Faculty of Business

Factors Influencing Behavioural Intention to Adopt *e-AgriFinance* among the Farmers in Sarawak

MPhil (Management)

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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262), Approval Number HRE2019-0753.

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ABSTRACT

Digital finance has the potential to provide access to a range of financial services for individuals and businesses, including those in the agriculture sector. Agriculture serves as the linchpin in every country's food supply, in which the agriculture value chain is often complex and inefficient, burdened with high wastage due to poor logistics and storage, exorbitant lending rates, and low insurance coverage for agriculture produce. Digital finance offers transformational solutions to chronic challenges in the agriculture value chain. While agriculture apps have been well developed and widely used in some developed and developing countries, no mobile apps at this stage incorporate digital finance and agriculture in the local context, especially in Sarawak. Therefore, this study investigated the behavioural intention of farmers in Sarawak to adopt digital finance in the agriculture sector or *e-AgriFinance*. Specifically, the objectives of this study were to examine the factors influencing the behavioural intention of farmers to adopt *e-AgriFinance* and to examine the possible moderating effect of technology readiness on the relationship between perceived cost and behavioural intention to adopt *e-AgriFinance*. The conceptual framework was developed based on the Unified Theory of Acceptance and Use of Technology (UTAUT), proposing perceived cost as an additional antecedent and technology readiness as a moderator in explaining the behavioural intention to adopt *e-AgriFinance*. A researcher-administered questionnaire survey was developed and used to collect data from 337 farmers in Kuching, Samarahan, Serian, Sarikei, and Miri between November 2019 and January 2020. The farmers operated in the four major crop areas in Sarawak: oil palm, rubber, cocoa, and pepper. The collected data were analysed using partial least squares structural equation modelling (PLS-SEM). The research findings indicate that performance expectancy, effort expectancy, social influence, and facilitating conditions are positively related to behavioural intention to adopt *e-AgriFinance*, while social influence was found to be the strongest predictor of behavioural intention.

On the other hand, perceived cost was also shown to be positively related to behavioural intention, which contradicts the hypothesised relationship in this study. Multi-group analysis (MGA) in SmartPLS was used to test the moderating effect of technology readiness on the relationship between perceived cost and behavioural intention since technology readiness of farmers was classified into two groups: high and low. The moderation analysis revealed that the

relationship between perceived cost and behavioural intention was both strong and positive when farmers' technology readiness was high versus low. This study makes a valuable contribution to the theoretical understanding concerning the application of UTAUT in explaining the adoption of digital finance applications among farmers in the agriculture sector. In practice, this study provides implications for the Sarawak government to promote digital and financial inclusivity for all communities in achieving a high income and advanced state by 2030. This study also provides insights into important features of the *e-AgriFinance* app for digital finance providers to develop the app that will be accepted by farmers.

Keywords: *Digital Finance, Agriculture Sector, e-Agriculture, e-Finance, Farmers, Unified Theory of Acceptance and Use of Technology (UTAUT), Perceived Cost, Technology Readiness.*

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

APPS (s)	Applications
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
BI	Behavioural Intention
CMB	Common Method Bias
CR	Composite Reliability
CB-SEM	Covariance-Based SEM
EE	Effort Expectancy
FC	Facilitating Conditions
GDP	Gross Domestic Products
H	Hypothesis
HTMT	Heterotrait-Monotrait Ratio of Correlations
IQR	Interquartile Range
LV	Latent Variable(s)
MCB	Malaysian Cocoa Board
MPB	Malaysian Pepper Board
MPOB	Malaysian Palm Oil Board
MRB	Malaysian Rubber Board
PLS-SEM	Partial Least Squares Structural Equation Modelling

PE	Performance Expectancy
PC	Perceived Cost
RISDA	Rubber Industry Smallholders Development Authority
SEM	Structural Equation Modelling
SI	Social Influence
SPSS	Statistical Package for Social Sciences
Std.	Standard
TR	Technology Readiness
TRI	Technology Readiness Index
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor

CHAPTER ONE: INTRODUCTION

1.1 Chapter Overview

This chapter introduces the research area and outlines the background and foundation of the present study. It briefly reviews the factors influencing the behavioural intention of farmers to adopt *e-AgriFinance* in Sarawak by outlining the effect on the local farmers. This chapter initially provides a background of the research, followed by presenting the problem statement, an introduction to *e-AgriFinance*, research gaps, research questions and research objectives. The scope of this study is next outlined, followed by the research significance and definition of terms. At the end of this chapter, the structure and organisation of the thesis are presented.

1.2 Research Background

The phenomenal expansion in computing power and the communication revolution has rapidly transformed the global landscape. In recent years, mobile devices such as smartphones have taken an unprecedented role, affecting every segment of society. While statistics reveal the number of approximately 2.87 billion users of smartphones in 2020, the use of smartphones continues to expand on a global scale (Statista 2020). Likewise, mobile app downloads have also significantly increased worldwide. In 2017, 178.1 billion apps were downloaded, which by 2020 is expected to grow to 258.2 billion app downloads (Statista 2020). The disruptive power of mobile and digital technologies has created a discontinuous change in transforming the business landscape. Mobile devices are now widely used to pay for goods and services via data transmission (Geva 2012).

Nevertheless, digital innovations are nowadays expanding rapidly, providing an opportunity to offer financial services at a much lower cost and convenience, thus boosting financial inclusion and enabling large productivity gains across the economy. Digital finance offers transformational solutions, where financial services are digitised via digital infrastructure with the low use of cash and brick-mortar bank branches. Among the available technologies, mobile devices are commonly used to connect users at all income levels, businesses and providers of all sizes and government entities to a digitised national payment infrastructure, thus enabling seamless financial transactions across and between all parties. Digital channels open access to financing

for people, enabling them to engage in economic activities and participate in formal financial systems. Manyika et al. (2016) forecast that widespread digital finance adoption and usage could boost the gross domestic product (GDP) of all seven emerging economies (China, India, Pakistan, Brazil, Ethiopia, Mexico, and Nigeria) by 6 per cent, or $3.7 trillion, by 2025.

Notably, agriculture has become increasingly important since the post-war era, not merely because of the importance of agriculture in a country's overall economic growth but also because it is the essential means of survival for the majority of poor people in the world (Windles and Cramb 1997). Moreover, agriculture apps are well developed and widely used in some developed and developing countries. For instance, agriculture applications assist Indian farmers, and the agricultural community remain up-to-date with new and emerging agricultural technology. These applications provide Indian farmers with assistance and fill the knowledge gap between rural people and the government. FarmerLink is a mobile solution in the Philippines that helps make the coconut value chain both feasible and possible. This app enables coconut farmers to increase production, cope with crop pests and diseases, and improve their farms' sustainability. Likewise, Vodacom has partnered with GIZ (The Deutsche Gesellschaft für Internationale Zusammenarbeit) (on behalf of the German Government and Manstrat Agricultural Intelligence Solutions) in South Africa to launch a mobile technology solution to connect South African smallholder farmers to the agriculture value chain, providing access to knowledge, services, and markets. Also, the AgUnity App in Africa records and transacts incorruptible truth using blockchain technology.

According to Bolt (2019), farmers communicate with their cooperatives and other market players digitally and are able to monitor individual patterns of behaviour to increase trust in agricultural value chains. The agriculture supply chain is extremely complex and inefficient and is burdened by almost 33 per cent of waste due to poor logistics and storage, exorbitant loan rates, and poor insurance coverage in Malaysia (Axryd and Chari 2019). Being the largest state in Malaysia, Sarawak owns a 16.5% share in the agriculture sector which is the highest among all the states in Malaysia (Department of Statistics 2016). Sadly, farmers who struggle the most remain poor and are at the bottom of the value chain, while middlemen continue to gain the most income (Axryd and Chari, 2019).

Over the years, the agriculture sector has steadily become an important contributor to Malaysia's GDP, export revenue, employment, and rural and economic development (Adnan 2011). The agriculture sector has become the backbone of the Malaysian economy for many years by producing agriculture products for domestic use and consumption as the earner of foreign exchange. The agriculture sector also contributes to the national GDP. In 2017, the agriculture sector contributed 8.2% to the national GDP and provided employment for 28% of its population (Axryd and Chari 2019). The contribution in 2018 was about 7.3% which is equivalent to RM 99.5 billion to the Sarawak state's GDP. Also, the agriculture sector exports in 2018 amounted to RM114,451 million (Department of Statistics 2020). In 2019, this sector employed more than 1.6 million people, equivalent to 10.36% of the total employment, which contributed to about 7.28% of Malaysia's GDP (Plecher 2020). The statistics also show that GDP contributions over the years continue to grow. However, despite its importance, farmers continue to face challenges, such as the dependence on middlemen to deal with trading and the lack of proper marketing knowledge to further improve their agriculture produce in Sarawak.

Digital technology brings many benefits from increasing connectivity, ranging from the micro-level to the macro-level (Henry 2019). Connectivity is not simply a matter of accessing knowledge but also involves accessing services. For example, Mobile banking may provide smallholder farmers with access to formal financial services, such as banking and loans, which are often lacking (Sunga 2017). Whether these benefits can be sufficiently diffused to rural people and the other actors in the agriculture value chain and bring forth a major impact on alleviating rural poverty remains to be seen and is an interesting question (Devaux et al., 2018).

As mentioned earlier, mobile devices are nowadays widely used to pay for goods and services via data transmission (Rosley, Lange, and Thwaites 2018). The rapid proliferation of digital technology, as a result, provides the ability to provide financial services at a much lower cost and convenience, thus improving economic inclusion and making significant productivity gains across the economy. Furthermore, agriculture apps are well developed and widely used in developed and developing countries (Daum et al., 2018). However, at present, no mobile apps that incorporate agriculture and finance in Sarawak exist.

Sarawak, the largest state in Malaysia, is located on the island of Borneo, distant from Peninsular Malaysia, which has always been seen as a distinct disadvantage in terms of development (Sarawak Digital Economy Strategy 2017). In 2018, the agriculture sector contributed about 7.3% to the state's GDP. While Sarawak is still in Industry 2.0, most countries are in Industry 4.0 (Chua 2017). Nevertheless, the Sarawak government has embarked on a mission to 'leapfrog' its economy towards introducing intelligent solutions, known as Industry 4.0 (Ogilvy 2017). Sarawak also needs to incorporate robotic technologies equipped with artificial intelligence to support the manufacturing sector, particularly for food production and modern agriculture. (Ogilvy 2017). Agriculture is one of the key sectors identified in the transformation of Sarawak's economy (Sarawak Multimedia Authority 2017), which plays an important role in alleviating poverty and improving rural communities' livelihoods. Accordingly, there is a continuing need to substantially improve the growth and development of this sector's economy. The transformational effort outlined in the Sarawak Digital Economy Strategy for 2018-2022 states that digital technology will be leveraged to bring about benefits to rural farmers. The next frontier of mobile and digital technologies is finance (Manyika et al., 2016). Here, the study of digital finance transforming the agriculture sector in Sarawak is aligned with the state government's digital economy agenda. As such, this study is based on *e-AgriFinance*, which incorporates digital finance into agriculture applications for future development to significantly boost the growth of the economy.

1.3 Problem Statement

The Sarawak government recognises the agriculture sector as the primary income source for rural people and is committed to supporting the sector over its digital infrastructure. However, one of the problems faced by farmers in Sarawak is that farmers are scattered about, given Sarawak's large geographical landscape. Digitalisation offers solutions to rural farmers who are scattered about in remote areas of Sarawak (Sengupta and Sharma 2019), in which remoteness is a major constraint towards rural development, thereby limiting awareness about the nature of rural poverty and restricting rural people's access to services and facilities in or close to urban centres (Windle and Cramb 1997). The digital divide and the technological gap between urban and rural areas in Sarawak have been identified as potential contributors to the country's ever-widening socio-economic gap (Lai 2018). In order to link farmers who are scattered about in

rural areas, this study investigates the actors in the agriculture value chain, in which the agriculture apps will help link farmers and other actors; for example, suppliers, distributors, and governments in the agriculture value chain. Therefore, research to investigate the behavioural intention to adopt *e-AgriFinance* among farmers is needed to answer this question.

Furthermore, farmers mainly depend on the middlemen who provide the linkages between farmers, traders, and final markets. Intermediate distributors are also restricting the profit of farmers (Kundu et al., 2017). Therefore, farmers may benefit from using mobile agriculture apps to overcome the existence of these middlemen by communicating with each other and trading directly with markets to gain a better price.

Consequently, it is necessary to undertake a study to determine the behavioural intention of farmers in the agriculture value chain so that the configuration of *e-AgriFinance* developed apps meets the needs of farmers. As such, the findings of this study bear important implications to the government, policymakers and financial service providers in Sarawak in addition to developing digital solutions as a means to improve agriculture productivity and efficiency, thus driving sustainable agriculture and financial inclusion in Sarawak. Accordingly, this study proposes investigating farmers' behavioural intention in the agriculture value chain in using digital finance mobile applications. The proposed application(s) will link farmers directly and efficiently with various suppliers and distributors seamlessly.

1.4 Research Gap

Each user technology acceptance theory has its own merits and demerits in explaining the behavioural intention of adopting digital technologies. Venkatesh et al. (2003) developed the UTAUT model that integrates eight prominent users' acceptance of technology theories in explaining the adoption of complex technologies. Extant studies empirically indicate that due to its high intensity of the main constructs to predict the purpose of the consumer and use of the method, UTAUT is superior compared to other competing models. (Park, Yang, and Lehto 2007; Zhou 2012; Venkatesh et al. 2003). Prior studies adopting this model conceptualise the intention to adopt the system before the behaviour of users towards using the system.

Previous empirical studies have applied UTAUT to interpret the acceptance of internet banking (Im, Hong, and Kang 2011, Rahi et al. 2018), online stocking (Wang and Yang 2005), mobile

banking (Zhou, Lu, and Wang 2010, Abbas et al. 2018, Raza, Shah, and Ali 2019) and location-based services (Zhou 2012, Lee, Lee, and Rha 2019). Furthermore, prior studies only focus on a particular group of digital finance users and providers. For instance, the adoption of remote mobile payments (Slade et al. 2015) and offering electronic finance services by financial institutions (Narayanasamy, Rasiah, and Tan 2011). Therefore, it is evident that there is a gap in the research regarding the application of UTAUT in explaining the adoption of digital finance applications in the agriculture sector.

Notwithstanding, prior studies on digital technology are mostly focused on e-government services (Veeramootoo, Nunkoo, and Dwivedi 2018), e-commerce (Sim et al. 2018), m-commerce, and mobile shopping (Imtiaz 2018), with limited studies on mobile applications in the context of Sarawak, especially in rural areas. Likewise, there are also limited studies on the agriculture value chain. Therefore, this study focuses on the adoption of digital finance applications by farmers that is lacking in this field of literature.

