RESEARCH IN MANAGEMENT OF TECHNOLOGY AND BUSINESS
e-ISSN: 2773-5044

RMTB

Vol. 5 No. 1 (2024) 826-839
https://publisher.uthm.edu.my/periodicals/index.php/rmtb

Relationship between Perceived Ease of Use and Perceived Usefulness towards Adoption Intention of Smart Home Technology among Government Servants in Kinta, Perak

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DOI: https://doi.org/10.30880/rmtb.2024.05.01.057

Article Info

Received: 31 March 2024
Accepted: 30 April 2024
Available online: 30 June 2024

Keywords

Perceived ease of use, perceived usefulness, adoption intention, smart home technology, internet of things, government servants

Abstract

The rapid advancement of technology has brought significant changes in various aspects of our daily lives, including our homes. The growth of the Internet of Things (IoT) is still at its early stages. However, previous research often lacks focus on understanding the issue from the perspective of specific customers. Government servants play a crucial role in the implementation and adoption intention of smart city initiatives because they are the backbone of the country. Perceived ease of use and perceived usefulness are two critical factors that influence a person's perspective and attitude towards adoption intention technology. Exploring government servants' intention to adopt smart home technology is critical. The study aims to investigate the relationship between perceived ease of use and perceived usefulness correlated with government servants' adoption intention to use smart home technology in Kinta, Perak. The surveys were distributed through WhatsApp and physical distribution with 80% response rate (182 out of 226 respondents). Based on the descriptive analysis, adoption intention to used smart home technology perceived ease of use, perceived usefulness had a high mean score. As for Spearman's Correlation Coefficient analysis, showed a strongest relationship between two independent variables of perceived ease of use and perceived usefulness with adoption intention of smart home technology. The discovered insights could provide valuable guidance for Smart Home developers aiming to grasp the inclinations of government servants regarding the adoption of Smart Home Technology.

1. Introduction

The topic of this study is the relationship between Technology Acceptance Model (TAM) and smart home technology among government servants in Perak This chapter will discuss overall the topic including the research background, problem statement, research question, research objectives, research scope and significance of study.

1.1 Research Background

The immediate development of technology has significantly affected various aspects of our daily life, including our homes. The same concept has been discussed under alternate titles, including electronic homes, digital homes, home automation, domestics, and connected home (Li *et al.*, 2021). Alam *et al.* (2012) claim that smart houses integrate intelligent systems to improve comfort, healthcare, safety, security, and energy saving. These technologies offer remote monitoring and control, and give people access to services that meet their perceived needs (Rocznik *et al.*, 2017). The Malaysian government, including the state of Perak, has also been investing in smart city development, aiming to leverage technology to enhance the living standards of its citizens (Mida, 2021). Government servants play a crucial role in the implementation and adoption intention of smart city initiatives because government servants are the backbone of the country, they are the first influencer to respond to government policies and initiatives. Perceived ease of use and perceived usefulness are two critical factors that influence a person's perspective and attitude towards adoption intention technology (Susanto *et al.*, 2015).

1.2 Problem Statement

Due to the internet of things (IoT) growth is still in its early stages, one major issue in previous research hasn't been much focus on understanding the issue from the perspective of specific customers. The first issue is related to the context of the study. Most of the previous research on the intention to adopt smart homes was undertaken in the setting of developed nations such as United States of America (U.S.), Korea, Indonesia, Thailand, and Europe. However, there is still a scarce of studies focusing on government servants in Kinta, Perak. Previous study more focusing on the respondents such as elderly, women, millennials, potential consumers. However, there is limited study focus on government servants as a respondent. The second issue is related to dearth of sufficient empirical research on the adoption intentions of smart home technologies, making it difficult to understand how this technology is being adopted among people (Pal *et al.*, 2018). In previous study, IoT only focused on cloud computing platform and conversational artificial intelligence (AI), but IoT focusing smart home is still limited.

The third issue is related to limited research that has been done to identify the variables affecting the adoption intention of smart homes. Koskela and Vaananen-Vainio-Mattila (2004) assert that users demand rapid control over smart home services, there are still problems that prospective users have still not resolved, which makes them apprehensive to adopt this new technology (Hande, 2019). There could be some unforeseen consequences of widespread adoption, especially government servants who may benefit from the convenience. The last issue is related to the rate of adoption of IOT services. Malaysians' awareness to adopt the smart houses and other Internet of Things (IoT) technology is still low due lack of understanding and familiarity with the technology, creating barriers to adoption and hindering future advancements within the smart home market (Rasyidah *et al.*, 2020). Malaysia's adoption intention of smart home technology among consumers is lower than that of a few other Asian nations (Mokhtar & Ismail, 2018).

