THE FACTORS THAT INFLUENCE TOURISTS TO ADOPT INTERNET OF THINGS (IoT) TECHNOLOGY RELATED TO TOURISM IN MALAYSIA

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DECLARATION

I declare that this thesis entitled

"THE FACTORS THAT INFLUENCE TOURISTS TO ADOPT INTERNET OF THINGS (IoT) TECHNOLOGY RELATED TO TOURISM IN MALAYSIA"

is the result of my research except as cited in the references. The thesis has not been accepted for my degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

I hereby declare that I have checked this report entitled

"THE FACTORS THAT INFLUENCE TOURISTS TO ADOPT INTERNET OF THINGS (IoT) TECHNOLOGY RELATED TO TOURISM IN MALAYSIA"

And in my opinion, this thesis is adequate in terms of scope and quality, which fulfil the requirement for the award of the Degree in Bachelor of Technology Management (Innovation Technology) with Honours.

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DEDICATION

For my beloved father and mother;

For my supervisor;

DR. MOHD AMIN BIN MOHAMAD

For beloved close friends and coursemates,

Thank you for your guidance, encouragement and support.

ACKNOWLEDGEMENTS

I would like to take this opportunity to express my immense gratitude to all those who have contributed greatly and helped me successfully complete my Final Year Project (FYP) report entitled " THE FACTORS THAT INFLUENCE TOURISTS TO ADOPT INTERNET OF THINGS (IoT) TECHNOLOGY RELATED TO TOURISM IN MALAYSIA".

First of all, I would like to express my deepest gratitude and appreciation to my supervisor Dr. Mohd Amin Bin Mohamad who guided and taught me with tolerance and patience from the beginning till the end, enabling me to successfully complete this FYP report.

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Finally, I would like to express my sincerest gratitude to my classmates for their insightful discussions and support. They are the best providers of constructive feedback I have ever encountered. I am truly grateful for every conversation we had and every moral support I received.

ABSTRACT

This research focuses on the application of Internet of Things (IoT) in the tourism industry, aiming to bring important changes to the tourism industry and improve the satisfaction of tourists visiting Malaysia. The purpose of this research is to investigate the factors that influence the application of IoT when tourists visit Malaysia. The research objective is to investigate the factors that influence the application of IoT based on the UTAUT model. This research adopted positivism as the research philosophy and deductive method as the theory development method. The author adopted quantitative research method to conduct the study and distributed questionnaires to 120 respondents. The data was collected from tourists who visited Malacca, Malaysia and SPSS was used to analyse the collected data. According to the research, the effort expectancy and facilitating conditions in the UTAUT model have a significant impact on tourists' usage of IoT when visiting Malaysia. IoT provides convenient and personalized assistance in the tourism industry, which has a good impact on tourist satisfaction. This study enhances stakeholders' awareness of the use of IoT capabilities while traveling to improve tourist experience and service quality in the highly competitive tourism industry. The significance of this study is to provide important insights into maximizing convenience and services to tourists traveling to Malaysia through the Internet of Things.

ABSTRAK

Kajian ini memfokuskan kepada aplikasi Internet of Things (IoT) dalam industri pelancongan, bertujuan untuk membawa perubahan penting kepada industri pelancongan dan meningkatkan kepuasan pelancong yang melawat Malaysia. Tujuan kajian ini adalah untuk menyiasat faktor-faktor yang mempengaruhi aplikasi IoT apabila pelancong melawat Malaysia. Objektif kajian adalah untuk menyiasat faktor-faktor yang mempengaruhi aplikasi IoT berdasarkan model UTAUT. Kajian ini menggunakan positivisme sebagai falsafah penyelidikan dan kaedah deduktif sebagai kaedah pembangunan teori. Penulis menggunakan kaedah kajian kuantitatif untuk menjalankan kajian dan mengedarkan borang soal selidik kepada 120 orang responden. Data dikumpul daripada pelancong yang melawat Melaka, Malaysia dan SPSS digunakan untuk menganalisis data yang dikumpul. Menurut penyelidikan itu, jangkaan usaha dan keadaan memudahkan dalam model UTAUT mempunyai kesan yang besar terhadap penggunaan IoT pelancong semasa melawat Malaysia. IoT menyediakan bantuan yang mudah dan diperibadikan dalam industri pelancongan, yang mempunyai kesan yang baik terhadap kepuasan pelancong. Kajian ini meningkatkan kesedaran pihak berkepentingan tentang penggunaan keupayaan IoT semasa melakukan perjalanan untuk meningkatkan pengalaman pelancong dan kualiti perkhidmatan dalam industri pelancongan yang berdaya saing tinggi. Kepentingan kajian ini adalah untuk memberikan pandangan penting dalam memaksimumkan kemudahan dan perkhidmatan kepada pelancong yang melancong ke Malaysia melalui Internet of Things.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In this era of rapid development of information and technology, the country plays an important role in the use and familiarity of the Internet of Things. In particular, Malaysia, as one of the Southeast Asian countries famous for its tourism industry, faces the vigorous development of tourism industry in neighbouring Thailand. It particularly important to integrate IoT technology with the tourism industry and create opportunities for sustainable development.

Therefore, this study will explore from the perspective of consumers what they think about the adoption of IoT technology in the Malaysian tourism industry and what factors will be attractive to them. Thereby drawing conclusions and providing information and reference value for those interested in this aspect.

1.2 Background of Study

Malaysia is a country located in Southeast Asia consisting of East Malaysia and West Malaysia. Since Malaysia is a multiracial country, it also attracts many tourists to travel here to experience different cultures. In addition, Malaysia also has many heritage buildings, such as Penang and Malacca, which are particularly famous. With the advancement of technology, it is inevitable that IoT will enter the tourism industry. And it is used all over the world, including Malaysia. But there are still pitfalls and challenges when it comes to implementation in the industry. So there's a lot of room for improvement (Sivakumar, 2017).

The Internet of Things(IoT) is a technology that aims to embed sensors, software, and other technologies that can update data in real time through the network into devices, buildings, or other items such as street signs (Hashim, 2020). Therefore, for the tourism industry, in order to remain competitive and provide an excellent tourist experience, it is very important to use the Internet of Things to streamline operations, improve customer experience and provide customized services. "Smart tourism" based on the Internet of Things, including smart hotels with effective communication systems and every basic component of smart management systems, will attract more tourists (Novera et al., 2022).

In the tourism industry, in addition to enhancing communication, the Internet of Things also includes aircraft, trains, hotels, travel, restaurants, destinations and tourist attractions. These areas will be affected by the entry of the Internet of Things into the tourism industry. For example, the term “Internet of Everything” refers to the ability of smart cities to control everything based on IoT technology. For example, Singapore has launched a self-driving taxi service that offers a limousine experience that business owners can track to reduce costs (Verma, 2019).

1.3 Problem Statement

To assess the factors that may contribute to the successful adaptation of the Internet of Things (IoT) in the Malaysian tourism industry and provide tourism operators with consumer insights and needs through the points raised in this study. To understand today's consumers' views on the Internet of Things and tourism to find out the most important or indispensable factors among these factors. Properly applied these factors will have a significant impact on the extent and speed of tourism development in Malaysia.

In addition, according to past research data, we can know that the Internet of Things is currently facing some problems, the first of which is data privacy and security. Since most of the data exchange in IoT systems is carried out through wireless communication technologies, these technologies are relatively susceptible to intrusions or threats to personal data or privacy (Khan, 2022). For example, people are worried that someone may illegally collect a large amount of personal data through the use of IoT devices and sell or use it. Also when traveling, sensitive information such as travel itineraries, cashless payment details and personal preferences can become targets for hackers.

Various types of smart objects in the Internet of Things have different information, processing and communication capabilities. In addition, these IoT devices will also face various conditions, such as different requirements for communication bandwidth and power availability (Car, 2019). Ensuring compatibility and seamless communication between these devices is both challenging and important. However, if these IoT devices lack common standards, it may cause them to work less efficiently.

To ensure a smooth rollout, the integration of IoT technology requires careful preparation. From planning to installation, implementation has multiple stages and aspects. Choosing the right platform is critical to minimizing integration issues. Although equipment is reasonably priced, the cost of maintenance, personnel training,

modifications, and downtime can be prohibitive. Especially when implemented widely (Mercan, 2020). Additionally, training employees to use and maintain new IoT systems is crucial for small and medium-sized tourism businesses due to a lack of experience in this area; however, this will increase overall costs.

But by taking proactive steps to overcome these barriers, the tourism industry can leverage IoT to enhance customer experience, improve operational efficiency and remain competitive in an increasingly digital world.

1.4 Research Question

1. Does performance expectancy influence tourists' adoption of IoT technology in Malaysia's tourism industry?
2. Does effort expectancy influence tourists' adoption of IoT technology in Malaysia's tourism industry?
3. Does social influence influence tourists' adoption of IoT technology in Malaysia's tourism industry?
4. Does facilitating conditions influence tourists' adoption of IoT technology in Malaysia's tourism industry?
5. Does security influence tourists' adoption of IoT technology in Malaysia's tourism industry?

1.5 Research Objective

1. To determine the effect of performance expectancy on tourists' adoption of IoT technology in the Malaysian tourism industry.
2. To determine the effect of effort expectancy on tourists' adoption of IoT technology in the Malaysian tourism industry.
3. To determine the effect of social influence on tourists' adoption of IoT technology in the Malaysian tourism industry.
4. To determine the effect of facilitating conditions on tourists' adoption of IoT technology in the Malaysian tourism industry.
5. To determine the effect of security on tourists' adoption of IoT technology in the Malaysian tourism industry.