From the theoretical perspective, although UTAUT has been widely used in relevant research, the use of technology readiness as a moderator is limited if not scarce in the agriculture sector. Indeed, technology readiness in studies involving multivariate frameworks can be an important moderating variable (Humbani and Wiese 2018). Scholars may also use technical readiness in a technology-enabled context to clarify the dynamics between variables and as a diagnostic or control variable in experiments (Parasuraman and Colby 2015). While the background theoretical literature that informs this study is rich, important gaps prevail. Parasuraman's Technology Readiness Model is widely adopted as a determinant of technology adoption in previous studies (Jaafar et al. 2007, Ramaseshan, Kingshott, and Stein 2015, Kim, and Chiu 2019) but not as a moderator. This study adopts a holistic view by adding perceived cost as an additional antecedent to behavioural intention and is moderated by technology readiness to comprehensively assess farmers' behavioural intention to adopt *e-AgriFinance* apps in the agriculture value chain. Moreover, this study attempts to fill the gap by adopting UTAUT in explaining the behavioural intention of *e-AgriFinance* apps through the lens of an agriculture value chain approach.

1.5 Research Questions

This research aims to answer the following research questions:

1. What are the antecedents to farmers' behavioural intention to adopt *e-AgriFinance* in Sarawak?
2. How does technology readiness moderate the relationship between perceived cost and behavioural intention to adopt *e-AgriFinance*?

1.6 Research Objectives

This research investigates the behavioural intention of farmers in the agriculture sector to adopt *e-AgriFinance* in Sarawak.

Specifically, the research objectives for this study are:

i. to determine the antecedents to the behavioural intention of farmers to adopt *e-AgriFinance*; and
ii. to assess the moderating effect of technology readiness on the relationship between perceived cost and behavioural intention to adopt *e-AgriFinance.*

1.7 Scope of the Study

This study focuses only on the farmers and agriculture finance platform in Sarawak, Malaysia. As mentioned earlier, Sarawak, as the largest state in Malaysia, is located on the island of Borneo, quite distant from Peninsular Malaysia (Sarawak Digital Economy Strategy 2017). The main purpose of this study is to examine the antecedents that affect farmers' behavioural intention to adopt the agriculture finance platform and determine the moderating effect of technology readiness on the relationship between the perceived cost and behavioural intention of farmers. Sarawak consists of 12 geographic divisions, of which nine are selected, namely Miri, Mukah, Bintulu, Betong, Sibu, Sarikei, Serian, Samarahan, and Kuching. In this study, the four crops selected are oil palm, rubber, cocoa, and pepper-based on the Department of Statistics, which is the major crop production and yield in Sarawak. Of the nine divisions and among all the districts, the districts' highest production number or yield is then selected. In conclusion, 11 districts are selected: Miri, Mukah, Bintulu, Kanowit, Julau, Sarikei, Betong, Serian, Samarahan,

Asajaya and Kuching based on the statistics provided by the Department of Statistics of Sarawak. The use of an offline survey questionnaire is used as the primary data source.

1.8 Research Significance

The majority of prior studies rarely focused on using related financial technology (FinTech) in the agriculture sector. This study is novel given it investigates the behavioural intention to use digital financial technology (i.e., *e-AgriFinance*) by farmers in the agriculture value chain. Including farmers in this study offers a more holistic view and understanding of *e-AgriFinance* adoption in the agriculture value chain.

Additionally, previous research on the implementation of mobile payment and mobile services technology tends to be focused on current technology. In this respect, this study is significant since it is based on a new prototype not yet existing in the market. The study creates a digital finance model based on the Sarawak context to assess the behavioural intention of farmers in the agriculture value chain towards *e-AgriFinance*. The customised prototype used in this study is significant to the Sarawak government, policymakers, digital finance providers and stakeholders in developing a sound digital financial system in the agriculture sector.

This study is significant because it integrates UTAUT with an additional antecedent; perceived cost, in a single research model to predict and explain the behavioural intention of using *e-AgriFinance*. Further, this study includes technology readiness as the moderator in the research model. By extending UTAUT and a moderator, this study endeavours to develop a more robust model to explain *e-AgriFinance* adoption in the agriculture value chain.

Accordingly, this study is considered relevant and quite timely since it focuses on digital finance in the agriculture sector, which is identified as one of the priority sectors in the Sarawak digital economy ecosystem. This research can be configured with an *e-AgriFinance* prototype and the development of appropriate infrastructure. As such, following the government's development of appropriate infrastructure, farmers have access, especially to the internet. The investigation of rural farmers' behavioural intention in the agriculture sector is indeed important for the successful implementation of *e-AgriFinance*. Importantly, this study also provides valuable empirical insights for developing appropriate infrastructure to satisfy the farmers' needs in which financial inclusion in rural areas could be promoted. Notably, this study also complements the

Sarawak government's efforts in achieving a digital economy which, in addition to the findings of this study, are of significance to the Sarawak government, policymakers, digital finance providers and users in developing the overall sound digital financial system in the Sarawak agriculture sector.

1.9 Definition of Terms

The following definitions offer further explanation of key terms used in this research as listed below:

1.9.1 Performance Expectancy

Venkatesh et al. (2003) defined performance expectancy as the extent to which the use of technology provides advantages to consumers when conducting those activities. In the context of this research, performance expectancy is defined as the extent to which *e-AgriFinance* apps improve the convenience, efficiency, effectiveness, and usefulness in the agriculture sector for farmers.

1.9.2 Effort Expectancy

Effort expectancy refers to the degree of ease that is associated with consumers' use of technology. The concept of effort expectancy contains perceived ease of use and complexity (Venkatesh et al. 2003). This research defines effort expectancy as the ease of use, ease of being skilful at using *e-AgriFinance* and ease of interacting with *e-AgriFinance*.

1.9.3 Social Influence

In the context of technology, social influence is characterised as the extent to which consumers perceive that important others believe that a specific technology should be used (Venkatesh, Thong, and Xu 2012). Therefore, this research defines social influence as the opinions and views of the farmers' family, friends, relatives, and social network.

1.9.4 Facilitating Conditions

Facilitating conditions refer to customers' views regarding the tools and availability, which help perform the behaviour. Venkatesh et al. (2003) describe facilitating conditions as an individual who has the ability and technical resources to use the system. Thus, this research describes facilitating conditions as the assistance, availability and compatibility of infrastructures in the

rural areas and farmers' necessary knowledge, resources, and control toward using *e-AgriFinance*.

1.9.5 Perceived Cost

Perceived cost is defined as the extent to which mobile services users assume that certain forms of financial, social, psychological, physical or time risk may be revealed to them (Zhang, Zhu, and Liu 2012). Hence, this research defines perceived cost as the cost farmers perceive they may have incurred in the future, such as moving or changing to smartphones and subscribing to internet plans once *e-AgriFinance* is ready to use.

1.9.6 Technology Readiness

Technology readiness refers to "the propensity to adopt and embrace cutting-edge technology at home and in the workplace" (Parasuraman and Charles 2000). Individuals' characteristics in using technology differ from one person to the next and can be categorised into several groups: explorers, pioneers, sceptics, paranoids, and laggards.

1.10 Thesis Structure

This thesis is organised into five chapters. Chapter One discusses the research background, including the background of the study, research gaps, problem statement, research objectives and research questions, the scope of the study, research significance, introduction to the *e-AgriFinance* app, and definition of terms.

Chapter Two presents a comprehensive literature review on the underpinning theories, potential antecedents to farmers' behavioural intention to adopt *e-AgriFinance* and the moderating effect of technology readiness on the relationship between perceived cost and behavioural intention. This chapter then discusses the conceptual framework and concludes with hypothesis development. Specifically, the theory adopted in this study is the UTAUT and Technology Readiness. This study adopts another antecedent, which is the perceived cost, to further suit the local study. Performance expectancy, effort expectancy, social influence, facilitating conditions and perceived cost are the antecedents in this study and technology readiness moderates perceived cost and behavioural intention.

Chapter Three explains the research methodology adopted in this study and discusses the questionnaire survey design. The chapter begins by discussing existing research methods, namely a quantitative study, and the study's chosen research method alongside the rationale for choosing the methods. The chapter then discusses the sampling methods, data collection methods, the questionnaire and the instruments utilised, concluding with explaining the data analysis technique adopted in the study.

Chapter Four details the findings and discussion of the findings and the procedures used to analyse the data collected in this study. First, data preparation and descriptive analysis are calculated using SPSS version 25.0. Then, the analysis of the measurement model and the structural model is applied using SmartPLS 3.0 to present the results. Finally, the chapter concludes with a discussion of the results concerning its consistency with prior studies.

Chapter Five presents a summary of how the research questions of this study were answered. The theoretical and managerial contributions of this study also are discussed. The chapter concludes with the limitations of the present study and recommendations for future studies.

CHAPTER TWO: LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Chapter Overview

The present chapter introduces the actors in the agriculture value chain, followed by the underpinning theories, UTAUT and the moderator, Technology Readiness. The chapter concludes with the conceptual framework of the study and hypotheses development.

2.2 Actors in the Agriculture Value Chain

The agriculture value chain refers to the incorporation of various players in the production, processing, and marketing of agriculture (Miller and Jones 2010) and defines various actors and activities that bring the basic agricultural product(s) from the field of production to their final consumption, in which value is added along the chain at each point to the product. A value chain may be represented as a vertical connection between different independent business entities or a network, including manufacturing, packaging, storage, transport, and distribution.

Adam et al. (2014, 4) define the concept of the value chain as "A business model in which producers and buyers of agriculture products form strategic alliances with other supply chain actors, such as aggregators, processors, distributors, retailers, and consumers, to enhance financial returns through product differentiation that advances social or environmental values. Partners within these business alliances recognise that creating maximum value for their products depends on interdependence, collaboration, and mutual support". Value Chain Theory (VCT) was developed by Kaplinsky and Morris (2001) while attempting to alleviate poverty among small-scale industries and smallholders participating directly or indirectly in global trade. Moreover, a value chain can be described as a full life cycle of a product or process (Amarender 2013), where values are added in different stages from the transformation of raw materials to end products (Cambridge Institute for Sustainability Leadership (CISL) 2017).

Notwithstanding, value chains are a crucial mechanism for understanding how a product is created and used to develop, turn, or produce inputs and services. Moreover, how the product physically travels from the manufacturer to the customer and how value is generated along the way. The perspective of the value chain offers an essential means of understanding business-to-business relationships that bind and strengthen the chain, performance enhancement processes, and the ways to enable companies to maximise productivity and add value. (Webber and Labaste

2010). It also offers a focal point for improving funding for services and business climate, thus improving the relationship between small businesses and the market. Besides, it is derived by analysing areas where competitive advantage can be achieved by the actors in an organisation (Osunde 2020; Ensign 2001; Institute of Management Accountants 1996).

The term value chain was first popularised by Porter (1985), who used it to illustrate how companies could achieve a competitive advantage within the organisation. Subsequently, the term was adopted for agriculture development purposes (Kaplinsky and Morris 2014), now becoming very much in vogue among those working in the agriculture sector. Therefore, the agriculture value chain can be defined as "a way of describing the different 'links' required in taking a product from the farm to the end consumer" (Hailu 2019, 9). Value chain actors refer to the people involved at each connection point along the chain required to transfer a product or services from the farm to the consumer. There are two categories under the value chain, namely the main actors and supporting actors. The main actors refer to those who buy and sell along the chain while supporting actors are those that provide services along the chain (Hailu 2019).

Traditional agriculture value chains are regulated by spot market transactions involving a large number of small distributors and producers, whereas in contrast, modern value chains are characterised by the consolidation of the supply base, vertical coordination, agro-industrial processing and the use of standards throughout the chain. Upstream of the value chain contains farm input, for example, seeds, fertiliser, crop protection, machinery and land, and farming, while downstream includes food companies and supermarkets and distributors of finished goods to end-users. Further, the third party's relationship with farmers, such as the government, banks and insurance companies, are also included. Lu et al. (2011) highlight that throughout a value chain, there is a vastness of information flows, such as demand information flow, forecast information flow, development and scheduling of information flows, and design and new product introduction information flows. The finance information flow constitutes another important information aspect of the agriculture value chain. Each actor in the value chain interacts and adds value, and in return, receives an economic rent. *Figure 1* shows the intrinsic flows in an agriculture value chain where material flows from upstream to downstream, information flows towards both upstream and downstream, and finance flows from downstream to upstream.

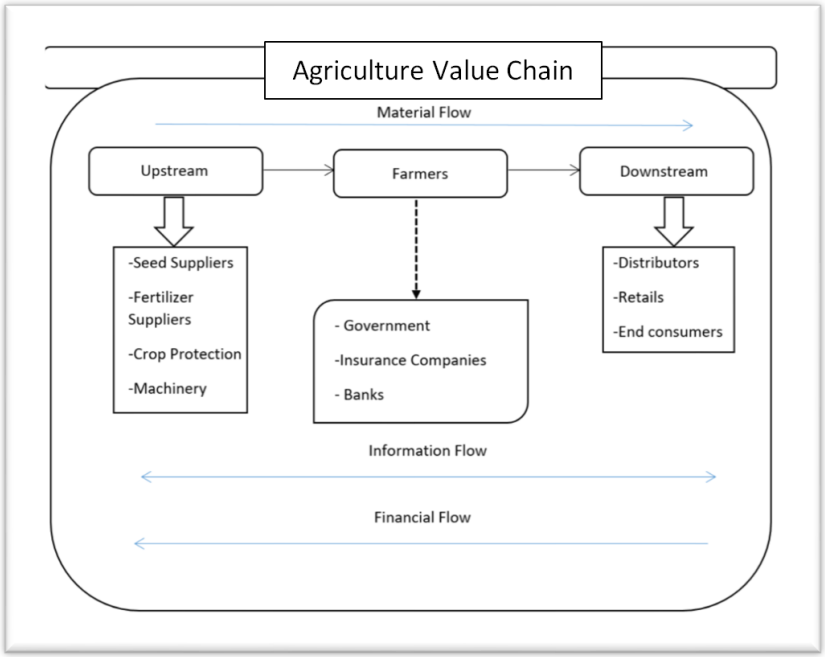

Figure 1: The Agriculture Value Chain adapted from Lu et al. (2011)

Farmers play an important role in the agriculture value chain, whose existence ensures the flow of information along the value chain. However, farmers, particularly rural farmers, are often at a disadvantage in the value chain because of limited bargaining power and lack of information regarding the markets to coincide with their farming activities. For instance, they have marginal or no impact on what the price traders pay for their goods or the price they pay to [input] suppliers for seeds, fertilisers, pesticides, unknowing the worth of their produce, the profit margin, and sources of financing, etc.

The approach to the value chain considers the role of current actors in the chain, the supporting actors, and the policy setting. It also allows for the discernment of current issues and problems in the value chain and opportunities to increase the performance of the value chain and benefits for each player involved. Being part of a well-functioning supply chain will offer higher income from the perspective of the farmer. In today's technology era, digitising the processes around payments could help to make these value chains more efficient in which there are distinct benefits for actors in the agriculture value chain to take advantage of the digital finance platform. As highlighted in Manyika et al. (2016), agriculture digital finance provides vital services to rural farmers in improving their livelihood, thus reducing the socio-economic divide.

Digitalisation offers solutions to rural farmers who are scattered about in remote areas of Sarawak. Moreover, digitalising agriculture value chains is imperative to build value for farmers in the face of the state economy transformation to digital. Particularly, digitalisation offers an opportunity for rural farmers to deepen financial inclusion.

