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**The Factors Influence Level Awareness Towards Car Users About Radio
Frequency Identification (RFID) Tag in Kuala Lumpur**

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**THE FACTORS INFLUENCE LEVEL AWARENESS TOWARD CAR
USERS ABOUT RADIO FREQUENCY IDENTIFICATION (RFID) TAG IN
KUALA LUMPUR**

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DECLARATION OF ORIGINAL WORK

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“I hereby declare that the work of this exercise is mine except for the quotations and summaries that have been duly acknowledged. ”

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DEDICATION

This research paper is lovingly and sincerely dedicated to my lovely mother, Puan Jamaiyah binti Mat Dawad and my handsome father, En. Mohamad Fozi binti Mat Yusoff and also my husband Muhammad Arief bin Hasbollah Amin who constantly support and always give a lot of source of inspiration during my studies. I am honoured and grateful to have both of them as my beloved family and also to all of my siblings and family, thank you for understanding and non-stop support me in any condition.

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ABSTRACT

Growth in road transport issues is an important issue in Malaysia's development. Hence, the presence of Radio Frequency Technology (RFID) will minimize issues related to transportation. This study is generally aimed at analysing the factors that give awareness to car users about RFID tag. The objectives of this study are further discussed by discussing factors such as perceive of efficiency, time saving and reducing road congestion affecting car users on RFID tag in Kuala Lumpur. The findings of this study are that researchers have noted that although Malaysia faces increases and decreases in transportation volumes, performance and utilization are still improving. Researchers are hoping that RFID technology will provide consumers with better awareness and effect. Quantitative research is chosen to conduct this research by distributing survey questionnaire to random 390 car users in Kuala Lumpur. The pilot test has been done and about 30 respondents were participated in pilot test in order to have reliability of the survey questionnaire before final data collection. Overall, the Cronbach's alpha of pilot test for all variables are 0.866. The data is analysed by using Statistical Package for Social Sciences (SPSS). As for Pearson's correlation analysis, all three independent variables are positively correlated with awareness of RFID Tag towards cars users and with multiple regression analysis all independent variable dimension that statistically significant towards car users about RFID Tag.

(Keyword: RFID Tag, Car Users, Level Awareness)

ABSTRAK

Pertumbuhan dalam isu pengangkutan jalan merupakan isu penting dalam pembangunan Malaysia. Oleh itu, kehadiran Teknologi Frekuensi Radio (RFID) akan meminimumkan isu berkaitan pengangkutan. Kajian ini secara amnya bertujuan menganalisis faktor-faktor yang memberikan kesedaran kepada pengguna kereta tentang teknologi RFID. Objektif kajian ini dibincangkan dengan membincangkan faktor-faktor seperti melihat kecekapan, menjimatkan masa dan mengurangkan kesesakan jalan yang memberi kesan kepada pengguna kereta pada tag RFID. Penemuan kajian ini adalah bahawa para penyelidik telah mencatatkan bahawa walaupun Malaysia menghadapi peningkatan dan penurunan dalam jumlah pengangkutan, prestasi dan penggunaan masih meningkat. Penyelidik berharap bahawa teknologi RFID akan memberi pengguna kesedaran dan kesan yang lebih baik. Penyelidikan kuantitatif dipilih untuk menjalankan kajian ini dengan mengedarkan soal selidik tinjauan kepada pengguna kenderaan rawak 390 di Kuala Lumpur. Ujian perintis telah dilakukan dan kira-kira 30 responden telah mengambil bahagian dalam ujian perintis untuk mempunyai kebolehpercayaan soal selidik tinjauan sebelum pengumpulan data akhir. Keseluruhannya, Cronbach's alpha pada ujian perintis untuk semua pemboleh ubah adalah 0.866. Data dianalisis dengan menggunakan Psikologi Sosial Pakej Statistik (SPSS). Bagi analisis korelasi Pearson, ketiga-tiga pemboleh ubah bebas itu dikaitkan positif dengan kesedaran Tag RFID ke arah pengguna kereta dan dengan analisis regresi berganda semua dimensi pembolehubah bebas yang secara statistiknya signifikan ke arah pengguna kereta mengenai Tag RFID.