Therefore, to achieve the research objectives the level of perceived ease of use and perceived usefulness among government servants in Kinta, Perak are determined. Furthermore, the level of adoption intention of smart home technology among government servants in Kinta, Perak also determined. Consequently, the relationship between perceived ease of use and adoption intention of smart home technology and the relationship between perceived usefulness and adoption intention of smart home technology among government servants in Kinta, Perak are identified.

1.3 Research Scope

According to Mida (2021), Perak's Minister Datuk Saarani Mohamad mentioned that Ipoh City Council (MBI), Plan Malaysia, and other agencies will work together strategically to implement the Ipoh Smart City Action Plan. This will add a new dimension to the development direction as well as establish new benchmarks for city development in the state. The independent variable for this research is perceived ease of use and perceived usefulness. The dependent variable of adoption intention of smart home technologies is the main topic of this study. Notably, prior research did not focus particularly on government servants' adoption intentions to embrace smart home technologies.

1.4 Significance of Study

This study's objective is to gather crucial data and understanding about smart home technologies to alter the potential of how people engage with smart homes. The research presents certain information and facts about how perceived ease of use and perceived usefulness relate to government servants' adoption intentions to embrace smart home technology in Kinta, Perak. The study could also serve as a theoretical basis for researchers to investigate smart home technology among government servants. This study aims to bridge the research gap in understanding the perceived ease of use and perceived usefulness towards government servants' intentions to

adopt smart home technology in Kinta, Perak. Therefore, this study is significant for future researchers to provide a reference for the gaps that exist on this topic to ensure that this study leads to more evolutionary research. This study also formulates the policy of smart home technologies towards government servants.

2. Literature Review

In Chapter 2, the researcher will focus on understanding and exploring the relationship between the two variables, emphasizing the independent and dependent variables. This chapter's key purpose is to analyze the definition, ideas, and theories around the relationship between the perceived ease of use and perceived usefulness, and adoption intention of smart home technology among government servants in Kinta, Perak.

2.1 Definition Internet of Things

A global network of connected computing devices built into commonplace objects is known as the Internet of Things (IoT) (Aldossari & Sidorova, 2020). It reflects a new paradigm that has transformed traditional living into a technologically enhanced lifestyle (Kumar *et al.*, 2019). According to Hsu and Lin (2016), the Internet of Things (IoT) is viewed as a potentially effective technique to merge multiple technologies to improve quality of life. As a new generation of information network and service infrastructure, the Internet of Things is developing, opening possibilities for further integrating the physical world into computer-based systems (Lin & Dong, 2018). With the IoT, functionality offers a way to connection and data-driven decision- making, which means that a device's utility might increase if it is connected to other devices (Mocrii, Chen & Musilek, 2018).

2.2 Internet of Things in Smart Home (IOT)

A smart home is a modernized version of traditional home automation (Yang *et al.*, 2018). In recent years, innovative technology with some kind of artificial intelligence has come to be known as "smart" (Rasyidah *et al.*, 2019). Although smart home technology has been a concept for many years, it has public notice due to its advancements (Wei *et al.*, 2019). Smart homes, a component of the Internet of Things (IOT), are assisting many users and households in gaining access to new services that satisfy their demands, requirements, and preferences (Ferdhany & Aldianto, 2020). According to Balta-Ozkan *et al.* (2013), a "smart home" is a structure with a communication network, contemporary household appliances, devices, and sensors. In addition to providing services catered to the needs of the residents, these components also enable remote access, monitoring, and control. A citizen can use a mobile phone to remotely monitor and control household appliances and other devices from a further distance.

2.3 Adoption Intention Smart Home Technology

According to Frambach & Schillewaert (2002), adoption intention is a series of stages that a potential adopter of an invention goes through before accepting a new product, service, or technology. Adoption intention smart home technology pertains to a user's willingness to embrace the innovative technology known as smart home technology. Smart homes enable consumers to monitor and manage their energy usage more effectively while also increasing their comfort and convenience for a variety of household activities by allowing all devices and appliances within a household to be operated remotely or manually from a single control unit (Salimon *et al.*, 2018). Over the last decade, the adoption and integration of smart home technology has risen tremendously in a variety of sectors, including healthcare, energy management, and living environments (Li *et al.*, 2021). Considering the expectation that smart house technology would play a significant role in people's lives and raise awareness of the residents' daily routines, preferences, and living styles, the smart living experience is very crucial when users are deciding about intention to adopt smart home technology.

