# EXPLORING THE ACCEPTANCE OF MYRFID BY NORTH-SOUTH EXPRESSWAY (PLUS) USERS

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**EXPLORING THE ACCEPTANCE OF MYRFID BY NORTH-SOUTH EXPRESSWAY (PLUS) USERS**

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# DECLARATION OF ORIGINAL WORK

"I hereby admit that this is my own work except for summary of excerpt of which I had mentioned the source"

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# APPROVAL

"I hereby declare that I had read and go through for this thesis and it is adequate in term of scope and quality which fulfil the requirements for the awards Bachelor of Technology Management (Technology Innovation) with Honours"

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**DEDICATION**

I dedicate this research to those who have been my guiding lights throughout this journey. To my loving family, thank you for your unwavering support and encouragement. Your belief in me has been my driving force. To my respected supervisor, Mr. Mukhiffun Bin Mukapit, your guidance and expertise have shaped my research and enriched my understanding. I am grateful for your invaluable supervision. To my family and friends, thank you for your constant encouragement and for making this journey more meaningful. Your camaraderie has been a source of strength. Lastly, to the participants who generously shared their time and insights, this research would not have been possible without you. Your contributions have made a lasting impact.

# ACKNOWLEDGEMENT

# ABSTRACT

MyRFiD, also known as Radio Frequency Identification, is an electronic toll collection (ETC) system implemented in Malaysia. The history of MyRFiD can be traced back to the early 2000s when the Malaysian government realized the need for a more efficient and convenient method of collecting tolls on highways and highways. In 2004, the Malaysian government began the migration from the Touch 'n Go system to a more advanced and automated ETC system based on radio frequency identification (RFID) technology. The new system, known as MyRFiD, aims to improve the overall efficiency of toll collection, reduce congestion at toll plazas and improve user experience. Malaysia uses MyRFiD for toll collection because of its efficiency, convenience and cashless payment capabilities. This research aims to identify factors that can influence MyRFiD acceptance, determine the relationship between these factors and MyRFiD acceptance, and identify the most significant factors that can influence MyRFiD acceptance among users of the North-South Expressway (PLUS). A total of 155 respondents have been involved in answering the online questionnaire that has been distributed. A quantitative approach was used and the data was analyzed using the Statistical Package for Social Science (SPSS). A quantitative approach was used and the data was analyzed using the Statistical Package for Social Science (SPSS). Analysis results obtained from the Multiple Regression Analysis and Pearson's Correlation Coefficient showed that, perceived usefulness, perceived ease of use and social influence had the significant relationship and strong relationship on user acceptance of MyRFiD and the most effective factor was perceived usefulness with the highest Beta value. The findings of this research will provide valuable insights into the acceptance of MyRFiD technology in the Malaysian toll plaza context, assisting in the development of effective strategies to increase user acceptance and usage.

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# ABSTRAK

MyRFiD, juga dikenali sebagai Pengenalan Frekuensi Radio, ialah sistem kutipan tol elektronik (ETC) yang dilaksanakan di Malaysia. Sejarah MyRFiD boleh dikesan sejak awal 2000-an apabila kerajaan Malaysia menyedari keperluan untuk kaedah kutipan tol yang lebih cekap dan mudah di lebuh raya dan lebuh raya. Pada tahun 2004, kerajaan Malaysia memulakan penghijrahan daripada sistem Touch 'n Go kepada sistem ETC yang lebih maju dan automatik berdasarkan teknologi pengenalan frekuensi radio (RFID). Sistem baharu itu, dikenali sebagai MyRFiD, bertujuan untuk meningkatkan kecekapan keseluruhan kutipan tol, mengurangkan kesesakan di plaza tol dan menambah baik pengalaman pengguna. Malaysia menggunakan MyRFiD untuk kutipan tol kerana kecekapan, kemudahan dan keupayaan pembayaran tanpa tunai. Penyelidikan ini bertujuan untuk mengenal pasti faktor-faktor yang boleh mempengaruhi penerimaan MyRFiD, menentukan hubungan antara faktor-faktor ini dengan penerimaan MyRFiD, dan mengenal pasti faktor paling signifikan yang boleh mempengaruhi penerimaan MyRFiD dalam kalangan pengguna Lebuhraya Utara-Selatan (PLUS). Seramai 155 orang responden telah terlibat dalam menjawab soal selidik atas talian yang telah diedarkan. Pendekatan kuantitatif digunakan dan data dianalisis menggunakan Statistical Package for Social Science (SPSS). Pendekatan kuantitatif digunakan dan data dianalisis menggunakan Statistical Package for Social Science (SPSS). Keputusan analisis yang diperolehi daripada Analisis Regresi Berganda dan Pekali Korelasi Pearson menunjukkan bahawa, persepsi kebergunaan, persepsi kemudahan penggunaan dan pengaruh sosial mempunyai hubungan yang signifikan dan hubungan yang kuat terhadap penerimaan pengguna MyRFiD dan faktor yang paling berkesan ialah persepsi kebergunaan dengan nilai Beta tertinggi. Penemuan penyelidikan ini akan memberikan pandangan berharga tentang penerimaan teknologi MyRFiD dalam konteks plaza tol Malaysia, membantu dalam pembangunan strategi berkesan untuk meningkatkan penerimaan dan penggunaan pengguna.

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| ABBREVIATIONS | MEANING |
|---|---|
| PLUS | *Projek Lebuhraya Utara-Selatan* |
| RFID | Radio Frequency Identification |
| MHA | Malaysian Highway Authority |
| ETC | Electronic Toll Collection System |
| TAM | Technology Acceptance Model |
| UTAUT | Unified Theory of Acceptance and Use of Technology |
| PU | Perceived Usefulness |
| PEU | Perceived Ease of Use |
| SI | Social Influence |
| DV | Dependent Variable |
| IV | Independent Variable |
| SPSS | Statistical Package for Social Science |
| TnG | Touch and Go |
| H1 | Hypothesis 1 |
| H2 | Hypothesis 2 |
| H3 | Hypothesis 3 |

# CHAPTER 1

# INTRODUCTION

## 1.1    Chapter Overview

This chapter aims to provide a comprehensive overview of the research. It begins by presenting the background, contextualizing the research, and highlighting its significance. The problem statement is then clearly articulated, identifying the specific issue that the research intends to address. To guide the investigation, well-defined research questions are formulated. The research objectives are also outlined, delineating the intended outcomes and goals of the study. Furthermore, the scope of the research is carefully defined, specifying the boundaries within which the investigation will take place. Lastly, a meticulous summary is presented, encapsulating the key points discussed in this chapter and paving the way for subsequent research endeavours.

## 1.2    Background of Study

The Malaysian Highway System is a network of national controlled-access highways in Malaysia that serves as the principal backbone network of national highways. Malaysian highways are developed by private corporations under the supervision of the Malaysian Highway Authority (MHA), a government highway authority. The Highway Authority of Malaysia was established to supervise and execute the design, construction, regulation, operation, and maintenance of inter-urban highways, to impose and collect tolls, to enter into contracts, and to provide for matters connected therewith (Malaysia, L. L., n.d.).

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RFID (Radio Frequency Identification) is one of the latest technologies used for the toll system in Malaysia. Sharom, D., (2019) claimed RFID is not a new technology and it is already in various industries such as production, where it can be used to manage goods and inventory, as well as data identification in travel documents such as passports and baggage managed by airlines. Sharom, D., (2019) also stated the widespread use of RFID systems in various platforms is not surprising because these systems offer stable signal aspects, with fast response times, and at the same time they are also cost-effective to use. The RFID scanning distance can cover a wider area, but it still depends on the system and its requirements. According to Fali Oklilas, A., et al., (2019), RFID is a technology that operates without the need for human interaction. Typically, this process utilizes radio frequencies to automatically achieve identification, eliminating the need for direct contact with individuals. Refers to the MyRFiD, the tag stores information electronically in a small chip, and it is unique to each vehicle. It has the same functionality as electronic payment using a Touch 'n Go (TnG) card or SmartTAG at the toll plaza. This tag is also linked with TnG eWallet (Sharom, D., 2019)

The purpose of the implementation is to reduce delays and eliminate traffic congestion at toll collection points. This payment collection approach aims to create a more seamless traffic flow on toll highways by enabling automatic vehicle identification and electronic toll collection (Noor, et al., n.d.).

Since its introduction in 2017, the adoption rate of Radio Frequency Identification (RFID) or MyRFiD tags has experienced a significant increase of 18% ("RFID usage increases 18 pct – Fadillah", 2022). The government has set a goal of attaining a 60% adoption rate for Radio Frequency Identification (RFID) in toll collection by the end of 2022. Additionally, there is a possibility that the use of Touch 'n Go (TnG) and SmartTAG cards may be discontinued by the end of 2023 (Lim, A., 2021).

## 1.3    Problem Statement

The toll collection system implemented in Malaysia has some shortcomings, despite the adjustments made to the automatic system at every toll plaza in the country.

Amarudin, S. K., (2022) mentioned the failure of the Radio Frequency Identification (RFID) lane to work properly since it was used in the middle of this month shows that the system is not yet eligible for mandatory use on highways in the country.

The failure is caused by various factors such as the failure of the scanning machine to scan the RFID Tag affixed to the user's car. The primary issue lies in the misalignment between the tag and the reader. To address this problem, the toll lane requires multiple sensors to adequately cover the detection area. However, currently, only one sensor is installed per lane due to cost constraints. This limited implementation can be considered an incomplete solution that is likely to fail without further investment. ("Yoursay | RFID snag – failed tech or drivers to blame?", 2022).

Furthermore, it is noteworthy that a significant number of highway users continue to opt for the Touch 'n Go payment method when transacting at toll plazas. Based on Zainuddin, M. Z., (2023), despite being offered RFID and SmartTAG, many people still use the Touch 'n Go card at the toll plaza, which causes congestion at the main toll plaza even when it's not peak time. Rural residents especially those who travel are more comfortable using Smart Tag and Touch 'n Go than RFID which for users is a bit too new and still unfamiliar (Abd Mutalib M. H., 2022). It also hopes that the existing systems such as Smart Tag and Touch 'n Go which have become ingrained in road users will not be abolished.

Even though there are many problems with MyRFiD, there are still people who choose to use it. Therefore, this study was conducted to find out the level determine the level of users' desire to use MyRFiD technology at the Toll Plaza and to identify the most effective factors of acceptance of MyRFiD technology at the Toll Plaza.

## 1.4    Research Question

The following research question is examined in the study:

1. What factors could influence the acceptance of the MyRFiD among North-South Expressway (PLUS) Users?
2. How is the relationship between these factors and the acceptance of MyRFiD among North-South Expressway (PLUS) Users?
3. Which are the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) Users?

## 1.5 Research Objective

With the above problem statement as view, the following are the research objectives:

1. To identify the factors could influence the acceptance of the MyRFiD among North-South Expressway (PLUS) Users
2. To determine the relationship between these factors and the acceptance of MyRFiD among North-South Expressway (PLUS) Users
3. To identify the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) Users

## 1.6 Scope of Study

This study focused on the acceptance of MyRFiD among users of the North-South Expressway (PLUS), Malaysia's primary and longest expressway connecting major cities and towns in Malaysia, and it often experiences heavy traffic, especially during peak periods like national holidays or festive seasons.

**1.7 Significant of Study**

This research can help to develop a better understanding of the user behaviour and preferences related to toll plaza operations, and the Electronic Toll Collection System (ETC) in Malaysia.

Additionally, the study can provide a framework for future research on technology acceptance and adoption in transportation and related domains. The study can contribute to practical knowledge by providing recommendations and insights to policymakers, toll plaza management, and technology vendors on how to improve the design, implementation, and marketing of MyRFiD technology.

The study's findings can help to identify potential barriers, such as user concerns about convenience in the use of MyRFiD. Ultimately, the research can inform strategies to increase user acceptance and adoption of MyRFiD technology, thereby improving the efficiency and effectiveness of toll plaza operations in Malaysia.

