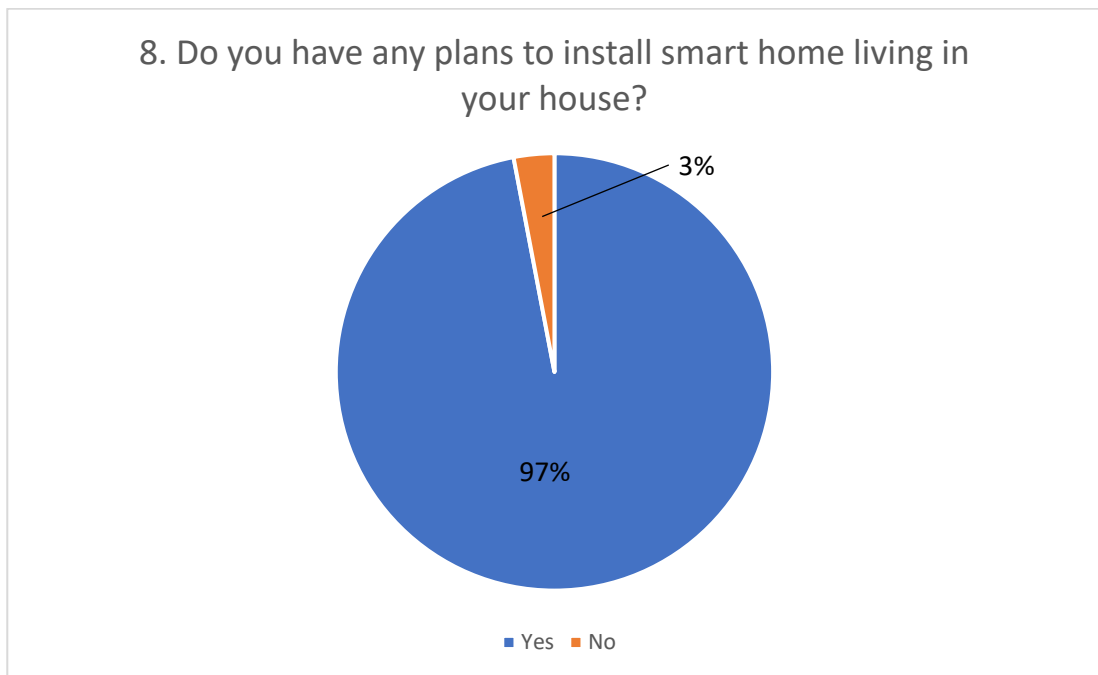


Source: Developed for the research

Based on the data presented in Figure 4.7, the majority of respondents work in the private sector, comprising 51%, followed by those in self-employment, accounting for 29%, and the government sector, representing 20%. There were no respondents categorized as retired.

4.1.8 Planning of installing smart home living

Figure 4.8: Distribution of Respondents' Plans for Installing Smart Home Living



Source: Developed for the research

Table 4.1: Table for respondents who answer No

Category	Comment	Frequency	Percentage (%)
Lack of Knowledge	- Lack of knowledge about Smart Home (R41)	1	1%
High Cost	- It is expensive (R21)	1	1%
Complexity to use	- It's hard to use if for my family (R89)	1	1%

*Note: R= Respondents

Source: Developed for the research

The majority of respondents with 97% from the data expressed their intention to install smart home living systems in their houses in the future. Smart home living is a concept that promises several benefits to homeowners, offering convenience and creating a comfortable living environment. Only 3% of the respondents chose not to install smart home living system in the future due to the lack of knowledge (1%), high cost (1%) and complexity of use (1%).

4.1.9 Central Tendencies Measurement of Constructs

The survey questionnaire has been divided into three sections. The first section (Section A) pertains to the demographic profile of the targeted respondents. The second section (Section B) consists of six parts, each based on a variable relevant to the research. Each variable has three questions that require respondents to answers. In the third section (Section C), respondents are required to share their opinions about the Smart Home Living concept. Likert Scale measurement methods are applied to the questions in Section B to assess participants' attitudes, opinions, or preferences. The Likert Scale offers multiple categories which ranging from 1 to 5 with the options from strongly disagree to strongly agree for respondents to choose according to their thoughts, satisfaction, or feelings about a given topic.

Table 4.2: Statistics table for Consistency Factor

Consistency Factor	Q1: I believe that the performance of a smart home system can provide convenience and efficiency in my daily living.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	26	26%
Neutral (3)	12	12%
Agree (4)	42	42%
Strongly agree (5)	20	20%
Mean	3.56	
Mode	4	
Median	4.00	

Q2: I believe that consistent system displays can help me understand information quickly.		
	Frequency	Percentage (%)
Strongly Disagree (1)	1	1%
Disagree (2)	3	3%
Neutral (3)	18	18%
Agree (4)	39	39%
Strongly agree (5)	39	39%
Mean	4.12	
Mode	4, 5	
Median	4.00	
Q3: I believe that the simple design style of smart home devices allows me to adapt to their usage faster		
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	9	9%
Neutral (3)	23	23%
Agree (4)	34	34%
Strongly agree (5)	34	34%
Mean	3.93	
Mode	4, 5	
Median	4.00	

Source: Developed for the research

Referring to Table 4.2, Consistency Factor Question 1 states "I believe that the performance of a smart home system can provide convenience and efficiency in my daily living." Based on the data collected, there were 0% of respondents who strongly disagreed, 26% of respondents who disagreed, 12% of respondents who remained neutral, 42% of respondents who agreed, and 20% of respondents who strongly agreed with Consistency Factor Question 1.