2.3 *e-Agriculture* and *e-Finance*

"A field of activity related to the use of modern information and communication tools and technologies that increase agriculture productivity and make available information that is relevant to agriculture research, planning, extension, production, monitoring, marketing and trade is referred to as e-agriculture" (Okediran and Ganiyu 2019). In other words, e-Agriculture refers to online or digital agriculture, which may perform the operation through access to the internet. *e-Agriculture* is recognised as having the strongest appeal for sustainable development globally (Sarker, Kaiser and Miah 2019). However, to access *e-Agriculture* or *e-Finance*, mobile devices are needed. According to Rosley, Lange and Thwaites (2018), mobile devices are now widely used to pay for goods and services by means of transmission of data.

Given the large geographical scale, most farmers, especially rural farmers, tend to be scattered. One of the advantages of e-agriculture is through using information and communications technology (ICT) tools that allow farmers to establish a network for information to become more empowered (Kundu et al. 2017). Besides, by going online, fraud cases can be reduced, and farmers are able to obtain a reasonable or fair price for their product.

2.4 Theoretical Background

Bacharach (1989, 496) defines theory as "a statement of relations among concepts within a boundary set of assumptions and constraints. It is no more than a linguistic device used to organise a complex empirical world. The purpose of a theoretical statement is twofold: to organise (parsimoniously) and to communicate (clearly)". In this section, the underpinning theory concerning the study of UTAUT and the moderator, technology readiness, is further explained.

2.4.1 Unified Technology of Acceptance and Use of Technology (UTAUT)

There are numerous technology adoption theories such as the theory of planned behaviour (TPB), technology acceptance model, motivational model, UTAUT and others. Prior literature adopts the TPB in mobile apps (Cheung, 2017, Dhir, Kaur and Rajala 2020), whereas Roy (2017) and Mehra, Paul and Kaurav (2020) adopt the technology expectancy model (TAM) in mobile apps adoption, Mittal, Aggarwal, and Mittal (2020) and Mehra, Paul and Kaurav (2020) adopt the motivational factor in mobile apps adoption. UTAUT is the foundation or underpinning theory used in this study to examine the behavioural intention to adopt *e-AgriFinance* in the agriculture sector in Sarawak. UTAUT is a technology acceptance model formulated by Venkatesh et al. (2003). In fact, there are many theories concerning technology adoption; however, UTAUT is one of the most widely used and accepted theories in consumer technology adoption when studying consumer technology adoption (Mohamad and Kasim 2018).

UTAUT integrates eight prominent user acceptance of technology theories (theory of reasoned action, technology acceptance model, motivational model, the TPB, a combined theory of planned behaviour/technology acceptance model, the model of personal computer use, diffusion of innovations theory, and social cognitive theory) to better describe the study for the adoption of technologies (Venkatesh et al. 2003). User intention to use an information system and subsequent usage behaviour is clarified by the theory in which there are four decisive constructs affecting the acceptance and usage actions of users in the original theory, namely: performance expectancy, effort expectance, social influence and facilitating conditions (Venkatesh, Thong, and Xu 2012). Besides, performance expectancy, effort expectancy and social influence are direct determinants of usage intention and behaviour, while facilitating conditions is a direct determinant of user behaviour (Venkatesh, Thong, and Xu 2012). Previous studies conclude that the four factors have a significant relationship with the adoption of information technology among users (Mohamad and Kasim 2018).

Subsequent to reviewing UTAUT2 developed by Venkatesh, Thong, and Xu (2012), it is not adopted as additional constructs, given hedonic motivation, price value and habit are unsuitable in the context of this study. Based on the use of technology context, hedonic motivation is about the degree of enjoyment perceived by a person using a technology, notwithstanding the effects of

performance, as well as fun or pleasure from using technology, irrespective of the final result (Khatimah et al. 2019). Likewise, hedonic motivation is unsuitable in this study as perceived enjoyment is unrelated to the context of the study, and price value refers to the cognitive trade-off of consumers between the applications' perceived advantages and the monetary cost of using them. (Venkatesh, Thong and Xu 2012).

As the concept and application of *e-AgriFinance* remain relatively new to some extent, farmers may not have the notion of whether price value influences their behavioural intention to adopt digital technology. A similar explanation on habit refers to the extent to which individuals tend to perform behaviours automatically because of learning (Venkatesh, Thong and Xu 2012). All of the additional constructs refer to the actual usage of technologies and play important roles in determining technology acceptance and use. Furthermore, the *e-AgriFinance* app is not developed at this stage; hence farmers have little idea about it. Therefore, UTAUT2 with the additional constructs is not relevant for this proposed study, as it is more fitting to follow perceived costs since it relates to how the consumer finds price important relative to his or her disposable income. (Moore and Benbasat, 1991, 194), and is more suitable from the farmers' perspective. Prior empirical studies have extended the UTAUT model with the additional construct of perceived cost in mobile banking (Bhatiasevi 2016), m-commerce (Dongmo, Jean and Samuel 2020; Wei et al. 2009), mobile wallet technology (Singh and Sinha 2020) and smartphone adoption (Baishya and Samalia 2020).

Moreover, existing studies have tested and validated empirically that UTAUT is superior to other models given its high robustness of the main constructs to predict the purpose and usefulness of some system users (Park, Yang, and Lehto 2007, Zhou 2012, Venkatesh et al. 2003, Lu, Papagiannidis, and Alamanos 2019). Subsequent validation of UTAUT in a longitudinal study by Venkatesh et al. (2003) found that UTAUT accounted for 70% of the variance in behavioural intention to use and about 50% in the actual use of technologies. Venkatesh et al. (2003) further found an R^2 of 70%, which means the UTAUT model illuminates 70% of the transformation to use information technology. Most existing studies measure the intention to adopt the system before actual system use (Abubakar and Ahmad 2013; Slade et al. 2015). Accordingly, this theory is relevant to this study, as *e-AgriFinance* has, at this stage, not been developed.

However, UTAUT has its drawbacks as well. There are highest-loading items in each core construction that would remove the facets of constructs, minimising the validity of the content (Venkatesh et al. 2003). According to Alotaibi and Wald (2014), the standard of validity must be increased by raising the scales of the constructs. Furthermore, Van Raaij and Schepers (2008) contended that UTAUT is less parsimonious than the prior paradigm of technology acceptance, such as TAM2, given that its high variance explained is only achieved with the inclusion of moderators. Moreover, they were also entitled to questionable classification and marking of objects and constructs when a number of separate items were merged in representing a single psychometric construct. UTAUT as the model tests new constructs by statistically selecting the best four elements from existing models, although it is unable to provide adequate concept coverage (Dishaw, Strong, and Bandy 2004).

However, regardless of the limitations, UTAUT has been commonly used, expanded, and incorporated for the implementation of a number of ICT-based technologies for empirical research (Baisha and Harsh 2020, Dwivedi et al. 2019). Additionally, prior studies have widely used UTAUT in explaining the acceptance of technologies such as internet banking (Im, Hong, and Kang 2011), the adoption of peer-to-peer mobile payment by individual consumers (Al-Saedi et al. 2019; Patil et al. 2020), the adoption of e-payment systems by university students (Salloum and Al-Emran 2018; Mohammad and Kasim 2018), and the offering of electronic finance services by financial institutions (Narayanasamy, Rasiah, and Tan 2011). More recently, Husin, Loghmani, and Zainal Abidin (2017) conducted a study on the adoption of e-government services in Malaysia, where UTAUT was used as the underpinning theory. The study indicates that performance expectancy, effort expectancy, and social influence prefigure behavioural intent that contributes to IT acceptance. The study further reports that facilitating conditions and behavioural intention predicts the use of behaviour in the acceptance of e-government services. As such, UTAUT can provide an ideal mechanism to assess the factors influencing the behavioural intention in adopting *e-AgriFinance*.

Table 1: Summary of UTAUT Literature Review

No.	**Author**	**Year**	**Area**

1.	Im, Hong, and Kang 2011	2011	Internet banking
2.	Al-Saedi et al.; Patil et al. 2020	2019; 2020	Adoption of peer-to-peer mobile payment
3.	Salloum and Al-Emran; Mohammad and Kasim	2018; 2018	Adoption of e-payment system
4.	Husin, Loghmani, and Zainal Abidin	2017	Adoption on e-government
5.	Alalwan, Dwivedi, and Williams; Indrawati and Putri	2014; 2018	Internet banking
6.	Martins, Oliveira, and Popovič; Junadi and Sfenrianto; Chao	2014; 2015; 2019	Behaviorual intention on adoption of internet banking

2.4.2 Technology Readiness

Technology readiness refers to "the propensity to adopt and embrace cutting-edge technology at home and in the workplace" (Parasuraman and Charles 2000). Each person's characteristics in using technology vary from one person to another and can be categorised into several groups: explorers, pioneers, sceptics, paranoids, and laggards. According to their study, explorers are the group of people who easily approach, if not adopt, new technology when introduced; and representing the first wave of customers. Pioneers are the group of people who need some level of assurance concerning the technology and are then only willing to try the technology. Sceptics are a group of people who are reluctant to adopt new technology and need to be convinced about the benefits. Moreover, once they are convinced of the benefits, adoption follows. The extreme group is termed as laggards of technology that never use modern technology unless required to do so. Meuter et al. (2003) mentioned that consumers with technology anxiety tend to avoid adopting new technologies.

The Technology Readiness Index 1.0 (TRI) is a multiple-item scale consisting of 36 items used to assess people's readiness to interact with technology regarding the four components: optimism,

innovativeness, insecurity, and discomfort (Parasuraman 2000). However, based on prior studies, the 36-item index is too long for research to be conducted (Parasuraman and Colby 2001). Subsequently, TRI 2.0 was revised and updated, comprising of 16 items with four items under the four components (Parasuraman and Colby 2015). Some studies have reported that technology readiness (TR) is linked to the use of technology (Parasuraman and Colby 2015), which is possibly the most significant outcome of TR (Blut and Wang 2019).

As mentioned above, each individual has distinct characteristics regarding the acceptance of new things. Optimism (Parasuraman 2000, Walczuch, Lemmink, and Streukens 2007) is one of the factors that has been used to evaluate farmers because if they are optimistic, they will accept and use the model. Similar to innovativeness (Parasuraman 2000, Walczuch, Lemmink, and Streukens 2007), also mentioned that high probability would occur in the younger generation if they are conversant with technology and aim to become a leader. Whereas for the inhibitors, namely discomfort and insecurity, (Parasuraman 2000, Walczuch, Lemmink, and Streukens 2007) signify whether or not one will feel uncomfortable uses the technology, and insecurity relating to whether or not one would not feel safe in this digital world. If the farmer's discomfort level is low, it signifies that their TR level is high, and they will accept digital payments with the intention to use those (Jaafar et al. 2007). Similar scenario apply to the variable of insecurity (Parasuraman 2000, Walczuch, Lemmink, and Streukens 2007), if the farmers' insecurity is low, they will trust and feel relatively safe about the technology and accept and adopt it. Not to mention that risk is always an underlying element in any technology.

To the best knowledge of the researcher's knowledge, no prior studies have investigated the probable moderating effect of TR of users on the relationship between predictors and behavioural intention of adopting digital finance. This study argues that the effects of predictors (i.e., perceived cost) on the intention to adopt *e-AgriFinance* may vary depending on the level of readiness among farmers to use the new technology. Therefore, TR is important concerning any technology acceptance model to evaluate the extent of farmers' readiness to accept new digital technology.

2.5 Conceptual Framework

The relationships between the variables proposed are based on the theoretical lens of UTAUT and previous related empirical studies. The following conceptual framework explains the proposed relationship between the identified UTAUT constructs, perceived cost as the additional antecedent, and TR as the moderator.

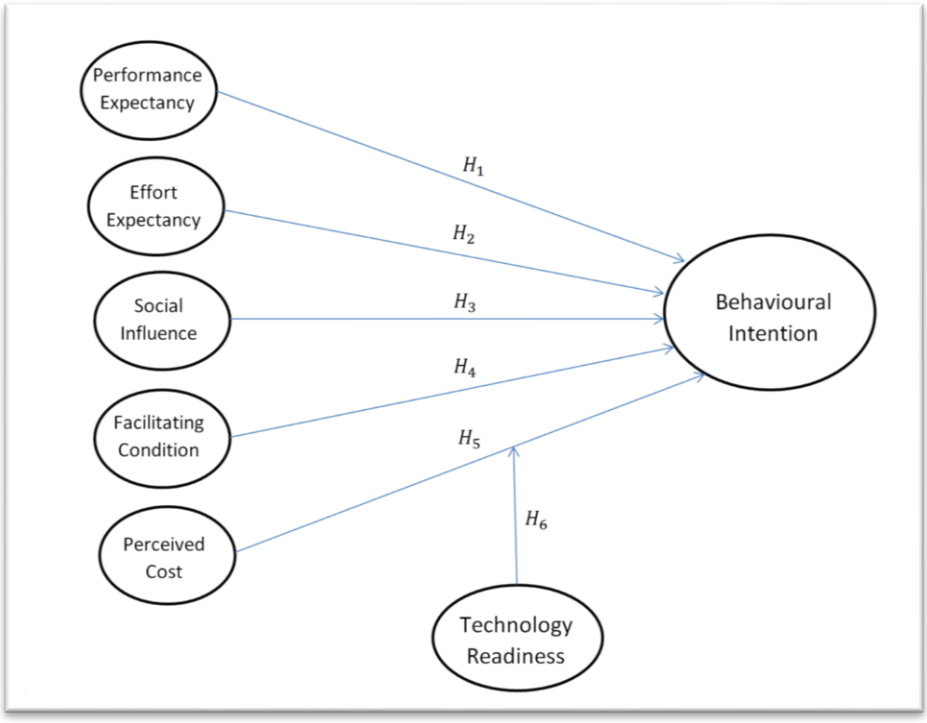

Figure 2: Conceptual Framework

2.6 Behavioural Intention

The concept surrounding behavioural intention has been applied to different interpretations. For instance, Fishbein and Ajzen (1975) defined behavioural intention as the person's subjective possibility that he or she will perform the behaviour. In contrast, Warshaw and Davis (1985) contend that the concept of behavioural intention has a different understanding than the "intention" spoken in daily life. Warshaw and Davis (1985, 214) define behavioural intention as 'the degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour'. Therefore, they depict Fishbein and Ajzen's original concept as behavioural expectation. In 1985, Ajzen related both concepts portrayed by Warshaw and Davis

in the initial version of the TPB. Ajzen (1975) undertakes that behavioural expectation is proportional to the product of behavioural intention and subjective behavioural control. However, Ajzen (1991, 1993) also views the concept of behavioural expectation and the concept of behavioural intention as a measure of how hard people are willing to try and how much effort they intend to outlay (Ajzen 1991, 181) in the more recent versions of the TPB. In general, the concept is similar to Gollwitzer's (1993) concept of goal intention.

In more recent studies, behavioural intention is shown to be a positive significant predictor of mobile internet use behaviour among Malaysian residential users (Wong, Leong and Puah 2019), mobile library applications (Rafique, Shamin and Anwar 2019), Internet banking adoption (Rasull et al. 2020), and e-government adoption (Soong, Ahmed and Tan 2020).