1.6 Scope of The Study

This study was conducted to find out the factors adapting to the Internet of Things for tourists traveling to Malaysia. This will provide a reference to the Malaysian tourism industry, allowing relevant personnel to obtain real responses from tourists and prepare corresponding countermeasures, so that the tourism industry can develop in the long term, increase the visibility of Malaysian tourism, and attract more tourists to travel.

With the development of science and technology, the status of the Internet has become more and more important. An IoT system can be described as a collection of interconnected smart devices and objects with unique identifiers that are able to communicate and transfer data without the need for human or computer interaction to achieve a desired goal. (Areej AlHogail, 2018) Therefore, in order to allow the Malaysian tourism industry to keep up with the development of technology, this study

strives to find out the factors that allow tourists to adapt to the Internet of Things, so that relevant personnel can obtain updated data for reference and adjust the direction.

1.7 Limitation of The Study

This study only explores and studies the tourism industry in Malaysia and is therefore not applicable to other industries or other countries. In addition, the focus of this study is the factors that influence travelers' use of the Internet of Things, so other technologies or technologies are not within the scope of the study.

At the same time, the study data may not be representative of all regions in Malaysia due to the size and diversity of the sample used. In addition, differences in IoT technology and local cultural differences will also bias the results of this study. Therefore, the research results can only show some opinions based on the study area and cannot represent the opinions of all tourists visiting Malaysia.

1.8 Significance of The Study

This study focuses on the factors that influence the use of IoT among tourists traveling in Malaysia. Furthermore, it is important to study these factors because a large part of whether a customer will return depends on the experience they had while traveling. If relevant operators can provide excellent IoT and allow passengers to have a satisfactory travel experience, it will increase the possibility of them visiting this place again.

In addition, the Internet of Things has also changed people's habits when traveling. It provides people with more conveniences, such as booking hotels online and investigating local culture and food in advance. There is also the most important city guide, which allows travelers to enjoy a convenient and immersive travel experience even if they are not familiar with local transportation routes.

In addition to visitor experience, technology related to the Internet of Things will also see significant advancements. Since this study will highlight the specific needs of tourists for the Internet of Things, the relationship between the Internet of Things and the tourism industry will be redefined and it will play a role in promoting the development of the Internet of Things to meet market needs.

These are just some of the many conveniences brought by the Internet of Things. The development and popularization of the Internet of Things can be said to have all benefits and no harm. At the same time, other advanced countries have also provided us with good examples, so the development of the Internet of Things has become a world trend. Only by being prepared and keeping up with the trend can the country develop better.

1.9 Summary

This introduction mainly explains the title and main direction of this research so that readers can better understand this research. In addition, this section is also subdivided into different parts such as background of study, problem statement, research question, research objective, scope of the study, limitation of the study and significance of the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review synthesizes earlier research and highlights important conclusions, research methods, and theoretical frameworks that influence our understanding of the topic today. Also, provide a comprehensive overview of the body of knowledge on a topic.

Therefore, in this section, we will explore the Internet of Things and its application in tourism through past research and so on. In addition, a suitable theoretical framework and hypotheses are also provided for this study.

2.2 Internet of Things (IoT)

The Internet of Things is a technology that allows information to be shared in real time through internal connectivity within physical machines and networks. His purpose is to improve the speed at which people obtain the latest information on the Internet, work efficiency and user experience. IoT can also be thought of as a global network that gives each object a unique identity, enabling communication between people, objects and any other object in the world (Madakam, 2015).

In order to implement this technology, embedded systems such as processors, sensors and communication hardware must be put into the device to establish a network-supported IoT ecosystem. When these IoT-enabled devices encounter a problem, they first perform local analysis and, if they cannot resolve it, send relevant data to a central hub. This setting is to reduce the amount of data sent to the cloud, thereby reducing bandwidth consumption. The degree of acceptance and innovation of IoT technology in daily life is related to human attitudes and behaviors (Ahmed, 2020). This means that people's views and intentions towards the Internet of Things are very important to its development.

Consumer adoption of IoT is dependent on trust because only trust will enable individuals to use such devices (AlHogail, 2018). As time goes by, IoT technology has gradually entered our lives. For example, the most common IoT device in our daily life today is RFID. When we drive a vehicle through a toll station, we can pay through the RFID tag. The RFID tag is connected through the mobile application (Touch 'n Go) and the balance in our mobile application can be confirmed and deducted in real time.

Of course, IoT can already be used in multiple fields such as healthcare, manufacturing, retail, agriculture, transportation and other. Which provide convenience to humans and enable predictive and condition-based maintenance to reduce waste of resources and costs and improve efficiency (Norliza, 2020).

2.2.1 Tourism

Tourism is a way for people to stay for a period of time in an environment that is not their place of residence for leisure, business or other purposes. Although people have different reasons for tourism, there are many departments they use or involve on their way, and cooperation with these involved businesses or departments is also part of the focus of the tourism industry (Mousavi et al., 2016). For example, the transportation department, hotel accommodation, catering services, medical sector and operation of attractions and activities and many others.

The diverse travel and tourism industry creates millions of businesses and jobs (Sofronov, 2018). Since the tourism industry as a whole involves many industries, as one of the means to attract money inflow to a country or region, the rise and fall of tourism has a significant impact on the country's overall economy, especially countries or regions that are world-famous for tourism. According to online information, the 3 most visited countries in 2023 are France, Spain and United States (Venditti, 2024). These three countries are all advanced countries, which means that their domestic infrastructure may be relatively complete and more user-friendly. This enhances tourists' travel experience.

At the same time, being able to attract tourists also means that the country's economic development is guaranteed. As mentioned above, tourism is linked to many fields and can well drive the development of other fields, improve their competitiveness and the perfection of basic tourism facilities, finally enhance the strength of the country's tourism industry, thus forming a good cycle. In actuality, tourism affects every area of the global economy and can have both good and negative effects on a country's GDP (Khan, 2020).

Tourism has a strong relationship with economic growth in both the short and long term, so tourism plays a huge role in the development of a country (Ohlan, 2017).

Of course, tourism not only brings income to the country, it can also promote exchanges of different cultures or technologies and reduce the barriers between people.

2.2.2 The Usage of IoT Technologies in Tourism

The applications of the Internet of Things(IoT) are very diverse, and it can exert its own advantages in various fields. In today's era of booming information, the Internet of Things also plays an indispensable role in the tourism industry. Due to the emergence of the Internet of Things, tourists have gotten a better gaming experience, allowing businesses to provide more complete services, and it has also made it easier for relevant people to understand the needs and preferences of tourists, thereby improving the development direction of the tourism industry. It can be said that the Internet of Things perfectly fits the tourism industry. Smart technology plays a dual role in the tourism industry. They can increase satisfaction by introducing new experiences while improving the operational efficiency and sustainability of tourist destinations (Ionescu, 2024).

The first is personalization, where tourists can design and arrange their itinerary according to their own preferences and interests. Any itinerary such as attractions, accommodation, restaurants and museums, etc. Systems in the tourism industry can provide recommendations and predictions to users by understanding their preferences or interests. At the same time, this system can also provide the best way to reach these attractions (Ionescu, 2024). When faced with attractions that require admission tickets, the tourism industry can use the Internet of Things to conduct automatic ticket sales or online ticket sales to reduce excessive crowding. However attractions such as museums can provide interactive exhibitions such as augmented reality (AR) and virtual reality (VR) to provide tourists with an immersive and interesting experience.

In addition, the tourism industry can also provide real-time feedback from tourists through the Internet of Things, so that tourism operators can make timely improvements based on these feedbacks, thus improving the accuracy and efficiency of improvements. For example, the hotel industry has adopted the use of the Internet of Things, allowing tourists to check in and check out by themselves through terminals, improving convenience. At the same time, IoT sensors can be used to detect whether a room is occupied and adjust its lighting and air conditioning systems. It can be said that the Internet of Things has played a role in seeking customer satisfaction, cost savings and business profits in this industry (Verma, 2019).

2.3 UTAUT Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) model is a theoretical construct that demonstrates how behavioural goals influence how technology is actually used. It is dependent upon the direct interaction of four major concepts: social influence, performance expectations, effort expectations, and facilitating conditions. Four important moderator variables which is gender, age, experience, and voluntariness of use can also be identified using this theory.

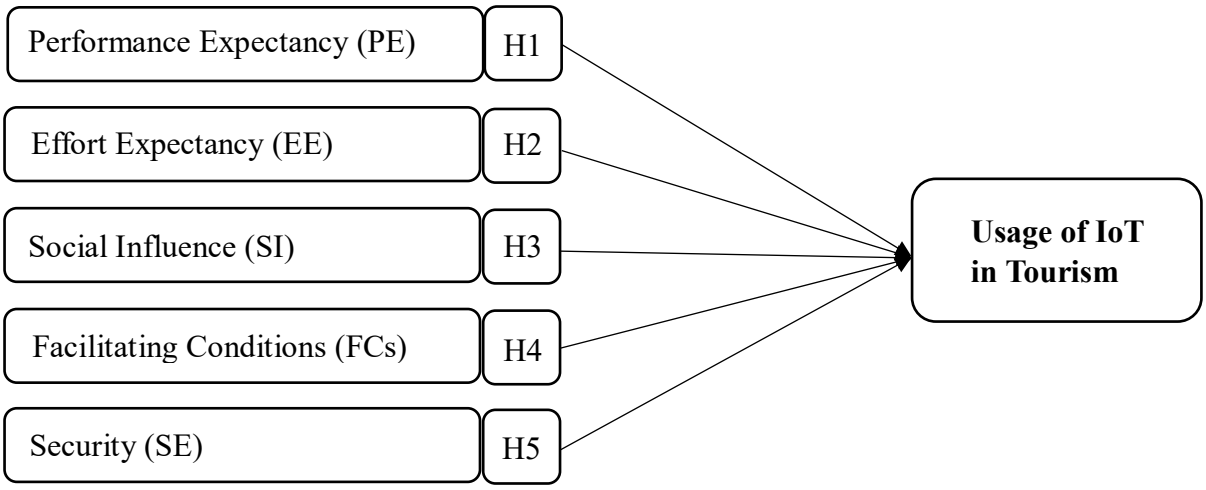
Simply put, the UTAUT model provides researchers with a comprehensive understanding of the factors that influence users' willingness and acceptance of using a certain technology. Researchers need to understand that age, gender, experience and voluntary use will affect the results of the study. And the theory of this model is based on eight previously developed theories, namely DOI proposed by Rogers et al. in 1983, social cognitive theory proposed by Bandura in 1989, TPB and MPCU proposed by Thompson et al. in 1991. TRA, TAM, MM proposed by Davis et al. in 1992 and TAM-TPB by Taylor & Todd in 1995 (Almetere, 2019). Additionally, research has

demonstrated that UTAUT accounts for 70% of technology use. (Venkatesh et al., 2003).