For Consistency Factor Question 2, the statement is "I believe that consistent system displays can help me understand information quickly." According to the data collected, 1 respondent strongly

disagreed with the statement, 3% of respondents disagreed, 18% of respondents were neutral, 39% of respondents agreed, and 39% of respondents strongly agreed.

For the last question from Consistency Factor, regarding “I believe that the simple design style of smart home devices allows me to adapt to their usage faster,” there were no respondents who strongly disagreed, 9% of respondents who remain neutral, 34 % of respondents who agreed, and 34% of respondents who strongly agreed.

Table 4.3: Statistics table for User Characteristics Factor

User Characteristics Factor	Q1: I believe that generational differences impact the acceptance and adoption of Smart Home Living concept.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	15	15%
Neutral (3)	28	28%
Agree (4)	38	38%
Strongly agree (5)	19	19%
Mean	3.61	
Mode	4	
Median	4.00	
	Q2: I believe that education level may influence the acceptance and adoption of Smart Home Living concept.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	9	9%
Neutral (3)	24	24%
Agree (4)	38	38%
Strongly agree (5)	29	29%
Mean	3.87	
Mode	4	

Median	4.00	
	Q3: The adoption of smart home system can influence my standard of living.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	11	11%
Neutral (3)	24	24%
Agree (4)	37	37%
Strongly agree (5)	28	28%
Mean	3.82	
Mode	4	
Median	4.00	

Source: Developed for the research

Based on the data collected from User Characteristics Factor Question 1, the question was “I believe that generational differences impact the acceptance and adoption of Smart Home Living concept.” The highest number of respondents responded with agree with the total of 38% of respondents, followed by neutral with 28% of respondents, strongly agree with 19% of respondents, and disagree with 15% of respondents. Notably, there were no respondents who chose strongly disagree.

The User Characteristics Factor Question 2 was “I believe that education level may influence the acceptance and adoption of Smart Home Living concept.” None of the respondents chose strongly disagree while 9% of respondents chose disagree. Regarding neutral and strongly agree, 24% and 29% of respondents responded respectively. The highest number of respondents responded with agree option with a total of 38% respondents.

The following question was “The adoption of smart home system can influence my standard of living.” Based on the data collected, none of the respondents chose strongly disagree, followed by disagree with 11% respondents, neutral with 24% respondents, agree with 37% respondents and strongly agree with 28% respondents.

Table 4.4: Statistics table for User-Friendly Interface Factor

User-Friendly Interface Factor	Q1: I believe that ease of use and accessibility play an important role in smart home system to make the system more comfortable.	
	Frequency	Percentage (%)
Strongly Disagree (1)	1	1%
Disagree (2)	8	8%
Neutral (3)	23	23%
Agree (4)	42	42%
Strongly agree (5)	26	26%
Mean	3.84	
Mode	4	
Median	4.00	
	Q2: I believe that clarity and intuitiveness of navigation in smart home system will meet my satisfaction	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	19	19%
Neutral (3)	11	11%
Agree (4)	33	33%
Strongly agree (5)	37	37%
Mean	3.88	
Mode	5	
Median	4.00	
	Q3: Readability of information is important for a smart home system.	
	Frequency	Percentage (%)
Strongly Disagree (1)	1	1%
Disagree (2)	11	11%
Neutral (3)	26	26%
Agree (4)	33	33%
Strongly agree (5)	29	29%
Mean	3.78	
Mode	4	

Median	4.00
---------------	-------------

Source: Developed for the research

The User-Friendly Interface Factor Question 1 was “I believe that ease of use and accessibility play an important role in smart home system to make the system more comfortable.” 42% of the respondents responded with agree which was the highest respondents followed by strongly agree with 26% respondents, neutral with 23% respondents and disagree with 8% respondents. Only 1% of the respondents responded with strongly disagree.

The second question in the User-Friendly Interface Factor was “I believe that clarity and intuitiveness of navigation in smart home system will meet my satisfaction.” The majority of respondents strongly agree with this statement with 37% of respondents. This means that clarity navigation is important for the smart home system.

The next question was “Readability of information is important for a smart home system.” The majority of respondents with a total of 33% respondents expressed agreement with this statement. Conversely, the lowest number of respondents, comprising 1% of respondent who were strongly disagreed.