2.7 Introduction to *e-AgriFinance*

The concept of *e-AgriFinance* is derived from the field of agriculture finance that refers to farm-related activities including input supply, processing, wholesaling, distributing, and marketing financial services, whereby from the finance perspective it includes savings, transfers, insurance, and loans, etc., (Sebatta, Wamulume and Mwansakilwa 2014). The incentive for smallholder ranchers to obtain horticultural money is to motivate their operational and capital speculation, in which farmers receive credit during the planting season to purchase seed, fertiliser, and other equipment. Although, this is not the case in a number of cases given the many measures aimed at promoting access for farmers, which culminated in the credit not being distributed at the correct time and proportions (Sebatta, Wamulume and Mwansakilwa 2014). Therefore, to overcome these difficulties facing farmers, *e-AgriFinance* apps are developed, which helps to move the concept of agriculture finance to the next level via the Internet.

e-AgriFinance can be implemented on various platforms such as websites, mobile apps, and electronic kiosks (Stock et al. 2020). In this study, *e-AgriFinance* is implemented on mobile apps. Mobile apps have become quite ubiquitous in our daily lives (Barker-Eveleth and Robert, 2020), and as we move further into the 21st century, mobile devices have taken an unprecedented role in affecting every segment of society on a global scale. For instance, applications developed specifically for the coronavirus (COVID-19) global pandemic that has imposed strict lockdowns and travel restrictions Mahapatra (2020) listed down a few advantages where mobile apps help

farmers during COVID-19, such as the dissemination of information and knowledge related to agriculture to farmers in the poorest of communities facilitated through automated IT systems, online education and mobile technology (i.e. smartphones). By using mobile and cloud computing technologies, seeding and irrigation activities can also benefit, in conjunction with providing up-to-date weather information and helping to monitor soil conditions in preparation for the planting and harvest season. Besides that, the provision of information through mobile phones has enabled information on farming services which has revolutionised agriculture practices improving the livelihood of smallholder farmers. Generally, the benefits of farming application services include enabling farmers to access financial information and services, gathering information from agriculture on inputs and use, activities, and market prices (Emeana, Liz and Katharina 2020).

The *e-AgriFinance* app incorporates agriculture and financial transaction apps such as Sarawak Pay. Farmers can access this application freely, which enables them to directly contact suppliers, distributors, and the government by eliminating the middlemen. The trade of crops, loans, insurance are all incorporated in this mobile application.

2.7.1 e-AgriFinance App Prototype

The *e-AgriFinance* app prototype consists of two main screens (See *Figure 3*):

(1) Main Page

(2) My Profile

The prototype has been developed using Proto.io software, with the general page structure consisting of the following:

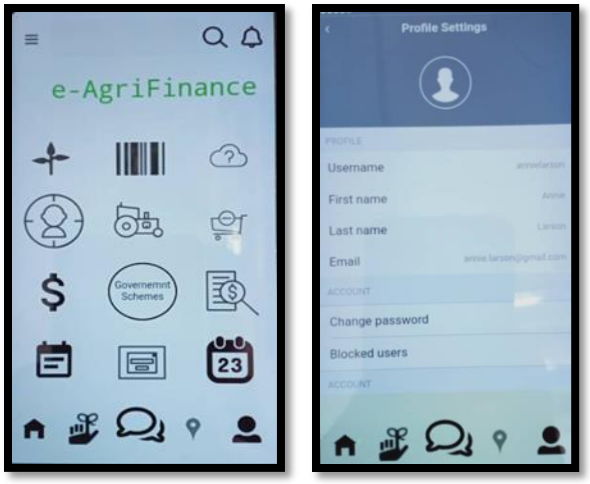

Figure 3: Prototype Interface of e-AgriFinance App

- *Header*: with an icon for the side menu and settings, a search bar, and an icon for notification.
- *Main*: with contents (explanation in the table below).
- *Footer*: with an icon for the home button, reminder button, icon linked to messaging, an icon for location and profile button.

Icon	Description
	The first icon on the header is *Settings*. This icon enables farmers to have their preference settings on whether they wish to be notified on the lock-screen or after (meaning that normal use when the mobile is active and the screen is unlocked).
	The second icon is *Search* enables farmers to search for crops or agriculture actors.
	The third icon is *Notification* which notifies farmers of incoming (received) information.
	The first icon on the first row represents *Crops*. For the purpose of this research, only four crops were available: palm oil, pepper, cocoa and rubber.

Icon	Description
	The second icon represents *Delivery Status*. Farmers may track the delivery status of their purchases, such as fertilisers and seeds.
	The third icon represents *Weather* which displays daily weather information for the next five days.
	The first icon on the second row represents *Suppliers* in the agriculture sector, such as suppliers for saplings, seeds, and fertilisers. Lists of suppliers are also available here.
	The second icon represents *Distributors* in the agriculture sector. Lists of distributors are available here.
	The third icon represents *Equipment* needed in the agriculture sector. Farmers may purchase agricultural equipment and machinery online without the need to travel to obtain or fulfil their needs as some rural areas are quite distant towns.
	The first icon on the third row (dollar sign) represents *Transactions* which allows farmers to perform financial transactions online either using a credit/debit card via SarawakPay.
	The second icon refers to *Government Schemes.* Farmers may easily receive the latest agricultural news. Besides, farmers can also assess other news such as insurance or loans for farmers via this option (icon) and further proceed if interested.
	The third icon represents *Receipts.* All transaction receipts are automatically saved in this folder to reduce the farmers' effort in filing.
	The first icon on the fourth row represents *Upcoming Events* forthcoming in the agriculture sector.
	The second icon represents a *Subscription*. Farmers may subscribe to news relating to suppliers, distributors, or agricultural equipment that they use, interested in and receive notifications on information updates.

Icon	Description
	The third icon represents the *Calendar* which helps farmers to manage important dates, meetings, and appointments.
	The first icon on the footer is *Home* that allows farmers to navigate to the home page.
	The second icon is *Reminders* which notifies farmers about reminders.
	The third icon is *Chat* which allows farmers to interact with suppliers, distributors, and the government by eliminating middlemen.
	The fourth icon - location sign represents *Google Maps*, where farmers can search for nearby suppliers and distributors.
	The fifth icon is *Profile*. Farmers are required to sign-in and enter personal information (i.e. password, email, etc.) before using the app. Farmers may update their profile according to any changes.

The design of this prototype is used to provide farmers with an understanding of what *e-AgriFinance* looks like and how it functions (i.e. operates). In the future, the government may consider adopting and enhancing the app further to cater to the needs of local farmers.

2.8 Farmers in Sarawak

Agriculture in the context of Malaysia includes planting crops, fishing, and rearing livestock (Adnan et al. 2017). While Sarawak is considered a fast-growing economy, many of the benefits have largely been concentrated in urban centres. Interestingly, the majority of the population live in rural areas, where poverty has prevailed but is gradually declining (Windle and Cramb 1997). Having said that, the majority of farmers in Sarawak live in these rural areas in which many proposals or propositions have been presented to widen the practice of technology among farmers such as the addition of agro-based information and assistance (Adnan et al. 2017).

Adnan et al. (2017) stated that this form of contact has also presented opportunities for farmers to join this novel [digital] marketplace and target new consumer segments via the internet.

Prior literature on the adoption of technology has mostly assessed the relative age of farmers and was found to be negatively significant in most cases (Ruttan 2000). Interestingly, older farmers tend to be close-minded and finding it quite difficult to accept the implementation of technology. Moreover, they tend to have less interest in new technology, preferring to remain in their "comfort zone". However, the experience and educational level of farmers tend to have a significant [positive] impact on the adoption of technology. Also, many studies included farm attributes such as farm size having a beneficial impact on technology adoption (Knowler and Bradshaw 2007, Feder and Umali 1993).

2.9 Hypotheses Development

The following section explains the development of the hypotheses, in which seven hypotheses are developed for this study that includes the potential relationship between performance expectancy, effort expectancy, social influence, facilitating conditions, perceived cost, and behavioural intention, in addition to the moderating relationship of technology readiness (TR) between perceived cost (PC) and behavioural intention.

2.9.1 Performance Expectancy

Venkatesh et al. (2003) define performance expectancy as the extent to which the use of technology in giving advantages to consumers when performing those activities or actions. Zhou et al. (2008) refer performance expectancy to the perceptual experience of users on convenient payment, fast feedback, and the effectiveness of the service. This variable also represents perceived usefulness (Davis 1989), job-fit (Thompson, Higgins, and Howell 1991), relative advantage (Moore and Benbasat 1991), extrinsic motivation (Davis, Bagozzi and Warshaw 1992), and outcome expectation (Compeau and Higgins 1995) constructs from previous technology acceptance models. Performance expectancy is a recognised antecedent of behavioural intention towards technology adoption (Venkatesh, Thong and Xu 2012). Michels, Vanessa and Oliver (2020) also supported performance expectancy as having a positive effect on the behavioural intention to use a crop protection smartphone app among farmers in Germany. The root constructs of performance expectancy incorporate relative advantage, perceived

usefulness, and outcome expectation (Venkatesh et al. 2003). In other words, performance expectancy is to some extent close to the perceived usefulness variable within TAM, which, because it is stable, efficient, and parsimonious, has become the most widely, adopted method for predicting technology usage (Palau-Saumell et al. 2019).

One of the main predictors of the intention to implement technology is the performance expectancy construct. Here, there are several longitudinal studies that explain the relationship between the construct and technology adoption. In conjunction with internet banking, Alalwan, Dwivedi, and Williams (2014), hypothesised performance expectancy is a useful construct in the usage of internet banking. Similarly, performance expectancy has been widely employed to understand the behavioural intention of users in adopting internet banking (Martins, Oliveira, and Popovič 2014; Junadi and Sfenrianto 2015, Chao 2019). Junadi and Sfenrianto (2015) also supported that performance expectancy (PE) has a positive effect on the intention to use electronic payment systems. More recently, Indrawati and Putri (2018) demonstrated that PE positively influenced e-payment adoption. Based on prior literature, it is anticipated that the *e-AgriFinance* app brings benefits to farmers in the agriculture sector when carrying out financial transactions over the digital finance platform. Therefore, the first hypothesis is proposed:

> *H1: Performance expectancy positively affects the behavioural intention of farmers to adopt e-AgriFinance.*

2.9.2 Effort Expectancy

Effort expectancy (EE) refers to the extent of ease that is associated with consumers' use of technology. The concept of EE contains perceived ease of use and complexity (Venkatesh et al., 2003). It is further defined by Venkatesh, Thong and Xu (2012) as the evaluation of an individual regarding the effort needed to complete a task using a given technology. In the context of this study, EE refers to the degree of informality associated with the use of the e-payment channel (Venkatesh et al. 2003). According to Venkatesh et al. (2012), PE and EE are two crucial predictors that influence the behavioural intention of the technology. In the context of the current study, EE indicates that the farmers consider and evaluate the implied effort required to adopt *e-AgriFinance*. They then determine whether the efforts required are aligned with the benefits gained from adopting the app.

Furthermore, previous empirical research on the adoption of mobile apps has supported the belief that EE affects the intentions to use. Moreover, the relationship between EE on behavioural intention has been found to be significant (Moore and Benbasat, 1991; Thompson, Higgins, and Howell 1991; Chao 2019). For example, EE has a positive impact on PE when users believe that internet banking is relatively easy to use, with little effort is needed to achieve the desired performance. (Zhou, Lu, and Wang 2010). When consumers perceive higher effort in using innovative technology, their tendency to use the technology is decreased (Zhou 2011). Junadi and Sfenrianto (2015) also demonstrated that EE has a positive effect on the intention to use e-payment systems, while Michels, Vanessa and Oliver (2020) supported EE having a positive effect on the behavioural intention to use the crop protection smartphone app among farmers in Germany. In this study, the effortless use of the digital platform leads to the willingness of farmers to use the app. Therefore, the second hypothesis is proposed:

H2: Effort expectancy positively affects the behavioural intention of farmers to adopt e-AgriFinance.

2.9.3 Social Influence

In the context of technology, social influence is characterised as the extent to which consumers perceive that important others believe that a specific technology should be used. Social influence (SI) refers to the normative belief structures that can be divided into three groups of people, namely peers, superiors, and subordinates and refer to the subjective norm in TRA (Taylor and Todd 1995). In addition, SI is developed from subjective norms, social factors, and image, which reflect the influence of other important people's expectation about using particular systems (Venkatesh et al. 2003). The important people in this context refer to family, relatives, and friends. In the context of technology, SI is characterised as the extent to which consumers perceive that important others believe that a specific technology should be used (Venkatesh, Thong, and Xu 2012). Here, individuals may choose to adopt the new system simply by following others' views and opinions (Wang, Meister, and Gray 2013). Venkatesh et al. (2003) asserted that SI is not significant in a voluntary sense but becomes significant during the early-stage of a mandatory context. In the early stages of technology implementation, users often experience a lack of information (Kerviler, Demoulin, and Zidda 2016). Furthermore, SI has

been considered a critical component in the decision-making process for people in behavioural science (Lu et al. 2017).

Soroa-Koury and Yang (2010) confirm the results on the relationship between SI and behavioural intentions via the social norms theory in a mobile advertising context. Karahanna, Straub, and Chervany (1999) contend that the adoption of information technology services by individuals is possibly influenced by the surroundings, peers and friends. According to the concept of the SI theory (Kelman 1974), once surrounding important peers recommend adopting a certain technology, individuals may jump at the suggestion. According to Martins, Oliveira, and Popovič (2014), SI affects the user's intention to adopt internet banking services. Similarly, Chaouali, Yahia, and Souiden (2016) hypothesised that those who believe what others believe about the new product or services are more inclined to use these products or technology services. Junadi and Sfenrianto (2015) demonstrated that SI has a positive effect on the intention to use electronic payment systems, while Indrawati and Putri (2018) demonstrated that SI has positively influenced e-payment adoption. Thus, it is anticipated that the intention of farmers to use *e-AgriFinance* depends on surrounding peers. Therefore, the third hypothesis is proposed:

H3: Social influence positively affects the behavioural intention to adopt e-AgriFinance.

2.9.4 Facilitating Conditions

Facilitating conditions signify how people support the presence of technological infrastructures to assist them in using the system at whatever crucial stage (Venkatesh et al. 2003). Venkatesh et al. (2003) formulate the facilitating conditions (FC) construct from the model of perceived cost (PC) utilisation (Thompson, Higgins, and Howell 1991), perceived behavioural control (PBC) (Ajzen 1991; Taylor and Todd 1995) and compatibility (Moore and Benbasat 1991). FC refers to the expectations of consumers regarding the services and help available to perform behaviour. Furthermore, FC, as a construct in the UTAUT model, reflects a person's perception of their control over their behaviour. Notably, FC is similar to PBC and compatibility.

Previous studies in the context of technology adoption illustrate that FCs have positively influenced the behavioural intention to use information systems (Jong and Wang 2009; Lakhal, Khechine, and Pascot 2013; Moore and Benbasat 1991; Venkatesh et al. 2003; Venkatesh, Thong,

and Xu 2012). In order to perform internet banking, users are required to have particular skills such as configuring and operating computers and connecting to the internet (Rahi et al. 2018, Martins, Oliveira, and Popovič 2014). Indrawati and Putri (2018) also demonstrated that FC positively influenced e-payment adoption. In this study, the complete infrastructure leads to the intention of the farmer to use the *e-AgriFinance* app. Hence, the fourth hypothesis is proposed:

H4: Facilitating conditions positively affects the behavioural intention to adopt e-AgriFinance.