**1.8 Summary**

This study aims to investigate the acceptance of MyRFiD, with a specific focus on the North-South Expressway (PLUS) users. The chapter provides an overview of the research, including the background of the Malaysian Highway System and the implementation of RFID technology for toll collection. It highlights the problem statement, which includes the shortcomings of the current toll collection system and the continued use of alternative payment methods despite the introduction of MyRFiD.

The research questions are then presented, focusing on the factors could influence the acceptance of MyRFiD, the relationship between these factors and the acceptance of MyRFiD, and the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) users. The research objectives correspond to these questions, aiming to identify the the factors could influence the acceptance of MyRFiD, determine the relationship between these factors

and the acceptance of MyRFiD, and identify the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) users.

The significance of the study lies in its potential to enhance understanding of user behavior and preferences related to toll plaza operations and electronic toll collection (ETC) systems. It can contribute to future research and provide recommendations for policymakers, toll plaza operators, and technology vendors to improve the design, implementation, and marketing of MyRFiD technology. The findings can also help identify barriers to adoption and suggest strategies to increase user acceptance and adoption, ultimately improving the efficiency of toll plaza operations in Malaysia.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

This chapter provides an analysis of the independent and dependent variables. Accurate sources such as reference materials were gathered to support the scientific and observational study, examining relevant hypothesis and previous scientific research. It begins with an overview of Radio Frequency Identification (RFID) technology and discusses the variables that influence perception to use MyRFiD, thereby establishing the research context. Additionally, it includes a brief discussion of relevant theory and presents the suggested research framework. The chapter summarizes the literature, presents the conceptual framework, formulates hypotheses, and concludes Chapter 2.

## 2.2 Concept

### 2.2.1 Radio Frequency Identification (RFID)

RFID, a field of automated identification, is rapidly growing and has the potential to become one of the most ubiquitous computing technologies in history. At its core, RFID shares similarities with barcoding, but it offers the advantage of improving data processes and working in harmony with existing technologies. With a track record dating back to the 1970s, RFID is a well-established and tested technology (Roberts, C. M., 2006).

According to Jerry, L., & Barbara, C., (2001), during the 1980s, RFID applications expanded into various sectors. Animal tracking systems gained popularity in Europe, and RFID technology was implemented in toll roads across Italy, France, Spain, Portugal, and Norway. The 1990s marked a significant milestone with the widespread acceptance of electronic toll collection in the United States. In 1991, Oklahoma introduced an electronic tolling system that allowed vehicles to pass toll collection points at highway speeds, eliminating the need for toll booths. Europe also showed considerable interest in RFID applications during this period, particularly in toll collection, rail applications, and access control. RFID tolling and rail applications were implemented in numerous countries, including Argentina, Australia, Brazil, Canada, China, Hong Kong, Japan, Malaysia, Mexico, New Zealand, South Korea, South Africa, Singapore, and Thailand. These countries recognized the benefits of RFID technology and adopted it for efficient toll collection and rail-related purposes.

As highlighted by Kaur, M., Sandhu, M., Mohan, N., & Sandhu, P. S., (2011), while numerous RFID implementation cases have been documented, achieving widespread adoption and maximizing the technology's potential still necessitates resolving technical, process, and security challenges. Although the current limitations of RFID technology are recognized, specialists are actively engaged in addressing these issues. Efforts are underway to overcome these limitations and further enhance the capabilities of RFID technology.

### 2.2.2 Perceived Usefulness

The perceived usefulness (PU) of a specific technology relies on an individual's belief that utilizing that technology would improve their performance or productivity (Davis, 1989). Consequently, a system that is perceived as highly useful is one in which the user believes that using it will lead to a positive relationship between their performance and the benefits gained from utilizing the system. According to Tahar, et al., (2020), the higher the level of users' belief in the simplicity of employing a system, the greater the likelihood that they will use it.   A study by Hidayat, R., et al., (2021) about Radio Frequency Identification (RFID) applications on E-Toll in Indonesia, stated the more

beneficial and valuable customers perceive the e-toll product to be, the more likely they are to use it. When an e-toll product offers multiple advantages to its users, they will be satisfied using it, which directly influences their interest in using the product. On the other hand, if users believe that the e-toll product doesn't offer any benefits, they will lose interest in using it, especially considering the availability of alternative non-cash transaction tools.

### 2.2.3 Perceived Ease of Use

Perceived ease of use (PEU) is defined as the degree to which an individual believes that using technology requires minimal effort or is easy to use (Davis, 1989; Teo & Jarupunphol, 2015). It represents an individual's evaluation that interacting with technology will impose a little cognitive burden and indicates the ease with which they can effectively engage with the technology. Perceived ease of use with RFID technology refers to the degree to which users believe that utilizing RFID devices will offer convenience and eliminate the need for manual labor or effort. Users are inclined to adopt a technology based on its ease of use, particularly if it assists them in improving their daily activities (Nurnadiah Samsuddin, et al., 2020).

### 2.2.4 Social Influence

Social influence is characterized as the extent to which an individual perceives that influential people or significant others believe that he or she should adopt and utilize the new system (Venkatesh, et al., 2003). Social influence is not limited to face-to-face interactions but can also be influenced by information about other people, as indicated by studies conducted by Robins, et al. (2001) and Trusov, et al. (2010). It implies that social influence can occur through various channels, including online interactions and information received from others. Kwahk and Ge (2012) emphasized that the emergence of the Internet and social media has revolutionized the landscape

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of social influence. In the past, people's influence was limited to their close social circles. However, with the widespread use of the Internet and social media platforms, individuals now can exert influence and connect with a much larger audience. This has broadened the reach and impact of social influence, extending it beyond traditional boundaries.

## MODEL AND THEORY

### 2.3 Technology Acceptance Model (TAM)

There is a vast body of research focused on the adoption and utilization of information systems, which encompasses various theoretical perspectives. Among these theories, the Technology Acceptance Model (TAM) is widely recognized as the most influential and commonly employed theory to explain an individual's acceptance. TAM, derived from the Theory of Reasoned Action by Ajzen and Fishbein (1980) and initially proposed by Davis (1986), posits that an individual's acceptance is influenced by two key variables, Perceived Usefulness (PU) and Perceived Ease of Use (PEU).
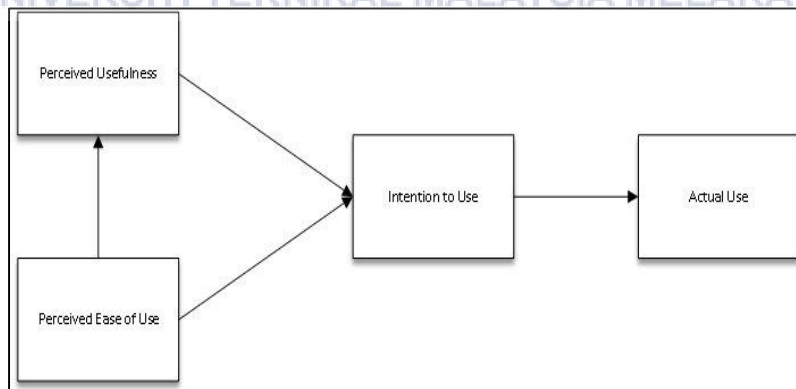


Figure 2. 1: Technology Acceptance Model (TAM)

Source: Fit, T. T. (2023). *Technology Acceptance Model*.

## 2.4 Research Framework

This researched used the extended Technology Acceptance Model (TAM) as a framework. Vankatesh, Davis, and Morris have put forward the UTAUT as a means to enhance technology acceptance models (Vankatesh, et al., 2003). UTAUT comprises four primary elements, performance expectancy, effort expectancy, social influence, and facilitating conditions. In this study, it has combined one of the variables from UTAUT which is social influence. Figure 2.2 illustrates the research framework, while Table 2.1 provides the definitions for its variables.
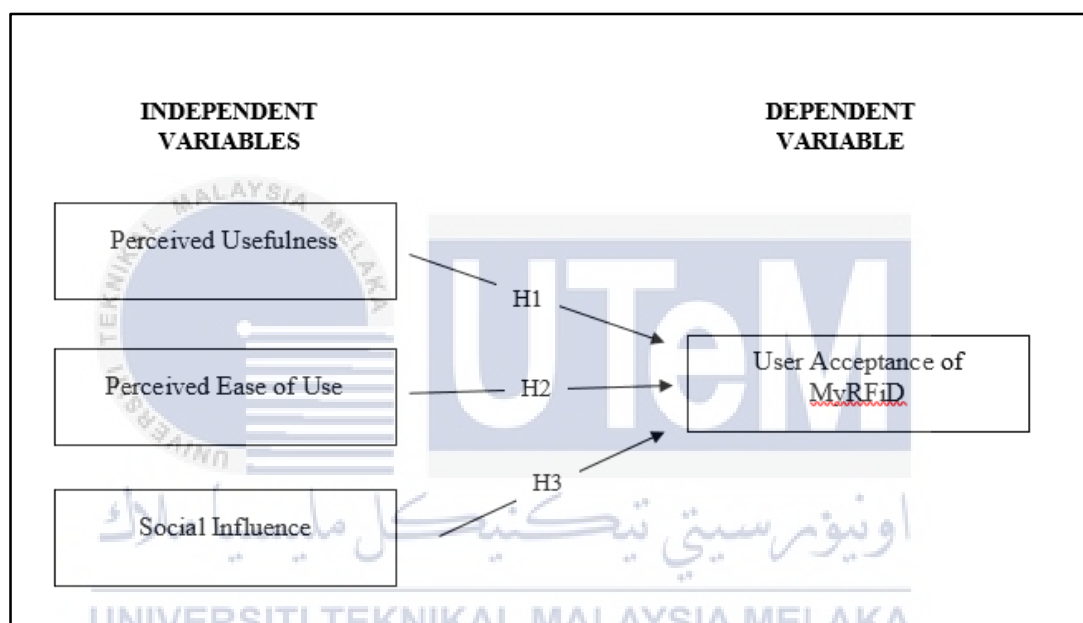


Figure 2. 2: Research Framework

Table 2. 1: Table of Construct

| Construct | Definition | Reference |
|---|---|---|
| Perceived Usefulness (TAM) | an individual's belief that utilizing that technology would improve their performance or productivity. | Davis, 1989 |
| Perceived Ease of Use (TAM) | the degree to which an individual believes that using technology requires minimal effort or is easy to use. | Davis, 1989, Teo & Jarupunphol, 2015 |

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| Social Influence (UTAUT) | the extent to which an individual perceives that influential people or significant others believe that he or she should adopt and utilize the new system | Venkatesh, et al., 2003 |
|---|---|---|

## 2.5 Hypothesis Testing

Based on the research framework in Figure 2.2, three hypotheses had been made by the researcher to study the relationship between these factors and the acceptance of MyRFiD. The hypotheses were:

**H1: There is a positive relationship between perceived usefulness towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users.**

According to B. Eckfeld, (2005) companies offering RFID-based solutions should capitalize on the inherent convenience offered by RFID-based applications for consumers. In a study by Dhurat, A., et al., (2014), RFID technology has been implemented extensively on numerous highways and expressways to facilitate quicker toll collection and alleviate traffic congestion. The convenience of using MyRFiD at toll plazas increases consumer intention to use it. When consumers realize that RFID offers a faster, more streamlined experience compared to traditional payment methods, they are more inclined to use it.

- There is a positive relationship between perceived usefulness towards the acceptance of the MyRFiD.

**H2: There is a positive relationship between perceived ease of use towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users**

F. D. Davis (1989) mentioned if individuals perceive that a particular technology is user-friendly and can enhance their job performance, they are more likely to adopt and utilize that technology. Zhang and Prybutok (2005) have highlighted that service convenience plays a significant role in enhancing consumer satisfaction and

influencing their intention to adopt a technology. Consequently, RFID-based systems have a higher likelihood of achieving greater adoption rates if they are designed to provide convenience and make the lives of consumers more convenient.

- There is a positive relationship between perceived ease of use towards the acceptance of the MyRFiD.

