DETERMINANTS AFFECTING BEHAVIOURAL INTENTION OF USING QR CODES AS A LEARNING TOOL

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

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Last but not least, we wish to avail ourselves of this opportunity to express a sense of gratitude and love to our friends and beloved family for their encouragement and understanding during the period of our research project. Thank you very much.

DEDICATION

This research project is dedicated to our beloved family and friends for their endless support and encouragement in the progress of completing this research project.

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LIST OF ABBREVIATIONS

BI	Behavioural Intention
CAATTs	Computer-Assisted-Auditing Techniques and Tools
DV	Dependent Variable
EE	Effort Expectancy
FC	Facilitating Conditions
HM	Hedonic Motivation
HT	Habit
IV	Independent Variable
JABU	Joseph Ayo Babalola University
MLR	Multiple Linear Regression
MTLE	Mobile Technology in Learning Environment
OLS	Ordinary Least Square Regression
OUM	Open University Malaysia
PE	Performance Expectancy
PLS	Partial Least Squares
PV	Price Value
QR	Quick Response
SAS	Statistical Analysis System
SI	Social Influence
TAM2	Technology Acceptance Model 2
TRA	Theory of Reasoned Actions

UB	Use Behaviour
UNIKL RCMP	Universiti Kuala Lumpur Royal College of Medicine Perak
URL	Uniform Resource Locator
UTAR	Universiti Tunku Abdul Rahman
UTAUT	Unified Theory of Acceptance and Use of Technology
UTP	Universiti Teknologi Petronas

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PREFACE

In the past, teachers tend to conduct the classes according to the contents of the textbooks while students only obtain information from their teachers. However, as time goes by, one way study is no longer sufficient. Students are required to do more researches in order to gain more knowledge for their studies. In the recent decades, teaching progression and teaching method are forced to transform since development of Internet affords more options for educational methods. The emergence of information technology had allowed QR codes to offer wide application in various industries. Hence, there is a possibility to adopt QR codes as a learning tool to support traditional education. Students may enjoy the course of learning and become willing to learn actively by implementing QR codes. It is becoming a worthwhile subject of discussion and it leads an interest to study on determinants which need to be considered for effective implementation of QR codes as learning tools.

ABSTRACT

In recent years, Quick Response (QR) codes have become increasingly visible in marketing field and expand further in education. The ease of creating and reading QR codes enable it to be adopted as a learning tool for mobile learning. However, the awareness of adopting QR codes among the students in Malaysia is still low. In this study, the determinants that affect the behavioural intention of using QR codes as a learning tool will be analyzed among undergraduate students of private universities in Perak. The factors subject to analysis include performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC) and hedonic motivation (HM). Unified Theory of Acceptance and Use of Technology2 (UTAUT2) is employed as theoretical foundation for this study. Data were collected through self-administered survey questionnaires from 300 undergraduate students of private universities in Perak and only 275 are usable. Reliability Test, Normality Test, Pearson Correlation Coefficient Analysis and Multiple Linear Regression Analysis have been conducted in this research. The results show that PE, EE, SI, FC and HM have a significant and positive relationship on behavioural intention in using QR codes as a learning tool. Based on the results of this research, adoption of QR codes as a learning tool in private universities is possible as the students' acceptance level towards the adoption is relatively high.

CHAPTER 1: INTRODUCTION

1.0 Introduction

This chapter discusses the research background, problem statement, research objectives and questions as well as significance of the study.

1.1 Research Background

Quick Response (QR) code is a popular kind of matrix barcode invented by Denso Wave, permitting its contents to be interpreted swiftly by QR code scanner (Byrne, 2011; Jupiter, 2011). It is scannable using cameras in smartphones and tablet computers, consequently preventing inconvenience and probable mistakes of keyboard input (Latif, Fadzil, Munira, & Ng, 2012). QR code can be generated through several free QR code generators (Sharma, 2013). Since they are versatile, the QR code readers could connect the users to abundant information embedded rapidly such as Uniform Resource Locator (URL), audios, videos, text and images (Byrne, 2011). It can store much greater data than ordinary bar codes in a small printout size (Law & So, 2010). Pulliam and Landry (2010) mention that QR code offers several benefits such as it displays excellent size variability and error rectification capabilities against dirt or damage up to 30%. It is dynamic and also an ISO (International Organization for Standardization) standard. These advantages have made them widely adopted around the world for product tracking, advertising, managing industrial operations and others (Rivers, 2009).

Figure 1.1: A QR code sample

Additionally, the growing ubiquity of mobile devices had raised the interest of QR codes in education (Law & So, 2010). In Malaysia, the penetration rate of mobile phone subscription as per end of first quarter of 2014 is 143.7% (Malaysian Communications and Multimedia Commission, 2014). With the popularity of smartphones and tablets, a new aspect for the progress of mobile learning (m-learning) is provided by the implementation of a novel innovation like QR codes (Latif et al., 2012) given that the research of QR codes in education is considered in the case of m-learning (Law & So, 2010). Furthermore, government is committed to integrating education sector with technology by contributing RM168 million from the total allocation of spending on education sector in 2014 budget to expand Internet access (Ministry of Finance Malaysia, 2013).

QR codes have rich potential in education. Simple and speedy retrieval of QR codes allow them to become excellent educational tools during teaching and learning processes. It encourages innovative educators to explore their utilization in their educational endeavors (Law & So, 2010). The uses of QR codes in education are illustrated in Table 1.1.

Table 1.1: Uses of QR Codes in Education

Uses of QR Codes in Education		**Descriptions**	**Citation**
1	Learner Centered Learning	Reports or other materials can be generated by learners online and shared their work with QR codes.	Mikulski, 2011
2	Provide Extension Assignments	QR codes can be put in class assignment and allow students follow it to the extension activity or question. It saves space and might create excitement about the extension assignment.	Sharma, 2013
3.	Enhance Knowledge	QR codes are pasted as stickers on books at relevant points, which bring the reader to related video, web page, book	Sharma, 2013

		summary or other source of information.	
4.	Improve Language Level	A QR codes and handheld augmented reality supported learning system are built to enhance students' English level.	Liu, Tan, & Chu, 2007
5.	Periodic Table of Chemistry Elements	A QR-code periodic table of chemical elements is designed by a student in Italy.	Rizzo, 2009

Source: Adapted from Law, C. Y., & So, S. (2010). QR codes in education. *Journal of Educational Technology Development & Exchange, 3*(1). and Sharma, V. (2013). QR codes in education – A study on innovative approach in classroom teaching. *IOSR Journal of Research & Method in Education, 3,* 62-70.

The University of Bath is the primary runner of promoting QR codes in education such as adopted in library catalogue search on bibliographic details of books, student assignment with coversheet associated with QR codes, posters, Websites and for marketing purposes (Law & So, 2010). In Latif et al. (2012) a survey investigated on 62 learners in Open University Malaysia (OUM) found that majority of them are satisfied in utilizing QR codes in learning. Lai, Chang, Li, Fan, and Wu (2013) also confirmed that there is a high acceptance level towards QR Code Learning System for teaching among 160 elementary teachers. Thus, it is critical to view the possibility of adopting QR codes in education as its application is still in embryonic stage (Latif et al., 2012).

This research will study on undergraduate students of private universities in Perak. Perak is selected as it is ranked as one of the top three states in providing highest number of private universities in Malaysia (Department of Higher Education, 2013). It also aspires to be world class education destination which expected to attract students across Malaysia ("SEGi expand with," 2011). Moreover, sparse literature in educational settings had been focused on Perak. Most of the researches of m-learning studied on Kuala Lumpur and Selangor (Hussin, Manap, Amir, & Krish, 2012; Jambulingam, 2013; Suki & Suki, 2007) as large number of universities are located at there. QR codes adoption is the core theme of this study,

thus Unified Theory of Acceptance and Use of Technology2 (UTAUT2) model is employed to investigate the determinants influencing behavioural intention of adopting QR codes as a learning tool.

1.2 Problem Statement

QR codes have rich potential in education (Law & So, 2010). However, it had been deemed that the deployment of QR codes in education progresses slowly and still in embryonic stage, although they are increasingly used for learning purposes in Japan and America (Sharma, 2013). Examples of its actual use in education are scarce. In Malaysia, QR codes are relatively new and the awareness of adopting QR codes in learning among the students is still low given that the use of QR code has yet to be studied in Malaysian institution (Latif et al., 2012). According to GMO Japan Market Intelligence (2012), high awareness of average 94.1% recognizing about QR codes arose among China, Japan, Taiwan, and South Korea (Roger, 2012). Thus, there is a need to create awareness of QR codes among students in Malaysia. Sparse studies had emerged that shed light on QR codes in learning. Latif et al. (2012) also suggested that more researches are required to examine the students' perception in adopting QR codes.

In the past, some studies have been carried out on QR codes among students. Nevertheless, their findings are limited in certain areas. Latif et al. (2012) conducted a research in Open University Malaysia (OUM) and found that majority of the learners were alert of QR codes, but have not adopted them either in education or any other purposes. However, this study only focused on the learners in OUM exclusively instead of students in private higher education institutions which provide for nearly half of the undergraduates in Malaysia. Furthermore, it is important to conduct a study on students in private higher education institutions (Jamshidi, Arasteh, NavehEbrahim, Zeinabadi, & Rasmussen, 2012).

Sago (2011) carried out a research in United States. This research found out that 70.4% of college students have recognized the QR codes and only 13.5 % of students have actually scanned the QR codes. Although the adoption level of QR codes among the college students had been examined, it was investigated for marketing purposes rather than for learning purposes. A study on QR codes should be conducted for education areas because the use of QR codes in education was increasing (Sharma, 2013) and education is important in Malaysia to retain civilisation with knowledge and wisdom (Ministry of Finance Malaysia, 2013).

Additionally, majority of the studies in the context of QR codes have been conducted with relation to administering libraries, leading to lesser coverage in teaching and learning (Latif et al., 2012). For instance, research done by Lo, Coleman, and Theiss (2013) discovered that the ease of use of QR codes influenced the students to adopt QR codes in libraries. Moreover, the researchers only investigated on one variable, the ease of use of QR codes, where did not consider other determinants in affecting the students' perceptions.

1.3 Research Objectives and Questions

1.3.1 General Objective

General Objective	General Question
To investigate the determinants that affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak.	What are the determinants that affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak?

1.3.2 Specific Objectives

Specific Objectives	Specific Questions
To examine whether performance expectancy will affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak.	Will performance expectancy affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak?
To determine whether effort expectancy will affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak.	Will effort expectancy affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak?
To investigate whether social influence will affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak.	Will social influence affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak?
To determine whether facilitating conditions will affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak.	Will facilitating conditions affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak?
To examine whether hedonic motivation will affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak.	Will hedonic motivation affect the behavioural intention of using QR codes as a learning tool among undergraduate students of private universities in Perak?

1.4 Significance of the Study

Practically, the information and outcomes of this research would contribute to educators, administrators and managements in Malaysian private universities with the knowledge of undergraduate students' intention in adopting QR codes as a learning tool. The potential in developing the application of QR codes in education could be determined since its implementation is still in embryonic stage. This study could give them a better comprehension on the determinants that influence students' perception before implementing QR codes. These would help to identify which traits of QR codes should be emphasized. QR codes could be embedded in the study materials which allow students to link to the assessment sheet and send the inquiries to educators, improving the communication between them (Al-Khalifa, 2011). Thus, it would benefit the education industry as the usage of QR codes has not been fully explored in Malaysia.

Additionally, this study would relatively contribute to the Ministry of Higher Education and government by assessing the likelihood of adoption of QR codes in education. Government is committed to advancing academic achievement and the issue of m-learning is discussed in relation to the future aspiration of technology-enhanced education in Malaysia (Embi & Nordin, 2013). Consideration on integration of QR codes in m-learning would be taken into account from this present study since QR codes in educational context had been successfully implemented in other countries. It is believed to be an indicative study to government since the concept of m-learning has come into existence in the teaching and learning scenario in Malaysia.

Theoretically, this is a significant research because a relatively contemporary model, UTAUT2, is being employed in this study. It provides a basis to facilitate the future researchers for further investigation since a few studies had been conducted on QR codes in Malaysia. It is believed to be one of the first few empirical studies using UTAUT2 model to analyze the determinants influencing the students' behavioural intention to adopt QR codes as a learning tool in Malaysia. More knowledge on the possibilities of QR codes applied in learning

process could be acquired by future researchers from this study, and thus developing a new research topic on QR codes. Therefore, the extension of the research model of this study by comprising other constructs and controlled variables could be a fruitful future study.