The broad application and predictive power of the UTAUT model can greatly aid in studying the variables that influence visitor adoption of IoT technologies and the model also provides insightful theoretical guidance (Dwivedi et al., 2017). Through in-depth analysis and application of the UTAUT model, this research able to provide strong theoretical support and empirical basis for technological innovation and deployment in the tourism industry, thereby providing a more comprehensive understanding of the complex dynamic acceptance of technology.

2.4 Framework

The researchers selected this model because it takes a broad and comprehensive approach, incorporating multiple explanatory variables from important theoretical models that have been established to explain the adoption and use of technology.



Source: Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003).

Figure 1: Conceptual Model For User Adoption

Factor	Definitions
Performance Expectancy (PE)	"The degree to which the user expects that using the system will help him or her to attain gains in job performance".
Effort Expectancy (EE)	"The degree of ease associated with the use of the system".
Social Influence (SI)	"The degree to which an individual perceives that important others believe he or she should use the new system".
Facilitating Conditions (FCs)	"The degree to which an individual perceives that organizational and technical infrastructure exist to support use of the system".
Security (SE)	The degree of organization protects user information in new systems or technologies (Hashim, 2020).

Table 1: Model Factor

2.5 Research Hypothesis

The UTAUT model is very consistent with the direction of this research. Figure 1 shows that the four key structures of this model are directly related to use behavior, so researchers can combine elements of IoT to put forward relevant hypotheses. To derive the relationship between the factors proposed in this study and use behavior. The following are the hypotheses proposed by the researchers:

2.5.1 Performance Expectancy (PE)

This factor is the study of whether a technology improves efficiency or performance for people in use. And maintaining normal operations allows people to save more time and energy. Based on the current performance of the Internet of Things, it is obvious that it successfully possesses this factor. Therefore we propose the following hypothesis:

Hypothesis 1: Performance Expectancy (PE) has a positive impact on the usage of IoT in Tourism.

2.5.2 Effort Expectancy (EE)

Expected effort (EE) is to study the direct relationship between the difficulty of learning a technology and people's usage behavior. In order for users to feel the charm and encouragement of the Internet of Things, the technology and services of the Internet of Things must make users realize that the Internet of Things is not difficult to apply. Therefore, we propose the following hypothesis:

Hypothesis 2: Effort Expectancy (EE) has a positive impact on the usage of IoT in Tourism.

2.5.3 Social Influence (SI)

Social influence (SI) is included the opinions and willingness to use a certain technology from the people, things, and things around an individual. It can be

evidenced by an individual's beliefs about whether important people in the community think they should use the technology or service (AlHogail, 2018). This means that there is a certain correlation between personal views and impressions of IoT technology and external factors. Therefore, we propose the following hypothesis:

Hypothesis 3: Social Influence (SI) has a positive impact on the usage of IoT in Tourism.

2.5.4 Facilitating Conditions (FCs)

Facilitating Conditions (FCs) is referred to the accessibility of technological infrastructure and resources. Numerous scholarly investigations have examined the influence of convenience on consumers' perceived ease of use (Arfi, 2021). Improving convenience conditions may make users feel more comfortable when using the Internet of Things and thus create enthusiasm for it. Therefore, we propose the following hypothesis:

Hypothesis 4: Facilitating Conditions (FCs) has a positive impact on the usage of IoT in Tourism.

2.5.5 Security (SE)

When technology becomes less popular, it is often because people do not have confidence in the technology in terms of the security of their personal data or data. Especially in this information age, the online world can provide ordinary people with convenience, but also allows them to be exposed on the Internet. Plenty of

investigations point out that a rise in customers' perceived risk negatively affects to their intended behaviour (Arfi, 2021). Therefore, we propose the following hypothesis:

Hypothesis 5: Security (SE) has a positive impact on the usage of IoT in Tourism.

2.6 Summary

This literature review mainly elaborates on the explanations of the Internet of Things, tourism, tourism industry's application of the Internet of Things in combination with researchers and past literature and articles, as well as the relevant hypotheses proposed by the theoretical framework that will be used.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The methodology section describes the steps the researcher took to study and examine the topic, as well as the methods and reasons used to collect, measure, and analyze data. This step is important for the precision of the study as it provides a clear framework for the research process, making it transparent and replicable.

In this study, the research methodology includes the selection of research design, methodology choices, data collection methods and analysis techniques used to investigate the factors influencing tourists' adoption of Internet of Things (IoT) technology in the Malaysian tourism sector.

3.2 Research Design

According to the main direction of this study, the researcher adopted a quantitative research method in the research design to obtain the conditions that are consistent with the research title on the factors that affect tourists' use of the Internet of Things. This approach allowed the researcher to obtain a larger sample size of target respondents as well as multiple forms of methodological measurement and analysis to obtain a more accurate picture of the factors that influence tourists' use of IoT in Malaysia.

In addition, there are many types of research designs within quantitative research methods, including exploratory research, descriptive research, correlational research, causality research, explanatory research, and predictive research. While this study uses descriptive research and causal relationship research. This is because the main purpose of this study is to objectively characterize the relationship between the independent variable and the dependent variable, so it chose a way to objectively characterize the viewpoints (Thomas, 2020).

3.2.1 Descriptive Research

Descriptive research design is a research method whose main purpose is simply to describe the characteristics, phenomena or current situation of the research object (Atmowardoyo, 2018). Conduct a comprehensive analysis of a topic through the systematic collection, analysis, and presentation of data. The characteristic of this research design is that it only observes and records the collected data, but cannot determine the causal relationship and can only describe the phenomenon. Therefore, the researchers also chose a causal research design to achieve a complementary effect.

3.2.2 Causal Research

The purpose of causality research design is to determine the causal relationship between one or more variables. That is, researchers can propose independent variables to observe whether they will lead to changes in the dependent variable. They can even manipulate the independent variables and observe the effect on the dependent variable, to find evidence of a relationship between them. It is often the case that simplifying assumptions are made in order to make the inference computationally and statistically tractable (Spirtes, 2010).

The nature of a causal research design makes it ideal for researchers to test their hypotheses and further explain the results obtained. For example, according to this study, the researchers roughly obtained 5 factors from the UTAUT model, and based on these factors, they proposed five factors that affect tourists' use of the Internet of Things when traveling in Malaysia, and further inferred which factor has the greatest impact.

3.3 Methodology Choices

Quantitative methods employ powerful, precise, and recognized mathematical techniques to measure, classify, and analyze literary texts, using numbers as representations of their elements or characteristics (Siemens, 2013). However, qualitative approach uses natural language, small sample sizes, and a focus on specific people, occasions, and environments (Gerring, 2017). Since this study mainly analyzes the factors that affect tourists' willingness to use the Internet of Things when traveling in Malaysia, quantitative research methods are more suitable for research that require a large number of samples and formula measurements than qualitative research

methods. Therefore, a quantitative research method was adopted as the choice for this study.

3.4 Data Collection

The purpose of data collection is to enable researchers to obtain a large amount of information and transform it into persuasive and reliable research conclusions through data analysis. Among these collected data, data can be divided into two types, namely primary data and secondary data. The two types of data come from different sources, thus providing researchers with more perspectives from different perspectives, so that the research conclusions can be more accurate and of reference value. Also, the data collected through survey will be subjected to statistical techniques including regression analysis and descriptive statistics in order to identify which variables are most affecting the adoption of IoT. Data for this research is collected from survey, online articles, books and existing research.

3.4.1 Primary Data

Primary data are those that a researcher gathers first in order to address an issue that is currently confronting the public (Ajayi, 2017). Furthermore, decision-making based on primary data is more reliable and confident when accompanied by a trusted analysis that maintains a direct intact with the occurred events (Taieh, 2020). However, collecting and analyzing these primary data will face correspondingly large costs and consume a lot of time. Common forms of primary data include surveys, interviews, observations, experiences, and focus groups. Due to the characteristics of this data,

this type of data usually has goals that are more consistent with research, is updated in the most real-time, and allows researchers to have a more comprehensive understanding of the details of the data. Therefore, this research uses survey to collect primary data.

3.4.2 Secondary Data

Secondary data is information that has already been gathered by organisations and investigative agencies in the past, as well as information that has been created or acquired by others (Ajayi, 2017). Sources of secondary data can originate from government reports and publications, academic research, commercial sources, online databases or internal records. For researchers, secondary data provides them with different insights and references in various fields. In addition, since this type of data has been analyzed and interpreted by previous studies, it provides a background consistent with previous studies, saving researchers a lot of time and resources. Thus, the secondary data for this research will be obtained from online articles, books and existing research.