## H3: There is a positive relationship between social influence towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users

According to Fishbein and Ajzen (1975), the perception of social pressure in relation to one's intention to engage in a certain behavior is referred to as social influence. It pertains to the extent to which users believe that other individuals should adopt and use new technology (Chyntia, et al., 2020). The primary influence on an individual comes from their immediate social circles and tightly-knit communities, such as family members and close friends. Consequently, if others within these social circles are utilizing a particular technology, an individual will exhibit a greater inclination to adopt and use that technology (Lim, H. L., et al., 2022).

- There is a positive relationship between social influence towards the acceptance of the MyRFiD.

### 2.6 Summary

This chapter provides a comprehensive literature review, establishes the research context, and formulates hypotheses that will be tested in subsequent chapters, aiming to deepen our understanding of the factors influencing the acceptance of MyRFiD technology.

The Technology Acceptance Model (TAM) is introduced as the theoretical framework for understanding technology adoption. TAM posits that perceived usefulness and perceived ease of use are key determinants of an individual's acceptance of technology. In this study, the TAM is extended to include external variables such

as social influence. Besides, the research framework is presented, illustrating the relationship between independent variables (perceived usefulness, perceived ease of use and social influence) and the dependent variable (acceptance of the MyRFiD among North-South Expressway users). At the end of this chapter, we can see the formulation of three hypotheses that explore these relationships.

# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter provides an overview of the research methodology employed in the investigation, including the methods utilized and the tools and strategies employed by the researcher. The research methodologies encompass various aspects such as research design, methodology selection, data sources, research strategy, research location, and time duration, all of which are discussed in detail. Additionally, this chapter delves into the design of questionnaires, the presentation of survey results, and the methods employed for data analysis. Overall, it serves as a comprehensive guide to the research methodology employed in the study.

## 3.2 Research Design

A research design encompasses the methods and procedures employed to gather, analyse, interpret, and report data in research studies (Creswell & Plano Clark, 2007). It serves as the comprehensive plan that establishes the connection between the conceptual research problems and the practical and achievable empirical research. Essentially, the research design outlines the steps involved in obtaining the necessary data, the methodologies used to collect and analyse that data, and how all of these components contribute to addressing the research question (Grey, 2014). During the planning stage of a study, selecting the appropriate research methodology is vital as it determines the approach by which relevant data for the investigation will be gathered.

This study uses descriptive research to identify the acceptance factors and relationships towards the user acceptance to use MyRFiD. The research aims to collect primary data from North-South Expressway users. Descriptive research aims to provide an accurate portrayal of individuals, events, or situations (Robson, 2002). A

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profile of described relevant components of the individual's intention phenomenon is presented in this design for researchers' perusal and use. Therefore, this research helped analyse the response obtained on North-South Expressway users' acceptance.

## 3.3 Research Design Method

According to Creswell (2014), research design refers to the specific procedures employed in the research process, including data collection, data analysis, and report writing. It is important to have a proper procedure to collect and analyse all data and accurate information. In this study, both descriptive research and quantitative research methodologies were employed to address the research questions and objectives.

### 3.3.1 Descriptive Research Design

According to Saunders et al., (2019), descriptive research aims to obtain a precise and comprehensive overview of events, individuals, or situations.

A descriptive study may be an expansion of an exploratory study or a precursor to an explanatory study. Before collecting the data, it is essential to have a thorough understanding of the phenomena you desire to study. It is the type of study design that is the most open-ended. A descriptive design may make use of a variety of research methods to investigate one or more variables. In descriptive research, regardless of whether the variables are independent or dependent, the outcomes are typically presented through measures such as mean, mode, median, and standard deviation. The responses are reported in terms of frequency and percentage (Kaliyadan, et al., 2019).

### 3.3.2 Quantitative Research Design

This study employed a quantitative research approach in order to get a comprehensive understanding of the research process. Quantitative methods were utilized to gather and analyse data in a systematic and numerical manner. Creswell (2003) explained that

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in quantitative research, researchers employ strategies of inquiry such as experiments and surveys. They collect data using predetermined instruments that are designed to yield statistical data. This approach allows for the systematic collection and analysis of numerical data to test hypotheses and draw statistical inferences.

## 3.4 Research Strategy

Research strategy plays a crucial role in guiding the flow and structure of a study. According to Saunders et al. (2016), a research strategy is a plan that helps researchers address their research questions and achieve their goals. In this particular investigation, the quantitative methodology was chosen, and a survey was deemed an appropriate research strategy for data collection. The decision to use a survey aligned with the chosen research method, research philosophy, and, most importantly, the research questions and objectives of the study. By employing a survey as the research strategy, the study aimed to gather relevant information from respondents in a systematic and efficient manner.

### 3.4.1   Questionnaire Design

The questionnaire for this study will be administered through Google Forms and distributed online by using social media platform such as Instagram, Twitter and Facebook. It consists of three sections designed to gather the necessary information. Section A of the questionnaire will capture respondents' demographic information, including gender, age, race, and other relevant details. Section B involve general questions about MyRFiD. Section C is to identify the factors could influence the acceptance of the MyRFiD. Lastly, for section D is to identify the acceptance of MyRFiD. Likert (1932) proposed a 5-point Likert scale, which is used in the research's questionnaire. The scale ranges from 1 to 5, with 1 representing significant disagreement and 5 indicating strong agreement. This scale allows respondents to express their level of agreement or disagreement with the statements provided in the questionnaire.

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

Figure 3. 1: Five-point Likert Scale

Source: Likert, 1932

### 3.5 Scientific Canons

### 3.5.1 Pilot Test

According to Saunders et al. (2019), the main goal of a pilot test is to improve the questionnaire so that respondents can readily complete the questions and data collection would be trouble-free. Kothari (2004) emphasized that if the survey is not adequately prepared and organized, it is highly likely to be unsuccessful. In this pilot test, a limited set of respondents was tested in the first stage to see if the questionnaire can obtain the data that the researcher requires. There are at least 30 participants involve in this pilot test. The time taken for them to answer the questionnaire, the validity, reliability, practicability and sensitivity of the questionnaire, and the problems they faced while answering the questionnaire will be recorded. The results will then be entered into SPSS statistical software for reliability testing. Amendments to the questionnaire will be made based on the results and feedback from the pre-test.

### 3.5.2 Reliability

According to Saunders et al. (2019), it is acknowledged that every data set contains some degree of error. To assess the consistency and dependability of an instrument, researchers often employ reliability analysis. This analysis involves examining the correlations between variables and employing various reliability indicators on a scale. One widely used approach for evaluating the dependability of responses to a series of questions is Cronbach's Alpha (Saunders et al., 2019). Cronbach's Alpha is a coefficient that measures the internal consistency of each item in a study. It assesses

how well the items in a scale relate to each other and strengthen the relationship between the variables being measured. In this study, the reliability of the items is tested using Cronbach's Alpha coefficient to ensure their internal consistency.

The Cronbach's Alpha coefficient's range and degree of relationship are shown in Table 3.1. A Cronbach's Alpha score of 0.7 or above is deemed acceptable. A Cronbach's Alpha exceeding 0.8 is considered good, and values of 0.9 and above are considered excellent. On the other hand, a Cronbach's Alpha below 0.6 is considered poor, and values below 0.5 are considered unacceptable. In this research, the reliability of each of the three independent variables and one dependent variable will be tested to assess their internal consistency.

Table 3. 1: Cronbach's Alpha Coefficient Range

| Cronbach's Alpha Coefficient Range | Strength of Association |
|---|---|
| $\alpha \geq 0.9$ | Excellent |
| $0.9 > \alpha \geq 0.8$ | Good |
| $0.8 > \alpha \geq 0.7$ | Acceptable |
| $0.7 > \alpha \geq 0.6$ | Questionable |
| $0.6 > \alpha \geq 0.5$ | Poor |
| $0.5 > \alpha$ | Unacceptable |

Source: George, D., and Mallery, M. (2003)

### 3.5.3 Validity

Validity relates to the appropriateness of the measures that were utilised, as well as the precision of the analysis and interpretation of the results (Saunders et al., 2019). A research instrument's validity can be evaluated using three methods which are internal validity, external validity, construct validity, and statistical conclusion validity (Bhattacherjee, 2012). In this research, the internal validity is used to measure the presence of the scale items in the questionnaire.

**3.6 Sampling Design**

### 3.6.1 Target Population

The target population of this study is the users of the North-South expressway (PLUS) in Malaysia. At this point, the amount of daily traffic on the highways operated by PLUS has increased to 1.8 million vehicles per day compared to the 1.6 million vehicles per day recorded in 2019. In addition, since Malaysia entered the endemic phase, PLUS recorded a high amount of traffic amounting to 1.8 million vehicles per day compared to 1.6 million vehicles per day in 2019, which was before the Covid-19 pandemic.

### 3.6.2 Sampling Techniques

According to Saunders et al. (2019), sampling techniques provide a way to decrease the quantity of data required by focusing on a subset of data from a particular subgroup, rather than collecting data from all potential cases or elements. There are two types of sampling techniques which are probability sampling and non-probability sampling.

Non-probability was chosen as the sampling technique for this study. According to Kothari (2004), non-probability sampling is that sampling procedure which does not afford any basis for estimating the probability that each item in the population has of being included in the sample. Non-probability sampling is more dependent on the researcher's capacity to select from a wider variety of potential samples. All population elements might not be able to participate evenly in the sample if the sample results are skewed (Saunders et al., 2019).

### 3.6.3 Sampling Size

To determine the sample size, the researcher used Raosoft InterForm software which was introduced in November 1991. Researcher used Raosoft, Inc for calculate survey sample size for larger population or unknown population size. By using Raosoft, Inc the result of recommended sampling size is 385 people which is the minimum

recommended size of the survey. However, this sampling size has been consulted with Krejcie & Morgan's table (1970) to get accurate results.



Figure 3. 2: Sample Size Calculator by Raosoft, Inc.

In this research, the total number of respondents who have been involved is only 155 people. It means that a total of 230 respondents were not involved in answering the questionnaire given. Research by Beleites, C., et al., (2013), mentioned that test sample sizes required to obtain a respectable level of validation precision and discover that 75–100 samples are often required to test an excellent, but not perfect, classifier. Therefore, this study accepted 155 respondents even though it did not reach the actual sampling size.

## 3.7 Data Collection Methods

### 3.7.1   Primary Data

Saunders et al., (2019) mentioned Primary data as data (primary sources) directly obtained through the empirical work. Kothari (2004) explained that primary data is collected in experimental research through the course of conducting experiments.

However, in descriptive research and surveys, such as sample surveys or census surveys, primary data can be obtained through observation, direct communication with respondents in various forms, or personal interviews. Therefore, the primary data for this study will be obtained through an online questionnaire, aiming to analyze and explore the factors that may influence the acceptance of MyRFiD. To ensure convenience and flexibility for respondents, Google Forms was created and used as an online survey platform. Data were collected from selected participants and respondents using convenience sampling, which is a non-probability sampling method.

### 3.7.2 Secondary Data

According to Kothari (2004), secondary data refers to data that are already existing and have been collected and analysed by someone else. Numerous secondary data sets that exist today are originally primary data sets that have been combined with other data sets to form larger sets of data (Saunders et. al., 2019). For the purpose of this study, a wide range of secondary data such as journal articles, books, and websites have been utilized to conduct the research.

### 3.8 Data Collection Process

The researcher implements the data collection method as planned. This is important to ensure data is collected consistently and accurately. The data is collected by online questionnaire survey over two months. Based on the results recommended by Raosoft, Inc, this study requires 385 respondents. Therefore, the researcher will distribute questionnaires to the respondents through social media such as Instagram, Facebook, and Twitter. In addition, dissemination via whatsApp will also be carried out.

### 3.9 Data Analysis Tools

### 3.9.1 Descriptive analysis

Descriptive analysis is a statistical technique employed to analyse the data obtained from survey respondents in order to interpret and draw conclusions from the collected data. The data for this study was gathered through questionnaires, and common measures such as mean frequency, total data, and percentage were used for analysis. Additionally, the collected data from the respondents was examined using SPSS software.