1.5 Outline of the Study

Chapter 1 discusses the research background, problem statement, research objectives, research questions as well as the significance of the study. Chapter 2 focused in reviewing literature and relevant theoretical model which describes the UTAUT2 model. Theoretical framework and five hypotheses are proposed for further investigation. Subsequently, Chapter 3 describes the research design, data collection method, variable and measurement as well as data analysis technique. Chapter 4 illustrated the results pattern and analysis. Lastly, Chapter 5 constitutes of summary of statistical analysis, discussion of major findings, implications, limitations and recommendations for future research.

1.6 Conclusion

This chapter illustrates the overall picture of this research. It provides a brief understanding on the determinants that affecting the behavioural intention to use QR codes as a learning tool. The following chapter will cover a review of relevant literature and theoretical foundation of the study.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter discusses the literature review of past empirical studies to investigate the relationship between each predictor and dependent variable. Conceptual framework that provides the theoretical foundation will be developed after the literature review. At the end of this chapter, five hypotheses are formed and tested scientifically in later chapter.

2.1 Review of the Literature

2.1.1 Behavioural Intention

Behavioural Intention is described as the strength of an individual's intention to implement a specified behaviour (Fishbein et al., 1975). It acts as a determinant of actual usage behaviour (Yi, Jackson, Park, & Probst, 2006). It is also defined as a function of both attitudes as well as subjective norms on the target behaviour in forecasting actual behaviour (Pickett et al., 2012). The behavioural intention is used to evaluate the relative strength of an individual's commitment in the engagement of a particular behaviour (Pickett et al., 2012).

In this study, the students' perception towards the use of QR codes as a learning tool is assessed via behavioural intention. It is supported by many previous studies which measured user acceptance through behavioural intention to use (Latif et al., 2012; Lai et al., 2013; Abu-Al-Aish & Love, 2013). QR codes are still in its early infancy and its adoption in learning is low in Malaysia (Latif et al., 2012). Only less people have experienced using QR codes as a learning tool in Malaysia. Hence, in this study,

behavioural intention plays the role of dependent variable in the initial phase of QR codes adoption research to avoid incorrect inference.

2.1.2 Performance Expectancy

Performance expectancy is described as the belief of individual that adopting a technology will aid in job performance. It is formed by five constructs that are perceived usefulness, extrinsic motivation, job-sit, relative advantage and outcome expectations (Venkatesh, Morris, Davis, & Davis, 2003).

Al-Hujran, Al-Lozi, and Al-Debei (2014) concluded that performance expectancy is positively related to the behavioural intention in adopting m-learning. Five-point Likert scale questionnaires were distributed to the undergraduate and postgraduate students of Al-Faisal University in Saudi Arabia to examine the determinants affecting students' intention to adopt m-learning. Multiple regression analysis was used to analyze 215 valid questionnaires received from the students.

Nassuora (2013) has conducted a survey on 80 students at Al-Faisal University and the results showed that performance expectancy have positive influence on behavioural intention to adopt m-learning. Questionnaires were distributed to the students and squared multiple correlations was applied to analyze the results.

Latif et al. (2012) surveyed on 62 learners from the eight chosen courses in Open University Malaysia (OUM) in order to create awareness of QR codes among them. Data was collected through a cross-sectional survey based on a four-point scale. Results generated from multiple regression analysis showed that usefulness has significant effect on their intention to use QR codes continuously.

Jambulingam (2013) surveyed on 1,100 undergraduate students of private universities in Kuala Lumpur and Selangor to examine factors affecting behavioural intention to adopt Mobile Technology in Learning Environment (MTLE) in Malaysia. A total of 351 five-point Likert-scale questionnaires were selected randomly by using computer generated program. Structural equation modeling was conducted and the result showed that performance expectancy is the strongest positive driver of MTLE adoption.

Thomas, Singh, and Gaffar (2013) conducted a research to investigate the magnitude and direction of the impacts of UTAUT construct on behavioural intention to use m-learning in higher education. 322 five-point Likert-scale questionnaires were obtained through a web survey of the students in Guyana's University. The result generated from structural equation modeling demonstrated that the total impact of performance expectancy on behavioural intention is significant and positive.

2.1.3 Effort Expectancy

Effort expectancy can be described as the degree of ease in which an individual think they will obtain when utilizing a technology, also characterizing as perceived ease of use in Technology Acceptance Model (Venkatesh et al., 2003). It is found that the ease of using an information system become one of the vital determinants in accepting information system (Wu, Tao, & Yang, 2008).

According to Fadare, Babatunde, Akomolafe, and Lawal (2011), perceived ease of use has a significant relationship on the behavioural intention in adopting m-learning. 458 university students in Joseph Ayo Babalola University (JABU), Nigeria were required to open mailbox and mobile instructional materials, study them, answer questions and fill the questionnaires to investigate the factors affecting m-learning adoption on

3G mobile telecommunications. The structural equation modeling technique was employed.

Lai et al. (2013) conducted an experiment and distributed questionnaires to 160 elementary teachers to assess the feasibility and applicability of the QR codes information system. Perceived ease of use of QR codes system has a significant positive relationship with teachers' enthusiasm to use this system in future has been concluded based on the results generated from multiple regression analysis.

Abu-Al-Aish and Love (2013) have conducted questionnaires on 174 respondents at Brunel University in United Kingdom to examine the determinants that influence their intention to accept m-learning. Data was collected by adopting convenience sample technique while structural model was used. Results showed that effort expectancy affects their behavioural intention using m-learning significantly.

Research conducted by Poong (2013) also concluded that perceived ease of use positively influences behavioural intention to use m-learning among young adults in Luang Prabang in determining mobile phone usage behaviour to create awareness towards World Heritage Site. A total of 365 questionnaires were collected from students in Souphanouvong University and Northen Law College. Interviews were also implemented with faculty members. The results were generated by using multiple regression analysis.

Findings from study carried out by Cruz, Boughzala, and Assar (2014) demonstrated that effort expectancy acts as a significant predictor of m-learning among undergraduate accounting students in Mexico City by employing structural equation modeling statistical technique. Their learning styles and m-learning acceptance is examined through collection of 42 Kolb Learning Style Inventory instrument in the commencement of semester and 39 questionnaires in the middle of semester after experiencing m-learning. Data was analyzed via partial least squares (PLS).

2.1.4 Social Influence

Social influence is the degree to which how people will be influenced by the important others to use a particular technology (Venkatesh et al., 2003). It is characterized as subjective norm in Theory of Reasoned Actions (TRA) and Technology Acceptance Model 2 (TAM2) (Venkatesh et al., 2003). Thompson, Higgins, and Howell (1991) described that social influence is the individual's internalization to accept to a set of norms that have been agreed publicly and privately.

Shin, Jung, and Chang (2012) have conducted individual interviews with 10 respondents from university while survey questionnaires were distributed to 370 QR codes users in Seoul to examine on how TAM influences the behavioural intention of users to continue using QR code by incorporating interactivity and quality motivations. Structural model was conducted to analyze the relationship and it showed that subjective norms is positively related to the customers' behavioural intention to adopt QR codes.

Wang, Wu, and Wang (2009) investigated the determinants affecting the individual's intention to adopt m-learning. Sample data was collected from five organizations in Taiwan and 330 questionnaires were collected from respondents with different level of experience. Structural model was used and the results showed that social influence has a significant positive relationship on behavioural intention in using m-learning.

Tan, Ooi, Sim, and Phusavat (2012) examined the factors in TAM that influences the application of m-learning in Malaysia by integrating subjective norms and individual differences. 432 data were collected through self-administered questionnaires among students of the largest private university in Perak. Multiple regression analysis was used and the results showed that subjective norms have significant impact to the intention towards m-learning usage.

A study was conducted by Abu-Al-Aish and Love (2013) to evaluate the determinants affecting the university students' intention to adopt m-learning. 183 respondents participated in the survey questionnaires and only 174 respondents were analyzed. Structural model was conducted and lecturers' influence was found to have a significant impact on behavioral intention to adopt m-learning.

Al-Hujran et al. (2014) concluded that social influence is significantly and positively associated with behavioural intention of m-learning adoption on the basis of UTAUT. 300 questionnaires were distributed to students in Saudi Arabia and only 215 questionnaires were returned. Multiple regression analysis was applied in study to analyze data collected.

2.1.5 Facilitating Conditions

According to Venkatesh et al. (2003), facilitating conditions refer to the extent of an individual's believe that the availability of technical resources and support for accepting the new technology. It can be explained as the consumers' perspective of the resources and support feasible to conduct behaviour (Brown et al., 2005; Venkatesh et al., 2003).

Iqbal and Qureshi (2012) have conducted a research to investigate students' perceptions about the m-learning adoption. 300 questionnaires were self-delivered to the students of charted universities in twincities of Rawalpindi and Islamabad in Pakistan and only 250 questionnaires are complete and usable. Result generated from Ordinary least square regression (OLS) showed that facilitating conditions positively affects the adoption of m-learning.

According to Tajudeen, Basha, Michael, and Mukthar (2013), facilitating conditions has a positive relationship on acceptance of m-learning. 300

questionnaires were self-administered to selected undergraduate universities students to examine the determinants of m-learning among students in developing country. Only 272 questionnaires are usable and the results were analyzed with multiple regression analysis.

Jairak, Praneetpolgrang, and Mekhabunchakij (2009) concluded that facilitating conditions have a significant positive effect on behavioural intention. 400 five-point scale questionnaires were distributed to students to examine the determinants affecting the use of m-learning among the students in private and public universities of Thailand and only 390 questionnaires are usable. Multiple regression analysis was being used.

Jiin, Hao, and Yu (2012) carried out seven-point Likert scale questionnaires and electronic questionnaires to explore the public's willingness to use QR codes in the government, telecommunication carrier and business sphere in Taiwan. 305 questionnaires were distributed and only 287 questionnaires are valid. The result generated by using structural equation models concluded that facilitating conditions has significant impact on intention to use the QR codes.

Nassuora (2013) concluded that facilitating conditions does not have a positive effect on behavioural intention to adopt m-learning in the study of m-learning acceptance. 100 questionnaires were distributed to the private university students at Al-Faisal University and only 80 questionnaires are usable. The Squared Multiple Correlations test was employed in this study.

2.1.6 Hedonic Motivation

According to Brown et al. (2005), hedonic motivation is characterized as an enjoyment or fun resultant from using an information system. In non-organizational contexts, hedonic motivation was found to be a more significant factor than performance expectancy in determining behavioural

intention (Venkatesh et al., 2012). It is concerned with fun, playfulness and enjoyment in the technology adoption (Babin, Darden, & Griffin, 1994; Venkatesh et al., 2012).

Gunawardana and Ekanayaka (2009) carried out five-point Likert scale questionnaires on 210 medical representatives to evaluate the determinant affecting the intention to adopt m-learning in Sri Lanka. Simple linear regression tests were conducted and the result showed perceived playfulness has a positive relationship on the intention to adopt m-learning.

Tajudeen et al. (2013) carried out a research to study the determinants of m-learning among undergraduate students of International Islamic University Malaysia, University of Maidiguri Nigeria and Al-Hikmah University, Ilorin. 300 five-point Likert-scale questionnaires were distributed to the students and only 272 were usable in this study. Multiple regression analysis was conducted to conclude that perceived enjoyment has a positive effect on acceptance of mobile learning.

A research was carried out by Liew, Kang, Yoo, and You (2013) to examine the determinants of the acceptance of m-learning. 185 five-point Likert-scale questionnaires were distributed to the college students from two universities in Korea and only 173 were found usable in this study. Multiple regression was employed and the results showed perceived playfulness was a significant predictor of behavioral intention to use m-learning.

Wang et al. (2009) conducted seven-point Likert-scale questionnaires to examine the determinants affecting the acceptance of m-learning. A sample of 330 usable responses was obtained in five organizations of Taiwan and structural equation modelling approach was used to test against the research model. The results indicated that perceived playfulness was a significant determinant of behavioural intention to use m-learning.