Table 4.5: Statistics table for Attractiveness Factor

Attractiveness Factor	Q1: I believe that the attractive visual design of smart home interface can entice me to adopt the system.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	11	11%
Neutral (3)	22	22%
Agree (4)	37	37%
Strongly agree (5)	30	30%
Mean	3.86	
Mode	4	
Median	4.00	

Q2: Simplicity of the smart home interface design make it easier for me to use the system.		
	Frequency	Percentage (%)
Strongly Disagree (1)	1	1%
Disagree (2)	18	18%
Neutral (3)	19	19%
Agree (4)	29	29%
Strongly agree (5)	33	33%
Mean	3.75	
Mode	5	
Median	4.00	
Q3: Personalized features provided by smart home system can increase my satisfaction.		
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	7	7%
Neutral (3)	26	26%
Agree (4)	38	38%
Strongly agree (5)	29	29%
Mean	3.89	
Mode	4	
Median	4.00	

Source: Developed for the research

For Attractiveness Factor Question 1, the statement was “I believe that the attractive visual design of smart home interface can entice me to adopt the system.” The highest response was agreed with 37% respondents while the lowest response was strongly disagreed with 0% respondent.

Based on Attractiveness Factor Question 2, the statement was “Simplicity of the smart home interface design make it easier for me to use the system.” The highest response was strongly agreed with 33% respondents, followed by agree with 29% respondents, neutral with 19% respondents, disagree with 19% respondents and strongly disagree with 1% respondent.

The last question in Attractiveness Factor was “Personalized features provided by smart home system can increase my satisfaction.” The majority of respondents with a total of 38% respondents responded with agree in this statement, followed by strongly agree with 29% respondents, neutral with 26% respondents and disagree with 7% respondents.

Table 4.6: Statistics table for Economic Performance Factor

Economic Performance Factor	Q1: I believe that smart home system will not need high maintenance costs.	
	Frequency	Percentage (%)
Strongly Disagree (1)	1	1%
Disagree (2)	8	8%
Neutral (3)	17	17%
Agree (4)	42	42%
Strongly agree (5)	32	32%
Mean	3.96	
Mode	4	
Median	4.00	
	Q2: Adoption of smart home system may help me to save energy bills.	
	Frequency	Percentage (%)
Strongly Disagree (1)	1	1%
Disagree (2)	14	14%
Neutral (3)	12	12%
Agree (4)	37	37%
Strongly agree (5)	36	36%
Mean	3.93	
Mode	4	
Median	4.00	
	Q3: I believe that good economic conditions will increase the rate of adoption Smart Home Living concept around Klang Valley.	
	Frequency	Percentage (%)

Strongly Disagree (1)	1	1%
Disagree (2)	11	11%
Neutral (3)	26	26%
Agree (4)	33	33%
Strongly agree (5)	29	29%
Mean	3.78	
Mode	4	
Median	4.00	

Source: Developed for the research

For the Economic Performance Factor, the first question was “I believe that smart home system will not need high maintenance costs.” 42% of the respondents who agreed, 33% of respondents who strongly agreed, 17% of respondents who remained neutral, 8% of respondents who disagreed, and 1% of respondent who strongly disagreed.

The following question was “Adoption of smart home system may help me to save energy bills.” The highest response was agreed with 37% respondents while the lowest response was strongly disagreed with 1% respondent.

The final question in Economic Performance Factor was “I believe that good economic conditions will increase the rate of adoption Smart Home Living concept around Klang Valley.” The lowest response was strongly disagreed with 1% respondent while the highest response was agreed with 33% respondents.

Table 4.7: Statistics table for Consumer Attitude Factor

Consumer Attitude Factor	Q1: I might feel more confident if I were aware of the advantages of smart home system.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	8	8%

Neutral (3)	21	21%
Agree (4)	44	44%
Strongly agree (5)	27	27%
Mean	3.90	
Mode	4	
Median	4.00	
	Q2: I believe that using smart home system will provide me positive experience in my daily living.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	6	6%
Neutral (3)	17	17%
Agree (4)	35	35%
Strongly agree (5)	42	42%
Mean	4.13	
Mode	5	
Median	4.00	
	Q3: I believe the marketing and the advertisement information from mass media will entice me to adopt the smart home system.	
	Frequency	Percentage (%)
Strongly Disagree (1)	0	0%
Disagree (2)	13	13%
Neutral (3)	24	24%
Agree (4)	37	37%
Strongly agree (5)	26	26%
Mean	3.76	
Mode	4	
Median	4.00	

Source: Developed for the research

For the Question 1 from Consumer Attitude Factor, the question was “I might feel more confident if I were aware of the advantages of smart home system.” 44% of the respondents responded with agree which was the highest respondents followed by strongly agree with 27% respondents, neutral with