2.4 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), a well-known theory in the field of information systems, provides insight into how individuals absorb and utilize technology advancements. TAM has grown significantly in popularity as a theoretical framework for analyzing how various ICT technologies and smart systems are intended to be used (Pal *et al.*, 2018). One of the most well-known frameworks in the discipline is TAM, which was first presented by Davis (1989). It has a well-established role as a theoretical model for investigating information-oriented or intelligent services. The dimensions of perceived ease of use and perceived usefulness could be used to define all psychological factors influencing the usage of information technology suggested by Davis (Susanto & Aljoza, 2015). Behavioral intention is a determining factor affecting the frequency of individuals' technology usage. According to Pal *et al.* (2018); Wei *et al.* (2019) found that perceived ease of use and perceived usefulness positively influence intention to adopt IoT.

2.4.1 Perceived Ease of Use

Perceived ease of use is described by Davis *et al.* (1989) as "the degree to which a user believes that using a particular system would be free from effort". The user's perspective of how simple they believe using a system to be depends on perceived ease of use. According to Rahmat (2019), the extent to which someone believes that embracing technology will free them from a task is reflected in their perspective of utilization. Therefore, if users think an information system is user-friendly, they are more likely to use it. Perceived ease of use is a term used to describe the idea that using technology involves little effort. A person's degree of confidence refers to their perception that information technology is not complicated to use, simple to comprehend, and has no specific requirements for operation (Rahadi & Zanial, 2015).

2.4.2 Perceived Usefulness

Perceived usefulness is defined by Davis *et al.* (1989) as "the degree to which a user believes that employing a certain system would enhance the living standards". A measure of perceived usefulness is the belief that using technology will benefit the user. Future users' perceptions of usefulness are their intangible capacity to believe that utilizing a given application system will boost output within an organizational setting (Davis, 1989). According to Rahadi and Zanial (2015), perceived usefulness can be evaluated through some indicators such as rapid delivery, timely, dependable, affordable services with proper security and precise information.

2.5 Past studies of perceived ease of use and perceived usefulness towards adoption intention of smart home technology

The section discusses the results of empirical research on the relationship between perceived ease of use and intention to adopt smart home technologies. According to Wei *et al.* (2019), perceived ease of use has a strong positive influence on the intention to use smart home technology, because the technology's providing of the necessary information is sufficient for users to use it. The structural model results demonstrate that perceived ease of use has a substantial impact on the adoption intention of smart home technology (Nikou, 2019). According to Pal *et al.* (2018), elderly users are more likely to accept smart home technology when they consider it to be simple to use and doesn't take any physical effort on their part. This is because smart home technology is simple to use in elderly users' homes and doesn't require any physical effort from the elderly. Therefore, perceived ease of use is the positive significant predictor of intention (Park *et al.*, 2018). Customers has been more knowledgeable and more logical in their assessments of a technology, particularly for applications demanding a high level of control. The qualities and future problems that could prevent a favorable assessment of these perceptions. Thus, perceived ease of use is significantly positively affecting adoption intention to use smart home applications (Hubert *et al.*, 2018). Therefore, the following hypothesis has been explored:

H1: *Perceived ease of use has a positive relationship with adoption intention of smart home technology in Kinta, Perak.*

The most important determinant of intention and attitude is perceived usefulness (Ferdhany & Aldianto, 2020; Park *et al.*, 2018). In the context of smart home systems, perceived usefulness is a powerful indicator of usage intention. Therefore, perceived usefulness has a considerable positive influence on adoption intentions for smart home applications (Hubert *et al.*, 2018). According to Shin *et al.* 2018, perceived usefulness has a significant positive impact on purchase of smart home products. As a result, operators of smart homes must evaluate how technology might directly help consumers. Perceived usefulness was a key factor in the adoption and timing of smart home purchases. Furthermore, Nikou (2019) stated that perceived usefulness is a key factor to determinant affecting the adoption intention of smart home technology. According to Wei *et al.* (2019), the adoption of smart home technology is significantly and favorably influenced by perceived usefulness. Therefore, the following hypothesis has been explored:

H2: *Perceived usefulness has a positive relationship with adoption intention of smart home technology in Kinta, Perak.*

2.6 Conceptual Framework

This study integrates the Technology Acceptance Model (TAM) to establish a conceptual framework, as depicted in Fig. 1, where the independent variables, perceived ease of use and perceived usefulness, are posited to significantly influence the dependent variable, which is the adoption intention of smart home technology.