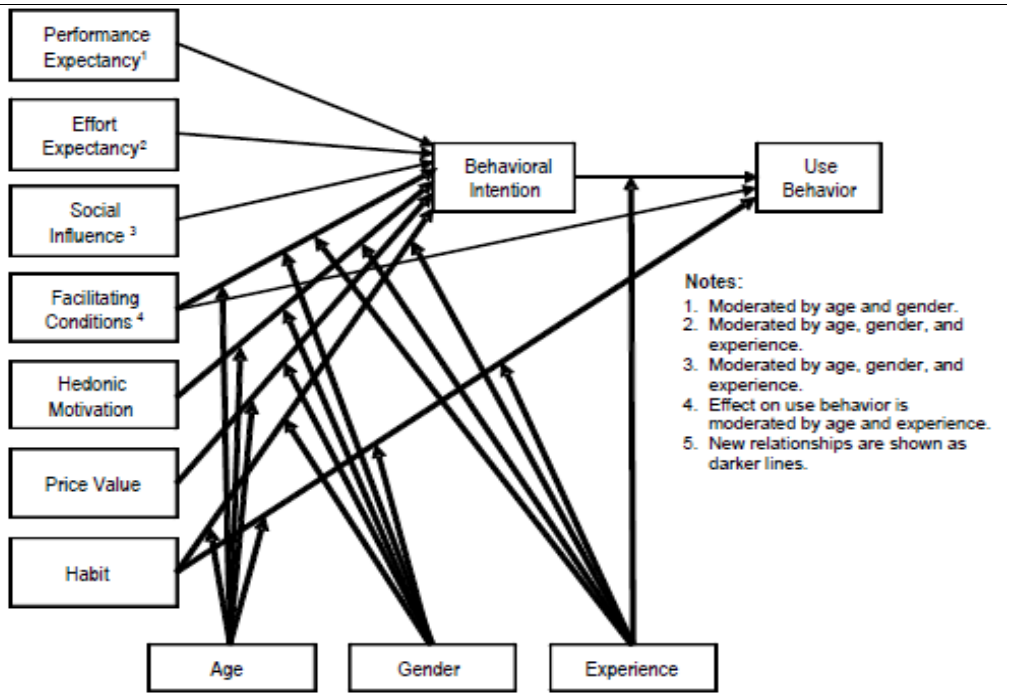
Chang (2014) conducted an experiment among 155 auto-repairing students in Taipei and New Taipei Cities to explore the usage of QR code as a social medium in searching and learning profession knowledge of auto-repairing. A final sample size of 153 was used in structural equation model to test the hypotheses. Questionnaires on degree of satisfaction for implementing QR codes were filled out after the experiment and the result showed that hedonic value and learning attitude appear obvious positive relationship.

2.2 Review of Relevant Theoretical Models

UTAUT2 model was applied in this study to examine the determinants affecting behavioural intention of using QR codes as a learning tool. UTAUT2 was developed by Venkatesh as extended model of UTAUT to investigate the acceptance of new technology in a consumer context (Venkatesh, Thong, & Xu, 2012). There are seven main constructs in UTAUT2 model as the drivers of behavioural intention to use information system, which are, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value and habit. Among the seven constructs, four constructs are originated from UTAUT model. UTAUT model was developed by condensing 32 variables across eight models that earlier researches had used to explain user acceptance of new information system (Venkatesh et al., 2003). It was the most powerful theory to measure information systems usage intention before the appearance of UTAUT2 (Abdul Rahman, Jamaludin, & Mahmud, 2011).

UTAUT2 has been used in various research areas such as air transport management which examined the online drivers purchasing behaviour of website airline tickets (Escobar-Rodr ́guez & Carvajal-Trujillo, 2013), computer and information technology areas to examine the moderating factors on behavioural intention towards Internet use (Touray, Salminen, & Mursu, 2013). This model also has been proposed in accounting and auditing areas in investigating the acceptance of Computer-Assisted-Auditing Techniques and Tools (CAATTs) in audit firms (Rosli, Yeow, & Siew, 2012).

Figure 2.1: UTAUT2 Model



Source: Adopted from Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quartely*, *36*(1), 157-178.

Figure 2.1 showed that all independent variables of UTAUT2 are associated with behavioural intention directly while facilitating conditions and habit have both direct and indirect effects on the use behaviour. The concepts of UTAUT2 will be explained in Appendix 2.1.

In this study, UTAUT2 model is employed as UTAUT2 proposed the extensions which improved the variance explained in behavioural intention of UTAUT (Venkatesh et al., 2012) while UTAUT integrates elements across the eight technology acceptance and adoption models (Venkatesh et al., 2003) and became the most powerful theory to explain information systems usage intention (Abdul Rahman et al., 2011). Nevertheless, price value and habit will be eliminated from this research due to less relevance with intention to adopt QR codes.

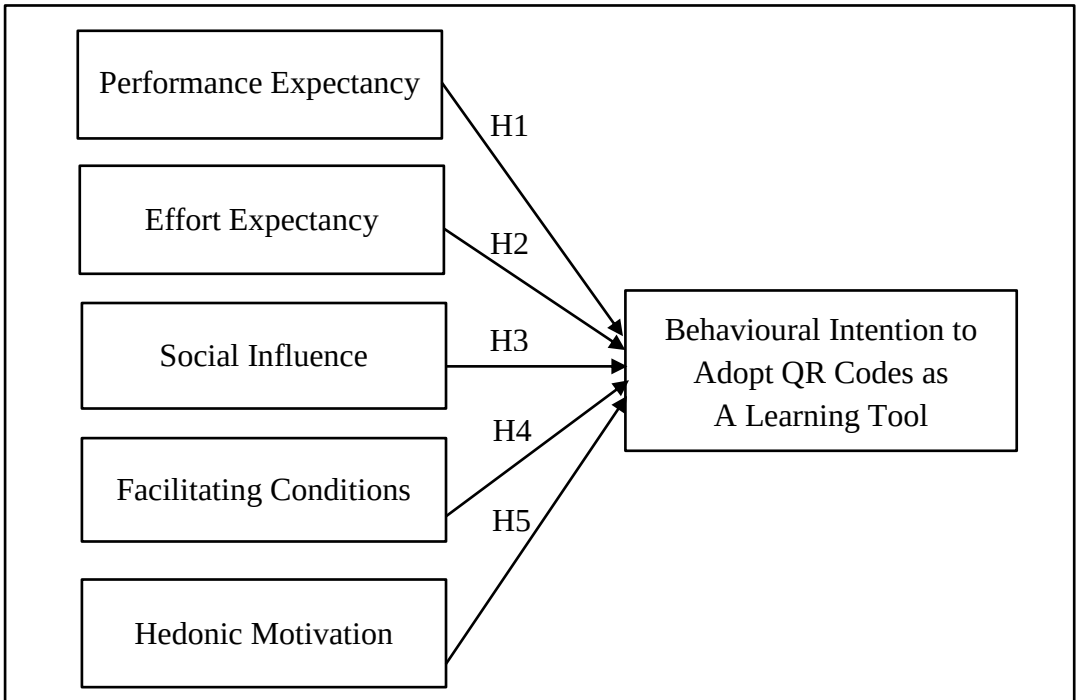
QR code readers can be downloaded at no cost and most of them can be used for free (Diazgranados & Funk, 2013; Jackson, 2011). Therefore, there is no direct cost imposed in the use of QR codes, thus price value is insignificant in this study.

The concept of habit is also excluded as experience is a necessity for the formation of habit (Venkatesh et al., 2012). This study is focused on creating awareness of QR codes among learners, thus the context of experience is not required to be investigated. Additionally, the direct impact of habit on information system use is over and above the effect of intention (Limayem et al., 2007). Past research conducted by Raman and Don (2013) showed that habit is insignificant in influencing on behavioural intention use of Learning Management System for academic purposes.

2.3 Proposed Conceptual Framework

Behavioural intention to adopt QR codes as a learning tool is dependent variable in this study, in which the variance is attempted to be explained by five independent variables.

Figure 2.2: Proposed Conceptual Framework



Source: Adapted from Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quartely, 36*(1), 157-178.

2.4 Hypotheses Development

2.4.1 Performance Expectancy

Several past studies have shown that performance expectancy has a significant positive influence on the behavioural intention to adopt m-learning (Al-Hujran et al., 2014; Thomas et al., 2013; Nassuora; 2013). It determined that the expected benefits of using m-learning such as convenience, cost and time reduction have a significant influence on students' intentions to use the system. A study which conducted by Latif et al. (2012) also showed that usefulness has significant positive impact on learners' intention to use QR codes. Based on the findings from the past studies, the hypothesis developed is as follows:

H_1: Performance expectancy has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

2.4.2 Effort Expectancy

Prior researches confirmed effort expectancy or perceived ease of use is positively associated with behavioural intention to adopt m-learning (Abu-Al-Aish & Love, 2013; Cruz et al., 2014; Poong, 2013). In the context of QR codes adoption, Lai et al. (2013) concluded that the ease of use of QR code information system is significantly and positively correlated with willingness of teachers to adopt the system. It was expected that students' perception in adopting QR codes would rely on whether or not the QR codes is easy to use. Thus, the following hypothesis is developed:

H_2: Effort expectancy has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

2.4.3 Social Influence

Based on past studies, social influence was demonstrated that it has a significant impact on the individual's intention to adopt m-learning as lecturers' acceptance toward m-learning will motivate students to use m-learning (Abu-Al-Aish & Love, 2013; Tan et al., 2012; Wang et al., 2009). Furthermore, Shin et al. (2012) also proved that subjective norms is positively associated with the customers' behavioural intention to adopt QR codes since social influence is critical in the early stage of technology use. Based on the results, the third hypothesis is developed as follow:

H_3: Social influence has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

2.4.4 Facilitating Conditions

Several researchers concluded that facilitating conditions has a positive effect on behavioural intention to use m-learning (Jairak et al., 2009; Iqbal & Qureshi, 2012; Tajudeen et al., 2013). It was revealed that, students will not move towards m-learning adoption in the absence of facilitating conditions. Similarly, facilitating conditions may also play an essential role in influencing the user's intention to use the QR codes as a learning tool. Thus, the following hypothesis is developed:

H_4: Facilitating conditions has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

2.4.5 Hedonic Motivation

Based on several past studies, perceived playfulness has been found to be a significant positive determinant of the behavioural intention to use m-learning (Gunawardana & Ekanayaka, 2009; Liew et al., 2013). Moreover, Chang (2014) also proved that there is a positive relationship between the hedonic value and learning attitude toward QR codes. It was determined that, students' learning attitude toward QR codes will be higher if they feel about the hedonic value of QR codes. Based on the findings, the hypothesis developed is as follows:

H_5: Hedonic motivation has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

2.5 Conclusion

In conclusion, proposed conceptual framework and five hypotheses were developed from the review of the past empirical studies. In the coming chapter, research methodology will be discussed thoroughly.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

An overview of methodology performed in acquiring data is provided in order to deepen understanding of readers. Research design, data collection method, variable and measurement as well as data analysis technique are discussed too.

3.1 Research Design

This research survey is proposed to investigate the relationship between performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation and behavioural intention to adopt QR codes as a learning tool. Quantitative method is used, whereby involves numerical measurement and analysis to deal with research objectives (Zikmund, Babin, Carr, & Griffin, 2012). Questionnaire is the preferred method to collect primary data as it is cost-effective, versatile as well as fast and straightforward in processing the data (Gillham, 2008; Bryman, 2008).

Cross-sectional analysis has been conducted since data in this study was collected at once and it is beneficial in determining the relationship between each variable (Saunders, Lewis, & Thornhill, 2009). Self-administered questionnaires were delivered manually to the target population which is undergraduate students of private universities in Perak State to collect data.

3.2 Data Collection Method

3.2.1 Primary Data

In this research, primary data collection method is used to collect required data. Since self-administered questionnaires were distributed to target respondents and collected back on the spot, collection of data is able to be done within a short period of time.

3.3 Sampling Design

3.3.1 Target population

Target population of this research is undergraduate students of private universities in Perak State. According to Tan et al. (2012), university students are the group that is more likely to use m-learning due to their educational background. Moreover, private universities are selected because nearly half of the undergraduates in Malaysia have enrolled in there (Jamshidi et al., 2012). Additionally, private universities also grow rapidly due to limited capacities in the existing public higher education (Arokiasamy & Nagappan, 2012).

3.3.2 Sampling Frame and Sampling Location

As there is no sampling frame available, convenience sampling is used as sampling method. Three private universities in Perak are chosen as the sampling locations which are Universiti Tunku Abdul Rahman (UTAR), Universiti Kuala Lumpur Royal College of Medicine Perak (UNIKL RCMP) and Universiti Teknologi Petronas (UTP).

3.3.3 Sampling Elements

Undergraduate students who are currently pursuing different qualifications and courses in the selected universities were sampled in this research. A more reliable result can be generated as different point of views can be collected among undergraduate students from different courses.

3.3.4 Sampling Technique

Non-probability sampling technique has been applied since the probability that a case is selected is unknown (Acharya, Prakash, Saxena, & Nigam, 2013). Convenience sampling is the most commonly used sampling method as researchers are allowed to select the most readily available respondents to participate in their studies. By using this method, cost effective and time saving can be achieved (Hair, Babin, Money, & Samouel, 2003). Furthermore, a few past studies on m-learning which focused on students were also conducted by using convenience sampling (Chambo, Laizer, Yaw, & Ndume, 2013; Nassuora, 2013; Tan, Ooi, Leong, & Lin, 2014). It shows that convenience sampling is still supported by researchers. In this study, convenience sampling is used as there is lack of reliable sampling frame (Wang et al., 2009).

3.3.5 Sampling Size

Sampling method is necessary as it is unattainable to gather all the data from the population and sampling is cost effective as well as less time consuming (White, 2002). According to Hinkin (1998), researchers must ensure that the sample size in collecting data is adequate to conduct subsequent analyses. Hinkin (1998) has described that at least 200 respondents are more conservative to adopt for the factor analysis and he also proposed the item-to-response ratios should range from 1:4 to at least

1:10 for each set of scale to be factor analyzed. There is a total of 25 items in this research and therefore a minimum 100 to 250 of sample size is needed. As a result, 300 questionnaires were distributed since large samples will be more representative of the population (Garfield, 2002).