2.9.5 Perceived Cost

Perceived cost (PC) is characterised as the extent to which the user of mobile services assumes that certain forms of financial, social, psychological, physical or time risks may be revealed to him or her (Zhang, Zhu, and Liu 2012). Additionally, when using mobile banking, users need to incur or accept access costs, such as that of data service and transaction fees. If users fail to have the requisite financial capital and organisational skills, mobile banking will not be embraced or used. Much research has uncovered the major influence of PC on the adoption of m-commerce (Hong et al. 2008, Kuo and Yen, 2009, Shin 2009). Chong et al. (2012) further hypothesised that costs had been shown to have a major and negative relationship with Malaysian customer decisions on mobile payment services. Furthermore, the absence of internet lines (i.e. cable, fibre, etc.) and smartphone devices bring additional costs to farmers in rural areas to afford these additional expenses. Also, the electricity bill is affected since the internet and smartphones consume more power than those of traditional phones. Also, installing Wi-Fi in the home is another expense for farmers, especially in rural areas. These extra expenses then affect their behaviour towards the acceptance of this technology. Therefore, the fifth hypothesis is proposed:

H5: Perceived cost negatively affects the behavioural intention to adopt e-AgriFinance.

2.9.6 Technology Readiness

Previous studies adopted a theory or integration of theories to explain the behavioural intention of adopting new technologies. For example, Davis (1989) explained computer use behaviour using TAM, and Lee (2009) predicted the use of e-banking using TAM and TPB with additional predictors; perceived risk and perceived benefits. However, the relationships between various

predictors and the behavioural intention to use new technologies could be affected by the third set of variables, namely, the age of mobile payment system users (Liébana-Cabanillas, Sánchez-Fernández, and Muñoz-Leiva 2014), the specific gender of users (Shao et al. 2019), and the design attributes of the e-payment system (See-To and Ho 2016). In addition, limited prior studies have explored the likely moderating effect of TR of users on the relationship between the predictors and behavioural intention of adopting digital finance. In a recent study by Kim, Lee and Preis (2020), it is concluded that for people with high optimism and innovativeness, the moderating position of tourists' TR is greater. This study hypothesises that TR only moderates the relationship between PC and behavioural intention, while the influence of perceptions of the relationships between PE, EE, SI and FC on behavioural intention will not vary according to the farmers' readiness to adopt the technology. For instance, farmers may have a positive behavioural intention to adopt *e-AgriFinance* if they determine that using the app may provide advantages or benefits that improve their agriculture activities and practices, regardless of whether or not they are technologically ready. Similarly, if the farmers consider having the required efforts to adopt *e-AgriFinance*, the behavioural intention to adopt is significantly higher, regardless of their TR. Likewise, with strong SI around the farmers and the presence of complete infrastructure, the behavioural intention to adopt is also high, regardless of their TR.

Accordingly, this study contends that the effects of PC on the intention to adopt *e-AgriFinance* may vary contingent on the level of readiness among farmers to use the new technology. According to Mallat (2007), the fees or pricing of mobile payments has a substantial negative effect on the willingness of customers to accept. Moreover, the findings of their study showed that mobile payments that pass on transaction costs to customers are unlikely to succeed unless they can deliver superior benefits (Humbani and Wiese 2018). In another study by Lu et al. (2011), they reported that 60% of the respondents were concerned about the cost or charges of using mobile payment services. In the context of the current study, when the farmers are prepared and ready to adopt *e-AgriFinance*, PC does not adversely influence their decision to adopt *e-AgriFinance* given they may not be too concerned about paying the required amount. In contrast, if the farmers are not technologically ready or prepared, their cost perception will adversely affect their decision to adopt *e-AgriFinance*.

Therefore, farmers with a different level of TR may change the relationship between PC and behavioural intention. Hence, the sixth and seventh hypotheses are proposed:

H6a: When farmers' technology readiness is high, the relationship between perceived cost and behavioural intention to use e-AgriFinance is positive.

H6b: When farmers' technology readiness is low, the negative relationship between perceived cost and behavioural intention is stronger.

For the purpose of this study, the moderating effect of TR is only investigated on the relationship between PC and behavioural intention since it is relevant to the context of mobile apps that, at this stage, are not developed and used by farmers. This study does not extend that the moderation effect cannot be extended to the relationships between other explanatory variables in the UTAUT; PE, EE, SI and FC with behavioural intention given there is a lack of theoretical and conceptual ground to develop such relationships based on the taxonomy set forth by Colquitt and Zapata-Phelan (2007). According to them, a prediction can be justified based on existing theory, existing models, diagrams or figures, existing conceptual arguments, references to past findings, and logical conjecture.. Therefore, except for PC, no hypothesis is developed to test the moderating effect of TR on the relationship between the four antecedents of the UTAUT and behavioural intention.

However, there are few empirical studies that test the TRI on all UTAUT factors and behavioural intention. For instance, Tsourela and Roumeliotis (2015) investigated the moderating role of TR in consumer acceptance and actual use of technology-based services where the moderating role of TR is significant, excluding EE and Si when customers' TR is high. Borrero et al. (2014) studied students' use of social networking sites using UTAUT with TR as the moderator on students' belief towards social networking sites. According to Borrero et al. (2014), female students with low TR are strongly influenced by EE, while male students with high TR are influenced by SI. Moreover, there are limited studies on the moderating role, particularly in the context of the TR index and the agriculture sector. Therefore, TRI in this study only moderates the relationship between PC and behavioural intention.

2.10 Summary of the Chapter

As demonstrated by the literature review in this chapter, it is shown that a large number of studies have adopted UTAUT. Indeed, many scholars have dedicated their research to help policymakers, digital finance providers and users in developing an improved understanding of digital finance and technology adoption. This chapter began with discussions on the context of the study, that is, the agriculture value chain, followed by the underpinning theory of the research – UTAUT and the moderator - TR. The research hypotheses were next developed, including five independent variables, such as PE, EE, FC, and PC. The inclusion of PC is an important variable since it considers the cost that might be incurred by the local farmers in adopting *e-AgriFinance*. The conceptual framework of this study was then explained, justified, and presented.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Chapter Overview

The present chapter outlines the research methods used to address the research questions developed in Chapter One. The chapter begins by providing a brief overview of the available research designs: quantitative, qualitative, and mixed-method. Next, the justification for the chosen research design is outlined, followed by the research's sample size, sampling procedures, data collection methods, questionnaire, and instrumentation of the study, in addition to the pilot study conducted. Finally, the last two sections of this chapter include the data analysis employed for the study and the ethical considerations of the study.

3.2 Research Design

There are three different types of research design, namely quantitative, qualitative and a mixture of both (Garson 2012). Each of these options has a different mix of fundamentals to achieve consistency in a research design (Creswell 2014; Saunders, Lewis, and Thornhill 2016, Bernard 2017). Likewise, the nature of the research project can be either exploratory, descriptive, explanatory, evaluative or a combination of both (Bernard 2017).

In other words, qualitative research designs attempt to gain a comprehensive understanding of subjects through various techniques like observation or narrative analysis or attempt to gain a comprehensive understanding of texts through exegesis or deconstruction (Garson 2012). Qualitative research design includes the techniques for gathering data, such as interviews or data processing, such as categorising data that is generated or uses non-numerical data (Bernard 2017). Some qualitative methods, such as content analysis, can also be quantitative, requiring detailed counting and statistical analysis of word patterns. In contrast, quantitative designs typically involve a larger sample size, placing more reliance on random sampling, greater use of statistical inference and less use of case illustration of findings. Besides that, Babbie (2016) suggests that the quantitative research method is recommended when the researcher wishes to determine the significance of the relationship between a specified variable and another.

This study is descriptive in nature and requires relationships between the variables to be explained, and therefore, it is superior in using the quantitative research method (Saunders,

Lewis, and Thornhill 2016). Furthermore, as mentioned earlier by Babbie (2016), this research determines the significant relationship between independent and dependent variables, in which there are three types of data variable that can be collected through questionnaires, namely factual, and demographic, attitudes and opinions and behaviours and events (Dillman, Smyth, and Christian 2014). Moreover, as this study aligns with the data variables, it was recommended that the study employed questionnaires to collect data. The data attained could be used to examine probable relationships among the variables under investigation (Garson 2002; Saunders, Lewis, and Thornhill 2016, Bernard 2017). Furthermore, the data acquired from the questionnaires could be easily measured and interpreted using a numerical basis given the well-established instruments is readily available in the literature.

Accordingly, a cross-sectional deductive study was conducted embracing a quantitative study design employing a questionnaire survey for data gathering and data analysis. The advantages of a cross-sectional study are that it is relatively inexpensive and not time-consuming to conduct. Also, the prevalence of the consequence of interest can be calculated since the sample is usually taken from the whole population and follow up is much simpler, if not more appropriate (Levin, 2006).

3.3 Target Population

The population of farmers in this study was obtained from Sarawak Facts and Figures, where the population of farmers in Sarawak totalled 12,330,296 farmers (Sarawak Facts and Figures). The target population in this study represented the farmers in Sarawak registered under respective boards: Malaysian Palm Oil Board (MPOB), Malaysian Cocoa Board (MCB), Malaysian Pepper Board (MPB) and Malaysian Rubber Board (MRB). In continuing this study, a list of farmers was requested from these respective boards in Sarawak.

3.4 Sampling Design

3.4.1 Sampling Location

Hair et al. (2010) define sampling location as the place or area where the samples should be drawn. Sarawak consists of 12 divisions and 40 districts with 26 sub-districts. In this research, based on the highest production of the four crops in Sarawak, nine divisions were selected in collecting data. The nine divisions were Miri, Mukah, Bintulu, Betong, Sibu, Sarikei, Serian,

Samarahan, and Kuching. In all nine divisions, and among all the districts, the highest numbers of production from the districts were then selected again, generating a total of 10 districts.

For oil palm, the selected research locations were Miri, Mukah and Bintulu; for cocoa, the locations were Sarikei, Samarahan and Bau in Kuching. For pepper, the locations were Julau in Saikei, Betong and Serian. Lastly, for rubber, the locations were Betong, Sibu and Saraikei. The selected districts are presented in Table 2a with the selected events and villages for data collection sites presented in Table 2b.

Table 2a: Sampling Location

Division	District
Kuching	Kuching
	Bau
	Lundu
Samarahan	Samarahan
	Asajaya
	Simunjan
Serian	Serian
	Tebedu
Sri Aman	Sri Aman
	Lubok Antu
Betong	Betong
	Saratok
	Pusa
	Kabong
Sarikei	Sarikei
	Maradong
	Julau
	Pakan
Sibu	Sibu
	Kanowit
	Selangau
Mukah	Mukah
	Dalat
	Matu
	Daro
	Tanjung Manis
Bintulu	Bintulu

	Tatau
	Sebauh
Kapit	Kapit
	Belaga
	Song
	Bukit Mabong
Miri	Miri
	Marudi
	Subis
	Beluru
	Telang Usan
Limbang	Limbang
	Lawas

Note. Highlighted in yellow denotes the selected divisions. Highlighted in green denotes the selected districts.

Table 2b: Data Collection Sites

Division/District	Venue	Date	Complete responses
Kuching/Samarahan	Kampung Sikog Kampung Mambong Kampung Niup Kampung Asajaya Tengah 1 and 2 Kampung Beradik Cina Kampung Asajaya Laut	9th – 11th Nov 2019	100
Kuching/Serian	Kampung Lebor AgroFest 2019	22nd – 25th Nov 2019	50
Miri/Niah	Kampung Tegageng Bakong Ladang Suria Seloi Rumah Ansang Rumah Junit Telabit	25th – 29th Nov 2019	100
Sarikei	Rumah Nyuka Rumah Ngabong Rumah Tayah Rumah Thomas	14th – 17th Jan 2020	100

3.4.2 Sampling Technique

In research, there are two broad types of sampling, namely, probability sampling and non-probability sampling. Under these different sampling methods, there are different respective techniques. Probability sampling is "associated most commonly with survey strategies where you

need to make inferences from your sample about a population to answer the research questions and to meet research objectives" (Saunders, Lewis, and Thornhill 2016, 276). There are essentially five basic procedures for selecting random samples from larger populations which include simple random, systemic random, stratified, cluster and multistage random sampling. Non-probability sampling, however, is an optional technique used to select samples non-randomly, the majority of which include an element of subjective judgement. Non-probability sampling includes convenience, snowball, quota, and purposive sampling (Mertler 2019). Therefore, this study adopted probability sampling for the crops of palm oil, cocoa and rubber, while non-probability sampling (purposive) was adopted for pepper due to the inaccessibility of the farmers' list from the MPB. The purposive sampling technique is also called judgemental sampling, that is to say, the participant's conscious preference regardless of the attributes that the participant possesses. Alternatively, in other words, simply put, the researcher decides what needs to be understood and sets out to find individuals who, through expertise or experience, can and are willing to provide the data (Etikan, Musa and Alkassim 2016).

Initially, the name list of farmers was obtained from the Malaysian Palm Oil Board (MPOB), Malaysian Cocoa Board (MCB), Malaysian Pepper Board (MPB) and the Rubber Industry Smallholders Development Authority (RISDA). Necessary documents were sent to respective boards to gain their approval since the information needed was private and confidential. Fortunately, the Malaysian Cocoa Board (MCB) and the Malaysian Palm Oil Board (MPOB) released the farmers' list and the areas where the farmers live. However, unfortunately, the Malaysian Pepper Board (MPB) refused to release the list, and the Rubber Industry Smallholders Development Authority (RISDA) declined to follow up. Therefore, the approach for pepper farmers was changed to purposive sampling, and for rubber, the Malaysian Rubber Board (MRB) was approached in which they agreed to assist in the data collection process. All respective boards randomly selected the farmers' list according to the respective areas except for pepper. For pepper farmers, the researcher was notified by the Board that the pepper farmers would be participating in an event held in Pusat Satu Malaysia, Kampung Lebor in Serian. The pepper farmers were also approached during the AgroFest 2019 held in Kuching. Before participating in answering the questionnaire, the farmers were asked whether they produced pepper and were registered under the MPB. AgroFest is an annual event organised to showcase the latest

agriculture technology, particularly smart farming technology, in promoting Sarawak as the nation's forerunner in modern farming. A booth was set up for the purpose to approach the pepper farmers during the AgroFest.

Zikmund et al. (2013) recommend that a self-administered survey could be used to clarify uncertain problems and test the hypotheses. Accordingly, this research employed self-administered paper-based surveys that were distributed to the local farmers. For palm oil, the data were collected from Kampung Tegageng, Bakong, Ladang Suria, Seloi, Rumah Ansang, Rumah Junit, Telabit in Miri, while for cocoa, the areas included Kuching, Samarahan and Sarikei. The farmers from Kampung Sikog and Kampung Mambong in Kuching; Kampung Niup, Kampung Asajaya Tengah 1 and 2; Kampung Beradik Cina and Kampung Asajaya Laut in Samarahan; and Rumah Thomas in Sarikei were open-minded and cooperative to participate in this research. For pepper, some of the respondents were from the AgroFest 2019 in Kuching, while others from Serian were from another event, Pusat Internet in Kampung Lebor. For rubber, some of the respondents were from the AgroFest 2019 in Kuching. Appreciatively, the Malaysian Rubber Board (MRB) assisted in collecting data at three longhouses in Sarikei; Rumah Nyuka, Rumah Ngabong and Rumah Tayah. In total, 337 respondents were identified in collecting the needed data.