Perceived usefulness, perceived ease of use and social influence are the descriptive statistics for the study's variables. The items are scored on a five-point likert scale. The mean in statistics describes the average value among a set of data points. In comparison to those who disagree or have a negative impression of the variables, those who agree with the factors will have a higher mean score. The standard deviation, on the other hand, is a statistic that is calculated as the square root of variance and is used to express how widely distributed a collection of data is in regard to the mean. The degree of data dispersion increases with the standard deviation. In this study, descriptive analysis is used to answer the first research question, which is to determine the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) users.

### 3.9.2 Pearson's Correlation Coefficient.

According to Low, L. Y. (1983), the correlation coefficient (r), was introduced by Karl Pearson in the early 1900s. It is a numerical value that quantifies both the strength and direction of the linear relationship between two variables: the independent variable (x) and the dependent variable (y). This coefficient is used to assess how closely the two variables are related and to what extent changes in one variable correspond to changes in the other. By calculating the correlation coefficient, researchers can determine the degree of linear association between x and y, providing valuable insights into the relationship between the two variables. R always has a value between –1 and +1: $-1 \leq r \leq 1$. There is a greater linear connection between x and y when r is nearer to –1 or +1. If r = 0, there is absolutely no linear relationship between x and y. If r =1, there is

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perfect positive correlation. If r = –1, there is perfect negative correlation. Researchers employed Pearson's correlation coefficient to determine the degree of the correlation between the variables in order to answer the third research question.
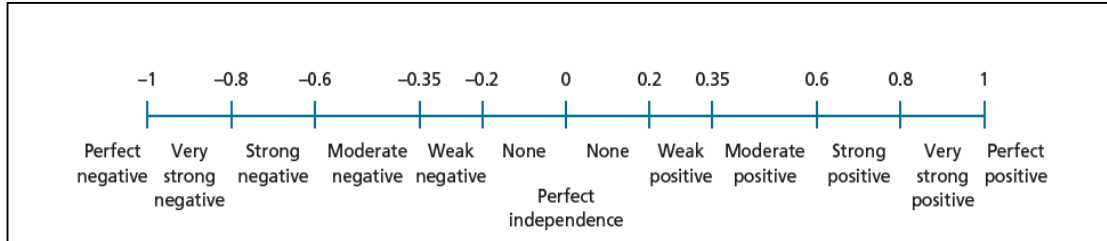


Figure 3. 3: Values of the correlation coefficient

Source: Saunders et. al., (2019)

### 3.9.3 Multiple Regression Analysis

Saunders et al. (2019) define regression as the process of establishing a statistical relationship between two or more variables. In simple regression, specifically, there are only two variables involved. One variable is considered independent, meaning it is considered the cause or predictor of the behavior or outcome of another variable, known as the dependent variable. In this study, multiple regression is applied to answer the first research question, examine the factors that could affect acceptance of the MyRFiD. Multiple regression is chosen as there are many independent variables which are perceived usefulness, perceived ease of use and social influence and only one dependent variable, the acceptance of the MyRFiD among North-South Expressway (PLUS) user. The multiple regression equation is shown below.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3, \text{ Where:}$$

Table 3. 2: Representative of each symbols in multiple regression equation

| Symbol | Refers to |
|---|---|
| **Y** | Dependent Variable (Acceptance of the MyRFiD) |
| **α** | Constant |

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| | |
|---|---|
| $\beta_1$ | Coefficient 1 |
| $\beta_2$ | Coefficient 2 |
| $\beta_3$ | Coefficient 3 |
| $X_1$ | Independent Variable 1 (Perceived Usefulness) |
| $X_2$ | Independent Variable 2 (Perceived Ease of Use) |
| $X_3$ | Independent Variable 3 (Social Influence) |

## 3.10    Time Horizon

According to Saunders et al., (2019) choosing a time horizon for our research is very important because we need to determine how long our study will take. There are two types of time horizon which are cross-sectional studies and longitudinal studies. The researcher conducted this research by using using cross sectional study. Cross-sectional studies are limited to short amount of time, particular phenomenon is discussed and analyzed (Saunders et al., 2019). The researcher has limited time which have only few months to complete the research.

## 3.11    Summary

Overall, chapter 3 provides an overview of the research methodology used in the study. It covers various aspects such as research design, research design method, research strategy, questionnaire design, scientific canons, sampling design, data collection methods, data collection process, and data analysis tools.

# CHAPTER 4

# DATA ANALYSIS AND DISCUSSION

## 4.1 Introduction

Chapter four of the research focuses on analysing and interpreting data collected from the questionnaire. The chapter includes pilot test, reliability analysis, descriptive analysis, normality test, validity test, multiple regression analysis and hypothesis testing. The research used the Statistical Package for Social Science (SPSS) to explore the factors could influence the acceptance of MyRFiD among North-South Expressway (PLUS) users.

## 4.2 Pilot Test

A pilot test with a small sample of respondents is conducted to validate the study subject before sending questionnaires to a larger population. The pilot study aims to demonstrate the questionnaire's reliability, as outlined by Saunders et al. (2019). Ensuring that the survey participants comprehend and are not confused by the questions given is crucial.

In order to get input from the respondents, the researcher created 31 sets of questions for the pilot test. The Cronbach's Alpha approach was used to evaluate the data's reliability, and SPSS was used by the researcher to investigate its reliability. According to Saunder et al. (2019), a Cronbach's Alpha equal to or exceeding 0.7 is considered acceptable. While a preference exists for a Cronbach's Alpha surpassing 0.8, values of 0.9 and beyond are deemed excellent.

Table 4. 1: Reliability Statistics of Perceived Usefulness

| Case Processing Summary | | | |
|---|---|---|---|
| | | N | % |
| Cases | Valid | 31 | 100.0 |
| | Excludedª | 0 | .0 |
| | Total | 31 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. | | | |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .922 | 5 |

*Sources: (SPSS Output)*

The reliability statistics for Independent Variable 1 (Perceived Usefulness) shown in Table 4.1. The questionnaire consists of 5 questions in perceived usefulness part. The Cronbach's Alpha value is 0.922, which is higher than 0.7. As a result, it is considered acceptable.

Table 4. 2: Reliability Statistics of Perceived Ease of Use

| Case Processing Summary | | | |
|---|---|---|---|
| | | N | % |
| Cases | Valid | 31 | 100.0 |
| | Excludedª | 0 | .0 |
| | Total | 31 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. | | | |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .858 | 5 |

*Sources: (SPSS Output)*

The reliability statistics for Independent Variable 2 (Perceived Ease of Use) shown in Table 4.2. The questionnaire consists of 5 questions in perceived ease of use part. The Cronbach's Alpha value is 0.858, which is higher than 0.7. As a result, it is considered acceptable.

Table 4. 3: Reliability Statistics of Social Influence

| Case Processing Summary | | | |
|---|---|---|---|
| | | N | % |
| **Cases** | **Valid** | 31 | 100.0 |
| | **Excludedᵃ** | 0 | .0 |
| | **Total** | 31 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. | | | |

| Reliability Statistics | |
|---|---|
| **Cronbach's Alpha** | **N of Items** |
| .859 | 5 |

*Sources: (SPSS Output)*

The reliability statistics for Independent Variable 3 (Social Influence) shown in Table 4.3. The questionnaire consists of 5 questions in social influence part. The Cronbach's Alpha value is 0.859, which is higher than 0.7. As a result, it is considered acceptable.

Table 4. 4: Reliability Statistics of User Acceptance of MyRFiD

| Case Processing Summary | | | |
|---|---|---|---|
| | | N | % |
| **Cases** | **Valid** | 31 | 100.0 |
| | **Excludedᵃ** | 0 | .0 |
| | **Total** | 31 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. | | | |

| Reliability Statistics | |
|---|---|
| **Cronbach's Alpha** | **N of Items** |
| .944 | 5 |

*Sources: (SPSS Output)*

The reliability statistics for Dependent Variable (User Acceptance of MyRFiD) shown in Table 4.4. The questionnaire consists of 5 questions in User Acceptance of MyRFiD part. The Cronbach's Alpha value is 0.944, which is higher than 0.7. As a result, it is considered acceptable.

Table 4. 5: Reliability Statistics of All Items (Overall)

| Case Processing Summary | | | N | % |
|---|---|---|---|---|
| Cases | Valid | | 31 | 100.0 |
| | Excluded[a] | | 0 | .0 |
| | Total | | 31 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. | | | | |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .966 | 20 |

*Sources: (SPSS Output)*

The reliability statistics for all items are shown in Table 4.5. The total questionnaire consists of 25 questions. The Cronbach's Alpha value is 0.966, which is higher than 0.7. It implies that the questionnaire was reliable and has a high level of dependability.

## 4.3 Reliability Analysis

Reliability is a necessary for a questionnaire to be valid, but it is insufficient by itself (Saunders et al., 2019). Table 4.6 shows the results from the reliability analysis:

Table 4. 6: Reliability Analysis of Independent and Dependent Variables

| Variable | Cronbach's Alpha | Number of Items | Strength of Association |
|---|---|---|---|
| Independent Variable | | | |
| PU | 0.961 | 5 | Excellent |
| PEU | 0.947 | 5 | Excellent |
| SI | 0.922 | 5 | Excellent |
| Dependent Variable | | | |
| DV | 0.968 | 5 | Excellent |

Table 4. 7: Reliability Analysis for All Items (Overall)

| Case Processing Summary | | | N | % |
|---|---|---|---|---|
| Cases | Valid | | 155 | 100.0 |
| | Excluded[a] | | 0 | .0 |
| | Total | | 155 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. | | | | |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .978 | 20 |

*Sources: (SPSS Output)*

In Table 4.6, where Cronbach Alpha's value for independent variables (PU, PEU, SI) and dependent variable (DV) achieved excellent results. While, in Table 4.7, Cronbach Alpha's value achieved for all of them is 0.978. This result has proven to be excellent and acceptable respectively.
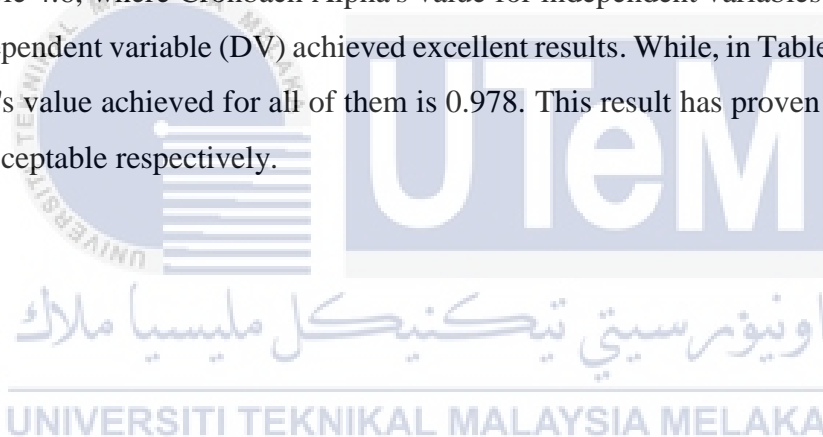
### 4.4 Descriptive Statistics Analysis

In this research, descriptive statistical analysis was used to discuss the characteristics of 155 participants that was chosen from the population. This analysis gives a clear view of the details with the help of visual data about respondents and measures to make things easier to understand. This section shows respondent's demographic profile, general question about MyRFiD, independent and dependent variable.

### 4.4.1 Respondent's Demographic Background

Demographic background is used to find out the background of respondents who have participated in the questionnaire. This respondent background's questionnaire consists gender, age, race, highest education, and employment status.

**4.4.1.1 Gender**

Table 4. 8: Gender

|  |  | Frequency | Percent (%) |
|---|---|---|---|
| **Valid** | Female | 107 | 69 |
|  | Male | 48 | 31 |
|  | **Total** | 155 | 100 |

As shown in Table 4.8, the total number of respondents who have participated in the survey is 155, which consists of 107 females with a percentage of 69% and 48 males with a percentage of 31%. This means that females make up a higher percentage of the respondents compared to males.