(Kata Kunci: RFID Tag, Pengguna Kereta, Tahap Kesedaran)

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

In recent years, most toll plazas in Malaysia have implemented a cashless electronic system to facilitate and accelerate vehicle movements. The introduction is a toll system that does not use cash for example using Touch n Go and Smart Tag cards. However, Malaysia will introduce the latest system of Radio Frequency Identification (RFID) technology. RFID tag is a method of identification using a tool called RFID label or transponder to store and retrieve long distance data. Methods are increasingly contagious in Malaysia but the use of this system does not extend throughout Malaysia.

Furthermore, Datuk Ismail Md Salleh (2017) said that the latest digital payment system that uses the RFID-based ETC (Electronic Toll Collection) system will replace the existing system. The application of this RFID technology is more efficient and more sophisticated than using Touch ' Go and SmartTAG to pay at the toll plaza. According to Rakhi Kalantri et al (2014), the object detection sensor in the readers detects the approach of the incoming vehicles tag and toll deduction takes place through a prepaid card assigned to the concerned RFID Tag that belongs to the owners account. RFID Tag in this research focus on automatic toll collection because RFID Tag also introduce in vehicle theft detection, signal breaking avoidance and tracking over speeding vehicle.

Therefore, this study is important to provide awareness to consumers as new systems that the government will introduce to consumers will have a good impact. Cars users should aware about this because the electronic toll collection system in expressway based on RFID Tag a design scheme was put forward. It has characteristics of high efficiency, saving time, reduce congestion, far communication and also reduce management cost and fees. (Rakhi Kalantri et al, 2014)

1.2 Problem Statement

Based on the title of this study is the factors influence level awareness towards cars users about RFID Tag in Kuala Lumpur. According to Rakhi Kalantri et al (2014), the automated toll collection system using passive Radio Frequency Identification (RFID) Tag emerges as a convincing solutions to the manual toll collection method employed at tollgates. Datuk Fadillah Yusof (2013) and Minister of Works said the effort was among several measures examined by the government to provide better facilities for highway users in the future. Sin Chew (2017) said the LLM will introduce this technology in January next year with at least one lane be provided at every toll plaza. Datuk Fadillah Yusof (2013) said the technology was being tested by PLUS Espressway Berhad at the Putra Heights Toll Plaza, Subang Jaya, Selangor. Therefore the target of this study is around Kuala Lumpur. Bruce Eckfeldt (2005) said RFID Tag provide value to users and users should aware with value which is peace of mind, consumer convenience and improved service.

1.3 Research Questions

Based on the problem statement, the researcher has identified two research questions. The research questions of the study are stated as below:

1.3.1 What the level of perceive of efficiency influence level awareness toward cars users bout RFID Tag?

1.3.2 What the level of perceive of saving time influence level awareness toward cars users about RFID Tag?

1.3.3 What the level of perceive of reduce congestion influence level awareness toward cars users about RFID Tag?

1.4 Research Objectives

The researcher has come out two research objectives in this research. The research objectives of the study are stated as below:

1.4.1 To study perceive of efficiency influence level awareness toward cars users about RFID Tag

1.4.2 To study perceive of saving time influence level awareness toward cars users about RFID Tag

1.4.3 To study perceive of reduce congestion influence level awareness toward cars users about RFID Tag

1.5 Scope and Limitations Of Study

1.5.1 Scope

The scope of this study is to analyse factors that create awareness to users about RFID tag and determine most factors that make users aware of RFID tag. The scope of this study is in Kuala Lumpur. Thus, the number of car users in Kuala Lumpur in 2015 is 3,720,213. Therefore, based on the Krecjie and Morgan table this study will use a sample size of 5% and the respondent is 390.

1.5.2 Limitation

The limitations that will be any barriers to achieve the accurate data is sometimes not all respondents only know the basic knowledge about RFID Tag sometimes they do not know what is the RFID Tag. From that, it shows difficult to find the suitable person to this research. The cooperation of the respondents also one of the researcher limitation because not of all respondent easy to approach or easier to tolerate when want to get feedbacks. Other than that, this research will focus on car users and the time to carry out this research is for 1 year. Additionally, this research is not in action research, so that effect of RFID Tag implementation on potential users is not effective as users only provide feedback through questionnaire about factors affecting consumer awareness of RFID Tag.