3.4.3 Sample Size

Malhorta (2013) defines a sample size as the number of elements to be included in the study. The unit of analysis for the study signified individual farmers in the Sarawak agriculture sector. G*Power was utilised to determine the sample size for this research. By using the G*Power analysis programme, the five predictors in this study (i.e. performance expectancy, effort expectancy, social influence, facilitating conditions, perceived cost), having 95% statistical power, detected a value of at least 0.15% with 5% probability of error. Accordingly, it was determined that the minimum sample size required for this study was 89 in order to run PLS. However, the sample size using Krejcie and Morgan (1970)'s approach with 95% confidence level and 5% significance level was a total of 384, being sufficient for a population size of more than 1 million. Indeed the estimated population of farmers in Sarawak was estimated to be around 137,530 at the time of this study. Therefore, the sample size was deemed to be sufficient in continuing this study (Sarawak Facts and Figures Portal 2016). Subsequently, one hundred

farmers were selected from each of the four crops at the nine identified locations using the stratified random sampling method, generating a total sample size of 400 that exceeded the required minimum sample size of 384. Stratified random sampling was adopted since the procedure to select respondents for data collection from the population of farmers in Sarawak was to narrow down to three major contribution crops in Sarawak: palm oil, cocoa, and rubber. Further, for the crops in which the farmers shared similar characteristics, the name list was randomly selected by the respective boards.

As such, the sample of farmers in this study is selected from four major agriculture crops in Sarawak which are crude palm oil, cocoa, pepper and rubber (Department of Statistics Malaysia 2019). Collectively, the four major crops contribute to 40% to the national GDP from Sarawak in year 2020. The statistics for the four productions are obtained from the Department of Agriculture Sarawak. The list of farmers is obtained through respective boards, Malaysian Palm Oil Board (MPOB), Malaysian Pepper Board (MPB), Malaysian Cocoa Board (MCB) and Rubber Industry Smallholders Development Authority (RISDA). As the information relating to farmers was private and confidential, the researcher formally approached the respective boards to solicit the list of farmers. Necessary documents and a letter were presented to the respective boards. However, as mentioned earlier, RISDA declined to release the farmers' list. Therefore, as an alternative, the Malaysian Rubber Board (MRB) was approached and agreed to cooperate and aid during data collection.

Specifically, for oil palm, the MPOB released the complete list of oil palm farmers. The researcher then used an online randomiser to select 100 farmers based on the producing districts to answer the questionnaire. For rubber and cocoa, MRB and MCB randomly selected 100 cocoa farmers and 100 rubber farmers, respectively, based on the producers' districts. Purposive sampling was adopted for pepper, given the inaccessibility of the farmers' list from the Malaysian Pepper Board (MPB), where farmers were approached during certain events such as Agrofest2019 and Pusat Internet. Hence, the sample collected was much less than the other three crops. Indeed, prior literature was also shown to adopt more than two sampling techniques in one study. For instance, Lowry et al. (2016) adopted both random and stratified sampling, while Carillo, Sid and Brenda (2017), and Liu, Joe, Markos (2018) adopted mixed methods sampling.

The empirical studies were from the Strategic Information Systems and MIS (Management Information System) Quarterly journal.

3.5 Data Collection Method

The primary data source was collected using a questionnaire survey. An offline questionnaire administered by the researcher was employed for all nine divisions in Sarawak. The review of prior literature also suggests that researchers investigating technology adoption has used two main data collection methods: a survey and a case study approach. Survey research may use a number of popular data collection techniques, such as questionnaires and interviews (Ponto 2015). Furthermore, questionnaires may be administered by an expert or self-administered, may be administered individually or in a group, and normally contain a set of items that represent the research goals. Further to the relevant and accurate research methods that can be adopted, questionnaires can include demographic questions as well. When researchers explain the contents of the survey questionnaire, it is useful for the participants in order for them to perceive and determine the potential for validity errors (e.g. items or instruments that fail to measure what they are intended to measure) and reliability (e.g. items or instruments that do not reliably measure a construct). Likewise, recent research from the AIS (Association of Information System) Basket on technology acceptance studies utilised a questionnaire survey to collect data; the methodology is similar to prior literature on internet banking adoption (Kumar, Amit and Ritu 2020), post-adoption behaviour by customers to mobile payment systems (Singh 2020), technology adoption in education (Holzmann, Eruch and David 2020) and information system adoption (Zobair, Louis and Kuldeep 2020). Surveys have also been employed to study technology adoption across different levels of analysis, like individual users, households, senior executives, and small firms. However, even though the adoption of technology is a popular topic within the IS (Information System) sector (Venkatesh et al. 2003), there is very little variation in the research methods used. Therefore, this study adopted a survey questionnaire to collect data.

3.6 Questionnaire Design

The questionnaire designed for the study incorporated four double-sided pages, with the first page representing the Participant Information sheet, followed by the description and demonstration of *e-AgriFinance* apps. A total of 46 questions were categorised into four

categories that included the factors influencing the behavioural intention of farmers, the behavioural intention of farmers TR and demographic profile. The participant information statement was presented on the first page to provide respondents with information on the purpose of the questionnaire, and to explain to respondents' that their participation was voluntary and also provide assurance concerning the confidentiality of the information to be collected (Dillman 2014).

The survey instrument was translated to Bahasa Malaysia to provide a clear and understandable description of the questions to the respondents since the majority of the farmers in this study communicated in Bahasa Malaysia (the local language). The cross-reference of the Bahasa Malaysia version of the questionnaire was checked by another person to avoid any misinterpretation of the original meaning of the questions. Simple words were used in the questionnaire to avoid implicit assumptions and improve the ease of completing the questionnaire (Creswell 2014). However, while reliance on back-translation of the questionnaire may provide correct translations, it may not provide the correct use of the words in providing correct and identical responses across different countries. In translating the questionnaire, there are two distinct collaborative approaches that can be used: the committee approach and an expert team approach (Douglas and Craig 2007). Five specific steps are also recommended, regardless of the approach adopted in generating the final translation of a questionnaire, namely: translation, review, adjudication, pre-testing, and documentation (Harkness 2003). In this study, the committee approach was adopted. The researcher and translator translated the questionnaire into the local language before reviewing its original meaning. Participants from the farmers were approached for pre-testing the context of the questionnaire to obtain feedback on the reliability and comprehension of the local context. Accordingly, the participants found the translated version of the questionnaire to be understandable and the context appropriate for the study.

The structure of the questionnaire was divided into a number of sections. Section 1 represented the factors influencing the behavioural intention of farmers, which included the five independent variables, (i.e. performance expectancy, effort expectancy, social influence, facilitating conditions and perceived cost). Section 2 represented the behavioural intention of farmers to adopt *e-AgriFinance* in Sarawak, followed by Section 3 that represented TR, how farmers view

technology and their acceptance of technology. Written approval from Parasuraman and Colby (authors of theory of technology readiness) to adopt the TR measurement items was approved by the authors. Section 4 of the questionnaire represented the demographic profile of the farmers in best describing themselves that included their gender, age, educational level, income level, the experience of using mobile apps, income level, years of farming etc. The table below presents a summary of the questionnaire design.

Table 3: Summary of Questionnaire Design

Section	Number of items	Content
1	19	Five exogenous variables of the study
2	5	An endogenous variable of the study
3	10	A moderating variable of the study
4	12	Respondents' demographic profile

3.7 Pilot Study

A pilot study is defined as a trial run to mirror the actual data collection for the main study. According to Teijlingen and Hundley (2002), there are several objectives for conducting a pilot study: "a) testing adequacy of research instruments, b) assessment of the feasibility of a full-scale project, c) assessing whether the research protocol is realistic and workable, d) revealing reveal logistics issues, e) collecting preliminary data, f) ensuring whether the sampling frame and technique are effective, g) determining sample size, h) convincing funding bodies that the major study is feasible and worth funding and so on". Prior to data collection, a pilot study was undertaken to assess the survey instruments' internal consistency and to ensure clarity and contextual relevance. Here, there are a few rules that can be applied to determine the sample size for the pilot study. For instance, Cooper and Schindler (2011) suggest a sample size between 25 to 100 people, though a number between 10 and 30 individuals is often considered to be adequate in conducting a pilot test (Hill, 1998; Isaac and Michael 1995). In addition, some scholars have suggested that 10% of the sample expected for the main analysis should represent

the sample size (Connelly 2008). However, most previous studies in the agriculture and finance areas have adopted 30 individuals for the pilot test. Therefore, in this study, 30 farmers were selected at random and asked to complete the questionnaire.

One month before the data collection process began, the farmers were contacted and invited to participate in the survey at the proposed date. Reminders were sent two days prior to the proposed date. Thirty respondents were chosen from Miri and Batu Niah but were not involved in the actual data collection process in the main study. Prior to answering the questionnaire, a brief introduction to the prototype of *e-AgriFinance* was conducted in order for the farmers to have an idea of the app before answering the survey questionnaire. Upon completing the pilot study, there were no changes made to the questionnaire given that farmers understood the questions. The data collected from the pilot study was used to conduct a reliability test using Statistical Package for the Social Sciences version 25 software. According to Sekaran and Bougie (2013), Cronbach's alpha is used to examine the internal reliability of the items measured, where the acceptable level is 0.70. The table 4 shows the internal consistency reliability for each of the constructs in the questionnaire. Hinton, McMurray, and Brownlow (2004) mentioned that a value between 0.5 and 0.7 suggests moderate reliability, and between 0.7 and 0.9 signifies high reliability. Hence, given the Cronbach's alpha yielded from each construct, the items in the questionnaire were considered reliable.

Table 4: Results of Reliability Statistics

Variables	**No. of items**	**Cronbach's Alpha**	**Level of Reliability**
Performance Expectancy	4	0.940	Excellent
Effort Expectancy	4	0.956	Excellent
Social Influence	3	0.943	Excellent
Facilitating Conditions	4	0.948	Excellent
Perceived Cost	4	0.624	Acceptable
Behavioural Intention	5	0.947	Excellent

Technology Readiness Motivator	5	0.829	Good
Technology Readiness Inhibitor	5	0.793	Acceptable

3.8 Variables and Measurement

"A measurement scale is a tool with a predetermined number of closed-ended responses that can be used to obtain an answer to a question" (Hair et al. 2017, 7). A Likert (1932) scale is one of the most widely used instruments for measuring opinions, preferences, and attitude and enables the researcher to portray the complexity of human thoughts, feelings, and attitudes toward an issue in a validated and reliable manner (Joshi et al. 2015). The Likert scale has also been widely used in prior research related to technology adoption (Johnson et al. 2018; Oliveira et al. 2016). In this study, the variables adopted from UTAUT used a 7-point Likert scale, while the moderator for TR used a 5-point Likert scale.

Cummins and Gullone (2000) suggested that the expansion of the scale beyond 5 or 7 points could increase the sensitivity of the scale without affecting reliability. However, Leung (2011) pointed out that having more points seems to reduce skewness. Having said that, there is no common agreement in this matter, but Likert (1932) and others recommended using the scale as widely as possible. Finstad (2010) concluded that a 7-point Likert scale of items illustrates a more accurate measure of the participants' evaluation. The responses to each of the items for UTAUT variables are in the form of a 7-point Likert scale, with scale points labelled from (1) Strongly disagree to (7) Strongly agree. The existing literature also argues in a particular context of clustering of attitudes. Given the reliability of the respondents' responses to a survey, the chances are that a 7-point scale would perform better than a 5-point scale given the choice of items on the scale identified by the survey construct. The 7-point scale also offers more variations in choices that increase the possibility of reaching people's objective reality. Moreover, a 7-point scale shows a further definition of the motif and thus basically appeals to the participants' "faculty of reasoning" (Joshi et al. 2015).

Though given the Technology Readiness Index (TRI) is copyrighted, written permission was sought from the authors and subsequently granted. As such, the current study adopted a 10-item scale recommended by the authors. However, it was important to keep the 5-point scale for comparability of the results. The TRI has been well-established for many years and is calculated separately to determine the 'High' and 'Low' segment as the moderator even though they are measured using a 5-point scale. The responses to each of the items for TR were in the form of a 5-point Likert scale, with the scale points labelled from (1) Strongly disagree to (5) Strongly agree. The 5-point scale also appeared to be less confusing for the respondents and thus helped to enhance the response rate (Sekaran and Bougie 2010). In a nutshell, all constructs were measured by the scales drawn and modified from the existing literature, and wherever possible, from within the IT usage domain. This was to ensure that this study met both the validity and reliability of the corresponding construct (Leong et al. 2013). The following section explains where and how the measurement instruments were adopted.

3.8.1 Performance Expectancy (PE)

Performance expectancy (PE) reflects the benefits that the user expects to gain from using a system to perform a particular activity (Venkatesh et al. 2003). Yu (2012) measured PE by the degree of performance improvement, time-saving, convenience and useful enhancements in the mobile banking system. There were four items under PE representing the use of the *e-AgriFinance* app that may be useful to farmers in the agriculture sector. As such, this study examined PE by the extent to which the *e-AgriFinance* app improves the convenience and usefulness among the farmers. Given prior studies have tested the PE variable (Junadi and Sfenrianto 2015, Indrawati and Putri 2018), it was therefore deemed suitable to use in this study.

3.8.2 Effort Expectancy (EE)

Venkatesh et al. (2003) stated that effort expectancy (EE) reflects the perceived ease of use and complexity by the user of the system. Deng et al. (2010) extracted the perceived ease of use to act as the proxy of EE in explaining mobile banking adoption behaviour, while Yu (2012) evaluated the influence of EE by measuring the degree to which information systems are easy to use, to interact and to learn in using. Besides, clarity and understanding of the system are also the items used to measure EE (Tai and Ku 2013). There are four items under EE, namely: (i) my

interaction with the system would be clear and understandable, (ii) it would be easy for me to become skilful using the system, (iii) I would find the system easy to use and (iv) learning to operate the system is easy for me. In the current study, these items were also used to reflect the ability to use the *e-AgriFinance* app, particularly the higher percentage of adopting the app. As prior studies tested the PE variable (Zhou, Lu, and Wang 2010, Junadi and Sfenrianto 2015) therefore, it was considered to be suitable for the current study.

3.8.3 Social Influence (SI)

Social influence (SI) is defined as the degree to which the user's decision is influenced by other's suggestion(s) and expectation(s) of using a system (Venkatesh and Morris 2000). Foon and Fah (2011) and Yu (2012) measured SI by examining the expectation from the aspects of important people and friends of the users. The studies also evaluated the support of working and studying environments to determine the influence of social perspectives. Slade et al. (2015) revealed that SI was the strongest predictor of non-adopters behavioural intention to use mobile payments. The main concept of this variable is that of surrounding peers that influence a person's decision. There are three items under this variable: (i) people who influence my behaviour think that I should use the system, (ii) people who are important to me think that I should use the system, and (iii) in general, the organisation has supported the use of the system. In the context of this study, SI is the extent to which the surrounding peers influence the stakeholders' decision to use the *e-AgriFinance* app.