**4.4.1.2 Age**

Table 4. 9: Age

|  |  | Frequency | Percent (%) |
|---|---|---|---|
| **Valid** | 17-24 | 35 | 22.6 |
|  | 25-40 | 50 | 32.3 |
|  | 41-56 | 63 | 40.6 |
|  | 57 and above | 7 | 4.5 |
|  | **Total** | 155 | 100 |

Table 4.9 shows the amount for each age group. For the age of 17-24 the percentage is 22.6% (n = 35), the age of 25-40, the percentage is 32.3% (n = 50), while the age of 41-56, the percentage is 40.6% (n = 63) and the age of 57 and above, the percentage is 4.5% only (n = 7).

### 4.4.1.3 Race

Table 4. 10: Race

|  |  | Frequency | Percent (%) |
|---|---|---|---|
| **Valid** | Malay | 144 | 92.9 |
|  | Indians | 6 | 3.9 |
|  | Chinese | 5 | 3.2 |
|  | Others | 0 | 0 |
|  | **Total** | 155 | 100 |

Table 4.10 shows the total for each race. For the total number for Malay race is 144 with the highest percentage, 92.9%. The total number of Indians is 6 with a percentage of 3.9%. While, for the total number of Chinese is 5 with the lowest percentage, 3.2%.
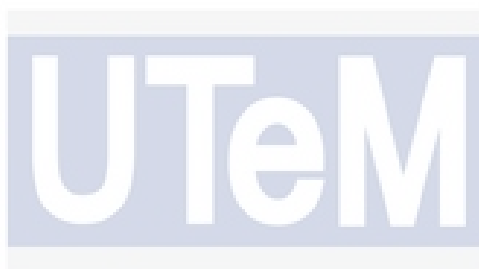
### 4.4.1.4 Highest Education

Table 4. 11: Highest Education

|  |  | Frequency | Percent (%) |
|---|---|---|---|
| **Valid** | SPM | 13 | 8.4 |
|  | STPM/Matriculation/Diploma | 24 | 15.5 |
|  | Bachelor's Degree | 102 | 65.8 |
|  | Master's Degree | 14 | 9 |
|  | PhD (Doctorate) | 2 | 1.3 |
|  | Others | 0 | 0 |
|  | **Total** | 155 | 100 |

Table 4.11 shows the amount for highest education. The highest percentage is Bachelor's Degree with 65.8% (n = 102). While the lowest percentage is PhD (doctorate) with 1.3% only (n = 2).

**4.4.1.5 Employment Status**

Table 4. 12: Employment Status

| | | Frequency | Percent (%) |
|---|---|---|---|
| **Valid** | Private Employee | 34 | 21.9 |
| | Government Employee | 90 | 58.1 |
| | Retired | 5 | 3.2 |
| | Student | 17 | 11 |
| | Unemployed | 8 | 5.2 |
| | Others:<br>▪ Part Time | 1 | 0.6 |
| | **Total** | 155 | 100 |

Table 4.12 shows the amount for employment status. The highest number is Government Employee with 58.1% (n = 90). While the lowest is "others" (part time) 0.6% only (n = 1).

**4.4.2 General Question About MyRFiD**

This section contains several questions to find out the respondents' basic knowledge and awareness about MyRFiD. Below show the results for the questions asked.

Table 4. 13: General Question About MyRFiD

| No | General Question About MyRFiD | | Frequency | Percentage (%) |
|---|---|---|---|---|
| 1. | How familiar are you with MyRFiD? | ▪ Very Familiar | 78 | 50.3 |
| | | ▪ Somewhat Familiar | 70 | 45.2 |
| | | ▪ Not Familiar at All | 7 | 4.5 |

| 2. | If you are familiar, where did you find out about MyRFiD? | ▪ Advertisement | 71 | 46.4 |
|----|----|----|----|----|
| | | ▪ Social Media | 95 | 62.1 |
| | | ▪ Word of Mouth | 62 | 40.5 |
| | | ▪ News | 47 | 30.7 |
| | | ▪ Others<br>i. Tol | 1 | 0.7 |
| | | ii. Final Year Project | 1 | 0.7 |
| 3. | Do you believe MyRFiD has many advantages over Smart Tag & Touch 'N Go? | ▪ Yes | 99 | 63.9 |
| | | ▪ No | 56 | 36.1 |
| 4. | How often do you use MyRFiD on the highway? (eg: North-South Expressway) | ▪ Never | 65 | 41.9 |
| | | ▪ Rarely | 16 | 10.3 |
| | | ▪ Sometimes | 31 | 20 |
| | | ▪ Often | 27 | 17.4 |
| | | ▪ Very Often | 16 | 10.3 |

Data from Table 4.13 shows that 50.3% (n = 78) of respondents were very familiar with MyRFiD. While, 62.1% (n = 95) reported respondents know about MyRFiD through social media, which represents the highest source. Furthermore, 63.9% (n = 99) respondents believe that MyRFiD has many advantages over Smart Tag & Touch 'N Go. However, regarding usage frequency of the MyRFiD on the North-South Expressway, the highest percentage is 41.9% (n = 65) reported never using MyRFiD, while respondents who answered "rarely" and "very often" comprised only 10.3% each.

### 4.4.3 Independent Variable (Factors of Acceptance)

### 4.4.3.1 Perceived Usefulness

Table 4. 14: Descriptive Statistics (Perceived Usefulness)

| Descriptive Statistics | | | |
|---|---|---|---|
| | N | Mean | Std. Deviation |
| **PU1 -** MyRFiD can improve the performance of toll payment methods | 155 | 3.87 | .978 |
| **PU2 -** MyRFiD allows to make toll payments faster | 155 | 3.88 | 1.015 |
| **PU3 -** MyRFiD can enhance the effectiveness in making toll payments | 155 | 3.88 | .956 |
| **PU4 -** MyRFiD makes it easier to make toll payments | 155 | 3.92 | .973 |
| **PU5 -** MyRFiD can increase the productivity in making toll payments | 155 | 3.83 | .999 |
| **Overall (Mean)** | | 3.87 | |

*Sources: (SPSS Output)*

Table 4.14 shows the mean and standard deviations of the first independent variable, Perceived Usefulness (PU). PU5 had the lowest mean, which is 3.83, and 0.999 for the standard deviation. While, PU4 had the highest mean, which is 3.92, and 0.973 for the standard deviation. The results have shown that the total mean of PU is 3.87.

### 4.4.3.2 Perceived Ease of Use

Table 4. 15: Descriptive Statistics (Perceived Ease of Use)

| Descriptive Statistics | | | |
|---|---|---|---|
| | N | Mean | Std. Deviation |
| **PEU1 -** MyRFiD is easy-to-use | 155 | 3.77 | 1.086 |
| **PEU2 -** Interaction with the MyRFiD clear and understandable | 155 | 3.76 | 1.051 |
| **PEU3 -** It is easy in learning how to use MyRFiD | 155 | 3.83 | 1.007 |

| | N | Mean | Std. Deviation |
|---|---|---|---|
| **PEU4 -** The use of MyRFiD in paying tolls is easier than the conventional methods. (eg: SmartTag, Touch 'N Go) | 155 | 3.66 | 1.095 |
| **PEU5 -** MyRFiD technology can enhance my paying experience | 155 | 3.77 | 1.037 |
| **Overall (Mean)** | | 3.76 | |

*Sources: (SPSS Output)*

Table 4.15 shows the mean and standard deviations of the second independent variable, Perceived Ease of Use (PEU). PEU4 had the lowest mean, which is 3.66, and 1.095 for the standard deviation. While, PEU3 had the highest mean, which is 3.83, and 1.007 for the standard deviation. The results have shown that the total mean of PEU is 3.76.

### 4.4.3.3 Social Influence

Table 4. 16: Descriptive Statistics (Social Influence)

| Descriptive Statistics | | | |
|---|---|---|---|
| | N | Mean | Std. Deviation |
| **SI1 -** People around me use MyRFiD for toll payment (e.g: family members, friends) | 155 | 3.49 | 1.164 |
| **SI2 -** People who influence my behaviour think that I should use MyRFiD | 155 | 3.40 | 1.085 |
| **SI3 -** Recommendations from the people surrounding on MyRFiD influence me to use it | 155 | 3.47 | 1.113 |
| **SI4 -** I would like to use MyRFiD when the people surrounding have benefited a lot from it | 155 | 3.64 | 1.110 |
| **SI5 -** I feel more comfortable to use MyRFiD when the people surrounding are using it | 155 | 3.59 | 1.204 |
| **Overall (Mean)** | | 3.52 | |

*Sources: (SPSS Output)*

Table 4.16 shows the mean and standard deviations of the third independent variable, Social Influence (SI). SI2 had the lowest mean, which is 3.40, and 1.085 for the standard deviation. While, SI4 had the highest mean, which is 3.64, and 1.110 for the standard deviation. The results have shown that the total mean of SI is 3.52.

### 4.4.4   Dependent Variable (Acceptance of MyRFiD)

Table 4. 17: Descriptive Statistics Dependent Variable

| Descriptive Statistics | | | |
|---|---|---|---|
| | N | Mean | Std. Deviation |
| **DV1 -** I am willing to use MyRFiD as a toll payment method | 155 | 3.67 | 1.201 |
| **DV2 -** I will always be comfortable using MyRFiD | 155 | 3.50 | 1.197 |
| **DV3 -** I have intended to increase my use of MyRFiD in the future | 155 | 3.66 | 1.153 |
| **DV4 -** I will recommend MyRFiD to my relatives and friends | 155 | 3.61 | 1.198 |
| **DV5 -** I would use whenever possible MyRFiD instead of the conventional methods. (eg: SmartTag, Touch 'N Go) | 155 | 3.60 | 1.177 |
| **Overall (Mean)** | | 3.61 | |

*Sources: (SPSS Output)*

Table 4.17 shows the mean and standard deviations of the dependent variable (DV). DV2 had the lowest mean, which is 3.50, and 1.197 for the standard deviation. While, DV1 had the highest mean, which is 3.67, and 1.201 for the standard deviation. The results have shown that the total mean of DV is 3.61.

## 4.5 Normality Test

In statistics, normality tests are used to determine whether a data set is modelled for normal distribution. Many statistical functions require that a distribution be normal or nearly normal. To get the result of normality test, the researcher employed SPSS to get the value of the Skewness and Kurtosis.

Table 4. 18: Result of Normality Test

| Descriptive Statistics | | | | | | | |
|---|---|---|---|---|---|---|---|
| | N | Mean | Std. Deviation | Skewness | | Kurtosis | |
| | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| PU | 155 | 19.3742 | 4.57995 | -.608 | .195 | -.090 | .387 |
| PEU | 155 | 18.7871 | 4.79581 | -.716 | .195 | .321 | .387 |
| SI | 155 | 17.5935 | 4.96049 | -.459 | .195 | -.340 | .387 |
| DV | 155 | 18.0452 | 5.58214 | -.690 | .195 | -.156 | .387 |
| Valid N (listwise) | 155 | | | | | | |

*Sources: (SPSS Output)*

According to Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A., (2019), skewness is a measure of symmetry, or more precisely, the lack of symmetry of the normal distribution. Kurtosis is a measure of the peakedness of a distribution. The original kurtosis value is sometimes called kurtosis (proper). A distribution, or data set, is symmetric if it looks the same to the left and right of the center point. If mean, median, and mode of a distribution coincide, then it is called a symmetric distribution, that is, skewness = 0, kurtosis (excess) = 0. A distribution is called approximate normal if skewness or kurtosis (excess) of the data are between − 1 and + 1. Table 4.18 shows that data were normally distributed as skewness and kurtosis for independent and dependent variables were within ±1.