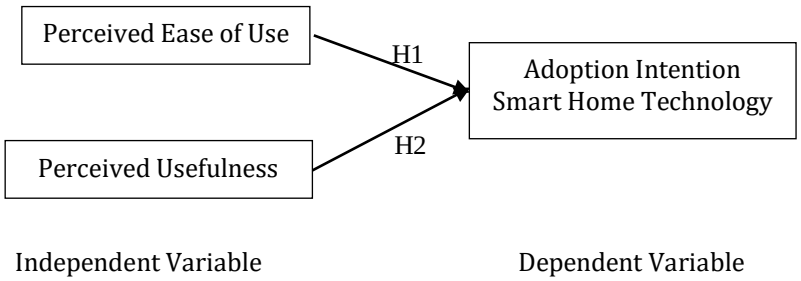

Fig. 1: *Conceptual framework*

3. Methodology

This chapter provides a comprehensive explanation of the research methodology, research design, demographic and sampling, data collection strategies, and data analysis methodologies used in this study.

3.1 Research Design

Research design is the term used to describe the process used to gather information from respondents. Information is gathered to address research questions and accomplish the objective of the study. The primary objective of the deterministic research design is to report findings that are typically evident from the study's relationship. The research design of this study included quantitative methods. The reason for this is the researcher can analyse the adoption intention of smart home technology through quantitative method. To accomplish the objective of the study, the data gathered from the respondents among government servants in Kinta, Perak, has been analysed using SPSS software. The demographics were measured using nominal and scale, whereas the independent and dependent variables were measured using a 5-point Likert Scale.

3.2 Research Instrument

The measurement for the items in the questionnaire is adopted from previous empirical studies. Appendix B showed the independent variable, perceived ease of use and perceived usefulness for this study are adopted from Nikou *et al.*, 2019; Pal *et al.*, 2018; Marikyan *et al.*, 2023 and Park *et al.*, 2018. Whereas the dependent variable for adoption intention smart home technology for this study is adopted from Hsu & Lin, 2016; Yang *et al.* 2017 and Park *et al.* 2018.study collected data and information with two types of data which are primary data and secondary data. A five-point Likert scale with a range of 1 (strongly disagree) to 5 (strongly agree) is used to measure the independent and dependent variables in this study. A psychometric scale known as the Likert scale is frequently used in surveys and research due to its simplicity, ease of understanding, and ability to capture a range of responses.

3.3 Data Collection

This study collected data and information with two types of data which are primary data and secondary data.

3.3.1 Primary Data

The meaning of primary data refers to information obtained directly from persons who had first-hand knowledge of an event or circumstance. It was more reliable because it was based on real research, untainted by human interference with the underlying data. Primary sources included a questionnaire to ensure its reliability. Therefore, a questionnaire was a research tool that collects data through requiring respondents to answer questions, offering quickness, efficiency, and cost-effectiveness. These methods are valuable for determining preferences, intentions, and points of view (Sharma, 2022). The researcher used questionnaires to obtain relevant information and data for this investigation. A questionnaire allows the researcher to get closer to the topic of research.

3.3.2 Secondary Data

In addition to primary data, researchers often rely on secondary data, which refers to second-hand information that has been previously published in various forms (Kabir, 2016). Secondary data can serve as a valuable resource for designing subsequent primary data collection methods and establishing a baseline for comparison with the primary data results obtained. By utilizing secondary data, researchers can save time, resources, and financial costs that would otherwise be required for data collection. This allows them to focus their attention on data analysis and interpretation, rather than solely on data gathering. Common sources of secondary data include books, journal articles, and newspapers, which provide a wealth of existing information and knowledge for researchers to draw upon. In this study, the secondary data that used are journals, previous research and internet resources.

3.4 Population and Sampling

3.4.1 Population

This study relates to perceived ease of use and perceived usefulness towards adoption intention of smart home technology among government servants in Kinta, Perak. According to Department of Statistics Malaysia (2021), the population for this study is comprised of 2006 government servant in Kinta, Perak. Based on krejcie and morgan, the sample of 2006 population is 322 respondents were involved in the data collection by using a stratified sampling technique. This is because Perak is one of Malaysia's states, is the second largest in terms of area in Peninsular Malaysia. Kinta is a district in Perak and includes the capacity of Perak, which is Ipoh. The government of Kinta has divided 2 major councils which are Ipoh City Council and Batu Gajah. Kinta also has other townships like Kampar, Batu Gajah and Gopeng. According to Mida (2021), Perak Menteri Besar Datuk Saarani Mohamad mentioned that Ipoh City Council (MBI), Plan Malaysia, and other agencies will work together strategically to implement the Ipoh Smart City Action Plan. This will add a new dimension to the development direction as well as establish new benchmarks for city development in the state. Therefore, the government servants in the Perak state of Kinta served as the study's target respondents. The questionnaire has been distributed to them. According to Mullens-Burgress (2018), the working age population of government servants is between the age of 18 to 60 years old.