3.4 Research Instrument

Survey approach was applied since it provides an inexpensive mean to assess information about a population (Mitchell & Jolley, 2012). A self-administered questionnaire was chosen as research instrument as it is easy to distribute to large number of people and get honest answers since target respondents are allowed to be anonymous (Mitchell & Jolley, 2012).

Self-administered questionnaires have been given to the target respondents in Perak through face-to-face method in order to increase higher response rate and quality responses (Hair et al., 2003). 300 questionnaires were distributed to the undergraduate students of three selected private universities which are UTAR, UNIKL RCMP and UTP from 19th May to 30th May 2014 and only 275 questionnaires are usable. The survey questionnaires were distributed and collected back after distributing to each target respondent for approximately 10 to 15 minutes.

Before questionnaires distributed for actual survey, pilot test was conducted to refine questionnaires and reduce the risk that the full study will be fatally flawed (Zikmund et al., 2012). 30 sets of survey questionnaires were delivered to the undergraduates in UTAR for pilot test since 20 sets of questionnaires are enough to ensure the reliability of the survey (Monette, Sullivan, & DeJong 2002).

3.5 Constructs Measurement

All independent and dependent variables in this research are measured by using items that mainly adapted from Venkatesh et al. (2012) as the proposed conceptual framework is adapted from UTAUT2 model. In order to adapt locally, minor modifications have been made.

The survey questionnaire is classified into three sections that are section A, B and C. In Section A, nominal and ordinal type questions are being used to collect demographic profile of target respondents such as gender, age, race and education. 20 questions are developed in Section B to test the five predictors and the dependent variable is tested through a total of 5 questions in Section C. 25 questions are tested by using an interval scale which range from 1=Strongly Disagree to 5=Strongly Agree in five-point Likert scale proposed by Rensis Likert. Five-point Likert scale is one of the most popular approaches to scaling because of its higher reliability with fewer items and reputed greater ease of construction (Monette, Sullivan, DeJong, & Hilton, 2013).

3.6 Data Processing

3.6.1 Data Checking

Data checking is considered as the first step of data preparation processing which aimed to detect error, completeness and the quality of the data collected. In this research, reliability test was conducted to test the reliability of data collected from pilot test.

3.6.2 Data Editing

Data editing is the process of checking the completeness, consistency and legibility of data before the data is ready for data coding process (Zikmund

et al., 2012). In order to prevent misrepresentation of data, 25 sets of questionnaires had been eradicated in this study due to the incomplete data.

3.6.3 Data Coding

Statistical Analysis System (SAS) Enterprise Guide 5.1 is used for data coding and data transcribing. In order to enter data into SAS software, data collected are required to be coded into numerical form. For example, the first answer of each question in Section A is coded as "1" while the second answer is coded as "2" and so forth. Whereas in Section B, "(1) = strongly disagree" is coded as "1", "(2) = disagree" coded as "2", and so forth. Coding makes the task to run smoother and easier compared to alphabet description.

3.6.4 Data Transcribing

The coded data has been keyed into SAS manually and transcribed by SAS for data analysis. Data entering has been conducted with due care in order to attain the completeness and accuracy of the data by diminishing the preventable human errors.

3.7 Data Analysis Techniques

3.7.1 Descriptive Analysis

The demographic profile of target respondents such as gender, age and current education level is described in this analysis. The frequency and percentage of demographic profiles are presented in form of tables and pie charts and attached with interpretations. Mean and standard deviation on all variables are also calculated. The results will be discussed in section 4.2.

3.7.2 Scale Measurement

3.7.2.1 Normality Test

Normal distribution is a common assumption to be met in statistical analysis. Therefore, skewness and kurtosis analysis are conducted to test the normality of the samples in this study. Skewness and kurtosis should be within the range of +2 to -2 to ensure the data is normally distributed (Garson, 2013). However, Hair, Celsi, Money, Samouel, and Page (2011) suggested that skewness and kurtosis should score within +1 to -1.

3.7.2.2 Reliability Test

Cronbach's alpha is worked out to estimate a multi-item scale's reliability, as reliability is important in consumer research (Iacobucci & Duhachek, 2003).

Table 3.1: Rules of Thumb about Cronbach-Alpha Coefficient Size

Strength of Association	Alpha Coefficient Range
Poor	< 0.6
Moderate	0.6 to < 0.7
Good	0.7 to < 0.8
Very Good	0.8 to < 0.9
Excellent	≥ 0.9

Source: Cronbach, L. J. (1951). Coefficient alpha and the internal structure of test. *Psychometrika*, *16*(3), 297-334.

Based on Table 3.1, alpha value that falls below 0.6 is regarded poor, while alpha value which equal and more than 0.9 is considered excellent. According to Bland and Altman (1997), alpha value of 0.70 to 0.80 is regarded as satisfactory while Zikmund et al. (2012) described that alpha value between 0.60 and 0.70 indicates as fair reliability. Hair et al. (2011) indicated that alpha value above 0.80 is very good and the independent variables can be combined to capture the dependent variable in a consistent manner.

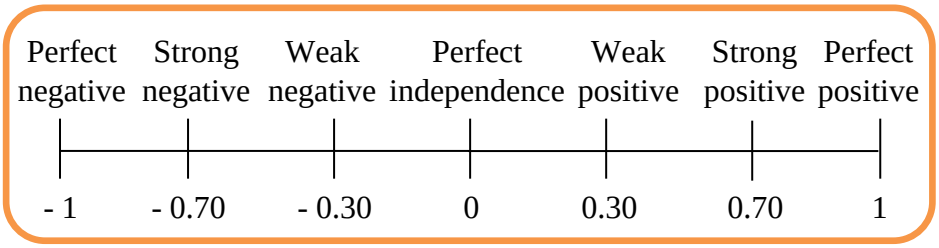
3.7.3 Inferential Analysis

Inferential analysis is conducted to generalize the results from a sample to the entire population of interest (Allua & Thompson, 2009). It assesses the strength of relationship between five predictors and dependent variable. In this study, Multicollinearity analysis, Pearson correlation analysis and multiple linear regression analysis are employed.

3.7.3.1 Pearson Correlation Analysis

Pearson correlation coefficient (r) analysis is conducted to investigate the relationship between determinants affecting behavioural intention to use QR codes as leaning tool. Pearson's correlation coefficient will vary from +1 and -1 (Kreinovich, Nguyen, & Wu, 2013). A value of +1 represents a perfect positive correlation whereas -1 represents perfect negative correlation. A correlation value close to 0 represents no association between the variables (Saunders et al., 2009).

Figure 3.1: Values of the Correlation Coefficient



Source: Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed.). Harlow, UK: Pearson Education Limited.

3.7.3.2 Multiple Linear Regression Analysis

Multiple linear regression (MLR) analysis has been used to examine the relationship between two or more predictors and dependent variable in the research model of this research (Akbarpour, Mohajeri, & Moradi, 2013). The coefficient of determination, R^2 indicates the strength of the impact of the predictors on the dependent variable. It measures on how well an independent variable explains the dependent variable. However, beta (β) represents the partial regression coefficient which depends on explanatory variables to specify the response variable.

The following multiple regression equation has been developed in this study:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where;

Y = Dependent Variable (Behavioural Intention)

X_1 = Independent Variable 1 (Performance Expectancy)

X_2 = Independent Variable 2 (Effort Expectancy)

X_3 = Independent Variable 3 (Social Influence)

X_4 = Independent Variable 4 (Facilitating Conditions)

X_5 = Independent Variable 5 (Hedonic Motivation)

ε = Error Term

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Parameters

There are four assumptions testing for multiple linear regression analysis which are linearity test, normality test, multicollinearity test and Levene test for homogeneity of variance (Saunders et al., 2009).

3.7.3.3 Multicollinearity Analysis

Multicollinearity analysis has been conducted to avoid any possible multicollinearity problem from the research model in this research. Zainodin, Noraini, and Yap (2011) stated that multicollinearity problems will occur when the independent variables are highly correlated with each other. According to Hair, Bush, and Ortinau (2006), multicollinearity problem will arise if correlation coefficient between variables is greater than 0.9. The existence of multicolinearity problems may cause the arisen of the estimation problems on multiple regression analysis (Alkan & Atakan, 2013).

3.8 Conclusion

Detailed descriptions had been discussed and justified on every method applied in research design, data collection method, variable and measurement as well as data analysis in this chapter. Following chapter will interpret the outcome of the analysis attached with diagrams and tables.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In order to interpret data collected from 275 questionnaires, Statistical Analysis System (SAS) version 5.1 was used in this study and descriptive analysis, scale measurement and inferential analysis were conducted in this chapter.

4.1 Pilot Test

A pilot test has been conducted to investigate whether the questionnaires are reliable to generate accurate results before performing actual survey. 30 sets of questionnaires were collected from the undergraduate students of Universiti Tunku Abdul Rahman. These questionnaires were analyzed through Statistical Analysis System (SAS) version 5.1 to test the variables' reliability by Cronbach's Alpha.

Table 4.1: Reliability Statistics for Pilot Test

Variable	Number of Items	Cronbach's Alpha
Performance Expectancy	4	0.848269
Effort Expectancy	4	0.709292
Social Influence	4	0.872930
Facilitating Conditions	4	0.706382
Hedonic Motivation	4	0.929440
Behavioural Intention	5	0.908709

Source: Developed for the research

Based on Table 4.1, the Cronbach's Alpha of all the variables were ranged between 0.706382 and 0.92944, which exceeded the limit of 0.7. All of the

variables are acceptable and reliable since the value of Cronbach's Alpha is above 0.7 (Hair et al., 2011).

4.2 Descriptive Analysis

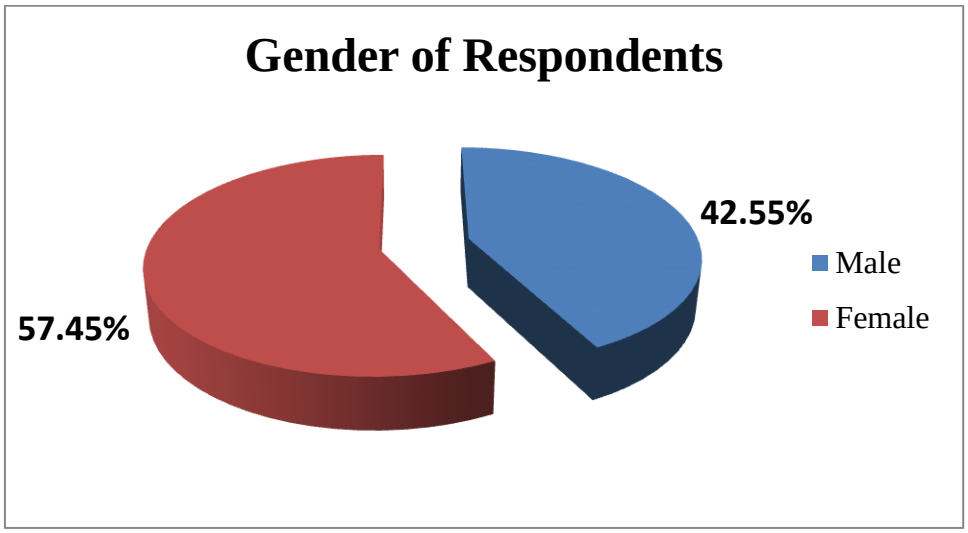
4.2.1 Demographic Profile of the Respondents

Table 4.2: Gender of the Respondents

Gender	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
Male	117	42.55	117	42.55
Female	158	57.45	275	100.00
Total	275	100.00		

Source: Developed for the research

Figure 4.1: Gender of the Respondents



Source: Developed for the research

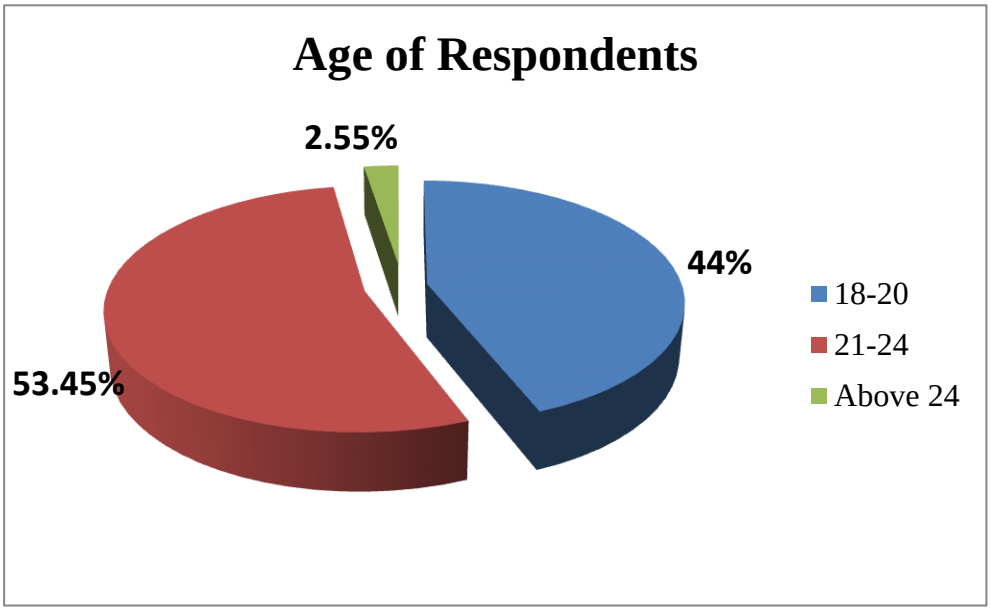
Based on Table 4.2 and Figure 4.1, out of the total of 275 respondents, 117 respondents are male with 42.55% and 158 respondents are female with 57.45%.