**4.6 Validity Test**

The validity test was performed using Pearson's Correlation, which explains the relationship between independent and dependent variables. In this research, the independent variables are perceived usefulness (PU), perceived ease of use (PEU) and social influence (SI). While the dependent variable is the acceptance of MyRFiD.

Table 4. 19 : Pearson's Correlation Coefficient Between Variables

| Correlations | | PU | PEU | SI | DV |
|---|---|---|---|---|---|
| **PU** | Pearson Correlation | 1 | .839** | .757** | .825** |
| | Sig. (2-tailed) | | .000 | .000 | .000 |
| | N | 155 | 155 | 155 | 155 |
| **PEU** | Pearson Correlation | .839** | 1 | .767** | .807** |
| | Sig. (2-tailed) | .000 | | .000 | .000 |
| | N | 155 | 155 | 155 | 155 |
| **SI** | Pearson Correlation | .757** | .767** | 1 | .791** |
| | Sig. (2-tailed) | .000 | .000 | | .000 |
| | N | 155 | 155 | 155 | 155 |
| **DV** | Pearson Correlation | .825** | .807** | .791** | 1 |
| | Sig. (2-tailed) | .000 | .000 | .000 | |
| | N | 155 | 155 | 155 | 155 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | |

*Sources: (SPSS Output)*

Table 4.19 has showed the results of correlation between independent variables and dependent variable. The relationship between perceived usefulness and the acceptance of MyRFiD was a very strong relationship with R value of 0.825, n = 155, p < 0.01. Besides, there was also a very strong relationship between perceived ease of use and the acceptance of MyRFiD as the R value represents 0.807 with n = 155 and p < 0.01. Next, the coefficient of social influence was R = 0.791, n = 155, p < 0.01 also showed a very strong relationship towards the acceptance of MyRFiD.

From the result of correlation analysis, it showed that perceived usefulness very much impactful when forming with the acceptance of MyRFiD. This is because perceived usefulness has showed the highest coefficient value of 0.825.

**4.7 Multiple Regression Analysis**

Regression analysis is a collection of mathematical techniques for determining and defending the significance of a dependent variable based on the values of one or more independent variables. The result of regression is a value that represents an approximate estimate of a dependent variable from a range of independent variables. Multiple regression analysis was utilized to determine the degree and importance of the relationship between the variables (independent and dependent variables).

Table 4. 20: Model Summary of Multiple Regression

| Model Summary | | | | |
|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
| 1 | .873[a] | .761 | .757 | 2.75352 |
| a. Predictors: (Constant), SI, PU, PEU | | | | |

*Sources: (SPSS Output)*

According to Table 4.20, the R value was positive as an outcome of the model summary of multiple regression analysis. R = 0.873 for multiple coefficients of regression, indicating a strong and positive relationship between the independent and dependent variables. R was referring to the framework's strong connections. As a result, the value of R is greater than ± 0.70, indicating that it has a positive and good association. Besides, the value of R square is 0.761. This suggests that the acceptance of MyRFiD (dependent variable) is influenced by independent variables of 76.1% (perceived usefulness, perceived ease of use and social influence), while the rest 23.9% is influenced by other factors or causes was not mentioned in this research. Moreover, the adjusted R Square values of 0.757 which means that around 75.7% variance in the user acceptance of MyRFiD (dependent variable) could be clarified by the regression predictor variables.

Table 4. 21: ANOVA

| ANOVAᵃ | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 3653.820 | 3 | 1217.940 | 160.638 | .000ᵇ |
| | Residual | 1144.864 | 151 | 7.582 | | |
| | Total | 4798.684 | 154 | | | |
| a. Dependent Variable: DV | | | | | | |
| b. Predictors: (Constant), SI, PU, PEU | | | | | | |

*Sources: (SPSS Output)*

Table 4.21 indicates the F-Test value was 160.638 with a significant level of 0.000 ($p<0.05$). The whole regressions are a good fit for the data, and it can be concluded that there was a significant link between the independent and dependent variables based on the F-Test value, which demonstrated a higher value. It was clear that each independent variables' impact on the dependent variable was statistically significant.

Table 4. 22: Coefficient Multiple Regression

| Coefficientsᵃ | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -2.553 | .978 | | -2.610 | .010 |
| | PU | .463 | .094 | .380 | 4.923 | .000 |
| | PEU | .289 | .092 | .248 | 3.157 | .002 |
| | SI | .352 | .074 | .313 | 4.777 | .000 |
| a. Dependent Variable: DV | | | | | | |

*Sources: (SPSS Output)*

Table 4.22 revealed that all independent variables (PU, PEU and SI) are significantly associated with the acceptance of MyRFiD with coefficient estimation of perceived usefulness Beta = 0.463, t-value = 4.923, p = 0.000, perceived ease of use Beta = 0.289, t-value = 3.157, p = 0.002 and social influence Beta = 0.352, t-value = 4.777, p = 0.000. Therefore, the linear equation was developed as below:

**Acceptance of the MyRFiD = -2.553 + 0.463PU + 0.289PEU + 0.352SI**

Based on this result, it can be concluded that all independent variables (PU, PEU and SI) positively influence the acceptance of MyRFiD as their significant values were 0.000 and 0.002 (p < 0.05).

### 4.8 Hypothesis Testing

A total of three hypotheses were covered in depth, and the conclusions about the acceptance or rejection were formed. From hypothesis 1 to hypothesis 3, the relationship between the independent and dependent variable was examined using a statistical method known as Coefficient Multiple Regression.

**H1: There is a positive relationship between perceived usefulness towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users.**

Table 4.22 presented the result of regression of perceived usefulness (PU) was Beta = 0.463, t-value = 4.923 with the significant value of 0.000 (p < 0.05), which indicates it has a positive and significant relationship between perceived usefulness towards the acceptance of the MyRFiD. Thus, the researcher accepted the H1.

**H2: There is a positive relationship between perceived ease of use towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users.**

Table 4.22 showed the result of regression of perceived ease of use (PEU) was Beta = 0.289, t-value = 3.157 with the significant value of 0.002 (p < 0.05), which indicates

it has a positive and significant relationship between perceived ease of use towards the acceptance of the MyRFiD. Thus, the researcher accepted the H2.

**H3: There is a positive relationship between social influence towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users.**

Table 4.22 showed the result of regression of social influence (SI) was Beta = 0.352, t-value = 4.777 with the significant value of 0.000 ($p < 0.05$), which indicates it has a positive and significant relationship between social influence towards the acceptance of the MyRFiD. Thus, the researcher accepted the H3.

**4.9 Summary**

In this chapter, all the results achieved are based on analyzes that have been carried out using SPSS software and has been presented and given a thorough explanation. Analysis results obtained from the Multiple Regression Analysis and Pearson's Correlation Coefficient showed that, perceived usefulness, perceived ease of use and social influence had the significant relationship and strong relationship on user acceptance of MyRFiD and the most effective factor was perceived usefulness with the highest Beta value.

# CHAPTER 5

# DISCUSSION, RECOMMENDATION AND CONCLUSION

## 5.1 Introduction

This chapter focuses on the statistical analysis and discussion of the significant discovery aimed at confirming the hypothesis proposed in the preceding chapter. It also concludes with a discussion of the implications, limits, and suggestions for further study.

## 5.2 Summary of Study

The purpose of this research was to examine the factors that could influence the acceptance of the MyRFiD among North-South Expressway (PLUS) users. This study focused on the North-South Expressway (PLUS) since it is Malaysia's primary and longest expressway connecting major cities and towns in Malaysia, and it often experiences heavy traffic, especially during peak periods like national holidays or festive seasons.

In this research, the extended Technology Acceptance Model (TAM) is utilized. Vankatesh, Davis, and Morris have put forward the UTAUT as a means to enhance technology acceptance models (Vankatesh et al., 2003). UTAUT comprises four primary elements, performance expectancy, effort expectancy, social influence, and facilitating conditions. Therefore, this research has combined one of the variables from UTAUT which is social influence with extended Technology Acceptance Model (TAM).

This quantitative research has carried out the analysis and received accurate results using Statistical Package for Social Sciences (SPSS). Then, six analytical procedures were used, which are Reliabity Test, Descriptive Statistics Analysis, Normality Test, Pearson's Correlation Analysis, Validity Test, and Hypothesis Testing. All the results obtained from SPSS are presented and explained in this research.

## 5.3 Discussion on the Demographic Background

The total of the respondents for this research was 155 respondents who were answering the questionnaires, where 69% were made up of females which represent 107 respondents, and 31% which represent 48 respondents of male. Female respondents were somewhat higher than male respondents.

Besides, there are a total of 4 categories of age groups in this research. The first group was categorized as Gen Z with the range of age between 17 years old to 24 years old. For this first group, there were 22.6% which represents 35 respondents. The second group was categorized as Millennials or Gen Y with the range of age between 25 years old to 40 years old. There were 32.3% of this group which represents 50 respondents. The third group was categorized as Gen X with the range of age between 41 years old to 56 years old. For this group, there were 40.6% which represents 63 respondents. The last group was categorized as Baby Boomers with the range of age 57 years old and above. For this last group, there were only 4.5% which represents 7 respondents.

Next, there are 4 categories of race which are Malay, Indians, Chinese, and Others. The highest percentage of race involved in this research is Malay with 92.9% which represents 144 respondents. Followed by Indians with 3.9% which represents 6 respondents, and Chinese with 3.2% which represents 5 respondents.

Move to the highest education, there are from Sijil Pelajaran Malaysia (SPM), STPM/Matriculation/Diploma, Bachelor's Degree, Master's Degree, PhD (Doctorate), and others. The highest percentage for this section in this research is respondents with Bachelor's Degree with 65.8% which represents 102 respondents. Followed by

STPM/Matriculation/Diploma with 15.5% which represents 24 respondents, Master's Degree with 9% which represents 14 respondents, SPM with 8.4% which represents 13 respondents, and PhD (Doctorate) with 1.3% which represents 2 respondents only.

Lastly, for the employment status of the respondents, there are 6 categories which are private employee, government employee, retired, student, unemployed, and others. The highest percentage for employment status is respondents under government employee with 58.1% which represents 90 respondents. Followed by private employee with 21.9% which represents 34 respondents, student with 11% which represents 17 respondents, unemployed with 5.2% which represents 8 respondents, retired with 3.2% which represents 5 respondents and others (part-time) with 0.8% which represents 1 respondent only.

## 5.4 Discussion on the Hypothesis Testing

The results of the hypothesis testing were obtained after performing the analysis. The results of the hypothesis testing have been summarized as below:

Table 5. 1: Summary of Hypothesis Testing

| Hypothesis | Result |
|---|---|
| H1: There is a positive relationship between perceived usefulness towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users. | **Hypothesis Accepted**<br>Beta = 0.463<br>t-value = 4.923<br>p = 0.000, (p<0.05) |
| H2: There is a positive relationship between perceived ease of use towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users. | **Hypothesis Accepted**<br>Beta = 0.289<br>t-value = 3.157<br>p = 0.002, (p<0.05) |
| H3: There is a positive relationship between social influence towards the acceptance of the MyRFiD among North-South Expressway (PLUS) Users. | **Hypothesis Accepted**<br>Beta = 0.352<br>t-value = 4.777<br>p = 0.000, (p<0.05) |

Table 5.1 showed the summary results of hypothesis testing. The test results of the hypothesis show that all the significant level (p) were below 0.05, which was accepted. There was positive relationship between all the independent variables (perceived usefulness, perceived ease of use and social influence) towards dependent variable (the acceptance of the MyRFiD among North-South Expressway users).

Hypothesis 1 (H1) was accepted and it has also been supported in previous studies by Dhurat, A., Magal, P., Chheda, M., & Ingle, D., (2014), RFID technology has been implemented extensively on numerous highways and expressways to facilitate quicker toll collection and alleviate traffic congestion. The convenience of using MyRFiD at toll plazas increases consumers' acceptance and intention and to use it. When consumers realize that MyRFiD offers a faster, more streamlined experience compared to traditional payment methods, they are more inclined to use it.