1.6 Summary

In this chapter, the above-mentioned issues are about factors that affect cars users awareness of RFID Tag. These all reflect the background of the study, problem statements, research questions, research objectives, research scope and limitations. The main purpose of this research is to examine the relationship between level awareness towards car users about RFID Tag.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This topic will describe the RFID tag. RFID tag is a proven technology that has been used since the 1970s. Roberts (2016) said RFID was an automatic identification area that gained momentum to emerge as one of the most widely used computing technologies in history. RFID tag is the simplest form and concept is the same for bar encoders. It is seen as a way to enhance the data process and is a complement to existing technology. Pesonen et al (2009) said RFID Tag has been identified as one of the cornerstones of the upcoming Internet of Things (IoT) and the focus is moving from conventional RFID towards next generation pervasive networked and interconnected systems. She said again, in the future IoT billions of objects are envisioned to report their identity, location, environmental conditions and history over wireless connections.

C.M. Roberts (2016) said the RFID tag function to collect tag information. RFID tag is an enhancement to non-optical remote thermal bar code, density information, and two-way communication capabilities. RFID tag is a System Operations involve tags and readers interacting with objects (assets) and database systems to provide information and operational functions. According to Seethalakshmi (2017), RFID Tag is for collecting the tax from vehicles, a toll gate is introduced and then the gate will be opened by authority that made tax collection directly from the drivers while passing the road or street, which led to traffic jam problem.

This study also explains where RFID tag is used for a variety of applications ranging from access control building cards close to supplying chain tracking, toll collection, parking access control, stock management, ski lift access, library tracking books, theft prevention, vehicle and train casting systems introduction of rolling stock and movement tracking.

C.M. Roberts (2016) stated in his article, in the 1990s the RFID tag was important and use Electronic toll collection in the United States is widespread. In the 1991 system of electronics toll opened in Oklahoma where vehicles can collect toll points on highway speeds (no tolls stall). In Europe there is also great interest RFID applications include toll quotes, rail applications and access control. In Malaysia, According to Fadilah as a Ministry is working with the Malaysian Association of Highway Concession Cos (PSKLM) to test RFID Tag effectiveness and suitability. The minister assured that the Touch n Go and Smart Tag gadgets continue to be used, despite RFID Tag implementation at expressways. The implementation has been a long term government strategy which started as more concessionaires moved towards cashless operations since 2015.

RFID tag and shutter toll apps appear in many countries including Argentina, Australia, Brazil, Canada, China, Hong Kong, Japan, Malaysia, Mexico, New Zealand, South Korea, South Africa, Singapore and Thailand. Continuous development in the 1990s with integrated circuit development and size reduction up to microwaves. The RFID tag is reduced to an integrated circuit.

2.2 Types of Radio Frequency Identification (RFID)

Passive RFID tags use tags without internal power sources and are instead powered by electromagnetic energy transmitted from RFID readers. Passive RFID tags are used for applications such as access control, file tracking, race times, supply chain management, smart labels and more. The lower price points for each tag make economically passive RFID systems available to many industries.

RFID systems are active using RFID tags that use batteries that continuously broadcast their own signals. Active RFID tags are typically used as "flares" to accurately locate the actual location of the asset or in high-speed environments such as tolls. Active tags give longer reading ranges than passive tags, but they are also more expensive.

2.2.1 Active RFID

R.Seethalakshmi et al, (2017) said Active RFID reader contains a transmitter that sends the signal to the receiver. The toll unit contains an active RFID reader to the identification of the vehicle that is required information when the vehicle arrives around the attached toll tag door on the vehicle communicates with the reader attached to the toll gate station and the tag information is sent through the central database station using the communication protocol. Therefore, the system's collection of pipes works electrically with better use of time, traffic jams and so on.

In an active RFID tag, each tag has its own emitter and power source. In most cases, the power source is the battery. Active tags show their own sign to send data placed on their microchip. Active RFID tags often work in ultrahigh frequency bands (UHF) and offer a scope of up to 100 m. Actually, active tags are used on broad items, for example, trains and cars. There are two active tag types that are active ie transponder and reference point. The transponder is "awakened" when they get the radio sign from the reader, and after that the power and react by sending a return sign. Because the transponder does not effectively transmit radio waves until they get the

reader's signal, they simplify the battery life. The benefits of active RFID Tags is a typical reading range, improving tag capabilities with experienced technology such as GPS and sensors and rugged tag options.