3.4.2 Sampling

The total number of government servants in Kinta, Perak population is 2006 census. Furthermore, the researcher used the Krejcie and Morgan Table (1970) to identify the sample size. Table 1 depicted the distribution of population and how sample size is determined. Based on Krejcie and Morgan's table, the sample size for government servant in Kinta, Perak is 322 sample size. A total of 322 respondents has been chosen for this study's analysis of the relationship between perceived ease of use and perceived usefulness towards adoption intention of smart home technology among government servant in Kinta, Perak.

In this study, researchers were using stratified sampling. Stratified sampling is effective for diverse populations. It involves dividing the diverse population into homogeneous groups (strata) and randomly selecting units from each stratum (Singh & Masuku,2014). Even though the suggested sample size is 322, based on Table 1, the calculation of sample is 226. A total of 226 questionnaires have been distributed to ensure the data obtained were sufficient for analysis. The details of the population of each department, the proportion of ratio, and the number of samples needed on each department were presented in Table 1. The calculation of the proportion of ratio determined in each department is shown as follows:

$$Ratio = \frac{\text{No of staff in each department}}{\text{Total population}} \times 100$$

Table 1 *Distribution of sample size by departments and offices in Kinta Perak*

No	Offices/Department	Population	Ratio (%)	Sample size needed (based on sample)
1	Batu Gajah District Police Headquarters	100	100/578*100 = 17.30	226*17.3% = 39
2	Kinta Perak Fire and Rescue Station	30	30/578*100 = 5.20	226*5.2% = 11.75
3	Kinta Perak Customs Department	150	150/578*100 = 26	226*26% = 58.76
4	Kinta Perak District and Land Office	150	150/578*100 = 26	226*26% = 58.76

5	Kinta District Public Works Department	48	48/578*100 = 8.30	226*8.3% = 18.75
6	SJK (C) Sam Tet	62	62/578*100 = 10.70	226*10.7% = 24.18
7	S.K Sri Kinta	38	38/578*100 = 6.60	226*6.6% = 14.90
	Total	578	100	226

3.5 Data Analysis

In this study, a statistical test was performed using the Statistical Packages for Social Sciences (SPSS) software version 26 to examine and analyses the data that is acquiring. The main statistical procedures used in this study were descriptive analysis, reliability analysis, normality testing, and correlation analysis.

3.5.1 Descriptive Analysis

Descriptive analysis, also known as descriptive statistics, refers to the use of statistical techniques to summarize and aggregate a dataset. This analytical approach is particularly helpful for researchers in simplifying and understanding large amounts of data. In this study, exploratory data from the questionnaire were analyzed using a statistical software package like SPSS. Various characteristics of the data, such as frequency, percentage, mean, and standard deviation, were computed to provide descriptive insights into all variables. For example, in Section A of the questionnaire, demographic questions regarding gender, age, race, education level, year of service and government servants' awareness of smart home were analyzed using frequency tests to describe the basic information of the respondents (Hussain, 2012; Descriptive Statistics, 2020).

Moreover, descriptive analysis was also applied to analyze the data from Section B, Section C and Section D which focused on the level of perceived ease of use and perceived usefulness towards adoption intention of smart home technology. Each item within these sections was assessed using frequency, percentage, mean, and standard deviation calculations. These measures were employed to compare and determine the overall mean value, as well as to identify the questions with the highest and lowest mean values. This process allowed researchers to gain insights into the characteristics of the variables being examined (Mizumoto & Takeuchi, 2010). The analysis also involved establishing different levels of response based on the average scores, with scores ranging from 3.68 to 5.00 indicating a high level and scores from 1.00 to 2.33 indicating a low level.

3.5.2 Correlation Analysis

The relationships between perceived ease of use and adoption intention for smart home technology, as well as the relationship between perceived usefulness and adoption intention, are examined in this study using correlation analysis. Two variables have a significant relationship with each other if the findings show a strong or high correlation value. A low correlation coefficient indicates a poor relationship between the two variables. A value of +1 or -1 for the correlation coefficient denotes a perfect positive correlation. A score of 0.00 indicates that there is no relationship between the two variables in the study.