Next, Hypothesis 2 (H2) was also accepted. F. D. Davis (1989) mentioned if individuals perceive that a particular technology is user-friendly and can enhance their job performance, they are more likely to adopt and utilize that technology. Zhang and Prybutok (2005) also have highlighted that service convenience plays a significant role in enhancing consumer satisfaction and influencing their intention to adopt a technology. Consequently, RFID-based systems have a higher likelihood of achieving greater adoption rates if they are designed to provide convenience and make the lives of consumers more convenient.

Lastly, Hypothesis 3 (H3) was also accepted and it has also been supported by Lim, H. L., Kuek, T. Y., Yeoh, G. L., & Yeap, P. Y, (2022), if others within these social circles are utilizing a particular technology, an individual will exhibit a greater inclination to adopt and use that technology.

In short, these three hypothesis are accepted due to the p-value is smaller than 0.05 and all the relationships were significant and positive.

**5.5 Discussion on Research Objectives**

**5.5.1   Objective 1: To identify the factors that could influence the MyRFiD acceptance among North-South Expressway (PLUS) Users**.

The first objective was achieved based on the descriptive statistics analysis in Chapter 4. Based on the analysis and data obtained in Table 5.2, this research found that the mean score of the technology acceptance factors was high.

Table 5. 2: Mean Score of Independent Variables

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| **PU** | 155 | 1.00 | 5.00 | 3.8748 | .91599 |
| **PEU** | 155 | 1.00 | 5.00 | 3.7574 | .95916 |
| **SI** | 155 | 1.00 | 5.00 | 3.5187 | .99210 |
| **Valid N (listwise)** | 155 | | | | |

*Sources: (SPSS Output)*

Perceived usefulness had the highest mean score, which was 3.8748, followed by perceived ease of use, which was 3.7574, and social influence, which was 3.5187. In the study made by Hamzah, et al., (2016), stated that the mean score range between 3.21 to 4.20 is in the high mean score range. This has clearly shown that the overall mean score for these three independent variables (PU, PEU and SI) is at a high level and there are all the factors that could influence the acceptance of the MyRFiD.

### 5.5.2 Objective 2: To determine the relationship between these factors and the acceptance of MyRFiD among North-South Expressway (PLUS) Users.

Pearson's correlation analysis was performed and used to examine the relationship between these factors and the acceptance of MyRFiD among North-South Expressway (PLUS) users. Table 4.19 in Chapter 4 showed that the relationship between perceived usefulness and the acceptance of MyRFiD was very strong, with an R value of 0.825, n = 155, with the significant level of 0.000. While, the relationship between perceived ease of use and the acceptance of MyRFiD, was a very strong relationship due to the R value of 0.807, n = 155, with the significant level of 0.000. Lastly, the relationship between social influence and the acceptance of MyRFiD was still very strong, with an R value of 0.791, n = 155, with the significant level of 0.000.

This second objective has been achieved with the results of these three variables have provided a positive and significant relationship with the acceptance of MyRFiD among the users of North-South Expressway.
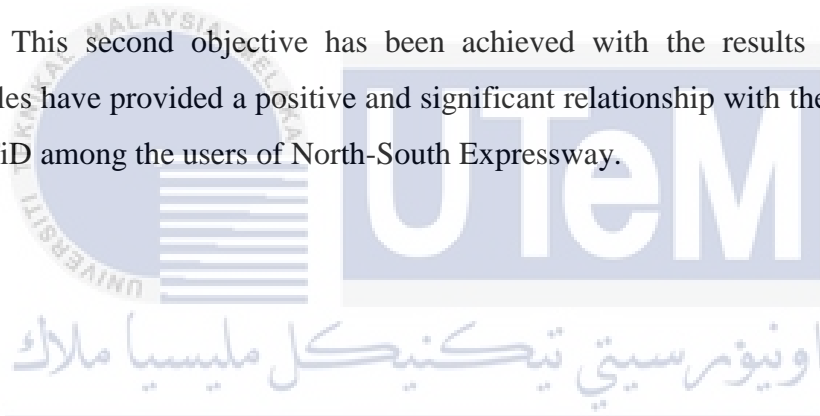
### 5.5.3 Objective 3: To identify the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) Users.

To achieve the third objective, the Beta value in coefficient multiple regression analysis has been seen to identify the most significant factors that could influence the acceptance of MyRFiD among North-South Expressway (PLUS) users. The Beta value, often associated with regression analysis, can indeed help in understanding the strength and direction of the relationship between the independent variables (factors) and the dependent variable (acceptance of MyRFiD).

As detailed in Table 4.22, presenting the coefficient multiple regression analysis, the findings revealed that the highest beta value recorded was 0.463, corresponding to the perceived usefulness factor. Consequently, it can be deduced that

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perceived usefulness stands out as the most significant factor capable of exerting an impact on the acceptance of MyRFiD among North-South Expressway (PLUS) users.

This particular factor underscores the respondents' conviction that the implementation of MyRFID can significantly enhance the efficiency of the toll payment process, allowing for a faster and more streamlined method. It is perceived as a means to expedite toll payments, thereby improving the overall effectiveness of the toll payment system. Furthermore, respondents contend that the acceptance of MyRFID simplifies the toll payment procedure, contributing to increased ease and convenience. This perceived ease of use is anticipated to not only facilitate the toll payment process but also augment overall productivity in the context of toll payment transactions.

## 5.6 Implication of the Study

In this research, the finding was analyzed to determine and help in understanding the factors that could influence the acceptance of the MyRFiD among North-South Expressway (PLUS) users. Through the analysis of the findings, the researcher found that these three factors which were perceived usefulness, perceived ease of use, and social influence had a significant relationship towards user acceptance. This result has also implications for various parties especially policymakers, toll plaza management, and technology vendors on how to improve the design, implementation, and marketing of MyRFiD technology.

From an academic perspective, the findings of this research contribute valuable insights into the acceptance patterns of users towards MyRFiD. Understanding the factors influencing acceptance, such as perceived usefulness, perceived ease of use, and social influence can inform the academic community about the dynamics of technology acceptance in the transportation sector. This knowledge can serve as a foundation for further research and discussions on user acceptance behavior, technology diffusion, and the role of innovation in infrastructure projects.

In the realm of technology development, the findings of this research also can guide businesses and technology developers in refining their products and services to better meet the needs and expectations of users. Understanding user preferences and concerns can lead to the development of user-friendly interfaces, feasibility in facilitating, and fostering a more positive reception of RFID technology among expressway users.

From a governmental standpoint, the research findings can influence policy decisions related to transportation infrastructure and technology adoption. Understanding user acceptance is crucial for policymakers to implement effective and user-friendly toll collection systems. The government may use the insights gained from this research to refine regulations, allocate resources, and promote the widespread adoption of MyRFiD technology, ultimately enhancing the efficiency and effectiveness of toll collection in Malaysia.

In summary, the implications of this research extend beyond academic circles to industries and government bodies, offering valuable knowledge that can shape future developments in toll collection technology, guide industry practices, and inform policy decisions to improve the overall transportation experience for North-South Expressway users in Malaysia.

## 5.7 Limitations of Research

During the conduct of the research, several constraints and limitations of the process of completing the research were identified. Among the constraints and limitations experienced is the difficulty in getting respondents' feedback. The questionnaire was shared on various platforms to get 385 respondents, but only 155 respondents answered the questionnaire given. It has made it difficult when many respondents could not cooperate to answer the questionnaire.

The second limitation poses difficulties for developing a comprehensive and accurate understanding of the issues. Consequently, challenges in obtaining relevant

and reliable data have emerged, accompanied by difficulties in interpreting and contextualizing findings. Notably, there is a dearth of previous research that has explored RFID technology in toll collection systems. Therefore, this study may overlook important elements that could be identified through a review of previous research.

The third limitation is time limitations. Numerous researchers face constraints imposed by time limitations, potentially influencing the depth and breadth of the study. The pressure of time can result in inadequate data collection and analysis, or insufficient exploration of the research topic.

Nevertheless, it is imperative to acknowledge and address the aforementioned limitations with a strategic approach aimed at overcoming each challenge. By proactively identifying and mitigating these constraints, researchers can enhance the likelihood of conducting a successful and impactful study. In light of this, meticulous planning, effective resource allocation, and a comprehensive understanding of potential pitfalls are essential components in navigating these challenges. Through a thoughtful and systematic approach to problem-solving, researchers can cultivate a resilient framework that not only acknowledges limitations but actively seeks solutions, thereby fostering the conditions necessary for a successful and well-executed study.

## 5.8 Recommendations for Future Research

The identified limitations in this research highlight significant challenges that need to be addressed for a more successful and impactful study. To overcome the difficulty in obtaining respondents' feedback, proactive measures should be taken to enhance cooperation. This may involve diversifying the platforms for questionnaire distribution, employing targeted outreach strategies, and clearly communicating the importance of participation. Researchers should consider incentivizing respondents or implementing follow-up mechanisms to improve response rates.

To address the second limitation regarding the lack of comprehensive understanding of the issues, researchers should acknowledge the gaps in previous research on RFID technology in toll collection systems. A thorough literature review should be conducted to identify any overlooked elements. Collaboration with experts in related fields may also provide valuable insights. By contextualizing findings within a broader research landscape, the study can achieve a more nuanced and accurate interpretation of the data.

Considering the time limitations as the third constraint, meticulous planning and effective resource allocation are crucial. Researchers should prioritize tasks, set realistic timelines, and allocate resources efficiently to ensure adequate data collection and analysis. Furthermore, employing advanced research methodologies or technologies may expedite certain aspects of the study without compromising its quality.

In conclusion, a strategic approach is essential to address these limitations successfully. Researchers should proactively identify and mitigate challenges through careful planning, resource allocation, and a comprehensive understanding of potential pitfalls. By cultivating a resilient framework that actively seeks solutions, researchers can enhance the likelihood of conducting a successful and well-executed study despite the identified constraints.

## 5.9 Summary

The study has successfully met all objectives, demonstrating the significant impact of three key factors on the acceptance of MyRFiD. Analysis, including mean scores, Pearson's Correlation Coefficient, and Multiple Regression, confirms a positive and significant relationship. Perceived usefulness emerges as the most influential factor. Overall, this research offers academic, industrial, and governmental insights, with recommendations for future studies.

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**APPENDICES**

**APPENDIX 1: GANT CHART FYP 1**

| PROCEDURE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seminar PSM 1 | █ | | | | | M | | | | | | | | | | | |
| Search PSM Topic | █ | | | | | I | | | | | | | | | | | |
| Modify Research Topic | | █ | | | | D | | | | | | | | | | | |
| Topic Confirmation | | █ | | | | | | | | | | | | | | | |
| Identify Problem Statement and Background Of Study | | █ | █ | | | S | | | | | | | | | | | |
| Identify Research Objective and Research Question | | █ | █ | | | E | | | | | | | | | | | |
| Find Information for Literature Review | | █ | █ | | | M | | | | | | | | | | | |
| Preparation and Completed for Chapter 1 | | | | █ | █ | | █ | | | | | | | | | | |
| Preparation and Completed for Chapter 2 | | | | | | | █ | █ | █ | █ | | | | | | | |
| Preparation and Completed for Chapter 3 | | | | | | B | | | | █ | █ | | | | | | |
| Preparation of Slide and Video Presentation | | | | | | R | | | | | █ | | | | | | |
| Presentation: PSM 1 | | | | | | E | | | | | | █ | | | | | |
| Proposal Correction | | | | | | A | | | | | | | █ | | | | |
| Submission | | | | | | K | | | | | | | | █ | | | |

| PROCEDURE | WEEK | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| Draft Questionnaire | X | X | X | | | | M | | | | | | | | | | |
| Submit: Draft Questionnaire | | | | X | | | I | | | | | | | | | | |
| Distribute Questionnaire (30 respondents for Pilot Test) | | | | | X | X | D | | | | | | | | | | |
| Data Analysis: Pilot Test | | | | | X | X | | | | | | | | | | | |
| Distribute Questionnaire | | | | | | X | S | X | | | | | | | | | |
| Data Gathering | | | | | | | E | | | | | | | | | | |
| Data Analysis | | | | | | | M | | | | | | | | | | |
| Preparation and Completed for Chapter 4 | | | | | | | | | | | | | X | | | | |
| Preparation and Completed for Chapter 5 | | | | | | | B | | | | | | | X | | | |
| Preparation of Slide and Video Presentations | | | | | | | R | | | | | | | X | | | |
| Presentation: PSM 2 | | | | | | | E | | | | | | | | X | | |
| Correction | | | | | | | A | | | | | | | | X | | |
| Submission | | | | | | | K | | | | | | | | | X | |

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## APPENDIX 3: QUESTIONNAIRE



## EXPLORING THE ACCEPTANCE OF MYRFID BY NORTH-SOUTH EXPRESSWAY (PLUS) USERS

Dear Sir/Madam,

I am Puteri Nur Kamilia Binti Mokhzani, a final year student who is currently pursuing a Bachelor of Technology Management (Technology Innovation) with Honours at Universiti Teknikal Malaysia Melaka (UTeM). I am conducting research on the topic "Exploring The Acceptance Of MyRFiD By North-South Expressway (Plus) Users". This research will be a guide for researchers to identify factors that can influence user acceptance of MyRFiD. So, I would like to invite respondents who are users of the North-South Expressway (PLUS).