Table 4.3: Age of the Respondents

Age	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
18-20	121	44.00	121	44.00
21-24	147	53.45	268	97.45
Above 24	7	2.55	275	100.00
Total	275	100.00		

Source: Developed for the research

Figure 4.2: Age of the Respondents



Source: Developed for the research

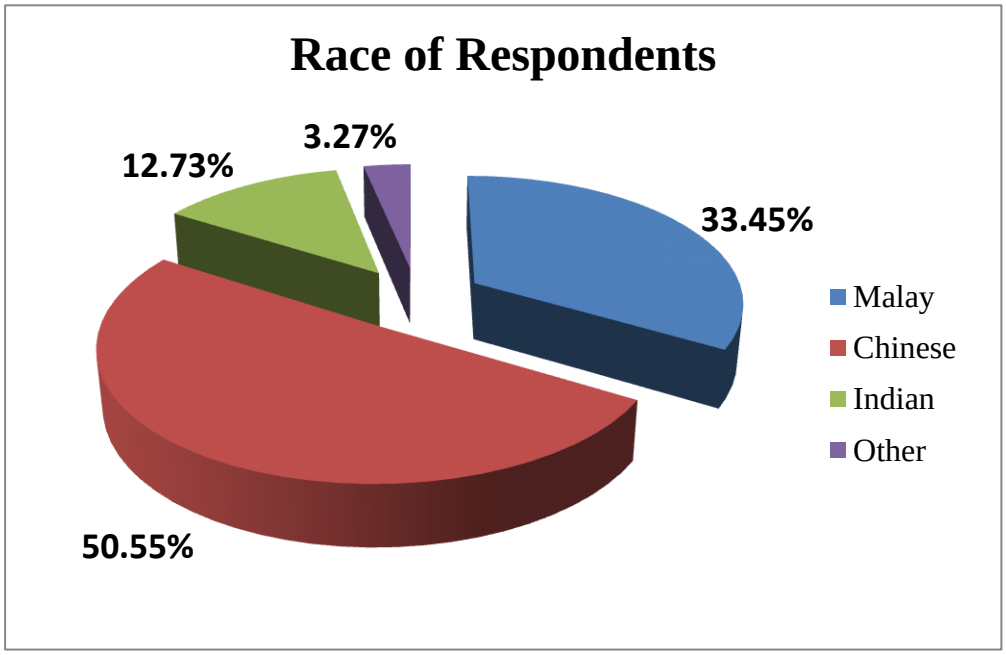
Table 4.3 and Figure 4.2 illustrate the distribution of respondents according to their age groups. Majority are in the group of age between 21 and 24 years old (53.45%) with 147 respondents. The next dominant group aged from 18 to 20 years old (44%) with 121 respondents, followed by those above 24 years old with 7 respondents (2.55%).

Table 4.4: Race of the Respondents

Race	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
Malay	92	33.45	92	33.45
Chinese	139	50.55	231	84.00
Indian	35	12.73	266	96.73
Other	9	3.27	275	100.00
Total	275	100.00		

Source: Developed for the research

Figure 4.3: Race of the Respondents



Source: Developed for the research

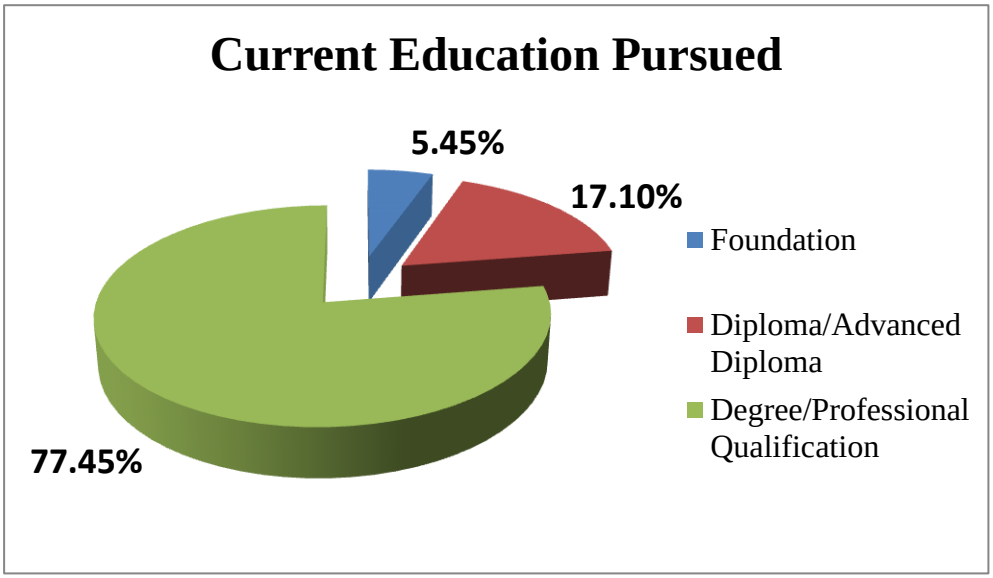
Table 4.4 and Figure 4.3 show that the respondents consist of Chinese with the highest frequency of 139 respondents (50.55%), followed by Malay with 92 respondents (33.45%) and Indian with 35 respondents (12.73%). The remaining group of 9 respondents (3.27%) constitute of different races such as Omani and Nigerian.

Table 4.5: Current Education Pursued

Education	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
Foundation	15	5.45	15	5.45
Diploma/ Advanced Diploma	47	17.10	62	22.55
Degree/Professional Qualification	213	77.45	275	100.00
Total	275	100.00		

Source: Developed for the research

Figure 4.4: Current Education Pursued



Source: Developed for the research

Table 4.5 and Figure 4.4 illustrated that majority of respondents pursue degree or professional qualification level (77.45%) where 47 respondents are pursuing diploma or advanced diploma level. Foundation comprises the least respondents as only 15 of them (5.45%) pursed it.

4.2.2 Central Tendencies Measurement of Constructs

Mean and standard deviation are important statistical measures that used to summarize the research data (Kothari, 2004). It can be calculated by using the 5-point Likert scale from "(1) = strongly disagree" to "(5) = strongly agree".

Table 4.6: Central Tendencies for Each Item in Each Variable

Variables	**Items**	**Mean (μ)**	**Standard Deviation (σ)**
Performance Expectancy (PE)	PE1	3.0727	0.9093
	PE2	3.0909	0.8770
	PE3	3.1091	0.8686
	PE4	3.0473	0.8679
Effort Expectancy (EE)	EE1	3.5600	0.9586
	EE2	3.2291	0.8808
	EE3	3.4327	0.8991
	EE4	3.3709	0.9125
Social Influence (SI)	SI1	2.8909	0.9176
	SI2	2.9491	0.8905
	SI3	3.3127	0.9224
	SI4	3.5091	0.9642
Facilitating Conditions (FC)	FC1	3.1491	0.9257
	FC2	3.2218	0.9310
	FC3	3.2509	0.8580
	FC4	3.3055	0.8678
Hedonic Motivation (HM)	HM1	3.3382	0.9272
	HM2	3.3091	0.8559
	HM3	3.3127	0.8983
	HM4	3.4436	0.9434

Behavioural Intention (BI)	BI1	3.1309	0.8656
	BI2	3.3709	0.9284
	BI3	3.1600	0.9181
	BI4	3.0400	0.9292
	BI5	3.1527	0.9582

Source: Developed for the research

From the Table 4.6, SI1 scores the lowest mean (2.8909) whereas EE1 scores the highest mean (3.5600). There are only two mean values that score in range from 2.8000 to 2.9999 which indicate that these items are more towards neutral. In contrast, most of the items score in the mean values which range from 3.0000 to 3.5999 reflected that majority of them are more towards agreed.

On the other hand, HM2 scores the lowest standard deviation (0.8559) whereas EE1 scores the highest standard deviation of 0.9586. The standard deviations of all the items are less than 1, indicating that the data points are close to the mean (Al-Saleh & Yousif, 2009).

4.3 Scale Measurement

4.3.1 Reliability Analysis

Table 4.7: Reliability Statistic

Variables	**No. of Items**	**Cronbach's Alpha**
Performance Expectancy	4	0.89688
Effort Expectancy	4	0.84082
Social Influence	4	0.83730
Facilitating Conditions	4	0.84798
Hedonic Motivation	4	0.92518
Behavioural Intention	5	0.89961

Source: Developed for the research

Table 4.2 presents the Cronbach's alpha for all the variables in this study. The range of Cronbach's alpha of the variables falls between 0.83730 and 0.92518. Hedonic motivation reflects the highest Cronbach's alpha of 0.92518, followed by behavioural intention and performance expectancy with 0.89961 and 0.89688 respectively. Whereas facilitating conditions, effort expectancy and social influence have attained Cronbach's alpha of 0.84798, 0.84082 and 0.83730 respectively. Since all the variables manage to achieve Cronbach's alpha of greater than 0.80, they are considered good and highly reliable (Hair et al., 2011). In short, they have exceeded the minimum requirement of Cronbach's alpha of 0.70 which commonly accepted by most of the researchers to indicate these variables are reliable (Hair et al., 2006).

4.3.2 Normality Test

Table 4.8: Summary of Normality Test

Variables	**Items**	**Skewness**	**Kurtosis**
Performance Expectancy	PE1	-0.26178	-0.04067
	PE2	-0.21083	0.07365
	PE3	-0.17959	0.14637
	PE4	-0.26037	0.18201
Effort Expectancy	EE1	-0.57290	0.15132
	EE2	-0.30344	-0.01467
	EE3	-0.38864	-0.06782
	EE4	-0.22216	-0.21104
Social Influence	SI1	0.10404	0.18145
	SI2	-0.08734	0.07045
	SI3	-0.37999	-0.15690
	SI4	-0.48119	-0.10528

Facilitating Conditions	FC1	-0.21756	-0.30440
	FC2	-0.40110	-0.20060
	FC3	-0.33275	0.23789
	FC4	-0.02769	-0.19079
Hedonic Motivation	HM1	-0.22421	-0.12801
	HM2	-0.35912	0.25578
	HM3	-0.32381	-0.05706
	HM4	-0.44039	0.00817
Behavioural Intention	BI1	-0.42653	0.15817
	BI2	-0.72048	0.25345
	BI3	-0.20896	-0.05883
	BI4	-0.18975	-0.14365
	BI5	-0.20998	-0.21306

Source: Developed for the research

Table 4.8 presents the results of normality test for every item of the variables by using coefficients of skewness and kurtosis. All values of skewness and kurtosis for the items are ranged between -0.57290 and 0.25578. Thus, the data are normally distributed as the results are within the absolute value of ±1 to fulfil the assumptions of multivariate model (Kreinovich et al., 2013).

4.4 Inferential Analysis

4.4.1 Pearson Correlation Coefficient Analysis

Table 4.9: Pearson Correlation

Pearson Correlation Coefficients, N = 275						
Variable	**PE**	**EE**	**SI**	**FC**	**HM**	**BI**
PE	1					
Sig.						
EE	0.65034	1				
Sig.	< .0001					
SI	0.68095	0.62773	1			
Sig.	< .0001	< .0001				
FC	0.53355	0.53953	0.48944	1		
Sig.	< .0001	< .0001	< .0001			
HM	0.55882	0.61028	0.59620	0.52730	1	
Sig.	< .0001	< .0001	< .0001	< .0001		
BI	0.63996	0.63102	0.67968	0.55591	0.68001	1
Sig.	< .0001	< .0001	< .0001	< .0001	< .0001	

Source: Developed for the research

According to Table 4.9, PE ($r = 0.63996$, $p < .0001$), EE ($r = 0.63102$, $p < .0001$), SI ($r = 0.67968$, $p < .0001$), FC ($r = 0.55591$, $p < .0001$), and HM ($r = 0.68001$, $p < .0001$) are positively correlated with BI. The relationship between HM and BI is the strongest which shows a correlation of 0.68001. Meanwhile, correlation coefficient of all the associated pairs of variables are statistically significance as the p-values are lower than 0.05.