3.5 Research Strategy

Strategy defines how research expectations will be achieved. Strategies include experiments, surveys, archival research, case studies, and narrative inquiry. In order to achieve the strategy of this article's research objectives, a multiple case study through a systematic review is needed (Mendis, 2021). A research strategy is a comprehensive strategy that specifies how the researcher will address the research questions and

accomplish the goals of the study. It goes over the general techniques for gathering, examining, and interpreting data. This approach guarantees that the investigation is methodical, cohesive, and aligned with the research goals.

Therefore, a suitable research strategy helps ensure that the research process is efficient and effective, enables the researcher to focus on the research objectives, conducts data collection and analysis in an appropriate and consistent manner, obtains reliability and validity findings, and has a structured timetable to able complete the research within a limited time. In summary, a research project's research plan is an essential element. It lays out the steps for carrying out research efficiently, guaranteeing that the study is sound in methodology and capable of offering significant and trustworthy responses to the research questions.

Therefore, the research strategy developed for this study is to use quantitative methods to obtain primary and secondary data for research and discussion on the factors that influence the use of IoT among tourists in Malaysia. For these data sources, researchers use opinion polls, online libraries, academic publications, and websites as channels to obtain data and conduct analysis to obtain reliable findings.

3.6 Questionnaire Design

The process of survey instruments and questions used by researchers to collect data on specific events is called questionnaire design. Questionnaires must be designed to be clear and concise, carefully planned and take into account the experiences of the respondents in order to collect meaningful and reliable data for the study. In other words, the respondents in this study will only be targeted at tourists to increase the rigor of the data.

Good questionnaire design has many functions. In addition to providing researchers with the data they need to further provide insights for the study, it can also provide researchers with standardized questionnaires to help collect quantitative data that can be used for statistical analysis. It is efficient and flexible and can adapt to different research backgrounds and populations. while ensuring anonymity and confidentiality. Therefore, the questionnaire design of this study will be divided into Section A, Section B and Section C.

The first part, Section A, aims to analyze the demographics of the respondents. Such as age, gender, local tourist or foreign tourist and race of the respondent, and these questions based on the demographic characteristics of the respondent were prepared in the form of closed multiple choice.

Demographic	Gender	Source: Author
	Race	
	Age	
	Nationality	

Table 2: Demographic Profile of Respondents

Next, in the second part, the researcher focused on the independent variables of this study, which are the factors that influence tourists' use of the Internet of Things in the tourism industry. This is to find out the factors that affect tourists' use of the Internet of Things and make improvements. Because the Internet of Things can provide tourists with a lot of convenience when traveling, it can also give tourists a better experience, thereby attracting their arrival. Therefore, identifying these problems and improving them will be beneficial to the development of tourism.

	Using IoT services can improve my overall experience while traveling.	Source: Hashim (2020b)

Performance Expectancy (PE)	Using IoT services helps to obtain useful information for sightseeing.	
	Using IoT services could provide me personalized travel recommendations.	Source: Auditor
	Using IoT technology (e.g. online ticketing, automated baggage drop-off) able to save my time.	
Effort Expectancy (EE)	IoT service has a user-friendly interface design.	Source: Author
	IoT services are very easy to use. Learning to use IoT services is easy.	Source: Hashim (2020b)
	Using IoT services is not a burden during the transition.	
	Overall, using IoT services requires a lot of effort.	Source: Author
Social Influence (SI)	When my friends recommend an IoT service, I'm more likely to use it.	Source: Hashim (2020b)
	My family's experience with IoT services influenced my choice.	
	Many people in my social circle are using IoT services, which makes me think I should too.	Source: Author
	I want to keep up with technology trends by using IoT services.	
Facilitating Conditions (FCs)	I have a device that is compatible with an IoT service, such as a smartphone.	Source: Hashim (2020b)
	I have the skills and knowledge for using IoT services.	
	I can easily connect to Wi-Fi or other networks to use IoT services.	Source: Author
	Technical support can effectively solve the IoT service problems I encountered.	
	I think these technologies are more secure than traditional passwords or credentials.	Source: Author

Security (SE)	I'm concerned that my data may be misused.	
	I am willing to pay extra for more secure services.	
	I would like to use apps with better security features to protect my personal data.	

Table 3: UTAUT Factors (Independent Variables)

Finally, the third part focuses on the dependent variable, which is tourists' perception of the application of IoT in tourism. This part of the assessment is extremely important. One of the reason is to understand whether there is a relationship between each measured construct, and the other is to understand tourists' willingness to use the Internet of Things when traveling.

Usage of IoT in Tourism	I have used IoT services while traveling.	Source: Author
	Using IoT devices can significantly improve my travel experience.	
	I prefer hotels that provide customized services.	
	Using IoT devices reduces queuing and waiting time, for which I am satisfied with the IoT service.	

Table 4: Usage of IoT (Dependent Variable)

A Likert scale consists of a series of statements related to a real or hypothetical situation under study. Participants were asked to indicate numerically how much they agreed with each statement, ranging from strongly disagree to strongly agree (Joshi, 2015). In order to make the data collected by the questionnaire easier to analyze and count, this study will provide choices for the respondents based on the Likette scale. The Likert scale is a five-point rating scale, with 1 representing "strongly disagree", 2 representing "disagree", 3 representing "neutral", 4 representing "agree" and 5 representing "strongly agree".

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

Table 5: Likert Scale Table

3.7 Sampling Design

One of the most important parts of the research process is sampling design, which involves selecting a small sample of subjects or units from a large population to examine. If the sampling method is carefully designed to ensure that the data collected accurately reflect the intended population, the researcher can effectively draw reliable conclusions about the population from the sample data. Sampling design can be divided into two types, namely probability sampling and non-probability sampling. According to these two types of sample design, it can be further subdivided into more different sampling methods.

Probability samples, also as know as samples selected was using random selection techniques, which able to provide accurate statistics that are applicable to the population from which they were taken (Lohr, 2021). On the other hand, non-probability sampling is a sampling strategy that cant use random selection methods due to certain factors in the population. Non-random sampling is usually used when probability sampling is not feasible or when exploratory research is being conducted. The sampling method chosen will make a difference in the population's confidence in the study results (McCombes, 2021).

When using the simple random sampling method, each unit has an equal chance of being included in the sample. If the population is homogeneous, this method

provides a more unbiased and superior approximation of the parameters (Singh, 2014). This study will choose to use simple random sampling because every member of the tourist population has an equal chance of being selected. And the main purpose of this study is to find out the factors that affect tourists' use of the Internet of Things, so this sample method is suitable for this study.

3.7.1 Population and Sampling Frame

The population is the set of all group or unit about which a researcher wishes to draw a conclusion (Hitzig, 2004). In order to determine the factors that influence the use of IoT among tourists coming to Malaysia, it is necessary to determine the overall population. The target population of this study is local tourists and foreign tourists.

According to data provided by Statista Research Department, a total of approximately 20 million tourists will visit Malaysia in 2023. These allow the tourism industry to provide Malaysia with a total tourism revenue of approximately RM71 billion, a sharp increase compared to RM22 billion in 2022 (Statista, 2024).

3.7.2 Sample Size

The process of choosing how many observations to include in a sample is called sample sizing. Sample size determine is an important component of any research project. Because the research project draws conclusions about the population through samples (Singh, 2014).

This study used the sample size of Hair et al. as a guide in deciding the sample size. The determination of sample size is primarily based on the number of questions or items used in the measurement model, not just the number of independent variables. Typically, there will be at least 5 to 10 respondents per project, and ideally 20 respondents per project. According to the total of 5 independent variables plus 1 dependent variable in this study, assuming that the researcher has 4 items for each variable, there will be 24 items in the questionnaire. If the researchers had used a 5 to 1 ratio as a basis, this study would have required 120 respondents.

Number of Item	5:1 Ratio	10:1 Ratio	20:1 Ratio
5	25	50	100
10	50	100	200
15	75	150	300
20	100	200	400
25	125	250	500
30	150	300	600
35	175	350	700
40	200	400	800

Table 6: Sample Size Table Hair et al (2014)

3.8 Pilot Test

A pilot test is a small-scale preliminary investigation conducted before the main study. The goal is to assess the feasibility, cost, duration, hazards, and adverse outcomes of an extensive investigation. To help researchers identify possible problems and improve study design, procedures, and equipment.

3.9 Data Analysis

The term "data analysis" describes the methodical use of logical and statistical methods to define, accumulate, and analyse gathered data. Finding relevant information, coming to conclusions, and assisting in decision-making are the goals. By converting unstructured data into relevant insights, data analytics enables researchers to make defensible conclusions grounded in empirical evidence.

First, to measures the employed in the questionnaire to assess their reliability or consistency, before conducting a large-scale questionnaire survey, the researcher will randomly select 30 volunteers to answer the questionnaire as a pilot test, and conduct a reliability analysis (Coefficient of Cronbach's Alpha) on the data of the 30 volunteers to test reliability of the data obtained. The higher the coefficient calculated by this data analysis tool, the higher the reliability of the questionnaire used.

Next, in order to summarize and describe the main characteristics of the collected data, the researcher will conduct descriptive statistics on the collected data. This step allows the researcher to outline the demographic characteristics of the respondents based on descriptive statistics such as age, gender.

Beside that, because Multiple Regression Analysis is a method that not only tests hypotheses about the relationship between variables, it also allows researchers to explore how multiple predictor variables jointly affect the outcome variable. Therefore, researchers will also use Multiple Regression Analysis to analyze test hypotheses and explore relationships between variables.

Lastly, to identify and quantify the degree of linear association between two quantitative variables. This study will use the Pearson correlation coefficient to calculate the correlation score of two quantitative variables (usually r represents). The correlation coefficient ranges from -1 to 1, with 1 illustrating a perfect positive linear

relationship, 0 illustrating no linear relationship and -1 illustrating a perfect negative linear relationship (Kirk et al., 2021). This means that the Pearson correlation coefficient has the ability to test hypotheses, analyze and validate data.