3.8.4 Facilitating Conditions (FC)

Facilitating conditions (FC) is defined as the ability and resource in using a system (Venkatesh et al. 2003). Previous studies measure FC in supporting living and working environment, system compatibility, availability of help and the support of necessary knowledge and resources in using the system (Foon and Fah 2011, Yu 2012). The measurement items used to examine FC in this study included: (i) the presence of the digital infrastructure, (ii) whether or not the telecommunication line is able to connect all the actors together, (iii) whether the farmers in rural areas have smartphones; (iv) and whether the electrical supply is stable. All these issues affect the behaviour of the farmers towards the adoption of the *e-AgriFinance* app. The main concept of this variable was that the farmers have the necessary resources to use the *e-AgriFinance* app.

3.8.5 Perceived Cost (PC)

Perceived cost (PC) is defined as the possible expenses of using internet banking that include equipment costs, access costs, and transaction fees (AlSoufi and Ali 2014), which relate to the initial costs of subscription, transactions, and correspondence that user believes that he or she will incur in the future (Abrahão, Moriguchi, and Andrade 2016). It also requires the willingness of the user to purchase a mobile device that is compliant with the mobile payment service (Shafinah et al., 2013). Costs are related to the time and effort to gather and evaluate alternatives, to change relative to decision-making, and the growth of the partnership with the new supplier or service provider (Abrahão, Moriguchi, and Andrade 2016). There were four items under this variable with respect to using the *e-AgriFinance* app and PC to farmers. Prior literatures with the adoption of perceived cost are shown in Table 4 (Brunham, Frels, and Mahajan 2003, Luarn and Lin 2005, Zhou, Lu, and Wang 2010, Zhang, Zhu, and Liu 2012). Table 5 shows the items of the exogenous variable and the source adopted.

Table 5: Items for Exogenous Variables

Exogenous Variable	**Amended Item**	**Original Item**	**Source**
Performance Expectancy (PE)	1. I would find the *e-AgriFinance* apps useful in my job. 2. Using the *e-AgriFinance* apps enables me to accomplish tasks more quickly. 3. Using the *e-AgriFinance* apps increases my productivity. 4. If I use the *e-AgriFinance* apps, I will increase my income.	1. I would find the system useful in my job. 2. Using the system enables me to accomplish tasks more quickly. 3. Using the system increases my productivity. 4. If I use the system, I will increase my chances of getting a raise.	(Venkatesh et al. 2003)
Effort Expectancy (EE)	1. My interaction with the *e-AgriFinance* apps would be clear and understandable. 2. It would be easy for me to become skilful at using the *e-AgriFinance* apps. 3. I would find the *e-AgriFinance* apps easy to	1. My interaction with the system would be clear and understandable. 2. It would be easy for me to become skilful at using the system 3. I would find the	(Venkatesh et al. 2003)

	use. 4. Learning to operate the *e-AgriFinance* apps is easy for me.	system easy to use. 4. Learning to operate the system is easy for me.	
Social Influence (SI)	1. People who influence my behaviour think that I should use the *e-AgriFinance* apps. 2. People who are important to me think that I should use the *e-AgriFinance* apps. 3. In general, the board of association has supported the use of the *e-AgriFinance* apps.	1. People who influence my behaviour think that I should use the system. 2. People who are important to me think that I should use the system. 3. In general, the board of organization has supported the use of the system.	(Venkatesh et al. 2003)
Facilitating Conditions (FC)	1. I have the resources necessary to use the *e-AgriFinance* apps. 2. I have the knowledge necessary to use the *e-AgriFinance* apps. 3. Using *e-AgriFinance* apps is entirely within my control. 4. I can get help from others when I have difficulties using *e-AgriFinance* apps.	1. I have the resources necessary to use the system. 2. I have the knowledge necessary to use the system. 3. The system is not compatible with other systems I use. 4. A specific person (or group) is available for assistance with system difficulties.	(Venkatesh et al. 2003)
Perceived Cost (PC)	1. I believe the *e-AgriFinance apps* would be very expensive. 2. I would have financial barriers (e.g. smartphone and data plan subscription) in order to use the *e-AgriFinance* apps. 3. I believe I would have to make effort to obtain the information that would make me feel comfortable in adopting *e-AgriFinance* apps. 4. It takes time to go through the process of adopting on *e-*	1. I believe the digital finance services would be very expensive. 2. I would have financial barriers (e.g. purchase of telephone and communication time expenses) in order to use the digital finance services 3. I believe I would have to do a lot of effort to obtain the information that would make me feel	(Brunham, Frels and Mahajan 2003; Gastal 2005; Luarn and Lin 2005; Lu et al. 2011; Yang et al. 2012 and Zhang et al. 2012)

	AgriFinance.	comfortable in adopting mobile payment. 4. It takes time to go through the process of moving to a new means of payment.	

3.8.6 Technology Readiness (TR)

The moderator in this study is measured using the Technology Readiness Index (TRI) 2.0, adopted from Parasuraman and Colby (2015), in which there are several versions: 16-item scales and 10-item scales. The former scale comprises four dimensions: optimism, innovativeness, discomfort, and insecurity. Optimism and innovativeness are presented as motivators of technology adoption, while the latter two dimensions are the inhibitor of TR. These four dimensions consist of four measurement items each, totalling 16-items to evaluate an individual's propensity to adopt and use new technologies. On the other hand, the 10-item TRI 2.0 consists of two dimensions: motivator and inhibitor. The 10-item scale allows creating an overall measure of TR and classifying respondents into one of five technology belief segments. The five segments include explorers, pioneers, sceptics, paranoids, and technology laggards (Parasuraman and Colby 2001).

According to Parasuraman and Colby (2001), explorers are the group of people who are easily approached towards a new technology when introduced and comprise the first wave of customers. Pioneers are the group of people who need some level of assurance about the technology and only then are they willing to try it. Sceptics are a group of people who are reluctant to adopt new technology and need convincing on the benefits of the latest technology.

For the purpose of this study as a moderator, the 10-items scale was adopted. The researcher obtained permission and a licence to use TRI 2.0. Since individual differences in their [the farmers] propensity to adopt new technology, this study included TR as the moderator in assessing the behavioural intention to adopt digital finance among farmers in the agriculture sector. Table 6 presents the items of the moderator variable and the adopted source.

Table 6: Items for Moderating Variable

Moderating Variable	Item	Source
Motivators	1. Technology gives me more freedom of mobility. 2. Technology makes me more productive in my personal life. 3. Other people come to me for advice on new technologies 4. In general, I am among the first in my circle of friends to acquire new technology when it appears. 5. I keep up with the latest technological developments in my areas of interest.	(Parasuraman and Colby 2014)
Inhibitors	1. Technical support lines are not helpful because they don't explain things in terms I understand. 2. Sometimes, I think that technology systems are not designed for use by ordinary people. 3. People are too dependent on technology to do things for them. 4. Too much technology distracts people to a point that is harmful. 5. Technology lowers the quality of relationships by reducing personal interaction.	(Parasuraman and Colby 2014)

These questions comprise the Technology Readiness Index 2.0 which is copyrighted by A. Parasuraman and Rockbridge Associates, Inc., 2014.

3.8.7 Behavioural Intention (BI)

Behavioural intention (BI) is characterised as the subjective probability of the individual committing the behaviour (Venkatesh et al. 2003). BI is measured by the intention, prediction, and planned use (Alshehri 2012) which is adopted in this study, specifically in the area of *e-AgriFinance*. Behavioural intention can be used to describe the actual use. (Davis 1989) suggested that BI is significantly correlated with actual use. Thus, this study used behavioural

intention as a dependent variable instead of actual use since the *e-AgriFinance* app was not in existence at this stage. Table 7 displays the items of the endogenous variable and the adopted source.

Table 7: Items for Endogenous Variable

Endogenous Variable	**Amended Item**	**Original Item**	**Source**
Behavioural Intention (BI)	1. I intend to use the *e-AgriFinance* apps in the next <n> months. 2. I predict I would use the *e-AgriFinance* apps in the next <n> months. 3. I plan to use the *e-AgriFinance* apps in the next <n> months. 4. I will often use *e-AgriFinance* apps in the future. 5. I will recommend others to use *e-AgriFinance* apps.	1. I intend to use the system in the next <n> months. 2. I predict I would use the system in the next <n> months. 3. I plan to use the system in the next <n> months.	(Venkatesh et al. 2003)

3.9 Control Variables

The present research identified four control variables that significantly influenced the behavioural intention of farmers to adopt *e-AgriFinance* in Sarawak.

3.9.1 Age

In the previous literature, age is among the most significant demographic characteristic (Mattila, Karjaluoto, and Pento 2003, Cruz et al. 2010, Foon and Fah 2011, Wu 2012) and is considered a significant factor in the adoption of technology and digital finance. Age was assumed to also affect the adoption of *e-AgriFinance* in the context of this study. Mattila, Karjaluoto, and Pento (2003) found that the earlier adopters of new technology were typically younger people, and older people finding difficulty in using finance services hosted on the internet (Cruz et al. 2010, Choudrie and Dwivedi 2005). Age is often determined in years, from ascending age intervals (Foon and Fah 2011, Wu 2012).

3.9.2 Gender

Gender is also one of the factors that could impact the use of digital finance. Men are more likely than women to access internet banking services (Kolodinsky, Hogarth, and Hilgert 2004, Laukkanen and Mika 2008, Laukkanen 2016, Sivathanu 2018). Therefore, the behavioural intention of females and males may differ in adopting *e-AgriFinance* in Sarawak.

3.9.3 Prior experience of using mobile apps

Experience in the context of this study is described as the prior use of smartphones and e-finance apps. Ajzen and Fishbein (2000) found that past experiences may affect the beliefs of users and, consequently, actual behaviours. The important connection between previous computer usage and new technology experiences and the acceptance and use of digital banking services was also supported by Laforet (2009) and Karjaluoto, Mattila, and Pento (2002). Venkatesh, Thong, and Xu (2012) adopt this variable in measuring experience relative to the length of time from using the system. Therefore, this study measured experience by the duration [time] the users had been using digital payment apps (Hsu and Lin 2015, Han, Dieck, and Jung 2018).

3.9.4 Education

Thomas and Streib (2003) highlighted that education could play a key role in cultivating internet users from their non-user counterparts. They also stated that among the various factors, culture and education are significant predictors of internet users, with the majority of users having a higher education. Educational level refers to a wide range of demographic education levels of citizens (Venkatesh and Morris 2000, Al-Shafi and Weerakkody 2010). Al-Shafi and Weerakkody (2010) added that educated individuals and citizens are more prone to achieving superior professions and employ new, cutting-edge innovations. Education is often measured from below or equivalent to primary to above or equivalent to high school by the level of education (Hashim 2007).

In the latest article in Sarawak, the majority of farmers had attained a primary educational level followed by secondary education. A small percentage had obtained Certificates and Diplomas, respectively, with a small number of farmers not attending school (Hassan et al. 2019). According to Danso-Abbeam and Baiyegunhi (2017), educational attainments play a vital role in

enhancing production. Therefore, with the support of prior literature, this study extends the educational level to include a diploma and a college degree.

3.10 Data Analysis Techniques

In analysing the data collected in this study, initially descriptive statistical analysis was used to analyse the data using SPSS. Partial least squares structural equation modelling (PLS-SEM) was later used to test the hypotheses using SmartPLS 3.0. PLS-SEM is a variance-based, linear model in which data normality is not required and allows simultaneous exploration of both measurement and structural models (Hair Jr et al. 2014). This method was adopted since it allows all relationships in the research model to be analysed simultaneously by integrating multiple regression and factor analysis, allowing for the simultaneous analysis of both observed and latent variables to assess the overall statistical fit or suitability. (Mathieu and Taylor 2006; Tabachnick, Fidell, and Ullman 2007).

According to Hair et al. (2018), PLS-SEM is best adopted when the research aims to explore theoretical extensions of current theories (exploratory analysis for the advancement of theory) to better explain increasing complexity when the study is concerned with evaluating a theoretical structure from a prediction perspective, when the structural model is complex and involves several constructs, indicators and/or model relationships and when the descriptive studies are focused on population descriptions. In addition, extended research indicates that PLS-SEM is appropriate for early-stage development theory testing and is ideal for managing complex models of large data sets (Fornell and Bookstein 1982, Hair et al. 2019). As there were multiple exogenous constructs in this study, PLS-SEM was considered an effective analytical method for analysing the interactions and importance of each variable (Hair, Christian, and Marko 2011).

3.10.1 Descriptive Analysis

Descriptive statistics allow frequency and percentage distributions to be performed in describing the demographic characteristics of respondents, such as gender, age, educational level, and ethnicity (Hair et al. 2010). Furthermore, descriptive analysis in this study was conducted on all items related to performance expectancy, effort expectancy, facilitating conditions, social influence, perceived cost, and behavioural intention. These analyses were conducted for each

variable to obtain preliminary information about the sample, such as frequencies, mean, and standard deviation (Hair et al. 2010).

3.10.2 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) refers to the second-generation multivariate data analysis method where many researchers have increasingly turned to in order to address and overcome the weaknesses afforded by the first-generation (Hair et al. 2017). SEM is a combination of path modelling/multiple regression and factor analysis (Ramayah et al. 2018) and enables researchers to incorporate variables measured indirectly by indicator variables.

Nevertheless, there are two types of SEM, namely covariance-based SEM (CB-SEM) and partial least square SEM (PLS-SEM), also known as PLS (partial least squares) path modelling (Hair et al. 2017). CB-SEM is mainly used for confirming or denying hypotheses (i.e. a collection of systematic relationships between several empirically testable variables) and does this by determining how well the covariance matrix for a sample data set can be calculated by a proposed theoretical model. PLS-SEM, in comparison, is primarily employed in exploratory research to build theories and does this by reflecting, when analysing the model, on describing the variance in the dependent variables.

The present study used a reflective measurement model for performance expectancy, effort expectancy, social influence and facilitating conditions while using a formative measurement model for perceived cost. PLS-SEM was adopted in this study since the data were not normally distributed. In a reflective model, the indicators all share a common theme and are interchangeable. This applies to all constructs in this study except for PC, where it is designed in such a way that the indicators define the construct. Therefore, this study used a reflective measurement model for performance expectancy, effort expectancy, social influence and facilitating conditions while using a formative measurement model for PC, which is consistent with prior literature (Tiwari and Shiv 2020, Jin, Lim and Aye 2019, Rahman, and Terry 2017).

Hair, Ringle and Sarstedt (2011) provide rules of thumb for choosing between PLS-SEM and CB-SEM. The reasons for choosing PLS-SEM might be when the objective is to predict key constructs or to classify key "driver" constructs, when formatively measured constructs are part of the structural model, when the structural model is complex, meaning that there are many

constructs and indicators when the sample size is small and/or the data are non-normally distributed, and when the plan is to use latent variable scores in subsequent analyses. Software that can be used to analyse PLS-SEM includes SmartPLS, WarpPLS, PLS-GUI, ADANCO, XL-STAT, GeSCA, PLSGraph and several more (Ramayah et al. 2018). Moreover, the output of SmartPLS is very flexible compared to R or SPSS graphics.