Among the relationship between independent variables, the relationship between PE and SI is the strongest ($r = 0.68095$, $p < .0001$). In contrast, the relationship between SI and FC is the weakest ($r = 0.48944$, $p < .0001$). In conclusion, there is no multicollinearity problem since the correlations between all variables are below the level of 0.90 (Hair et al., 2006). This

research also supported that there is a significant relationship between BI and PE, EE, SI, FC and HM.

4.4.2 Multiple Linear Regressions

Multiple linear regressions analysis was carried out to evaluate the relationship between the five predictors and dependent variable. Throughout the multiple regressions analysis, the statistical significance of coefficient, nature of relationship and strength of relationship are tested.

Table 4.10: Summary of Multiple Linear Regressions Test

Model	**Unstandardized coefficients**		**T value**	**Sig. (Pr >t)**
	Beta	**Std. Error**		
(constant)	0.05672	0.15583	0.36	0.7162
Performance Expectancy	0.15034	0.05754	2.61	0.0095
Effort Expectancy	0.12078	0.05782	2.09	0.0375
Social Influence	0.27039	0.05767	4.69	<.0001
Facilitating Conditions	0.13084	0.05007	2.61	0.0095
Hedonic Motivation	0.28707	0.04936	5.82	<.0001

a. Dependent Variable: Behavioural Intention

Source: Developed for the research

Hypothesis 1

H_1: Performance expectancy has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

Table 4.10 shows that performance expectancy has a beta value of 0.15034. It indicates that performance expectancy has a positive relationship with behavioural intention. Hypothesis 1 is supported since the significant value 0.0095 is lower than 0.05.

Hypothesis 2

H_2: Effort expectancy has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

From Table 4.10, the beta value of effort expectancy is 0.12078 which indicates that effort expectancy is positively related with behavioural intention. Since its significant value 0.0375 is below 0.05, hypothesis 2 is supported with sufficient evidence.

Hypothesis 3

H_3: Social influence has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

From Table 4.10, social influence has 0.27039 beta value and <0.0001 significant value which indicates that social influence has a positive relationship on behavioural intention. Hence, hypothesis 3 is supported.

Hypothesis 4

H_4: Facilitating conditions has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

Table 4.10 shows that facilitating conditions has a beta value of 0.13084 which indicates that facilitating conditions is positively associated with behavioural intention. As the significant value 0.0095 less than 0.05, hypothesis 4 is supported.

Hypothesis 5

H_5: Hedonic motivation has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.

From Table 4.10, the beta value of hedonic motivation is 0.28707 which indicates that there is positive relationship between hedonic motivation and behavioural intention. As its significant value is at <0.0001 which is lower than 0.05, hypothesis 5 is supported with sufficient evidence.

The following equation is being created based on the results in Table 4.10.

BI = 0.05672 + 0.15034 (PE) + 0.12078 (EE) + 0.27039 (SI) + 0.13084 (FC) + 0.28707(HM)

Where,

BI = Behavioural Intention

PE = Performance Expectancy

EE = Effort Expectancy

SI = Social Influence

FC = Facilitating Conditions

HM = Hedonic Motivation

This equation indicates that all independent variables are found to have a positive relationship with the dependent variable. Among all the independent variables, HM has the strongest impact on BI where 0.28707 unit of BI will be increased when every unit factor increases in HM, provided other variables remain unchanged. It is followed by SI (β=0.27039), PE (β=0.15034), FC (β=0.13084) and EE (β=0.12078).

Table 4.11: Model Summary

Model	**R-Square**	**Adjusted R-Square**	**F Value**	**Pr > F**
5	0.6232	0.6162	89.00	<.0001

Source: Developed for the research

Based on Table 4.11, R-Square has the value of 0.6232 which implies that 62.32% of the variation in behavioural intention can be explained by all the five independent variables (PE, EE, SI, FC, HM) in this research. The remaining 36.68% of the variation would be explained by other determinants which are not taken into consideration in this research. As shown in the Table 4.11, the F Value of 89.00 is significant by a p-value of <0.0001 which is lower than 0.05. It highlighted that there is a significant influence between independent variables and dependent variable. The model for this study is good and well fit as the variation in behavioural intention is well explained by the research model.

4.5 Conclusion

All the results generated by using SAS 5.1 from the collected questionnaires in this chapter. The data analysis has been performed in the diagram and table form with the interpretation. The major findings, implications of study, limitations and recommendations for future research will be elaborated in detail in Chapter 5.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

Summary of statistical analysis, major findings discussion, implications and limitations of study are presented in this chapter. Furthermore, recommendations for the forthcoming research and a comprehensive conclusion of the entire research study are provided.

5.1 Summary of Statistical Analysis

5.1.1 Summary of Descriptive Analysis

Table 5.1 Summary of Demographic Profile

Profile	Category	Frequency	Percentage
Gender	Male	117	42.55
	Female	158	57.45
Age	18-20	121	44.00
	21-24	147	53.45
	Above 24	7	2.55
Race	Malay	92	33.45
	Chinese	139	50.55
	Indian	35	12.73
	Other	9	3.27
Current Education Pursued	Foundation	15	5.45
	Diploma/Advanced Diploma	47	17.10
	Degree/Professional Qualification	213	77.45

Source: Developed for the research

Table 5.1 illustrates the demographic profile of the target respondents. The total respondents of this research are 275. Majority with 158 respondents are female (57.45%) and the remaining 117 respondents are male (42.55%). Besides, data collection exhibits that most of the respondents aged from 21 to 24 (53.45%), followed by 18 to 20 (44.00%) and above 24 (2.55%). The largest ethnic group taken part is Chinese (50.55%), followed by Malay (33.45%), Indian (12.73%) and other races (3.27%). Majority of the respondents is pursuing degree or professional qualification (77.45%) and minority of the respondents is from foundation (5.45%). The remaining respondents are pursuing diploma or advanced diploma (17.10%).

5.1.2 Central Tendencies Measurement of Constructs

Table 5.2: Summary of Central Tendencies Measurement of Constructs

Variables	**Average Mean**	**Average Standard Deviation**
Performance Expectancy	3.08000	0.76979
Effort Expectancy	3.39818	0.75127
Social Influence	3.16545	0.75750
Facilitating Conditions	3.23182	0.74275
Hedonic Motivation	3.35091	0.81950
Behavioural Intention	3.17091	0.77744

Source: Developed for the research

Based on Table 5.2, effort expectancy has the highest average mean and performance expectancy has the lowest average mean. Meanwhile, variable with highest average standard deviation is hedonic motivation whereas facilitating conditions has the lowest average standard deviation.

5.1.3 Scale Measurement

Table 5.3: Reliability Statistic

Variables	No. of Items	Cronbach's Alpha
Performance Expectancy	4	0.89688
Effort Expectancy	4	0.84082
Social Influence	4	0.83730
Facilitating Conditions	4	0.84798
Hedonic Motivation	4	0.92518
Behavioural Intention	5	0.89961

Source: Developed for the research

Table 5.3 shows the result of reliability test of this study. Among all the variables, hedonic motivation contains the highest reliability with Cronbach's Alpha of 0.92518 while social influence scores the lowest value of 0.83730. In overall, all variables are deemed to be good and highly reliable as the Cronbach's Alpha of each variable exceed 0.8 (Nunnally & Bernstein, 1994).

Table 5.4: Summary of Normality Test

Variables	Average Skewness	Average Kurtosis
Performance Expectancy	-0.48621	0.49282
Effort Expectancy	-0.61912	0.53688
Social Influence	-0.38646	0.77351
Facilitating Conditions	-0.42004	0.70416
Hedonic Motivation	-0.47514	0.41716
Behavioural Intention	-0.58451	0.47331

Source: Developed for the research

Table 5.4 presents the results of average skewness and kurtosis. All of the variables in this study have negative skewness which means that the data points are skewed to the left. Meanwhile, all of the variables are having positive kurtosis which indicates that the distribution is relatively peaked. In

conclusion, the data is normal distributed as skewness and kurtosis are within the range of +1 to -1 (Sit et al., 2009).

5.1.4 Summary of Inferential Analysis

Table 5.5: Summary of Inferential Analysis

Hypotheses	**Pearson Correlation**	**Multiple Linear Regression (R-Square = 0.6232)**		
	Result	**Beta**	**P-value**	**Hypothesis**
H_1: Performance expectancy has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.	0.63996	0.15034	0.0095	Supported
H_2: Effort expectancy has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.	0.63102	0.12078	0.0375	Supported
H_3: Social influence has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.	0.67968	0.27039	<.0001	Supported
H_4: Facilitating conditions has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.	0.55591	0.13084	0.0095	Supported
H_5: Hedonic motivation has a positive relationship on the behavioural intention to adopt QR codes as a learning tool.	0.68001	0.28707	<.0001	Supported

Source: Developed for the research

According to Table 5.5, result of Pearson Correlation illustrates that all independent variables (PE, EE, SI, FC and HM) are positively and moderately associated with dependent variable (BI). Additionally, there is no multicollinearity problem as the correlations between the variables are below the level of 0.90 (Hair et al., 2006). The p-value for all independent variables is less than 0.05, which indicates that all independent variables are significantly influence the dependent variable. Hence, all developed hypotheses are supported. Besides, the R-square of 0.6263 from Multiple Linear Regression test indicates that 62.63% of the dependent variable can be explained by the five independent variables.

Based on the outcomes, the equation is being created as:

BI = 0.05672 + 0.15034 (PE) + 0.12078 (EE) + 0.27039 (SI) + 0.13084 (FC) + 0.28707(HM)

The above mentioned equation shows that hedonic motivation (β = 0.28707) is the most effective factor while effort expectancy (β = 0.12078) is discovered as the least effective factor. All the independent variables have significant positive relationship with the dependent variable.

5.2 Discussion of Major Findings

5.2.1 The relationship between Performance Expectancy and Behavioural Intention of Adopting QR Codes as a Learning Tool

Based on the results of previous chapter, performance expectancy is found to be positively related with the behavioural intention to adopt QR codes as a learning tool by achieving a significant value of p-value < 0.05. This result is in line with the past study of Latif et al. (2012) which concluded that usefulness has significant positive impact on learners' intention to continue using QR codes for learning. Performance expectancy shows a positive

relationship as QR codes render greater mobility in learning and it may help to improve the learning performance of the students. Students will tend to use QR codes as a learning tool when they find QR codes are useful to their studies.

Additionally, this finding is congruent with the past studies by Al-Hujran et al. (2014), Nassuora (2013) and Thomas et al. (2013) which found that performance expectancy has positive effect on behavioural intention to use m-learning. Students are more willing to use m-learning as well as QR codes as their learning tool when they perceive that the technology can help to improve their academic performance. The characteristic of QR codes such as convenient, quick and efficient allow learning to be more flexible and portable. It causes students' intention to use QR codes as a learning tool.

The findings of this research are further consistent with Jambulingam (2013). According to Jambulingam (2013), the mobility of the mobile technology and its perceived usefulness significantly influence user intention to employ m-learning. As QR codes render greater mobility in learning, the result of this research also indicates that performance expectancy positively influence the QR codes as learning tool.

5.2.2 The relationship between Effort Expectancy and Behavioural Intention of Adopting QR Codes as a Learning Tool

The results in this research found that effort expectancy has a positive relationship on the behavioural intention to use QR codes as a learning tool. It is consistent with the past study conducted by Lai et al. (2013) which indicated that the perceived ease of use of the information system has a positive correlation with the willingness of the teachers in adopting the QR code system in the future. In this context of study, this relationship presented that the respondents lacked of experience in using QR codes as a

learning tool. This is because QR codes are still in infant stage and its adoption in learning is low in Malaysia (Latif et al., 2012). The research done by Venkatesh et al. (2003) also claimed that the effort expectancy will be a factor of behavioural intention to use particularly towards those users with little experience in utilizing information technology.

The results is also congruent with the past studies (Fadare et al., 2011; Abu-Al-Aish & Love, 2013) which confirmed the perceived ease of use and effort expectancy influences the behavioural intention in adopting m-learning significantly. These results in past studies show that the students felt the m-learning is easy to use and will not require abundant instructions on how to use it. In this study, majority of respondents also think that handling on how to use QR codes as a learning tool are easy, clear and understandable. They find QR codes are flexible and easy to use. Thus, this provides an indicator to the QR codes implementer especially in education sector to provide education by using QR codes as a learning tool.