No	Coefficient of Cronbach's Alpha	Reliability Level
1	More than 0.90	Execllent
2	0.80 – 0.89	Good
3	0.70 – 0.79	Acceptable
4	0.6 – 0.69	Questionable
5	0.5 – 0.59	Poor
6	Less than 0.59	Unacceptable

Table 7: Coefficient of Cronbach's Alpha

3.10 Summary

In this chapter of Research Methodology, the researcher explains a series of research design, methodology choices, data used, research strategy, questionnaire design, sampling design, sample size and data analysis that will be used in the research process way. Make sure this research is conducted rigorously and produces reliable and valid results.

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

Data analysis chapter is the important part of the overall study that involves systematically examining data sets to discover meaningful opinions, ideas, and relationships. In this study, descriptive statistics were used to summarize the data set, which helped to highlight its key features. Significant correlations and trends are also identified, including demographics and behavioral tendencies. This chapter will also give a more intuitive and clear understanding of the structure and distribution of data.

4.2 Pilot Test

This pilot study involved 30 respondents who were representative of the target population. The respondents are requested to response and giving opinion with the questionnaire survey. Researcher choosing sample size of at least 30 respondents since

the actual respondents for this research will take 120 respondents, otherwise the research might difficult to detect several potential issues if the sample size is less than 30 respondents. The main purpose of this phase was to assess the internal consistency of the survey instrument and to identify any issues related to question wording, format, or structure.

Cronbach's Alpha was used as a measure of reliability to estimate the internal consistency of the scale items. When the Cronbach's Alpha value between 0.6 to 0.69 is indicate questionable, the values between 0.7 to 0.79 is generally considered acceptable, values ranged between 0.8 and 0.89 demonstrating good and values greater than 0.9 is considered as excellent. While the the Cronbach's Alpha values lower than 0.6 are considered as poor and unacceptable, which suggests that the instrument needs revision.

Reliability Statistics

Cronbach's Alpha	N of Items
.639	4

Table 8: Reliability Statistics for Pilot Test (PE)

Table 8 shows the pilot results of the first independent variable Performance Expectancy (PE). According to the table, the value of this independent variable is 0.639, which means that most of the respondents understand the questionnaire developed by the researcher.

Reliability Statistics

Cronbach's Alpha	N of Items
.857	4

Table 9: Reliability Statistics for Pilot Test (EE)

Table 9 shows the pilot results of the second independent variable Effort Expectancy (EE). As shown in the table, the value of this independent variable is 0.857, which means that majority respondents well understand the questionnaire developed by the researcher.

Reliability Statistics

Cronbach's Alpha	N of Items
.638	4

Table 10: Reliability Statistics for Pilot Test (SI)

Table 10 shows the pilot results of the third independent variable Social Influence (SI). Referring to the table, the value of this independent variable is 0.638, which means that most of the respondents understand the questionnaire developed by the researcher.

Reliability Statistics

Cronbach's Alpha	N of Items
.856	4

Table 11: Reliability Statistics for Pilot Test (FC)

Table 11 shows the pilot results of the forth independent variable Facilitating Conditions (FCs). As demonstrated in the table, the value of this independent variable is 0.856, which means that majority of the respondents understand to the questionnaire that developed by the researcher.

Reliability Statistics

Cronbach's Alpha	N of Items
.677	4

Table 12: Reliability Statistics for Pilot Test (SE)

Table 12 shows the pilot results of the fifth independent variable Security (SE). As presented in the table, the value of this independent variable is 0.677, which means that most of the respondents understand to the questionnaire that developed by the researcher.

Reliability Statistics

Cronbach's Alpha	N of Items
.810	4

Table 13: Reliability Statistics for Pilot Test (Usage)

Table 13 shows the pilot results of the dependent variable Usage of IoT in Tourism. As illustrated in the table, the value of this dependent variable is 0.810, which means that majority of the respondents understand to the questionnaire that developed by the researcher. Since all of the independent and dependent variable's value greater than 0.6 and according to Cronbach's Alpha, this means that the questionnaire designed by the researcher can be used for comprehensive research.

4.3 Respondents Demographic Analysis

A total of 120 respondents were required for analysis. All available questionnaires were obtained from the online questionnaire. The following table shows a summary of the descriptive analysis.

Demographic	Demographic Details	Frequency	Percentage(%)
Gender	Male	55	45.83
	Female	65	54.17
Age	Below 20	0	0
	21-29	85	70.83
	30-39	16	13.33
	40-49	7	5.83
	50-59	10	8.33
	Above 60	2	1.67
Race	Chinese	58	48.33
	Malay	37	30.83
	Indian	21	17.50
	Others	4	3.33
Nationality	Malaysian	120	100
	Non-Malaysian	0	0

Table 14: Summary of the Demographic Details of the Respondents

4.3.1 Gender

Demographic Details	Frequency	Percentage(%)	Cumulative Percentage (%)
Male	55	45.83	45.83

Female	65	54.17	100

Table 15: Respondents Gender

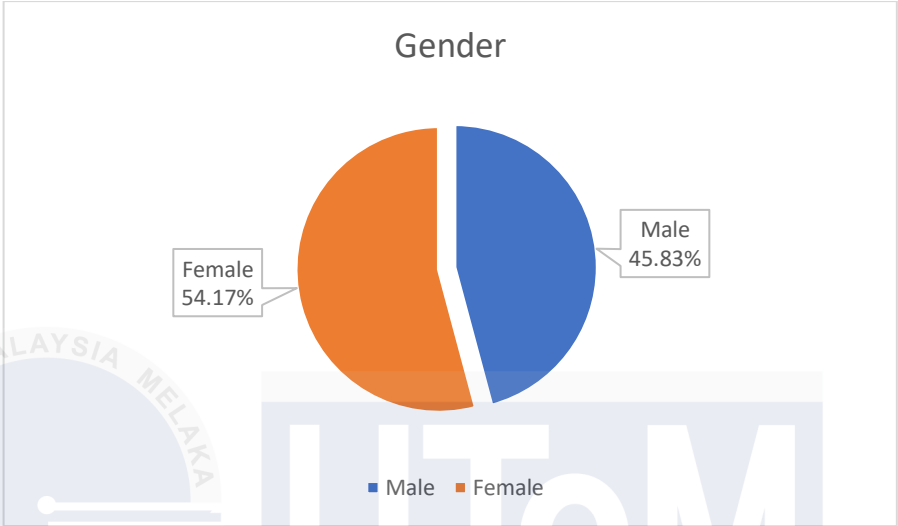


Figure 2: Respondents Gender

Table 15 and figure 2 shows the gender of the respondents. About 45.83% (55 respondents) are male and the female is 54.17% (65 respondents). This shows that there are slightly more female respondents than male respondents in this study.

4.3.2 Age

Demographic Details	Frequency	Percentage(%)	Cumulative Percentage(%)
Below 20	0	0	0
21-29	85	70.83	70.83
30-39	16	13.33	84.16
40-49	7	5.83	89.99
50-59	10	8.33	98.32

Above 60	2	1.67	100

Table 16: Respondents Age

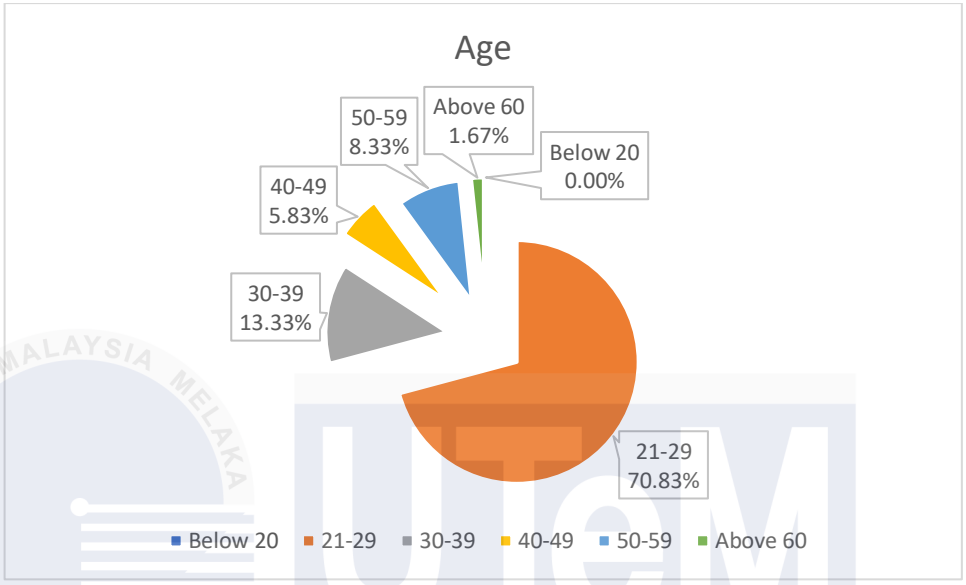


Figure 3: Respondents Age

Table 16 and figure 3 shows the age group of the respondents. There are no respondents (0%) from below 20. Next, most of the respondents were in the 21-29 age group, with a total of 85 respondents, equivalent to 70.83%.