The questionnaire consists of FOUR (4) sections which are, section A, B, C, and D. It will take 5 to 10 minutes to complete the following questions. Please read the questions carefully before answering them and tick the answer in the box provided. The data collected for this research will be kept private and used exclusively for academic reasons. I appreciate your cooperation and important time. If you have additional inquiries, feel free to reach out to me anytime without hesitation.

Yours Sincerely,

Name: Puteri Nur Kamilia Binti Mokhzani

Course: Bachelor of Technology Management (Technology Innovation) with Honours

Email: b062010419@student.utem.edu.my

Supervisor: Mr Mukhiffun Bin Mukapit

Email: mukhiffun@utem.edu.my

Address: Faculty of Technology Management and Technopreneurship, Universiti TeknikalMalaysia Melaka, 76100 Hang Tuah Jaya, Melaka.

*Tuan / Puan,*

*Saya Puteri Nur Kamilia Binti Mokhzani, pelajar tahun akhir yang sedang mengikuti pengajian Ijazah Sarjana Muda Pengurusan Teknologi (Inovasi Teknologi) dengan Kepujian di Universiti Teknikal Malaysia Melaka (UTeM).*

*Saya sedang menjalankan penyelidikan mengenai topik "Menerokai Penerimaan MyRFiD Oleh Pengguna Lebuhraya Utara-Selatan (Plus)". Penyelidikan ini akan menjadi panduan kepada penyelidik untuk mengenal pasti faktor-faktor yang boleh mempengaruhi penerimaan pengguna terhadap MyRFiD. Jadi, saya ingin menjemput responden yang merupakan pengguna Lebuhraya Utara-Selatan (PLUS).*

*Soal selidik ini mengandungi EMPAT (4) bahagian iaitu bahagian A, B, C dan D. Ia akan mengambil masa 5 hingga 10 minit untuk menyelesaikan soalan berikut. Sila baca soalan dengan teliti sebelum menjawabnya dan tandakan jawapan dalam kotak yang disediakan. Data yang dikumpul untuk penyelidikan ini akan dirahsiakan dan digunakan secara eksklusif untuk tujuan akademik. Saya menghargai kerjasama dan masa penting anda. Jika anda mempunyai pertanyaan tambahan, sila hubungi saya pada bila-bila masa tanpa teragak-agak.*

*Yang ikhlas,*
*Nama: Puteri Nur Kamilia Binti Mokhzani*
*Kursus: Sarjana Muda Pengurusan Teknologi (Inovasi Teknologi) dengan Kepujian E-mel: b062010419@student.utem.edu.my*

*Penyelia : En Mukhiffun Bin Mukapit*
*E-mel: mukhiffun@utem.edu.my*
*Alamat: Fakulti Pengurusan Teknologu dan Teknousahawan, Universiti Teknikal Malaysia Melaka, 76100 Hang Tuah Jaya, Melaka.*

## SECTION A: DEMOGRAPHIC BACKGROUND

| Questions | Options | |
|---|---|---|
| 1. Gender / *Jantina* | • Male / *Lelaki* | |
| | • Female / *Perempuan* | |
| 2. Age / *Umur* | • 17-24 | |
| | • 25-40 | |
| | • 41-56 | |
| | • 57 and above / *57 dan ke atas* | |
| 3. Ethnic / Race / *Bangsa* | • Malays / Melayu | |
| | • Indians / *India* | |
| | • Chinese / *Cina* | |
| | • Other / *Lain-lain* | |
| 4. Employment Status / *Taraf Pekerjaan* | • Private Employee / *Sektor Swasta* | |
| | • Government Employee / *Sektor Kerajaan* | |
| | • Retired / *Bersara* | |
| | • Student / *Pelajar* | |
| | • Unemployed / *Tidak Bekerja* | |
| | • Other / *Lain-lain* | |
| 5. Highest Education / *Pendidikan Tertinggi* | • SPM | |
| | • STPM/Matriculation/Diploma | |
| | • Bachelor's Degree / *Ijazah Sarjana Muda* | |
| | • Master's Degree / *Ijazah Sarjana* | |
| | • PhD (Doctorate) / *PhD (Kedoktoran)* | |
| | • Other / *Lain-lain* | |

## SECTION B: GENERAL QUESTIONS OF MYRFID

| Questions | Options | |
|---|---|---|
| 1. How familiar are you with MyRFiD? / *Sejauh manakah anda mengenali MyRFiD?* | • Very familiar / *Sangat Kenal* | |
| | • Somewhat familiar / *Agak Kenal* | |
| | • Not familiar at all / *Tidak Kenal Sama Sekali* | |
| 2. If you are familiar, where did you find out about MyRFiD? / *Jika anda kenal, di* | • Advertisement / *Iklan* | |
| | • Social Media / *Media Sosial* | |
| | • Word of Mouth / *Buah Mulut* | |

| | | |
|---|---|---|
| *manakah anda mengetahui tentang MyRFiD?* | • News / *Berita* | |
| | • Other / *Lain-lain* | |
| 3. Do you believe MyRFiD has many advantages over Smart Tag & Touch 'N Go? / *Adakah anda percaya MyRFiD mempunyai banyak kelebihan berbanding Smart Tag & Touch 'N Go?* | • Yes / *Ya* | |
| | • No / *Tidak* | |
| 4. How often do you use MyRFiD on the highway? (eg: North-South Expressway) / *Berapa kerapkah anda menggunakan MyRFiD di lebuh raya? (cth: Lebuhraya Utara-Selatan)* | • Never / *Tidak Pernah* | |
| | • Rarely / *Jarang Sekali* | |
| | • Sometimes / *Kadangkala* | |
| | • Often / *Kerap* | |
| | • Very Often / *Sangat Kerap* | |

**SECTION C: FACTORS THAT INFLUENCE THE ACCEPTANCE OF MYRFID**

Please choose an answer based on the table of Likert Scale.

| Score<br>*Skor* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Scale<br>*Skala* | Strongly Disagree<br>*Sangat Tidak Setuju* | Disagree<br>*Tidak Setuju* | Neutral<br>*Neutral* | Agree<br>*Setuju* | Strongly Agree<br>*Sangat Setuju* |

**FACTORS: PERCEIVED USEFULNESS**

| Label | Items | 1 | 2 | 3 | 4 | 5 |
|-------|-------|---|---|---|---|---|
| PU 1 | MyRFiD improves the performance of toll payment methods / *MyRFiD meningkatkan prestasi kaedah pembayaran tol* | | | | | |
| PU 2 | MyRFiD allows to make toll payments faster. / *MyRFiD membolehkan pembayaran tol dengan lebih pantas.* | | | | | |
| PU 3 | MyRFiD enhances the effectiveness in making toll payments / *MyRFiD meningkatkan keberkesanan dalam membuat pembayaran tol* | | | | | |
| PU 4 | MyRFiD makes it easier to make toll payments / *MyRFiD memudahkan untuk membuat pembayaran tol* | | | | | |
| PU 5 | MyRFiD increases the productivity in making toll payments / *MyRFiD meningkatkan produktiviti dalam membuat pembayaran tol* | | | | | |

**FACTORS: PERCEIVED EASE OF USE**

| Label | Items | 1 | 2 | 3 | 4 | 5 |
|-------|-------|---|---|---|---|---|
| PEU 1 | MyRFiD is easy-to-use / *MyRFiD mudah digunakan* | | | | | |
| PEU 2 | Interaction with the MyRFiD clear and understandable. / *Interaksi dengan MyRFiD jelas dan boleh difahami.* | | | | | |
| PEU 3 | It is easy in learning how to use MyRFiD / *Mudah dalam mempelajari cara menggunakan MyRFiD* | | | | | |
| PEU 4 | The use of MyRFiD in paying tolls is easier than the conventional methods. (eg: SmartTag, Touch 'N Go) / *Penggunaan MyRFiD dalam membayar tol adalah lebih mudah berbanding kaedah konvensional. (cth: SmartTag, Touch 'N Go)* | | | | | |
| PEU 5 | MyRFiD technology enhances my paying experience. / *Teknologi MyRFiD meningkatkan pengalaman membayar saya.* | | | | | |

**FACTORS: SOCIAL INFLUENCE**

| Label | Items | 1 | 2 | 3 | 4 | 5 |
|-------|-------|---|---|---|---|---|
| **SI 1** | People around me use MyRFiD for toll payment. (e.g: family members, friends) / *Orang sekeliling saya menggunakan MyRFiD untuk pembayaran tol. (cth: ahli keluarga, rakan)* | | | | | |
| **SI 2** | People who influence my behaviour think that I should use MyRFiD / *Orang yang mempengaruhi tingkah laku saya berfikir bahawa saya harus menggunakan MyRFiD* | | | | | |
| **SI 3** | Recommendations from the people surrounding on MyRFiD influence me to use it. / *Syor daripada orang sekeliling mengenai MyRFiD mempengaruhi saya untuk menggunakannya.* | | | | | |
| **SI 4** | I would like to use MyRFiD when the people surrounding have benefited a lot from it. / *Saya ingin menggunakan MyRFiD apabila orang sekeliling telah mendapat banyak manfaat daripadanya.* | | | | | |
| **SI 5** | I feel more comfortable to use MyRFiD when the people surrounding are using it. / *Saya berasa lebih selesa menggunakan MyRFiD apabila orang sekeliling menggunakannya.* | | | | | |

## SECTION D: THE ACCEPTANCE OF MYRFID

| Label | Items | 1 | 2 | 3 | 4 | 5 |
|-------|-------|---|---|---|---|---|
| DV 1 | I am willing to use MyRFiD as a toll payment method. / *Saya bersedia menggunakan MyRFiD sebagai kaedah pembayaran tol.* | | | | | |
| DV 2 | I will always be comfortable using MyRFiD / *Saya akan sentiasa selesa menggunakan MyRFiD* | | | | | |
| DV 3 | I have intended to increase my use of MyRFiD in the future. / *Saya berhasrat untuk meningkatkan penggunaan MyRFiD pada masa hadapan.* | | | | | |
| DV 4 | I recommend MyRFiD to my relatives and friends / *Saya mengesyorkan MyRFiD kepada saudara-mara dan rakan-rakan saya* | | | | | |
| DV 5 | I would use whenever possible MyRFiD instead of the conventional methods. (eg: SmartTag, Touch 'N Go) / *Saya akan menggunakan MyRFiD sebanyak yang mungkin berbanding kaedah konvensional. (cth: SmartTag, Touch 'N Go)* | | | | | |

Thank you for your participation.
The data collected are for academic purpose only.

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# APPENDIX 4: TURNITIN

B062010419 full thesis

by Puteri Nur Kamilia

B062010419 full thesis

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