4. Result and Discussion

4.1 Demographic Analysis

Table 2 *Demographic information of respondents*

Demographic	Details	Frequency	Percentage (%)
Gender	Male	78	42.9
	Female	104	57.1
Race	Malay	126	69.2
	Chinese	36	19.8
	India	19	10.4
	Other	1	0.5
Age	18 – 22 years old	9	4.9
	23 – 27 years old	48	26.4

	28 years old and above	125	68.7
Level of Education	Master	11	6.0
	Degree	99	54.4
	Diploma	46	25.3
	STPM	4	2.2
	SPM	22	12.1
Respondent's Department	Batu Gajah District Police Headquarters	19	11.0
	Kinta Perak Fire and Rescue Station	15	8.0
	Kinta Perak Customs Department	37	20.0
	Kinta Perak District and Land Office	47	26.0
	Kinta District Public Works Department	26	14.0
	SJK (C) Sam Tet	22	12.0
	S.K Sri Kinta	16	9.0
Year of Service	1 -3 years	38	20.9
	4 – 6 years	40	22.0
	7 – 9 years	47	25.8
	More than 9 years	57	31.3
Awareness of Smart Home	Yes	116	63.7
	No	66	36.3

In this demographic analysis, the characteristics of the population were analysed. The characteristics consist of gender, race, age, level of education, respondent's department, year of service and awareness of smart home. Table 2 shows that most of the 104 female respondents participated in this study. There are also 126 Malay respondents participating in this study. The age of most of the respondents is 28 years old and above is 68.7%. Most of the respondents in this study have a bachelor's degree (54.4%). This study shows that 47 (26.0%) of the respondents were from Kinta Perak District and Land Office. Most respondents served in the organization more than 9 years (31.3%). 116 out of 182 respondents (63.7%) aware about smart home, whereas 66 out of 182 respondents (36.3%) lacked of awareness of smart home concepts.

4.1.1 Descriptive Data for Level of Adoption Intention Smart Home Technology

Table 3 *Adoption intention smart home technology descriptive analysis*

	Statement	Mean	Standard Deviation	Interpretation
1.	I plan to install smart home technology in my house soon.	3.74	0.852	High
2.	I intend to keep using smart home services in the future.	3.84	0.881	High
3.	I intend recommend my friends to use smart home services in the future.	3.76	0.839	High
4.	I am likely to continually use smart home services in my life.	3.82	0.822	High
5.	Using smart home services is worthwhile.	3.68	0.878	High
6.	I intend to invest smart home services as much as possible.	3.69	0.908	High
	Total Average	3.7546	0.74012	High

The statement of "I intend to keep using smart home services in the future" is the highest mean which is 3.84 and standard deviation is 0.881, while the second highest mean is "I am likely to continually use smart home services in my life" is 3.82 and standard deviation is 0.822. Next, the statement of "I intend recommend

my friends to use smart home services in the future" which is 3.76 and standard deviation is 0.839. The mean for the "I plan to install smart home technology in my house soon" is 3.74 and the mean for the "I intend to invest smart home services as much as possible" is 3.69. The lowest mean is 3.68 and standard deviation is 0.878 which is the "using smart home services is worthwhile." Therefore, the overall average mean score and standard deviation for adoption intention smart home technology among government servants in Kinta, Perak is high (μ=3.7546, σ=0.74012).

4.1.2 Descriptive Data for Perceived Ease of Use with Adoption Intention Smart Home Technology

Table 4 *Perceived ease of use with adoption intention smart home technology descriptive analysis*

	Statement	Mean	Standard Deviation	Interpretation
1.	I feel that the smart home appliance are easy to install and use.	3.80	0.870	High
2.	I feel that it is easy for me to learn to use smart home appliances.	3.86	0.842	High
3.	I feel that it is easy to get smart home appliances and devices to do what I want them to do.	3.81	0.861	High
4.	I can operate the smart home technology devices in my home by myself.	3.76	0.857	High
5.	Using smart home technology devices is not difficult for me.	3.76	0.871	High
6.	My interaction with smart home services is understandable and clear.	3.81	0.829	High
7.	Interacting with smart home services does not require my mental effort.	3.74	0.902	High
	Total Average	3.7904	0.73193	High