4.3.3 Race

Demographic Details	Frequency	Percentage(%)	Cumulative Percentage(%)
Chinese	58	48.33	48.33
Malay	37	30.83	79.16
Indian	21	17.50	96.67
Others	4	3.33	100

Table 17: Respondents Race

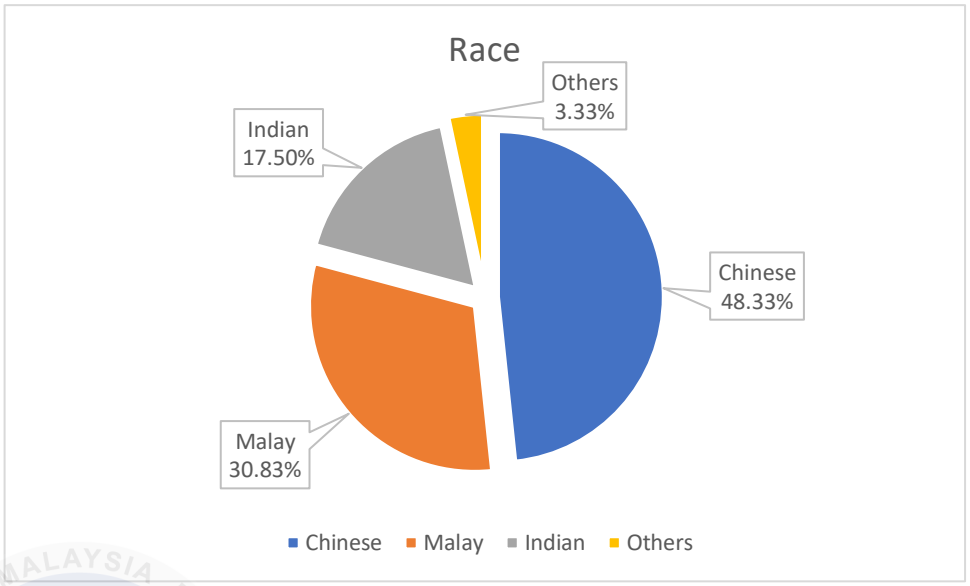


Figure 4: Respondents Race

Table 17 and figure 4 indicate the race of the respondents. The highest race is Chinese which contributes 58 respondents (48.33%). The second highest race is Malay which is 37 respondents (30.83%). Indian has 21 respondents (17.50%). And the lowest is others race which is only 4 respondents (3.33%).

4.3.4 Nationality

Demographic Details	Frequency	Percentage(%)	Cumulative Percentage(%)
Malaysian	120	100	100
Non-Malaysian	0	0	100

Table 18: Respondents Nationality

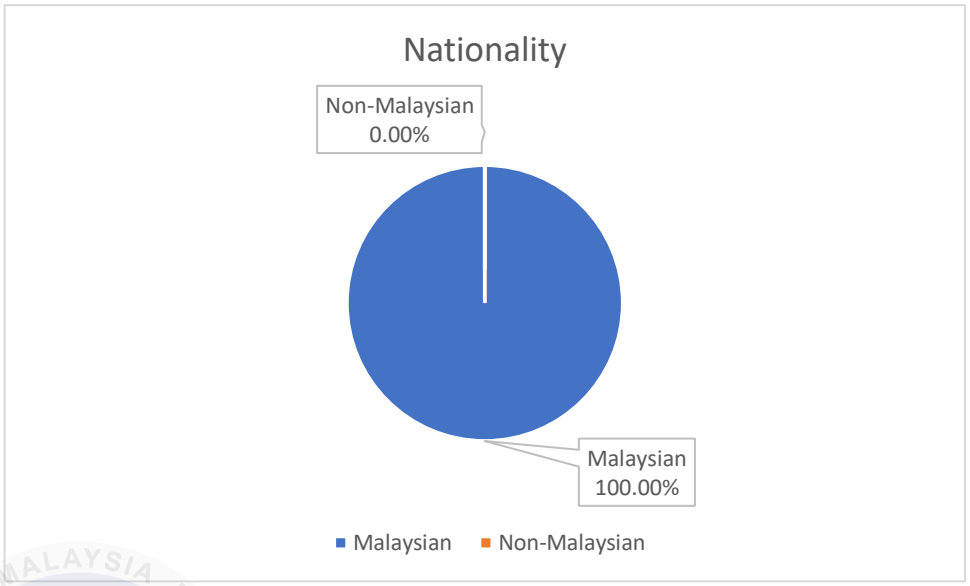


Figure 5: Respondents Nationality

The nationality of respondents is illustrated in Table 18 and figure 5. Based on the table and figure, 120 respondents (100%) are Malaysians, while 0 respondents (0%) are non-Malaysians.

4.4 Descriptive Analysis

Descriptive analysis is a procedure for summarizing and describing the basic characteristics of data. To identify some patterns, trends, and variable distributions before carrying out any inferential analysis.

4.4.1 Independent Variable: Performance Expectancy (PE)

	N	Mean	Std. Deviation

Using IoT services can improve my overall experience while traveling.	120	4.58	.528
Using IoT services helps to obtain useful information for sightseeing.	120	4.68	.568
Using IoT services could provide me personalized travel recommendations.	120	4.51	.710
Using IoT technology (e.g. online ticketing, automated baggage drop-off) able to save my time.	120	4.78	.453

Table 19: Performance Expectancy (PE)

According to table 19 showed that the statistics of all items in Performance Expectancy among 120 respondents. From the table, the respondents agreed that using IoT services can improve their overall experience while traveling with mean 4.58 and standard deviation is 0.528. Next respondents is acknowledged that the using IoT services helps to obtain useful information for sightseeing with mean 4.68 and standard deviation 0.568. Other than that, the respondents have slightly different opinion on using IoT services could provide their personalized travel recommendations with mean 4.51 and standard deviation 0.710. Lastly, respondents consented that using IoT technology (e.g. online ticketing, automated baggage drop-off) able to save their time with mean 4.78 and standard deviation 0.453.

4.4.2 Independent Variable: Effort Expectancy (EE)

	N	Mean	Std. Deviation
IoT service has a user-friendly interface design.	120	4.65	.560
IoT services are very easy to use. Learning to use IoT services is easy.	120	4.53	.565

Using IoT services is not a burden during the transition.	120	4.51	.565
Overall, using IoT services requires a lot of effort.	120	3.94	.737

Table 20: Effort Expectancy (EE)

According to table 20, the statistics of all item Effort Expectancy showed among 120 respondents. As reflected in the table, most of the respondents are agreed that IoT service has a user-friendly interface design with a mean 4.65 and a standard deviation is 0.560. Next the respondents also consented that IoT services are very easy to use. Learning to use IoT services is easy with the mean 4.53 and standard deviation is 0.565. Other than that, the respondents also acknowledged that using IoT services is not a burden during the transition with mean 4.51 with the standard deviation 0.565. Lastly, respondents have slightly different views on using IoT services requires a lot of effort with the mean 3.94 and standard deviation is 0.737.

4.4.3 Independent Variable: Social Influence (SI)

	N	Mean	Std. Deviation
When my friends recommend an IoT service, I'm more likely to use it.	120	4.75	.489
My family's experience with IoT services influenced my choice.	120	4.78	.493
Many people in my social circle are using IoT services, which makes me think I should too.	120	4.75	.506
I want to keep up with technology trends by using IoT services.	120	4.62	.597

Table 21: Social Influence (SI)

According to table 21 presented that the statistics of all items in Social Influence among 120 respondents. From the table most of the respondents are agreed that when their friends recommend an IoT service, they will more likely to use it with a mean 4.75 and a standard deviation is 0.489. Next the respondents also consented that their family's experience with IoT services influenced their choice with the mean 4.78 and standard deviation is 0.493. Other than that, the respondents acknowledged that many people in their social circle are using IoT services, which makes them think they should too with mean 4.75 with the standard deviation 0.506. Lastly, respondents also assented that they want to keep up with technology trends by using IoT services with the mean 4.62 and standard deviation is 0.597.

4.4.4 Independent Variable: Facilitating Conditions (FCs)

	N	Mean	Std. Deviation
I have a device that is compatible with an IoT service, such as a smartphone.	120	4.75	.583
I have the skills and knowledge for using IoT services.	120	4.30	.717
I can easily connect to Wi-Fi or other networks to use IoT services.	120	4.81	.436
Technical support can effectively solve the IoT service problems I encountered.	120	4.65	.575

Table 22: Facilitating Conditions (FCs)

According to table 22, the statistics of all item Facilitating Conditions displayed among 120 respondents. As demonstrated in the table, most of the respondents are agreed that they have a device that is compatible with an IoT service, such as a smartphone with a mean 4.75 and a standard deviation is 0.583. Next, there is a slight variation in the respondents' opinions on they have the skills and knowledge for using

IoT services with the mean 4.30 and standard deviation is 0.717. Other than that, the respondents acknowledged that they can easily connect to Wi-Fi or other networks to use IoT services with mean 4.81 with the standard deviation 0.436. Lastly, respondents also agreed that technical support can effectively solve the IoT service problems their encountered with the mean 4.65 and standard deviation is 0.575.

4.4.5 Independent Variable: Security (SE)

	N	Mean	Std. Deviation
I have used IoT services while traveling.	120	4.40	.571
Using IoT devices can significantly improve my travel experience.	120	4.58	.544
I prefer hotels that provide customized services.	120	4.58	.560
Using IoT devices reduces queuing and waiting time, for which I am satisfied with the IoT service.	120	4.62	.611

Table 23: Security (SE)

According to table 23, the statistics of all item Security illustrated among 120 respondents. As reflected in the table, most of the respondents are agreed that they have used IoT services while traveling with a mean 4.40 and a standard deviation is 0.571. Next the respondents also consented that using IoT devices can significantly improve their travel experience with the mean 4.58 and standard deviation is 0.544. Other than that, the respondents also acknowledged that they prefer hotels that provide customized services with mean 4.58 with the standard deviation 0.560. Lastly, there is a minor discrepancy in the respondents' views on using IoT devices reduces queuing and waiting time, for which they were satisfied with the IoT service with the mean 4.62 and standard deviation is 0.611.

4.5 Pearson Correlation Analysis

The Pearson correlation coefficient is a statistical method used to accurately calculate the linear relationship between two variables, thereby showing how closely they are related. The correlation coefficient, denoted r, quantifies the strength of the association (M.Fikri, 2024).