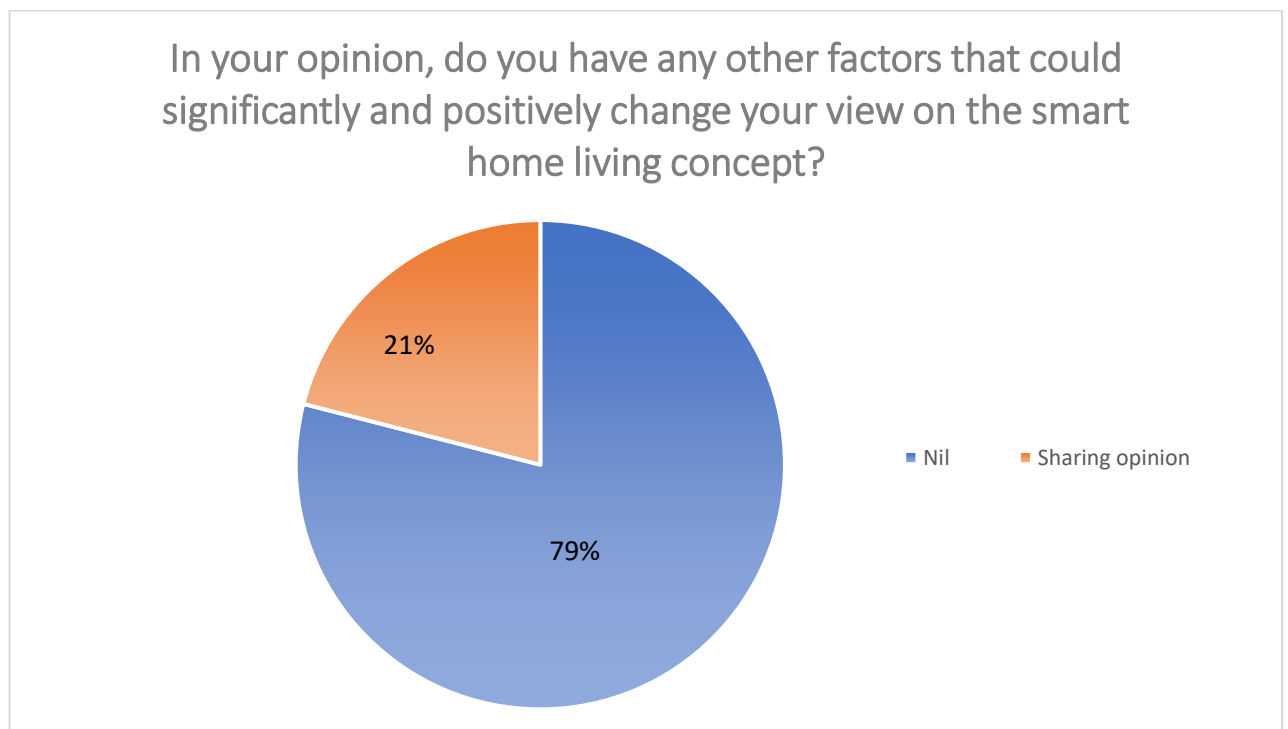
21% respondents and disagree with 8% respondents. None of the respondents responded with strongly disagree.

The second question was “I believe that using smart home system will provide me positive experience in my daily living.” According to the data collected, none of the respondent strongly disagreed with the statement, 6% of respondents disagreed, 17% of respondents were neutral, 35% of respondents agreed, and 42% of respondents strongly agreed.

The last question was “I believe the marketing and the advertisement information from mass media will entice me to adopt the smart home system.” The highest response was agreed with 37% respondents while the lowest response was strongly disagreed with 0% respondents.

In conclusion, based on the data collected, the median for all questions is 4.00. The mode for all questions falls between "agree" (4) and "strongly agree" (5). As for the mean, it ranges between 3.56 to 4.13 for all questions.

Figure 4.9: Result from Section C



Source: Developed for the research

Table 4.8: Table for respondents who sharing opinion

Category	Comment	Frequency	Percentage (%)
Pricing	- Price of smart home product should be lower so that everyone can apply this concept include me. (R5)	1	9%
	- The price should be cheaper to attract more buyer. (R21)	1	
	- Price should be cheaper. (R44)	1	
	- The price of smart home system should decrease. (R78)	1	
	- The price should be lower. (R11)	1	
	- Need to conduct and research more convenience and affordable price in future. (R32)	1	
	- Price should be reasonable. (R45)	1	
	- If the price drop, I will consider buying it. (R2)	1	
	- installation fee must lower. (R85)	1	
Awareness	- Government should organize some talk to improve the awareness of smart home living concept. (R7)	1	5%
	- Government should promote smart home living concept. (R29)	1	
	- Media should promote about benefit of smart home living concept to more people know it. (R34)	1	
	- Should provide more information about smart home for us to know. (R99)	1	
	- Lack of knowledge about the smart home concept, can organise some talk. (R7)	1	

Perceived benefits	- It is better if the system can make it easier for the old generation to understand easily. (R81)	1	7%
	- Provide longer warranty period. (R60)	1	
	- Develop a smart home living that can provide more benefit. (R51)	1	
	- Having a very useful function. (R73)	1	
	- Enhance security and protect personal data. (R86)	1	
	- Having more customization. (R11)	1	
	- Giving some beneficial like longer warranty, free installation. (R97)	1	

*Note: R= Respondents

Source: Developed for the research

For the question in Section C, respondents were required to share their opinions about other factors that could significantly and positively change their view on the smart home living concept. Out of the respondents, 21% respondents chose to share their opinions, while 79% respondents opted not to share their opinion based on the statement in Section C. Based on the data collected, the majority of respondents stated that factors such as pricing (9%), awareness (5%), and perceived benefits (7%) would change their view on smart home living concepts.