Reference points are used as part of most of the continuous search systems (RTLS) to track the precise area of continuous advantage. Unlike a transponder, the reference point is not encouraged by the reader's sign. Instead, they release the signal on the pre-set interim. Involved on the required level of accuracy searching, the reference point can be set to send the flag at regular intervals, or once a day. Each reference point mark is obtained by the read antenna located around the boundary of the region being checked, and delivers the data and position ID of the tag.

2.2.2 Passive RFID

R.Seethalakshmi et al (2017) said the passive RFID tag contains details that will be read by the RFID receiver acting as a transmitter to signal the approaching sign. This system ensures vehicles to stop in toll for manual payments, thus enabling efficient toll collection by reducing traffic congestion and eliminating possible human errors. In this method, passive RFID cards are perceived by RFID receivers at the toll booth and the money will be deducted automatically. The automated toll collection process saves time, effort, and manpower.

Generally, the three main parts are in passive RFID systems - RFID readers or interrogators, RFID antennas, and RFID tags. Unlike active RFID tags, passive RFID tags only have two main components - tag antennas and microchips or integrated circuits (ICs).

As the name suggests, passive tags wait for signals from RFID readers. The reader transmits energy to the antenna which converts the energy into RF waves sent to the red zone. Once the tag is read in the red zone, RFID tag internal antenna draws energy from the RF wave. The energy moves from the tag antenna to the IC and the power chip that produces the signal back to the RF system. This is called a backscatter. Backscatter, or electromagnetic or RF wave changes, detected by the reader (via antenna), which defines information.

As mentioned above, the passive RFID tag has no internal power source, and standard passive RFID tags consist only of ICs and internal antennas; This basic structure is usually referred to as an RFID inlay. There are not many other types of passive RFID tags that exist in the market, but all the tags are generally contained in two categories - inlays or hard tags. RFID tags are durable and are made of plastic, metal, ceramic and rubber. They come in many shapes and sizes and are usually designed for unique functions, materials, or applications.

The advantages of passive RFID are the smaller Tags, Many tags are cheaper filter tags / more flexible, multiple tag options higher, tags can last a lifetime without battery (depending on wear and tear).

2.3 Influences level awareness towards cars users about RFID Tag

This research focuses on an electronic toll collection (ETC) system using radio frequency identification (RFID) Tag. According to Kamarulazizi et al (2010) research on ETC has been around since 1992, during which RFID Tags began to be widely used in vehicles to automate toll processes. The proposed systems eliminates the need for motorist and toll authorities to manually perform ticket payments and toll fee collections, respectively. Data information are also easily exchanged between the motorist and toll authorities , thereby enabling a more efficient toll collection by reducing traffic and eliminating possible human errors. Nath et all (2006) said the radio frequency identification is a wireless communications technology that allows computers to read the identities of cheap electronic tags from distance, without the need for batteries in tags. In the past, the widespread lack of accepted industry standards and market-induced RFID tag usage restrictions were limited to some applications such as tickets. Expressway "EZ-Pass" toll booth is an example Smart ticket that allows RFID tag.

However, the current situation changes, guarantees responsible debates about the benefits of RFID and implications. As mature RFID tag, it is likely to release a new application wave which will exploit cheap and highly automated identification of existing ones. Ismail (2017) said Malaysia was also faced with a challenge to create highway awareness on the benefits of the system's use so that they would be more prepared to accept any change. Kamarulazizi et al (2010) said the benefits about RFID Tag for the motorist include fewer or shorter queues at toll plazas by increasing toll booth service turnaround rates, faster and more efficient service which is no exchanging toll fees by hand), the ability to make payments by keeping a balance on the card itself or by loading a registered credit card and the use of postpaid toll statement which is no need to request for receipts. Kamarulazizi et al (2010) also said for the operators the benefits include lowered toll collection costs, better audit control by centralized user accounts and expanded capacity without building more infrastructures.

In the meantime, he said eight toll plazas in the country started to implement a toll collection system using the Radio Frequency Identification (RFID) tag involving