Correlation Coefficient	Correlation Strength
0.80 to 1 (-0.80 to -1)	Perfect positive (Negative)
0.60 to 0.79 (-0.60 to -0.79)	Strong positive (Negative)
0.31 to 0.59 (-0.31 to -0.59)	Moderate
0.01 to 0.30 (-0.01 to -0.30)	Weak positive (Negative)
0	Perfect Independence

Table 24: Strength of the Correlation Coefficient

The Pearson correlation coefficient ranges between +1 and -1 and indicates the degree of direct relationship between two entities. A correlation coefficient of +1 indicates a perfect positive correlation between the variables, while a correlation coefficient of -1 indicates a perfect negative correlation between the variables.

Correlations							
		PE	EE	SI	FCs	SE	Usage
PE	P.Correlation	1	.756**	.653**	.771**	.542**	.656**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	120	120	120	120	120	120
EE	P.Correlation	.756**	1	.706**	.722**	.538**	.675**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	120	120	120	120	120	120
SI	P.Correlation	.653**	.706**	1	.840**	.609**	.620**
	Sig. (2-tailed)	.000	.000		.000	.000	.000

	N	120	120	120	120	120	120
FCs	P.Correlation	.771**	.722**	.840**	1	.718**	.755**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	120	120	120	120	120	120
SE	P.Correlation	.542**	.538**	.609**	.718**	1	.621**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	120	120	120	120	120	120
Usage	P.Correlation	.656**	.675**	.620**	.755**	.621**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	120	120	120	120	120	120
**. Correlation is significant at the 0.01 level (2-tailed).							

Table 25: Pearson Correlation Coefficient Analysis

Table 25 showed the association between dependent variables (Usage of IoT in Tourism) and the five independent variables which are performance expectancy, effort expectancy, social influence, facilitating and security. As observed in the table 25, performance expectancy, effort expectancy, social influence, facilitating and security is positively correlated to each other. First is Performance Expectancy has the strong positive relationship with usage of IoT in tourism as the value of correlation 0.656 is under the range 0.60 to 0.79 and the significant value is under the range of 0.05, which is p = 0.000. Meanwhile, Effort Expectancy has slightly stronger relationship with usage of IoT in tourism as it has a correlation value of 0.675 as the value is under the range 0.60 to 0.79 and the significant value is of 0.000 lower than 0.005.

Next, the Social Influence has a positive relationship with usage of IoT in tourism with a lowest correlation value which is 0.620. But it still considered as strong positive relationship with usage of IoT in tourism as the value is under the range of 0.60 to 0.79 and the significant value is under 0.05 which is p = 0.000. In addition to that, the Facilitating has the strong positive relationship with usage of IoT in tourism as the highest correlation value which is 0.755 under the range 0.60 to 0.79 and the significant value is under the range of 0.05, Ih Is p = 0.000. As a final point, Security has strong relationship with usage of IoT in tourism as it has a correlation value of

0.621 as the value is under the range 0.60 to 0.79 and the significant value is of 0.000 lower than 0.005. From the analysis results, these variables are related to the use of IoT in tourism. Therefore, these variables are supported.

4.6 Multiple Regression Analysis

Multiple regression analysis is a statistical technique that allows one to understand the relationship between a dependent variable and two or more independent variables. It enables one to see how changes in the independent variables change the dependent variable, and to what extent.

Model Summary				
Model	R	R Square	Adjusted R Square	Std, Error of the Estimate
1	$.790^{a}$	.624	.607	.30444
a. Predictors: (Constant), Performance Expectancy, Effort Expectancy, Social Influence, Facilitating, Security				

Table 26: Model Summary

Table 26 shows the results of the model summary of multiple regression analysis produced by the SPSS software. According to the table, the value of correlation coefficient (R) is 0.790. This result represents that there is strong correlation between dependent variable (usage of IoT in tourism) and independent variables (performance expectancy, effort expectancy, social influence, facilitating, security). The R square value is 0.624, which shows that usage of IoT in tourism has 62.4% influenced by the factors such as performance expectancy, effort expectancy, social influence, facilitating, security. While the remaining 37.6% are explained by other factors that are not covered in this research.

$Anova^a$						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.517	5	3.503	37.801	$<.000^b$
	Residual	10.566	114	.093		
	Total	28.083	119			
a. Dependent Variable: Usage of IoT in Tourism						
b. Predictors: (Constant), Performance Expectancy, Effort Expectancy, Social Influence, Facilitating, Security						

Table 27: Anova

ANOVA is a statistical method used in comparing the means of three or more groups to find out if there are significant differences between them. In the light of table 27, the F value generated is 37.801 with significant level 0.000. Since the p value is 0.000 is lower than 0.05, it is represented a significant relationship between dependent variable (usage of IoT in tourism) and independent variables (performance expectancy, effort expectancy, social influence, facilitating, security).

$Coefficients^a$						
Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	.323	.335		.966	.336
	PE	.055	.103	.054	.533	.595
	EE	.309	.111	.272	2.788	.006
	SI	-.155	.119	-.145	-1.308	.193
	FCs	.560	.148	.527	3.783	<.001
	SE	.165	.087	.156	1.884	.062
a. Dependent Variable: Usage of IoT in Tourism						

Table 28: Coefficients

Referring to table 28, there is a positive relationship between performance expectancy, effort expectancy, facilitating and security towards usage of IoT in tourism.

However, the social influence showed a negative relationship with the usage of IoT in tourism. The equation of multiple regressions is formed and shown as below:

Equation:

$y = a + b1x1 + b2x2 + b3x3$

$y = 0.323 + 0.054\ x1 + 0.272\ x2 + (-0.145\ x3) + 0.527\ x4 + 0.156\ x5$

Where

y = Value of usage of IoT in Tourism

a = constant

b1,b2,b3,b4,b5 = Coefficient value

x1 = Performance Expectancy

x2 = Effort Expectancy

x3 = Social Influence

x4 = Facilitating

x5 = Security

To determine the relationship between which independent variable with dependent variable, the researcher compare the standardize beta value gained in table 28. Based on the information presented in the table, it showed that the facilitating has the highest standardized coefficient beta value which is 0.527, this illustrated facilitating has the strongest positive relationship with the usage of IoT in tourism. Following, effort expectancy and security are the second and third independent variables that have a positive relationship with the usage of IoT in tourism, with standardized coefficient beta values of 0.272 and 0.156 respectively. Other than that, the lowest positive relationship is performance expectancy. Since its beta value is only 0.054, it is the independent variable with the lowest beta value in the positive relationship.

According to the standard of this analysis method, the higher the beta value is, up to 1 or -1, the stronger the influence of the independent variable on the dependent variable. However, this study found that social influence showed a negative relationship, because the beta value was negative, that is, -0.145. Thus, facilitating and social influence have the highest beta values with positive and negative relationships with usage of IoT in tourism respectively.

4.7 Hypothesis Testing

Hypothesis 1: Performance Expectancy (PE)

H_0: Performance Expectancy (PE) has no positive impact on the usage of IoT in Tourism.

H_1: Performance Expectancy (PE) has a positive impact on the usage of IoT in Tourism.

From the table above, performance expectancy has significant value of 0.595. As the significant value is greater than 0.05, it indicates that performance expectancy is not significantly related to the usage of IoT in tourism. Hence, the hypothesis (H_1) is not accepted.

Hypothesis 2: Effort Expectancy (EE)

H_0: Effort Expectancy (EE) has no positive impact on the usage of IoT in Tourism.

H_1: Effort Expectancy (EE) has a positive impact on the usage of IoT in Tourism.

As shown in the table 28, effort expectancy has significant value of 0.006. As the significant value is under 0.05, it represented that effort expectancy has a significant relationship with usage of IoT in tourism. Hence the hypothesis H_1 is accepted.

Hypothesis 3: Social Influence (SI)

H_0: Social Influence (SI) has no positive impact on the usage of IoT in Tourism.

H_1: Social Influence (SI) has a positive impact on the usage of IoT in Tourism.

From the table above, social influence has a significant value of 0.193. Since the value is greater than 0.05, it indicates that social influence does not have a statistically significant relationship with the usage of IoT in tourism. Hence, the H_1 related to social influence is not accepted.

Hypothesis 4: Facilitating (FCs)

H_0: Facilitating (FCs) has no positive impact on the usage of IoT in Tourism.

H_1: Facilitating (FCs) has a positive impact on the usage of IoT in Tourism.

From the table above, facilitating has significant value of <0.001. As the significant value is under 0.05, it shows that facilitating has a significant relationship with usage of IoT in tourism. Hence the hypothesis H_1 is accepted.

Hypothesis 5: Security (SE)

H_0: Security (SE) has no positive impact on the usage of IoT in Tourism.

H_1: Security (SE) has a positive impact on the usage of IoT in Tourism.

As shown in the table, security has significant value of 0.062. Since the significant value is greater than 0.05, it reveals that security has no significant relationship with usage of IoT in tourism. Hence the hypothesis H_1 is not accepted.

Independent Variable	p value	Result
Performance Expectancy	.595	Reject H_1
Effort Expectancy	.006	Accept H_1
Social Influences	.193	Reject H_1
Facilitating	<.001	Accept H_1

Security	.062	Reject H_1

Table 29: Summary of Hypothesis Testing Result

As indicated by the table, the variable is accepted when the p value is below 0.05. Otherwise, the variable will be rejected, as showed in table 29, performance expectancy, social influences and security p value was greater than 0.05, so the hypothesis of these three independent variables were rejected. However, effort expectancy and facilitating p value was under 0.05, so the hypothesis was accepted.