5.2.3 The relationship between Social Influence and Behavioural Intention of Adopting QR Codes as a Learning Tool

According to the results illustrated, it indicates that social influence has a positive relationship on behavioural intention in adopting QR codes as a learning tool. This finding is corroborated by the results from past researches on m-learning (Wang et al, 2009; Tan et al., 2012) which revealed that social influence in form of subjective norm had a significant positive impact on behavioural intention in using m-learning.

Abu-Al-Aish and Love (2013) illustrated that lecturers play a vital role in influencing students to apply new technologies in learning system such as m-learning. More willingness would be given by the students in adopting m-learning when it is motivated by lecturers. Past study of Wang et al. (2009)

further explained that m-learning users may begin to convince others to adopt m-learning system when they are getting familiar with the system. In short, students are more willing to use new technology such as QR codes in their learning if they are encouraged by others.

In addition, this result is also consistent with the result from a past research relating to customers' behavioural intention to use QR codes (Shin et al., 2012). According to Ertekin and Pelton (2014), consumers are influenced by social factors when they are using QR codes. As QR codes are still new to consumers in general, social influence may act an important role in encouraging consumers to use QR codes. Similarly, social influence also significant in influencing behavioural intention of using QR codes as a learning tool as QR codes are still new to the students.

5.2.4 The relationship between Facilitating Conditions and Behavioural Intention of Adopting QR Codes as a Learning Tool

Facilitating conditions has a significant value of $p<0.05$ which supported the statement of facilitating conditions is positively related with behavioural intention to use QR codes as a learning tool. This result is in line with several past studies which had proved that facilitating conditions has a positive relationship on the behavioural intention to adopt m-learning (Iqbal & Qureshi, 2012; Jairak et al., 2009; Tajudeen et al., 2013). Facilitating conditions such as hardware, software, and Internet speed are very important for m-learning adoption. In the absence of facilitating conditions, students will not move towards m-learning adoption.

Furthermore, this finding aligns with Jiin et al. (2012) who concluded that facilitating conditions has significant relationship on the intention to adopt the QR codes. With the ubiquity growth of mobile devices, mobile phones are capable to read QR codes. The software of QR codes is freely available

and its applications can be downloaded easily from internet. These developments have contributed to the growing of QR codes and it affected the behavioural intention to adopt QR codes as a learning tool.

5.2.5 The relationship between Hedonic Motivation and Behavioural Intention of Adopting QR Codes as a Learning Tool

Hedonic motivation is found to have the strongest relationship with the behavioural intention to adopt QR codes as a learning tool. This finding is in line with the result of Liew et al. (2013) which reported that perceived playfulness is the strongest predictor of m-learning acceptance.

Hedonic characteristics of digital learning system play a significant role in affecting behavioral intention to adopt it since individuals who experience enjoyment from using a technology are more likely to use it extensively (Wang et al., 2009). Several past studies concluded that perceived playfulness has a positive relationship on behavioural intention to adopt m-learning (Gunawardana & Ekanayaka, 2009; Wang et al., 2009). This result may due to the factor that m-learning system is enjoyable to be used.

Additionally, the result of this study is also congruent with Chang (2014) who concluded hedonic value of QR codes and learning attitude for QR codes have a positive relationship. Students will learn QR codes and intend to use it when they feel about the hedonic value of QR codes as scanning an interesting looking tiny square is an exciting way to obtain information. As a conclusion, hedonic motivation is an important determinant towards the behavioural intention to adopt QR codes and hence it has the strongest relationship among all the independent variables.

5.3 Implications of the Study

5.3.1 Managerial Implications

This research provides an in depth study on the determinants affecting behavioural intention to adopt QR codes as a learning tool among undergraduate students of private universities in Perak State. It benefits the educators, administrators and managements of private universities since digital learning has become a key attribute of the future education systems. By using this research as a source of reference, the educators, administrators and managements of private universities are able to understand which features of QR codes are crucial throughout the students' learning process. In addition, this research also provides information about a new technological and innovative teaching method which is using QR codes as a pedagogical tool to the universities. The initiative of educators in using QR codes as their teaching tools is one of the important determinants in affecting students' intention to adopt it. With the increase popularity of QR codes, it is possible to implement QR codes as a learning tool since students' intention towards it is relatively high.

5.3.2 Theoretical Implications

This study has validated the modified version of UTAUT2 model for the QR codes in educational context. The results indicated that 62.32% of the variance in behavioural intention is jointly explained by all the five independent variables (performance expectancy, effort expectancy, social influence, facilitating conditions and hedonic motivation). All the hypotheses are supported. It has further served as a foundation and thus provided a valuable contribution in UTAUT2 to understand the behavioural intention of the undergraduate students of private universities towards QR codes as a learning tool specifically in Perak, Malaysia. Additionally, it has become one of the first few empirical studies using UTAUT2 model to

examine the drivers influencing the students' behavioural intention to adopt QR codes as a learning tool in Malaysia.

5.4 Limitations of the Study

Some limitations are existed in the path of completing this research. Firstly, target population of this research is only focused on undergraduate students of private universities in Perak State. The samples chosen are not able to represent the views of all undergraduate students in Perak as well as in Malaysia. Additionally, more female respondents participated in this research and it may cause the existence of over representative of female group. Consequently, a more insightful analysis between different groups with different demographic factors cannot be obtained. As a result, the data obtained from this research may not be generalized.

Secondly, data of this research were collected through the closed questions structure of questionnaires. Participants are limited to the "suggested answers" and they are unable to express their real opinions in the questionnaires. Thus, some participants may answer the questionnaires superficially and it may cause the data gathered from the questionnaires lack of validity.

Thirdly, this research only focused on five independent variables and the findings showed that the selected variables were only capable to describe 62.32% of the behavioural intention to use the QR codes as a learning tool. This indicates that there is a limitation in selecting variables to explain the determinants.

Lastly, this research is a cross-sectional study which only investigated a specific phenomenon at a particular time (Saunders et al., 2009). The findings generated might be pointless as the nature of the human will always change from time to time.

5.5 Recommendations of Future Research

In future researches, there are necessities to collect data from samples which include other geographical areas rather than focus solely on Perak State. Balancing the number of male and female participants is also important in future researches in order to prevent over representative of one of these groups. Through these ways, the findings would be generalized and achieve a more comprehensive coverage.

Secondly, future researchers could collect data through different methods such as interviewing. Through conducting interviews with respondents, interviewers able to explain questions set in questionnaires. Detailed information about personal views and feelings could be obtained and this will increase the likelihood of useful responses. In addition, open questions should be set in questionnaires in order to obtain more detailed answers and enable participants to express themselves freely.

Thirdly, it is recommended that the future researchers could incorporate more determinants to improve the explanatory of the behavioural intention to adopt QR codes as a learning tool. There are many other factors that may affect the behavioral intention such as self-efficacy and personal innovativeness. By incorporating additional factors, the findings of the research might be strengthened.

Lastly, longitudinal study approach is strongly recommended to the future researchers as data collected in the longitudinal study may give a valuable data and powerful insight into developments in respondents' behaviour change over a period (Saunders et al., 2009). The result will be more precise if the behaviour of pre and post-using QR codes as a learning tool were examined.

5.6 Conclusion

With the ubiquity growth of mobile devices, the implementation of QR codes has offered a new dimension in education. It is important to study in depth in all aspects of QR codes since QR codes is believed to become an excellent educational tool for future teaching and learning processes.

The five independent variables which are performance expectancy, effort expectancy, social influence, facilitating conditions and hedonic motivation were tested in this research. All independent variables were found to have a positive relationship on the behavioural intention to adopt QR codes as a learning tool among undergraduate students of private universities in Perak State. This research may contribute to create awareness and to broaden the knowledge for the education industry to understand students' intention towards QR codes. Through the findings of this research, the educators, administrators and managements of private universities are able to understand the determinants that influence students' intention before investing in and implementing QR codes as learning tool. Additionally, it will also help them to develop a better user accepted digital learning systems to students.

In conclusion, this research can be used as future reference for supporting the development of QR codes as a learning tool.

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Appendix 2.1: Definition of Independent Variables and Dependent Variable

Variable	*Definition*	*References*
Performance Expectancy (PE)	The degree to which an individual believes that using the system will help him or her to attain gains in job performance.	Venkatesh, Thong, & Xu, 2012
Effort Expectancy (EE)	The degree of ease associated with the use of the system.	Venkatesh, Thong, & Xu, 2012
Social Influence (SI)	The degree to which an individual perceives that important others believe he or she should use the new system.	Venkatesh, Thong, & Xu, 2012
Facilitating Conditions (FC)	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.	Venkatesh, Thong, & Xu, 2012
Hedonic Motivation (HM)	The enjoyment and playfulness derived from using a technology, and it has been shown to play an important role in determining new technology adoption.	Brown & Venkatesh, 2005
Behavioural Intention (BI)	A person's subjective probability that he will perform some behaviour.	Fishbein & Azjen, 1975

Appendix 2.2: Summary of Past Empirical Studies on PE and BI

Performance Expectancy (PE)

Study	*Country*	*Data*	*Major Findings*
Al-Hujran, Al-Lozi, & Al-Debei, 2014	Saudi Arabia	Five-point Likert scale questionnaires of 215 undergraduate and postgraduate students of Al-Faisal University.	Performance expectancy has a significant positive influence on the behavioural intention to adopt m-learning.
Nassuora, 2013	Saudi Arabia	Survey questionnaires of 80 students at Al-Faisal University.	Performance expectancy has positive influence on behavioural intention to use m-learning.
Latif, Fadzil, Munira, & Ng, 2012	Malaysia	Generating QR codes, decoding QR codes and collecting data through a cross-sectional survey of 62 learners of Open University Malaysia (OUM).	Usefulness and satisfaction have significant impact on learners' intention to continue using QR codes.
Jambulingam , 2013	Malaysia	Five-point Likert scale questionnaires of 351 undergraduate students of private universities in Kuala Lumpur and Selangor.	Performance expectancy is the strongest positive predictor of Mobile Technology in Learning Environment (MTLE).
Thomas, Singh, & Gaffar, 2013	Guyana	Five-point Likert scale questionnaires of 322 higher education students of Universitiy of Guyana.	Effect of performance expectancy on behavioural intention is significant and positive.

Appendix 2.3: Summary of Past Empirical Studies on EE and BI

Effort Expectancy (EE)

Study	*Country*	*Data*	*Major Findings*
Fadare, Babatunde, Akomolafe, & Lawal, 2011	Nigeria	Experiment and survey questionnaires of 458 university students in Joseph Ayo Babalola University (JABU).	Perceived ease of use has a significant influence on the behavioural intention in adopting m-learning.
Lai, Chang, Li, Fan, & Wu, 2013	Taiwan	Experiment and survey questionnaires of 160 elementary teachers.	Perceived ease of use of QR codes learning system has a significant positive correlation with teachers' willingness to adopt the system.
Abu-Al-Aish & Love, 2013	United Kingdom	Survey questionnaires of 174 respondents at Brunel University in United Kingdom.	Effort expectancy affects behavioural intention of using m-learning significantly.
Poong, 2013	Japan	365 questionnaires were collected from Souphanouvong University and Northen Law College students, and interviews were conducted with faculty members.	Perceived ease of use positively influences behavioural intention to use m-learning among young adults in Luang Prabang.
Cruz, Boughzala, & Assar, 2014	Mexico & France	42 Kolb Learning Style Inventory instrument in the commencement of semester and 39 questionnaires in the middle of semester.	Effort expectancy acts as a significant predictor of m-learning among undergraduate accounting students in Mexico city.

Appendix 2.4: Summary of Past Empirical Studies on SI and BI

Social Influence (SI)

Study	*Country*	*Data*	*Major Findings*
Shin, Jung, & Chang, 2012	Korea	Individual interviews and questionnaire survey of 370 QR codes users in Seoul.	Customer behaviour with QR codes is positively influenced by subjective norm.
Wang, Wu, & Wang, 2009	Taiwan	Questionnaire survey of 330 respondents with different levels of computer and internet experience from five organizations.	Social influence had a significant positive effect on the behavioural intention to use m-learning.
Tan, Ooi, Sim, & Phusavat, 2012	Malaysia & Thailand	Questionnaire survey of 432 university students with mobile devices from one of the largest universities in Perak.	Subjective norms have a positive effect on the behavioural intention to adopt m-learning.
Abu-Al-Aish & Love, 2013	United Kingdom	Survey questionnaires of 174 respondents at Brunel University in United Kingdom.	Social influence affects behavioural intention of using m-learning significantly.
Al-Hujran, Al-Lozi, & Al-Debei, 2014	Saudi Arabia	Five-point Likert scale questionnaires of 215 undergraduate and postgraduate students of Al-Faisal University.	Social influence has a significant positive influence on the behavioural intention to adopt m-learning.