The statement of the "I feel that it is easy for me to learn to use smart home appliances" is the highest mean which is 3.86 and standard deviation is 0.842 while the second highest mean is "I feel that it is easy to get smart home appliances and devices to do what I want them to do" is 3.81 and standard deviation is 0.861. Next, the statement of "my interaction with smart home services is understandable and clear" which is 3.81 and standard deviation is 0.829. Next, the statement of "I feel that the smart home appliances are easy to install and use" is 3.80 and standard deviation is 0.870. The mean for the statement that "using smart home technology devices is not difficult for me" is 3.76 and standard deviation is 0.871. Moreover, the mean for the statement that "I can operate the smart home technology devices in my home by myself" is 3.76 and standard deviation is 0.857. The lowest mean is 3.74 and standard deviation is 0.902 which is the statement that "interacting with smart home services does not require my mental effort." Therefore, the overall average mean score and standard deviation for perceived ease of use of smart home technology among government servants in Kinta, Perak is high (μ=3.7904, σ=0.73193).

4.1.3 Descriptive Data for Perceived Usefulness with Adoption Intention Smart Home Technology

Table 5 *Perceived usefulness with adoption intention smart home technology descriptive analysis*

	Statement	Mean	Standard Deviation	Interpretation
1.	Using smart home technology makes my life more enjoyable.	3.80	0.890	High
2.	Using smart home technology improves the performance of my daily activities.	3.84	0.905	High
3.	I can accomplish my daily activities	3.95	0.816	High

	more quickly by using smart home.			
4.	I feel that installing and using the smart home would make things easier to do.	3.93	0.877	High
5.	I feel that I would find a smart home useful for doing various tasks at home.	3.88	0.809	High
6.	I feel that using smart home would increase my productivity at home.	3.93	0.825	High
7.	There is improvement in my overall quality of life when using smart devices.	3.86	0.792	High
	Total Average	3.8862	0.73777	High

The statement of the "I can accomplish my daily activities more quickly by using smart home" is the highest mean which is 3.95 and standard deviation is 0.816 while the second highest mean is "I feel that installing and using the smart home would make things easier to do" is 3.93 and standard deviation is 0.877. Next, the statement of "I feel that using smart home would increase my productivity at home" which is 3.93 and standard deviation is 0.825. Next, the statement of "I feel that I would find a smart home useful for doing various tasks at home" is 3.88 and standard deviation is 0.809. The mean for the statement that "there is an improvement in my overall quality of life when using smart devices" is 3.86 and standard deviation is 0.792. Moreover, the mean for the statement that "using smart home technology improves the performance of my daily activities" is 3.84 and standard deviation is 0.905. The lowest mean is 3.80 and standard deviation is 0.890 which is the statement that "using smart home technology makes my life more enjoyable." Therefore, the overall average mean score and standard deviation for perceived usefulness of smart home technology among government servants in Kinta, Perak is high (μ=3.8862, σ=0.73777).

4.2 Normality Test

Table 6 *Result of normality test*

	Kolmogorov-Smirnov[a]		
Independent Variables	Statistic	df	Sig.
Perceived Ease of Use	0.184	182	0.000
Perceived Usefulness	0.199	182	0.000
Dependent Variable			
Adoption Intention of Smart Home Technology	0.168	182	0.000

a.Lilliefors Significance Correction

Table 6 indicates that the independent variables and dependent variable, the perceived ease of use, perceived usefulness, and intention to adopt smart home technology, has a p-value of 0.000. The outcome of the normality test indicates that the independent variables and dependent variable' p-values are less than 0.05. This study will use a Spearman correlation analysis because the data are not normally distributed.

4.3 Correlation Analysis

Table 7 *Result of Spearman' correlation*

	Perceived Ease of Use	Perceived Usefulness	Adoption Intention of Smart Home Technology
Perceived Ease of Use	1.000	.819**	.825**
Perceived Usefulness	.819**	1.000	.878**
Adoption Intention of Smart Home Technology	.825**	.878**	1.000

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

Table 7 shows the Spearman correlation between perceived ease of use, perceived usefulness, and adoption intention smart home technology. The Spearman correlation coefficient1value, Spearman's rho (r), is 0.825, indicating a strong relationship between the1perceived ease of use and adoption intention smart home technology. The significance value is 0.000, which is less than10.01 ($p < 0.01$). Therefore, Hypothesis 1 can be accepted in this study.

Second, the Spearman correlation coefficient1value, Spearman's rho (r), is 0.878, indicating a moderate relationship between the1perceived usefulness and adoption intention smart home technology. The significance value is 0.000, which is less than10.01 ($p < 0.01$). Therefore, Hypothesis 2 can be accepted in this study.