4.8 Summary

In this chapter, the researcher used SPSS software to examine the entire data collected from the 120 respondents. The researcher conducted Reliability Analysis, Descriptive Analysis, Pearson Correlation Coefficient Analysis, and Multiple Regression Analysis to interpret the data to examine the relationship between the independent and dependent variables. The researcher also determined the significance of the hypotheses mentioned previously in chapter 2. In this research, two hypotheses were accepted and the other three hypotheses were rejected.

CHAPTER 5

RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter comprehensively summarizes the findings of the study and provides conclusions and recommendations for reference. The focus of this research is on what influences the adoption of IoT technology in the tourism industry of Malaysia. The research hypothesizes findings which are substantiated through quantitative analysis. This will also include the implications of the findings on future research and practice, outlining the strengths and limitations of the research. With such recommendations to address the deficits and challenges brought forth in this study, such suggested strategies are looking towards an inclusive and highly efficient tourism ecosystem. This chapter is divided into several sections, including summary of findings, research limitations, significance of the research, recommendation and summary.

5.2 Summary of Findings

5.2.1 Research Objective 1 (To determine the impact of performance expectancy on tourists' adoption of IoT technology in the Malaysian tourism industry)

This study aims to determine the impact of performance expectations on the adoption of IoT technology by tourists in the Malaysian tourism industry. First, the researcher designed four questions about performance expectations to confirm the level of agreement of the respondents and collected data through a questionnaire. The mean and standard deviation were then calculated to confirm the level of agreement of the respondents.

In Table 19, it can be clearly seen that the mean values of each question are higher than 4, which indicates that the respondents agree that performance expectations will affect the adoption of IoT technology by tourists in the Malaysian tourism industry. However, in Table 28, Multiple Regression Analysis shows that the p-value of performance expectations is 0.595, which is greater than 0.05. Therefore, this objective is not achieved.

5.2.2 Research Objective 2 (To determine the impact of effort expectancy on tourists' adoption of IoT technology in the Malaysian tourism industry)

In this objective, the researchers aimed to determine the impact of effort expectation on the adoption of IoT technology by tourists in the Malaysian tourism industry. In Table 20, it is shown that the mean values of 3 questions are above 4, while another one is close to 4. This also shows that the respondents agree that effort expectation is related to the adoption of IoT by tourists when traveling in Malaysia.

This objective is also demonstrated in Table 28. Through Multiple Regression Analysis, the p-value is 0.006, which is lower than 0.05, which means that the effort expectation has a positive impact on the application of IoT in the tourism industry. Therefore, this objective has been achieved.

5.2.3 Research Objective 3 (To determine the impact of social influence on tourists' adoption of IoT technology in the Malaysian tourism industry)

In this objective, the researchers aimed to determine the impact of social influence on the adoption of IoT technology by tourists in the Malaysian tourism industry. In Table 21, it is shown that the mean values of each question are higher than 4. This also shows that the respondents agree that social influence is related to the adoption of IoT by tourists when traveling in Malaysia. However, in Table 28, the p-value of the factor of social influence in Multiple Regression Analysis is 0.193, which is higher than 0.05. Therefore, this objective was not achieved.

5.2.4 Research Objective 4 (To determine the impact of facilitating conditions on tourists' adoption of IoT technology in the Malaysian tourism industry)

In this objective, the researchers aimed to determine the impact of facilitating on the adoption of IoT technology by tourists in the Malaysian tourism industry. In Table 22, it is shown that the mean values of each question are higher than 4. This also shows that the respondents agree that facilitating is related to the adoption of IoT by tourists when traveling in Malaysia. This objective was also verified again in the

Multiple Regression Analysis in Table 28, because its p-value was 0.001, which was lower than 0.05. Therefore, this objective was achieved.

5.2.5 Research Objective 5 (To determine the impact of security on tourists' adoption of IoT technology in the Malaysian tourism industry)

In this objective, the researchers aimed to determine the impact of social influence on the adoption of IoT technology by tourists in the Malaysian tourism industry. In Table 23, it is shown that the mean values of each question are higher than 4. This shows that the respondents agree that social influence is related to the adoption of IoT by tourists when traveling in Malaysia. However, in Table 28, the p-value of the factor of social influence in Multiple Regression Analysis is 0.062, which is higher than 0.05. Therefore, this objective was not achieved.

5.3 Limitations of The Research

While conducting this study, the researchers also found some limitations in the study. The first one is that the sample of respondents did not cover the whole of Malaysia but only sampled tourists traveling in Malacca, and the sample size was only 120. Therefore, the results of this study are more biased towards tourists from certain areas and reference personnel need to be cautious when making references.

Second, although the study examined key factors such as performance expectations, effort expectations, social impact, facilitating and safety based on the

UTAUT model, other factors were not taken into consideration. Therefore, it is not possible to provide effective reference value for the impact of other factors.

Third, since this study was conducted from the perspective of tourists, only quantitative methods were used to meet the conditions that require a large number of tourists as samples. However, this also led to the fact that the research results obtained in this study were more general and could not be presented in depth compared with mixed methods or qualitative research.

5.4 Significance of The Research

This study provides valuable insights into the factors that influence the adoption of Internet of Things (IoT) technologies in the Malaysian tourism industry. The shortcomings and challenges identified were helped to be addressed through recommendations to inform strategies towards achieving an inclusive and efficient tourism ecosystem, as much as possible.

5.5 Recommendations of The Research

First, by raising awareness of the benefits of the Internet of Things, tourism companies and stakeholders can actively promote the benefits of the Internet of Things to tourists and industry insiders, so as to promote tourists' trust in the Internet of Things and increase their usage of the Internet of Things.

Second, according to the conclusions drawn from this study, facilitating has a positive impact on the usage of IoT in tourism. Therefore, investment in infrastructure construction can enhance Internet connectivity, deploy smart devices in tourism hotspots and ensure interoperability between technologies. In order to increase the penetration rate and success rate, the government and the private sector should work together to face this challenge.

The third is to customize and enhance the user experience. According to the research results, the expected effort has a positive impact on the usage of IoT in tourism. Therefore, while using IoT to analyze customer data and preferences and provide a tailored experience, it is necessary to ensure that the user-friendly design and operation of the IoT interface make it easy for users to get started.

5.6 Suggestion for Future Research

In addition, this study also has some suggestions for researchers who are conducting related research in the future. In future research, different sample sizes or subjects can be studied. Since researchers can now obtain more and more detailed data, the impact of IoT applications in the tourism industry can be improved from more different aspects.

Alternatively, in future studies, researchers can try to study different variables and keep up with current technologies and trends to ensure a more accurate analysis of the current situation.

5.7 Summary

In the chapter of Recommendation and Conclusion, researchers has summarize the findings and identify factors that affect the adoption of IoT in the tourism industry. Moreover, the chapter discusses the limitation and implication of the study. The researchers also give some recommendations on how to improve the efficiency of researchers who want to conduct similar studies in the future.

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APPENDIX

Questionnaire

Section A: Demographic

Description (optional)

Gender *

- Male
- Female

Age *

- Below 20
- 21 - 29
- 30 - 39
- 40 - 49
- 50 - 59
- Above 60

Race *

- Chinese
- Malay
- Indian
- Other...

Nationality *

- Malaysian
- Non-Malaysian

Section B

Performance Expectancy (PE)

Using IoT services can improve my overall experience while traveling. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Using IoT services helps to obtain useful information for sightseeing. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Using IoT services could provide me personalized travel recommendations. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Using IoT technology (e.g. online ticketing, automated baggage drop-off) able to save my time. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Effort Expectancy (EE)

Description (optional)

IoT service has a user-friendly interface design. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

IoT services are very easy to use. Learning to use IoT services is easy. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Using IoT services is not a burden during the transition. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Overall, using IoT services requires a lot of effort. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Section B

Social Influence (SI)

When my friends recommend an IoT service, I'm more likely to use it. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

My family's experience with IoT services influenced my choice. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Many people in my social circle are using IoT services, which makes me think I should too. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I want to keep up with technology trends by using IoT services. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Facilitating Conditions (FCs)

Description (optional)

I have a device that is compatible with an IoT service, such as a smartphone. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I have the skills and knowledge for using IoT services. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I can easily connect to Wi-Fi or other networks to use IoT services. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Technical support can effectively solve the IoT service problems I encountered. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Section B

Security (SE)

I think these technologies are more secure than traditional passwords or credentials. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I'm concerned that my data may be misused. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I am willing to pay extra for more secure services. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I would like to use apps with better security features to protect my personal data. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Section C

Usage of IoT in Tourism

I have used IoT services while traveling. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Using IoT devices can significantly improve my travel experience. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I prefer hotels that provide customized services. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Using IoT devices reduces queuing and waiting time, for which I am satisfied with the IoT service. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Gantt Chart For PSM 1

TASK	PSM 1 GANTT CHART / WEEK															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Title Brainstorming																
Title Selection																
Meeting with SV																
Literature Review																
Finding and discussion on the research topic by supervisor																
Draft of Research																
Changes on Research Topic																
Writing Chapter 1																
Finding Related Journals																
Identify the Research Objectives, Research Questions, and Variables																
Writing Chapter 2																
Developing Research Framework																
Writing Chapter 3																
Determine and Refine the Research Methodology																
Final Report Correction																
PSM 1 Submission																
PSM 1 Presentation																

MID SEMESTER BREAK

Gantt Chart For PSM 2

TASK	PSM 2 GANTT CHART / WEEK															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Finalise Report									MID SEMESTER BREAK							
Meeting with SV																
Questionnaire Check																
Pilot Test																
Actual Survey																
Data Collection																
Data Analysing																
Writing Chapter 4																
Writing Chapter 5																
Compiling Chapter 1 to Chapter 5																
PSM 2 Submission																
PSM 2 Presentation																
Final Report Correction																