Appendix 2.5: Summary of Past Empirical Studies on FC and BI

Facilitating Conditions (FC)

Study	*Country*	*Data*	*Major Findings*
Iqbal & Qureshi, 2012	Pakistan	Survey questionnaires of 250 students of charted universities in twincities of Rawalpindi and Islamabad in Pakistan.	Facilitating conditions positively affects the adoption of m-learning.
Tajudeen, Basha, Micheal, & Mukthar, 2013	Malaysia & Nigeria	Five-point Likert-scale questionnaires of 272 undergraduate students of International Islamic University Malaysia, University of Maidiguri Nigeria and Al-Hikmah University, Ilorin.	Facilitating conditions has a positive influence on acceptance of mobile devices for learning purpose.
Jairak, Praneetpol-grang, & Mekhabun-chakij, 2009	Thailand	Survey questionnaires of 390 students in public and private universities of Thailand.	Facilitating conditions has a significant positive relationship with behavioural intention.
Jiin, Hao, & Yu, 2012	Taiwan	Total of 287 Seven - point Likert scale questionnaires and electronic questionnaires were collected in Taiwan.	Facilitating conditions has significant influencing on intention to use QR codes.
Nassuora, 2013	Saudi Arabia	Survey questionnaires of 80 students at Al-Faisal University.	Facilitating conditions does not show positive influence on behavioural intention to use m-learning.

Appendix 2.6: Summary of Past Empirical Studies on HM and BI

Hedonic Motivation (HM)

Study	*Country*	*Data*	*Major Findings*
Gunawardana & Ekanayaka, 2009	Sri Lanka	Five-point Likert scale questionnaires of 210 medical representatives.	There is a strong positive relationship between perceived playfulness and intention to use m-learning.
Tajudeen, Basha, Micheal, & Mukthar, 2013	Malaysia & Nigeria	Five-point Likert-scale questionnaires of 272 undergraduate students of International Islamic University Malaysia, University of Maidiguri Nigeria and Al-Hikmah University, Ilorin.	Perceived enjoyment has a positive influence on acceptance of mobile devices for learning.
Liew, Kang, Yoo, & You, 2013	South Korea	173 Five-point Likert scale questionnaires collected from two universities in Korea.	Perceived playfulness was a significant predictor of behavioural intention to use m-learning.
Wang, Wu, & Wang, 2009	Taiwan	330 questionnaires on different levels of computer and internet experience from five organizations.	Perceived playfulness was a significant determinant of behavioural intention to use m-learning.
Chang, 2014	Taiwan	Experiment on among auto-repairing students in Taipei and New Taipei Cities, 153 questionnaires on degree of satisfaction for implementing QR codes.	Hedonic value and learning attitude appear obvious positive relationship.

Appendix 3.1: Sources of Independent Variables and Dependent Variable

Variable	*Item*	*Description*	*References*	*Measure-ment*
Performance Expectancy (PE)	PE1	I would find QR codes as a learning tool useful for my studies.	Venkatesh, Thong, & Xu, 2012	Five-point Likert scale
	PE2	Using QR codes as a learning tool increases my chances of achieving things that are important to me.		
	PE3	Using QR codes as a learning tool enables me to accomplish learning tasks more quickly.		
	PE4	Using QR codes as learning tool in my studying increases my learning productivity.		
Effort Expectancy (EE)	EE1	Learning how to use QR codes as a learning tool is easy for me.	Venkatesh, Thong, & Xu, 2012	Five-point Likert scale
	EE2	My interaction with QR codes as a learning tool would be clear and understandable.		
	EE3	I would find QR codes flexible and easy to use.		
	EE4	It would not be easy for me to become skillful at using QR codes.		

Variable	*Item*	*Description*	*References*	*Measure-ment*
Social Influence (SI)	SI1	People who are important to me will think that I should use QR codes as a learning tool.	Venkatesh, Thong, & Xu, 2012	Five-point Likert scale
	SI2	People who influence my behaviour will think that I should use QR codes as a learning tool.		
	SI3	I would use QR codes as a learning tool if it was recommended to me by my friends.		
	SI4	I would like to use QR codes as a learning tool if my lecturers' supported the use of it.	Abu-Al-Aish & Love, 2013	
Facilitating Conditions (FC)	FC1	I have the resources necessary to use QR codes as a learning tool.	Venkatesh, Thong, & Xu, 2012	Five-point Likert scale
	FC2	I have the knowledge necessary to use QR codes as a learning tool.		
	FC3	QR codes as a learning tool is compatible with other technologies I use.		
	FC4	I can get help from others when I have difficulties using QR codes as a learning tool.		

Variable	*Item*	*Description*	*References*	*Measure-ment*
Hedonic Motivation (HM)	HM1	Using QR codes as a learning tool is fun.	Venkatesh, Thong, & Xu, 2012	Five-point Likert scale
	HM2	Using QR codes as a learning tool is enjoyable.		
	HM3	Using QR codes as a learning tool is very entertaining.		
	HM4	Using QR codes as a learning tool is very interesting.	Ryu & Murdock, 2013	
Behavioural Intention (BI)	BI1	I intend to use QR codes as a learning tool in my studies.	Abu-Al-Aish & Love, 2013	Five-point Likert scale
	BI2	I predict I would use QR codes as a learning tool in the future.	Venkatesh, Thong, & Xu, 2012	
	BI3	I will always try to use QR codes as a learning tool in my studies.		
	BI4	I plan to use QR codes as learning tools in my studies frequently		
	BI5	I intend to recommend others to use QR codes as a learning tool.	Abu-Al-Aish & Love, 2013	

Appendix 3.2: Permission Letter

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

2nd April 2014

To Whom It May Concern

Dear Sir/Madam

Permission to Conduct Survey

This is to confirm that the following students are currently pursuing their *Bachelor of Commerce (HONS) Accounting* program at the Faculty of Business and Finance, Universiti Tunku Abdul Rahman (UTAR) Perak Campus.

I would be most grateful if you could assist them by allowing them to conduct their research at your institution. All information collected will be kept confidential and used only for academic purposes.

The students are as follows:

Name of Student	Student ID
CHOOI WING JING	11ABB06460
CHOOI WING YUE	12ABB02663
LEE SIEW HWA	11ABB06458
NG SOK KUAN	11ABB06699
NG WAN SHIN	11ABB06509

If you need further verification, please do not hesitate to contact me.

Thank you.

Yours sincerely

Mr Fong Choong Ee
Head of Department,
Faculty of Business and Finance
Email: fongce@utar.edu.my

Dr Krishna Moorthy Manicka Nadar
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Faculty of Business and Finance
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Tel: (603) 7958 2628 Fax: (603) 7956 1923 Homepage: http://www.utar.edu.my

Appendix 3.3: Questionnaire

UNIVERSITI TUNKU ABDUL RAHMAN
FACULTY OF BUSINESS AND FINANCE

BACHELOR OF COMMERCE (Hons) ACCOUNTING
FINAL YEAR PROJECT

Determinants Affecting Behavioural Intention of Using QR Codes As A Learning Tool

Survey Questionnaire

Dear respondent,

We are final year undergraduate students of Bachelor of Commerce (Hons) Accounting, from UniversitiTunku Abdul Rahman (UTAR). The purpose of this survey is to examine determinants affecting adoption level of QR codes as a learning tool among Private University Undergraduate Students in Perak state. Please answer all questions to the best of your knowledge. All responses are completely confidential and used for academic purpose only.

Thank you for your participation.

QR Code

Instructions:

1) There are **THREE (3)** sections in this questionnaire. Please answer ALL questions in ALL sections.

2) This will only take you approximately 10 to 15 minutes.

3) The contents of this questionnaire will be kept **strictly confidential**.

Section A: Demographic Profile

In this section, we are interested on your background in brief. Please tick "√" your answer and your answers will be kept strictly confidential.

Q1) Gender
- □ Male
- □ Female

Q2) Age
- □ 18 - 21
- □ 21 - 24
- □ Above24

Q3) Race
- □ Malay
- □ Chinese
- □ Indian
- □ Other: _____

Q4) Current education pursued:
- □ Diploma / Advanced Diploma
- □ Degree / Professional Qualification

Q5) Do you have a mobile device? (Eg: Tablet or Smartphone)
- □ Yes
- □ No

Q6) Do you bring your mobile device to every class?
- □ Yes
- □ No

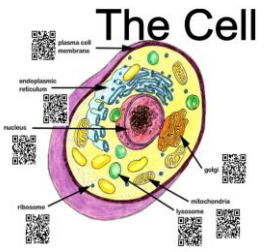
Q7) Have you seen QR codes before?
- □ Yes
- □ No

Q8) If you have seen a QR code, have you ever scanned one?
- □ Yes
- □ No

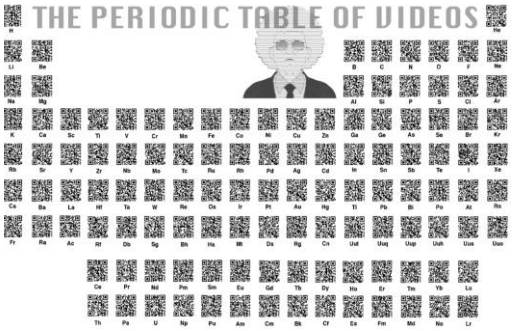
Q9) How often do you scan QR codes?
- □ Daily
- □ 2 to 4 days once
- □ 5 to 6 days once
- □ Weekly
- □ Monthly
- □ Seldom
- □ Never

Examples of QR Codes in Education

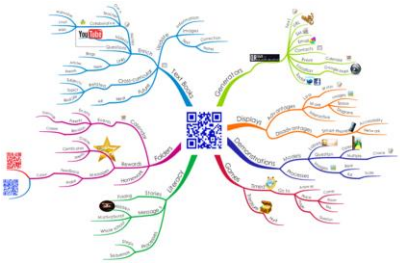
(a) Biology



(b) Chemistry



(c) ICT Mind Map



(d) English

(e) Treasure Hunt Game

Scan it!

Section B

This section is seeking your opinion regarding the importance of different types of determinants. Respondents are asked to indicate the extent to which they agreed or disagreed with each statement using 5-point Likert scale [(1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree and (5) = strongly agree] response framework. Please choose one number per line to indicate the extent to which you agree or disagree with the following statements.

No	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Performance Expectancy (PE)					
PE1	I would find QR codes as a learning tool useful for my studies.	1	2	3	4	5
PE2	Using QR codes as a learning tool increases my chances of achieving things that are important to me.	1	2	3	4	5
PE3	Using QR codes as a learning tool enables me to accomplish learning tasks more quickly.	1	2	3	4	5
PE4	Using QR codes as learning tool in my studying increases my learning productivity.	1	2	3	4	5
	Effort Expectancy (EE)					
EE1	Learning how to use QR codes as a learning tool is easy for me.	1	2	3	4	5
EE2	My interaction with QR codes as a learning tool would be clear and understandable.	1	2	3	4	5
EE3	I would find QR codes flexible and easy to use.	1	2	3	4	5
EE4	It would be easy for me to become skillful at using QR codes.	1	2	3	4	5
	Social Influence (SI)					
SI1	People who are important to me will think that I should use QR codes as a learning tool.	1	2	3	4	5
SI2	People who influence my behaviour will think that I should use QR codes as a learning tool.	1	2	3	4	5
SI3	I would use QR codes as a learning tool if it was recommended to me by my friends.	1	2	3	4	5
SI4	I would like to use QR codes as a learning tool if my lecturers supported the use of it.	1	2	3	4	5

	Facilitating Conditions (FC)					
FC1	I have the resources necessary to use QR codes as a learning tool.	1	2	3	4	5
FC2	I have the knowledge necessary to use QR codes as a learning tool.	1	2	3	4	5
FC3	QR codes as a learning tool is compatible with other technologies I use.	1	2	3	4	5
FC4	I can get help from others when I have difficulties using QR codes as a learning tool.	1	2	3	4	5
	Hedonic Motivation (HM)					
HM1	Using QR codes as a learning tool is fun.	1	2	3	4	5
HM2	Using QR codes as a learning tool is enjoyable.	1	2	3	4	5
HM3	Using QR codes as a learning tool is very entertaining.	1	2	3	4	5
HM4	Using QR codes as a learning tool is very interesting.	1	2	3	4	5

Section C

This section is seeking your opinion regarding the intention to use QR codes as a learning tool with different types of determinants. Respondents are asked to indicate the extent to which they agreed or disagreed with each statement using 5-point Likert scale [(1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree and (5) = strongly agree] response framework. Please choose one number per line to indicate the extent to which you agree or disagree with the following statements.

No	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Behavioural Intention (BI)					
BI1	I intend to use QR codes as a learning tool in my studies.	1	2	3	4	5
BI2	I predict I would use QR codes as a learning tool in the future.	1	2	3	4	5
BI3	I will always try to use QR codes as a learning tool in my studies.	1	2	3	4	5
BI4	I plan to use QR codes as learning tools in my studies frequently	1	2	3	4	5
BI5	I intend to recommend others to use QR codes as a learning tool.	1	2	3	4	5

Thank you for your time & participation.

~ The End ~