4.2 Scale Measurement

In this context, SPSS software is used to conduct the reliability analysis. Cronbach's Alpha is considered one of the key metrics that will be applied to test the pilot test form the SPSS data. The pilot test will be conducted before proceeding to the data analysis. The pilot test on 30 respondents was conducted to ensure that the question design is reliability for the research. Pilot test is important for research to identify the potential practical problems and make some necessary adjustments to reduce the risk of failure data collection (Teijlingen, V, et al. 2022). Cronbach's Alpha represents a statistical measure used to assess the internal consistency reliability of a set of scales or tests based on their internal consistency. Typically, researchers aim

for Cronbach's Alpha values falling between 0.7 and 0.8 to indicate an acceptable level of internal consistency reliability. Cronbach's Alpha values that are higher indicate that there is a higher level of internal consistency.

Table 4.9: Result of Cronbach's Alpha for the pilot test

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.801	.797	18

Source: Developed for the research

Based on the pilot test results, the data contained 18 items obtained from 30 respondents of the questionnaire in the form of a Likert scale ranging from 1 to 5 in Consistency Factor Question 1 to Consumer Attitude Factor Question 3. The score of the Cronbach's Alpha was 0.801 which is in the acceptable level of internal consistency reliability. As a result, the pilot test is valid, and the questionnaire can be used for the data collection.

Table 4.10: Reliability Analysis (Item- Total Statistics)

Item Statistics

	Mean	Std. Deviation	N
Consistency Factor Q1	3.40	1.329	30
Q2	4.00	.743	30
Q3	4.03	.928	30
User Characteristics Factor Q1	3.60	1.003	30
Q2	3.73	.980	30
Q3	3.63	.928	30
User-Friendly Interface Factor Q1	3.80	.925	30
Q2	3.77	1.194	30

Q3	3.57	1.040	30
Attractiveness Factor Q1	3.57	.898	30
Q2	3.63	1.217	30
Q3	4.13	.860	30
Economic Performance Factor Q1	3.87	.973	30
Q2	3.63	1.098	30
Q3	3.67	1.061	30
Consumer Attitude Factor Q1	3.77	.971	30
Q2	3.80	.961	30
Q3	3.83	1.085	30

Source: Developed for the research

4.3 Inferential Analysis

For the inferential analysis, regression analysis will be applied to determine the functional relationship among variables. This method will be taken when the variables are having more than one in order to find out the perspective of implementation of Smart Home Living concept among potential homebuyers in Klang Valley.

Table 4.11: Model Summary of Multiple Linear Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.503 ^a	.253	.188	.475

a. Predictors: (Constant), Consistency Factor, User Characteristics Factor, User-Friendly Factor, Attractiveness Factor, Economic Performance Factor, Consumer Attitude Factor

Source: Developed for the research

According to the model summary in Table 4.11, the R value is 0.503. This means that there are more than 50% of the variability in the dependent variable is explained by the independent variables in the model. Besides that, the r-squared is 0.253. This means that all perspective can explain 25.3% of this phenomenon. To sum up, there may be another important perspective that is not captured by the research. It is recommended to conduct more primary and secondary studies to obtain better model summary in future study.

Table 4.12: Table of Analysis of Variance (ANOVA)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	P-Value
1	Regression	8.466	6	1.411	2.102	.042 ^b
	Residual	62.444	93	.671		
	Total	70.910	99			

a. Dependent Variable: Smart Home Living

b. Predictors: (Constant), Consistency Factor, User Characteristics Factor, User-Friendly Factor, Attractiveness Factor, Economic Performance Factor, Consumer Attitude Factor

Source: Developed for the research

Based on the ANOVA results, the table shows that the F value is 2.102. The significance is 0.042. When the P value < 0.05, this mean that the model is valid. There are at least one of the variables has a statistically significant relationship with the implementation of smart home living in Klang Valley.

Table 4.13: Table of coefficients

Coefficients ^a								
Model		Unstandardized		Standardized		95.0% Confidence		
		Coefficients		Coefficients		Interval for B		
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	3.336	.822		4.058	<.001	1.704	4.969
	Consistency Factor	.050	.157	.035	.317	.752	-.261	.361
	User Characteristics Factor	-.364	.178	-.240	-2.040	.039	-.718	-.010
	User-Friendly Interface Factor	-.273	.152	-.175	-1.473	.044	-.524	.078

Attractiveness Factor	.392	.161	.274	2.442	.017	.073	.711
Economic Performance Factor	.124	.135	.096	.919	.361	-.144	.392
Consumer Attitude Factor	-.081	.186	-.053	-.437	.663	-.450	.288

a. Dependent Variable: Smart Home Living

Source: Developed for the research

Based on the results of the coefficients in Table 4.13, it can be seen that various perspective show varying degrees of effect to the implementation of Smart Home Living concept. In terms of significance, Attractiveness Factor has the highest coefficient value of 0.392. Attractiveness Factor is the most perspective of implementation of Smart Home Living concept among potential homebuyers in Klang Valley.