4.4 Summary of hypothesis

Table 8 shows the findings of the hypothesis testing for Hypotheses H1 and H2, which are based on the correlation analysis results.

Table 8 *Summary of hypotheses*

Hypotheses	Result
H_1: There is a relationship between perceived ease of use and adoption intention smart home technology.	Supported
H_2: There is a relationship between perceived usefulness and adoption intention smart home technology.	Supported

5. Conclusion

5.1 Discussion of Research Objective

The first research objective is to identify the level of perceived ease of use and perceived usefulness among government servants in Kinta, Perak. The overall mean value of 3.7904 and the standard deviation of 0.73193 indicate that the government servants in Kinta, Perak have a high level of perceived ease of use of smart home technology. Whereas the overall mean value of 3.8862 and the standard deviation of 0.73777 indicate that the government servants in Kinta, Perak have a high level of perceived usefulness of smart home technology. The findings of this study align with previous research conducted by Pal *et al.* (2018); Wei *et al.* (2019), which demonstrated a high level for total average value of adoption intention of smart home service.

The second research objective is to identify the level of adoption intention of smart home technology among government servants in Kinta, Perak. The overall mean value of 3.7546 and the standard deviation of 0.74012 indicate that the government servants in Kinta, Perak have a high level of adoption intention of smart home technology. This arises from the fact that Perak is moving to the Ipoh Smart City Action Plan by 2030 collaboratively between Ipoh City Council (MBI), Plan Malaysia, and other relevant agencies. The result is supported with previous research (Park *et al.*, 2018) stated that adoption intention of smart home technology can improving user's efficiency and performance. The findings of this study align with previous research conducted by Pal *et al.* (2018), which demonstrated a high level for total average value of adoption intention of smart home service.

The third research objective is to examine the relationship between perceived ease of use and adoption intention of smart home technology among government servants in Kinta, Perak. The Spearman Correlation result that tested the relationship between perceived ease of use and adoption intention of smart home technology shows a value of 0.825. This result indicates that perceived ease of use can make a significant contribution to government servants' adoption intention smart home technology. Perceived ease of use constitutes a pivotal component of the Technology Acceptance Model (TAM) impacting IoT adoption. Factors such as user-friendly navigation, quick response, and universal accessibility significantly influence the adoption intention to use smart home technologies. The findings of this study align with previous research conducted by Liew *et al.* (2017), perceived ease of use had a significant on the users' adoption decisions on smart home technology.

The fourth research objective is to examine the relationship between perceived usefulness and adoption intention of smart home technology among government servants in Kinta, Perak. The Spearman Correlation result that tested the relationship between perceived usefulness and adoption intention of smart home technology shows a value of 0.878. Based on the result, the relationship between perceived usefulness with adoption intention of smart home technology have a strongest correlation. The Technology Acceptance Model (TAM) includes the factor of perceived usefulness that influences IoT adoption. Factors such as cost reduction, energy conservation, time efficiency, and the availability of valuable information significantly influence adoption intention smart home technologies. The findings of this study align with previous research conducted by Wang & Wang (2010), perceived usefulness was found to have a high influence on attitude and adoption intention to use.

5.2 Limitation of Study

This study was carried out with several limitations. The limitation is a small sample size for the study. The sample size only represents government servants in Kinta, Perak. There is only a limited number of responders willing to participate in providing answers to the survey. Only around two months were spent gathering data for

this study. Next is researcher has used quantitative method in collecting data. Therefore, the respondents are limited to answering only the prepared questions.

5.3 Recommendations

As for future researchers, the main recommendations for them would be to enlarge the sample size of their research population. This is because it would enable them to generalize their findings further instead of obtaining concentrated results which would jeopardize the conclusions of their research. A larger sample size allows a more precise estimation of the research objectives. It would be easier to assess the representativeness of the sample and to obtain a better overall generalized result. Besides, researchers need to effectively manage time to expand the time for data collection procedure and complete the research. Furthermore, future researchers should integrate mixed methods into their research. By including qualitative methods, they can broaden their scope of research in terms of extracting information from other articles or even by conducting interviews to gain from the perspectives of others. These mixed methods enable researchers to induce and deduce their findings for a more comprehensive conclusion.

Acknowledgement

The authors would like to thank the Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia for its support.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *I.L.J.Y. and N.K.K.;* ***data collection:*** *I.L.J.Y.;* ***analysis and interpretation of results:*** *I.L.J.Y.;* ***draft manuscript preparation:*** *I.L.J.Y. and N.K.K. All authors reviewed the results and approved the final version of the manuscript.*

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