4.4 Conclusion

In conclusion, this chapter discussed the primary results that were generated by the SPSS software based on the responses provided by the 100 respondents to the questionnaire. The primary results of this study include statistics data, reliability statistics, summary of the model, data for ANOVA, and data on coefficients. As a result of the data analysis in this chapter, it can be said that only some of the perspectives are positively related to the implementation of Smart Home Living concept among potential homebuyers in the Klang Valley. Among the perspectives that are acceptable based on the results of the generated data are characteristic factor, consumer-friendly factor, and consumer attitude factor. In the next chapter, we will discuss the conclusion, research findings, recommendations for future research, and limitations of the study.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.0 Introduction

In this chapter, the conclusions and findings from the research will be discussed based on the data presented in the previous chapters. The purpose of this chapter is to determine the perspective of implementing the Smart Home Living concept in the Klang Valley. The most perspective of implementation of Smart Home Living concept among potential homebuyers in Klang Valley will also be discussed. Additionally, recommendations will be provided to enhance the implementation of the Smart Home Living concept in the Klang Valley. The limitations of the study will also be discussed, along with recommendations for future research to provide valuable insights for upcoming researchers.

5.1 Summary of Statistical Analysis

Based on the data presented in the previous chapter, this study engaged 100 participants representing diverse demographics across the Klang Valley. The statistical analysis indicates that despite all respondents expressing interest in and intent to implement the Smart Home Living concept in the future, various perspective still exerts affect over their opinions. Thus, a comprehensive summary of the statistical analysis underscores the need for further exploration into additional perspective that may impact the implementation on the smart home living concept in order to obtain more valid and comprehensive research findings.

5.2 Discussion of Major Findings

The first objective aims to determine the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley. To test these objectives, a questionnaire with a total of six hypothesis has been created based on secondary research related to the field of study. Based on the data collected, there was certain perspectives having the relationship between the implementation of Smart Home Living concept among potential homebuyers in Klang Valley based on the data collected in chapter 4.

Table 5.1: The accepted hypothesis of this research study

		Status
H1	User characteristics factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.	Accepted
H2	User-friendly interface factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.	Accepted
H3	Attractiveness factor has a positive perspective of Smart Home Living concept among potential homebuyers in Klang Valley.	Accepted

Source: Developed for the research

The hypothesis that accepted for this research include characteristics factor (Factor B), user-friendly factor (Factor C), and attractiveness factor (Factor D). Based on the coefficients table from Table 4.11, if the significance value < 0.05 , the null hypothesis will be rejected. This means that there is evidence to support the hypothesis that there is a relationship between that perspective and the implementation of smart home living. In conclusion, characteristics, user-friendliness, and attractiveness factors have statistically significant relationships with the implementation of smart home living in Klang Valley. For the hypothesis of consistency factor (Factor A), economic factor (Factor E), and consumer attitude (Factor F) will be rejected due to the significance value are exceed 0.05.

The second objective of the research aims to evaluate the most perspective of implementation of Smart Home Living concept among potential homebuyers in Klang Valley. Based on the result from SPSS, attractiveness factor is the most perspective of implementation of Smart Home Living concept among potential homebuyers in Klang Valley with the highest coefficient value of 0.392. Visual design, colour schemes, and graphical features are key components that can evoke a positive emotional reaction from users and thereby improve their overall experience. Therefore, it is crucial for Smart Home companies to prioritize the attractiveness of the Smart Home Living system to develop an advanced system that will attract more homebuyers to implement Smart Home Living in the future.

The third objective of the research is to recommend the improvement of implementing the Smart Home Living concept among potential homebuyers in Klang Valley. To test the objective, the questionnaire in Section C required the respondents to share their opinion that could significantly and positively change their view on the smart home living concept. Based on the data collected, the majority of respondents stated that

other factor such as pricing, awareness, and perceived benefits would change their view on smart home living concepts. Based on the result, we can prove that there are some recommendations for the improvement of implementing the Smart Home Living concept among potential homebuyers in Klang Valley such as pricing, awareness, and perceived benefits. These recommendations are important for the country in order to develop a market strategy and establish some policies to increase the implementation of the Smart Home Living concept in the future. The Government, developers and Smart Home company in Malaysia plays an important role in making some recommendation for the improvement of implementing the Smart Home Living concept in the future.

5.3 Implications of the Study

In this research, the research aims to provide a guideline about the determination of the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley, evaluate the most perspective of implementation of Smart Home Living concept among potential homebuyers in Klang Valley and provide recommendation for the improvement of implementing the Smart Home Living concept among potential homebuyers in Klang Valley. This guideline plays an important role for the government, developer, and seller to establish some policies, strategies, and action towards the Smart Home market in Malaysia. The data collected from this research can be used for determining the citizens' needs and wants regarding the Smart Home Living concept in order to facilitate useful decision to enhance the adoption rate of the Smart Home Living concept in Malaysia in the future.

5.4 Limitations of the study

There are several limitations of the study were faced when conducting this research. One of the limitations was that most of the respondents did not wish to share their opinion in questionnaire section C. This could potentially compromise the reliability of the research and lead to incorrect results. Additionally, the targeted population consists of potential homebuyers across the Klang Valley including Federal Territory of Kuala Lumpur, Gombak, Hulu Langat, Klang, Petaling, Sepang, and Kuala Langat. Given the geographical spread, collecting data may require considerable time. Moreover, this may prolong the research process due to limitations on accessing free sources from the website.

5.5 Recommendations for Future Research

To increase the implementation rate of Smart Home Concept in Klang Valley, it is crucial to study the behavior and preferences of the potential homebuyers. Understanding the current trend, needs and wants of the Smart Home market is essential for the developers and sellers. This knowledge enables them to create and develop the smart home products that can meet the satisfaction of the consumers and increase the demand in the market. Besides that, collecting data form larger number of target respondents are recommended for the future study. This is because the more data collected, the decrease the incorrect result of the study in order to enhance the reliability of the research.

Based on the result of the research, government can also establish polices to provide tax credits or subsidies for the Smart Home projects around the Klang Valley to increase the number of Smart Home in the country. In addition, public awareness campaigns also can be launched to educate and promote the benefit of the Smart Home Living concept to the citizens. The Smart Home company in Malaysia like Xiaomi, Amazon and Google can also offer advantages such as longer warranty periods and lower installation fee to attract and encourage the citizen to purchase smart home system.

5.6 Conclusion

In conclusion, studying the perspective of implementing the Smart Home Living concept among the potential homebuyers in Klang Valley is important for determining the needs and wants of the potential homebuyers. This study not only aims to determine the perspectives of potential homebuyers regarding the implementation of the Smart Home Living concept but also identifies the most influential perspective that affect their decision-making process. Based on these findings, the study will provide recommendations to address the current situation in the Smart Home market in Malaysia to aiming better satisfy potential homebuyers. The Smart Home Living concept offers numerous benefits and conveniences compared to traditional living arrangements. Therefore, it is imperative for the government to initiate various programs aimed at raising awareness about the advantages of smart homes. By doing so, we can increase the adoption rate of the Smart Home Living concept in Klang Valley and fostering a more comfortable environment for all citizens in Malaysia.

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APPENDICES

Survey questionnaire form



UNIVERSITI TUNKU ABDUL RAHMAN

Dear respondents,

My name is Chan Eng Kean, a final year undergraduate student at Universiti Tunku Abdul Rahman, Sungai Long, currently pursuing a Bachelor Degree of Building and Property Management (HONOURS). I am conducting a survey for my final year project (FYP) titled "The Perspective of Implementing the Smart Home Living Concept among Potential Homebuyers in Klang Valley."

The purpose of this questionnaire is to determine the perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley and to purpose the recommendation to consent for of implementing the Smart Home Living concept among potential homebuyers in Klang Valley.

There are **3 SECTIONS** in this survey, and it will take approximately **5 - 10 MINUTES** to answer all the questions. All responses will be kept confidential. Your participation in this survey will be a significant contribution towards this research. Please do not hesitate to contact me at ekchan0118@utar.my if you have any questions.

Thank you for your time in advance.

Name	Student ID
Chan Eng Kean	2002023

Section A: Demographic information

This section of the demographic profile of the respondents.

Please circle (O) the answer of your choice.

1. Gender

- Male
- Female

2. Age Group

- 18-20
- 21-30
- 31-40
- 41-50
- 51 years old or above

3. Ethnicity

- Malay
- Chinese
- Indian
- Others: ____

4. Education level

- SPM/Certificate
- Diploma/STPM
- Bachelor's Degree
- Master's Degree/ Doctorate (PHD)
- Others: ____

5. Monthly income

- Below RM4,849 (B40)
- RM 4,850 – RM10,959 (M40)
- Above RM10,960 (T20)

6. Location (District)

- Federal Territory of Kuala Lumpur
- Gombak
- Hulu Langat
- Klang
- Petaling
- Sepang
- Kuala Langat

7. Occupation

- Government Sector
- Private Sector
- Self-employment
- Retirement
- Others: ____

8. Do you have any plans to install smart home living in your house?

- Yes
- No
If no, reason: ____

Section B: The perspective of implementing the Smart Home Living concept among potential homebuyers in Klang Valley

This section seeks your opinion on the perspective of implementing the Smart Home Living concept.

Please indicate your response to each statement using the following **Likert scale**:

(1) = Strongly Disagree; (2) = Disagree; (3) = Neutral; (4) = Agree; (5) = Strongly Agree

No.	Factors/ Assessment Criteria	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Part A: Consistency Factor						
1	I believe that the performance of smart home system can provide convenience and efficiency in my daily living.	1	2	3	4	5
2	I believe that the system displays consistently can help me understand the information quickly.	1	2	3	4	5
3	I believe that the simple design style of smart home device allows me to adapt the usage faster.	1	2	3	4	5
Part B: User Characteristics Factor						
1	I believe that generational differences impact the acceptance and adoption of Smart Home Living concept.	1	2	3	4	5
2	I believe that education level may influence the acceptance and adoption of Smart Home Living concept.	1	2	3	4	5
3	The adoption of smart home system can influence my standard of living. (Exp: Control all the smart device such as lightning system and temperature system around the house.)	1	2	3	4	5
Part C: User-Friendly Interface Factor						
1	I believe that ease of use and accessibility play an important role in smart home system to make the system more comfortable.	1	2	3	4	5

2	I believe that clarity and intuitiveness of navigation in smart home system will meet my satisfaction.	1	2	3	4	5
3	Readability of information is important for a smart home system. (Exp: The manual of the system is easier for the users to understand.)	1	2	3	4	5
Part D: Attractiveness Factor						
1	I believe that the attractive visual design of smart home interface can entice me to adopt the system.	1	2	3	4	5
2	Simplicity of the smart home interface design make it easier for me to use the system. (Exp: There are icons representing devices such as light bulbs and thermostats.)	1	2	3	4	5
3	Personalized features provided by smart home system can increase my satisfaction. (Exp: The users' wake-up routines are learned by the smart home system, and it sets an adaptive alarm to wake them up.)	1	2	3	4	5
Part E: Economic Performance						
1	I believe that smart home system will not need high maintenance costs.	1	2	3	4	5
2	Adoption of smart home system may help me to save energy bills.	1	2	3	4	5
3	I believe that good economic conditions will increase the rate of adoption Smart Home Living concept around Klang Valley.	1	2	3	4	5
Part F: Consumer Attitude						
1	I might feel more confident if I were aware of the advantages of smart home system.	1	2	3	4	5
2	I believe that using smart home system will provide me positive experience in my daily living.	1	2	3	4	5
3	I believe the marketing and the advertisement information from					

	mass media will entice me to adopt the smart home system.	1	2	3	4	5
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Section C: Opinions on smart home living concept among potential homebuyers

This section seeks your opinion on the smart home living concept.

Please answer the following questions in the space provided.

1. In your opinion, do you have any other factors that could significantly and positively change your view on the smart home living concept?

○ IF YES, STATE YOUR OPINION _____

**IF NONE, SAY NIL*

IBM SPSS Statistic data

*Untitled2 [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

Search application

Visible: 26 of 26 Variables

	@1 Gender	@2 AgeGroup	@3 Ethnicity	@4 EducationLevel	@5 MonthlyIncome	@6 LocationDistrict	@7 Occupation	@8.Doyouhaveanyplans toinstalla...	PartAConsistencyFactor1	@2.Ibelievehatthesystemdisplaysco...	@3.Ibelievehatthesimpledesignstyle	PartBUserCharacteristicsFactor1	@2.Ibelievehateducationlevelmayin...	@3.Theoddsforonofsmart homesyste...	PartCUserFriendlinessFactor1	@2.Ibelievehatcarintuitive
1	1	2	2	3	1	5	3	1	4	3	2	4	2	3	4	4
2	1	2	2	3	1	3	2	1	4	4	4	4	4	4	4	4
3	1	3	1	1	2	1	2	1	2	4	3	2	3	4	4	5
4	1	4	2	1	3	5	3	1	2	3	4	2	3	4	5	5
5	2	3	3	2	2	2	2	1	4	4	2	3	4	5	1	1
6	1	2	3	1	1	2	1	1	2	4	5	2	4	5	5	5
7	2	3	1	3	2	7	2	1	4	2	5	5	5	3	5	5
8	1	4	2	2	2	3	3	1	2	4	4	5	3	4	5	5
9	2	4	3	2	2	5	3	1	4	5	2	3	5	2	4	4
10	1	1	2	1	1	7	3	1	4	5	4	3	4	5	2	2
11	1	3	3	3	2	3	2	1	4	3	3	3	3	3	4	4
12	2	3	2	2	2	1	2	1	3	4	5	3	4	3	4	4
13	1	3	1	3	2	3	2	1	3	3	4	3	3	3	4	4
14	1	3	2	2	2	1	2	1	5	5	5	4	3	4	3	3
15	1	4	2	4	3	1	3	1	5	5	5	4	3	4	5	5
16	1	3	2	2	2	2	3	1	4	3	5	3	5	4	3	3
17	1	3	3	3	2	4	3	1	4	5	3	4	5	3	4	4
18	1	3	3	3	1	3	1	1	3	4	5	2	4	4	5	5
19	2	4	3	2	2	6	2	1	2	5	4	5	4	2	5	5
20	2	2	2	3	1	3	1	1	4	3	4	2	4	3	4	4
21	1	3	2	4	2	3	2	1	2	3	5	3	2	4	4	4
22	2	1	1	1	1	5	1	1	4	5	2	4	4	5	4	4
23	2	3	2	2	2	3	2	1	4	5	2	4	5	3	5	5
24	1	3	1	3	2	6	3	1	5	4	5	3	4	5	2	4
25	2	2	1	2	1	2	1	1	2	4	4	3	4	2	4	4
26	1	3	3	3	2	1	2	1	5	4	2	3	4	4	3	3
27	2	4	3	3	2	4	3	1	3	4	5	3	2	4	2	4
28	1	5	2	1	3	3	3	1	4	5	3	4	4	5	3	3

Overview Data View Variable View

IBM SPSS Statistics Processor is ready Unicode:ON Classic