Accordingly, employing SmartPLS in this study was anticipated to assist the researcher in interpreting the responses of the research participants in drawing reliable and cohesive conclusions (Danks, Pratyush and Marko 2020). In contrast, the reason for choosing CB-SEM could be, where the purpose is to test the theory, validate the theory, or compare alternative theories, where error terms require additional requirements, such as covariation, when the structural model has circular relationships, and when a global goodness-of-fit criterion is required for analysis.

3.10.3 Multigroup Analysis (MGA)

Multi-group analysis (MGA) in SmartPLS was applied to the moderating effect of TR between PC and behavioural intention since the moderation on TR was classified into two groups: high and low. The multi-group analysis was used to test whether the significant differences of pre-defined data groups in the specific group parameter would estimate outer loadings, outer weights, and path coefficients. SmartPLS is also able to present the outcomes of three different approaches based on bootstrapping results. The multi-group analysis methods include Confidence Intervals (Bias Corrected), Partial Least Squares Multi-Group Analysis (PLS-MGA), Parametric Test and Welch-Satterthwait Test (Sarstedt et al. 2011; Hair et al. 2018).

In this study, technology readiness (TR) is classified according to the associated technology segment (Parasuraman and Charles 2015). In this example, the SPSS data set was sent to the author (Charles Colby) to determine the technology segmentation since the classification is created using a proprietary algorithm. The lowest possible score is 1, and the highest score is 5, where a higher score represents higher TR. For computing, the TRI 2.0 approach for 10 item-scales only the average of the positives (motivators) and negatives (inhibitors) it gained, but not the individuals' dimensions since there are insufficient variables for four reliable sub-scales. As

seen from the table below, for the number of farmers in this study, the majority had a low TRI score.

3.11 Ethical Considerations

This research was undertaken in accordance with the Australian Code for the Responsible Conduct of Research. As human participants were involved during the course of this research, ethical clearance was sought before the commencement of collecting the data. Accordingly, this research was approved by the Human Research Ethics Committee of Curtin University, approval number HREC2019-0753. The consent form and personal information form were attached at the front of the questionnaire to ensure that the participants were well informed about the study and that their participation was voluntary. Also, all details of the respondents remained anonymous. According to the Australian Code for the Responsible Conduct of Research and the Curtin Research Data Management policy, the research data are retained by the researcher for a sufficient time for both reference and use by other researchers. Furthermore, the research data are kept in a safe and secure manner, as well as in a durable, indexed, and retrievable form. The research methods and data source were recorded precisely and accurately throughout the study.

3.12 Summary of the Chapter

This chapter discussed the research methodologies employed in this research. Firstly, a brief explanation of the research design was given and the types of research methods discussed, followed by justification as to the rationale of choosing the quantitative method. A survey questionnaire approach was adopted in collecting data, preceded by conducting a pilot study involving 30 respondents to confirm the validity and consistency of the instrument. The study sites chosen for the study included Miri, Mukah, Bintulu, Betong, Sibu, Sarikei, Serian, Samarahan, and Kuching, in which a total of 337 questionnaires were collected and analysed. The questionnaire design and instrument were discussed in detail, including the data analysis techniques that were adopted, namely, descriptive analysis and PLS-SEM. This was followed by discussing the approach to assess the measurement model, assessment of the structural model and fitness of the models in providing a robust overview. Finally, ethical considerations surrounding the collection of data were discussed.

CHAPTER FOUR: DATA ANALYSIS AND RESULTS

4.1 Chapter Overview

This chapter presents the empirical findings of the study. Descriptive analysis was undertaken using SPSS, followed by performing an assessment on the models using SmartPLS 3.0 (measurement model and structural model). The tests conducted are further analysed along with a brief interpretation and discussion on the specific criteria, threshold values and results of the tests.

4.2 Data Preparation

The data preparation process involved data entry, followed by coding the data into Microsoft Excel. A total of 337 responses were recorded. The researcher manually coded the responses in Microsoft Excel, checking for incomplete, invalid or missing data. As a result, there were no incomplete or invalid responses. Furthermore, the researcher was mindful when distributing the questionnaires to the respondents to ensure they were correctly answered and complete. After a preliminary analysis, 337 usable cases were then loaded into SPSS version 25 for analysis. The database in SPSS statistics was used to generate descriptive statistical reports, to check for missing data on each variable, to generate an analysis of the data for the normality test, common method bias and collinearity test.

The existing data in SPSS was then exported back into Microsoft Excel as a CVS (comma-separated values) file to generate raw input for the SmartPLS software programme. Assessment of the measurement model and the structural model assessment were performed using SmartPLS.

4.3 Respondents' Profile

Descriptive statistics were used to provide insight into the respondents' demographic profiles and included the mean, standard deviation, range of scores, skewness, and kurtosis.

Based on the analysis performed using SPSS, the response rate was 100% for palm oil, cocoa and rubber, while the response rate for pepper was 50%. All 337 questionnaires were returned, of which 57.8% of the respondents were males, and 41.2% were females. The highest percentage age group of the farmers that participated in this study were aged between 51 and 60 years, representing 28.1%. The majority of the respondents were Dayak. The experience of using

mobile apps was also captured in demographic information. As expected, the majority of respondents (40.4%) had never used mobile apps such as WhatsApp or Grab. Since this study is also aligned with the Sarawak Digital Economy Strategy 2018-2022, a question regarding the respondent's awareness of the digital economy was also included. The analysis showed that 44.3% of respondents were aware of the Sarawak Digital Economy Strategy, while 55.1% were unaware of the strategy. Regarding the ownership of mobile phones, 58.0% owned a smartphone, 41.0% owned a cell phone, and 0.3% owned a feature phone. This finding is encouraging since more than half of the respondents possessed the necessary device to embrace digital technology.

Table 8: Respondents' Demographic Information (n=337)

Demographic Variable	Frequency	Percentage (%)
Gender		
Male	193	57.8
Female	141	42.2
Age		
20-30	34	10.2
31-40	50	15.0
41-50	76	22.8
51-60	94	28.1
61-70	67	20.1
71-80	12	3.6
81-90	1	0.3
Ethnicity		
Malay	107	32.0
Chinese	23	6.9
Dayak	177	53.0
Other	27	8.1
Education		
No formal education	36	10.8
Primary school	100	29.9
Secondary school	151	45.2
Technical/Vocational school	10	3.0
Diploma	21	6.3
Degree and above	13	3.9
Others	2	0.6
Experience of using mobile apps		
No	135	40.4
Less than 1 year	44	13.2
1-3 years	45	13.5
More than 3 years	109	0.3

Monthly Income		
RM1,500 or below	234	70.3
RM1,501-RM3,500	68	20.4
RM3,501-RM5,500	21	6.3
RM5,501-RM8,500	10	3.0
Crop		
Oil Palm	107	31.8
Rubber	98	29.2
Cocoa	89	26.5
Pepper	42	12.5
Years in Farming		
1-10	183	54.6
11-20	67	20.0
21-30	29	8.7
31-40	23	6.9
More than 40	33	9.9
Awareness of Sarawak Digital Economy Strategy		
Yes	149	44.3
No	185	55.1

4.4 Descriptive Statistics

Using SPSS version 25, the mean and standard deviation of each indicators were calculated. Table 8 outlines the descriptive statistic for all variables of this study.

Table 9: Descriptive Statistics for All Variables

Construct	Indicator	Mean	Std. Deviation
Performance Expectancy	PE1	5.36	1.133
	PE2	5.50	1.116
	PE3	5.38	1.182
	PE4	5.50	1.105
Effort Expectancy	EE1	5.23	1.096
	EE2	5.18	1.284
	EE3	5.23	1.156
	EE4	5.09	1.353
Social Influence	SI1	4.77	1.377
	SI2	5.07	1.103
	SI3	5.34	1.215
Facilitating Conditions	FC1	4.72	1.664
	FC2	4.58	1.642
	FC3	4.72	1.544

	FC4	5.40	1.202
Perceived Cost	PC1	4.36	1.638
	PC2	4.64	1.623
	PC3	5.28	1.241
	PC4	5.11	1.402
Behavioural Intention	BI1	5.12	1.222
	BI2	5.09	1.268
	BI3	5.48	1.118
	BI4	5.32	1.217
	BI5	5.60	1.148
Motivator Statements	MS1	4.15	.841
	MS2	4.09	.857
	MS3	3.63	.986
	MS4	3.30	1.112
	MS5	3.94	.937
Inhibitor Statements	IS1	3.00	1.193
	IS2	2.99	1.341
	IS3	3.41	1.207
	IS4	3.36	1.267
	IS5	3.50	1.303

Table 10 shows the segmentation from the respondents in this study. The TRI score is conducted by the author using proprietary algorithm. The Technology Readiness Segmentation provides a more holistic view of behaviour.

Table 10: Technology Segmentation

TRI Segment	**TRI Score**	**Respondents No.**	**Percentage (%)**
Avoiders	1	105	31.16
Hesitators	2	98	29.08
Pioneers	3	11	3.26
Skeptics	4	106	31.45
Explorers	5	17	5.04
Total		337	100

4.5 Verifying Data Characteristics

This section discusses the analysis undertaken to validate the characteristics of the collected data. This was to confirm that the data were usable, valid, and complete for the higher-level analysis

undertaken in PLS, which included verification of any missing values, data normality and the potential of common method bias.

4.5.1 Missing Data

Missing data occurs when respondent either purposely or unintentionally fails to answer one or more question(s), which is often a problem in social science research, especially when obtaining data through a survey. Therefore, missing value analysis was an important requirement prior to further analysis. Frequency analysis under SPSS was also undertaken to identify any missing values in the data set. Accordingly, there were no missing values in the data.

4.5.2 Outliers

After checking for missing data, the data were then tested to examine if there were any outliers present. An outlier is an extreme answer to a specific problem or an extreme answer to all questions. The boxplot was used to identify the outliers, where some cases were deemed to be outliers. In a boxplot, the boundaries of the box are Tukey's hinges, and the median is identified by a line inside the box. The length of the box is the inter-quartile range (IQR) computed from Tukey's hinges. Values more than three IQR from the end of the box are labelled as extreme and signified using an asterisk (*), identifying them as an outlier. Values more than 1.5 IQR but less than 3 IQR from the end of the box are labelled as outliers (o). However, Hoaglin and Iglewicz (1987) demonstrate that the 1.5 multiplier was inaccurate 50% of the time, on average, suggesting that 2.2 is probably more valid in many cases.

Therefore, the Mahalanobis distance test was performed to further analyse the data set for outliers. In the compute command, a relational expression such as "probability MD < 0.001" returns as 1; this case is an outlier because the threshold value for this test needs to be less than 0.001 (Tabachnick, Fidell, and Ullman 2007). Furthermore, Roni (2015) asserted that to check if the outliers affect data, compare 5% trim mean and mean values. If there is a large difference between these values, then there is a big possibility that further analyses, such as correlation and regression, is affected. Five per cent trimmed means the mean that slashes out 5% of the extreme ends (both lower and higher ends) of the dataset. Therefore, in this study, there were no outliers identified.

4.5.3 Data Normality

Data normality was next examined in two different statistical analyses, namely the Skewness and Kurtosis and the Shapiro-Wilk tests. Both normality tests can be undertaken using the SPSS software, while for the Shapiro-Wilk test, to achieve normally distributed data, the threshold value for the p-value is 0.05 (Shapiro and Wilk 1965, Razali and Wah 2011). The skewness and kurtosis measures should be as close to zero as possible. However, in reality, data are often skewed and kurtotic. As a consequence, the z-value is calculated by dividing the measure by its standard error. In order to achieve data normality, the threshold of the z-value should be between -1.96 and 1.96 (Cramer 2003, Cramer, and Howitt 2004, Doane and Seward 2011). It was shown that most of the z-values exceeded their threshold value, thus, indicating that the data was not normal. Besides, the null hypothesis for the Shapiro-Wilk test for normality is that the data are normally distributed. The null hypothesis is rejected if the significant value is below 0.05. The results from the Shapiro-Wilk test in this study showed that all variables had a p-value of 0.00, meaning that the data was not normal, not normally distributed, and therefore, the results support the use of PLS.

Table 11: Normality Test

Variables	**Items**	**Skewness**		**Kurtosis**		**p-value (Statistic/Standard Error)**		**Shapiro-Wilk Test (p-value)**
		Statistic	**Standard Error**	**Statistic**	**Standard Error**	**Skewness**	**Kurtosis**	
Performance Expectancy	4	-0.388	0.133	1.429	0.265	0.998	1.450	0.000
Effort Expectancy	4	-0.318	0.133	0.625	0.265	0.992	0.009	0.000
Social Influence	3	-0.075	0.133	0.448	0.265	0.712	0.046	0.000
Facilitating Conditions	4	-0.661	0.133	0.488	0.265	0.999	0.033	0.000
Perceived Cost	4	-0.371	0.133	0.259	0.265	0.997	0.164	0.000
Behavioural Intention	5	-0.528	0.133	1.197	0.265	0.999	0.000	0.000
Technology Readiness Motivator	5	-0.444	0.133	0.750	0.265	0.999	0.002	0.000

Technology Readiness Inhibitor	5	-0.034	0.133	-0.699	0.265	0.603	0.996	0.000

4.5.4 Common Method Bias

Common method bias depicts the measurement error, which is compounded by the sociability of respondents that contribute constructive responses (Chang and Eden 2010). Most results and concerns of researchers are related to studies having a single-source, self-reporting, cross-sectional design. Generally, there is a tendency of biasness towards the rating of the indicator or items of the questions in the questionnaire. Indeed, a common method bias is a potential bias that respondents show when filling or completing the questionnaire or when responding to the question(s) asked in the questionnaire. Thus, common method bias is due to the method of measurement rather than the structures described by the metrics.

In order to minimise common method bias, Podsakoff et al. (2003) recommended performing several procedures, divided into five categories:

1. Temporal, proximal, psychological, methodological separation of measurement;

2. Obtaining measures of the predictor and criterion variables from different sources;

3. Improving scale items;

4. Counterbalancing the question order; and

5. Protecting respondent anonymity.

These procedures are normally carried out during the design stage of the study and the development of the questionnaire instrument. This study adopted one of these procedures in protecting respondent anonymity. As the responded questionnaires were anonymous, this protected respondent anonymity, thereby enabling respondents' to respond accurately and independently without hesitation.

Harman's Single Factor test in SPSS was used to identify common method variance. In EFA (exploratory factor analysis), if a single factor emerges or one general factor accounts for the majority of the measure, it is assumes that a significant amount of common variance in the process exists. Besides, in the total variance explained results, the percentage of variance under

extraction sums of squared loadings should be less than 50% (Podsakoff et al. 2003). The test was performed in SPSS on all 34 items in this study, and the percentage of variance was 29.29%, which was far below the recommended 50%. However, to complement Harman's Single Factor in assessing common method bias, the full collinearity test was undertaken. Indeed, it is a systematic technique to test both vertical and lateral collinearity concurrently (Kock and Lynn 2012). The statistical test in this study was performed using SmartPLS, where it involved variance inflation factors (VIFs) in being generated for all latent variables in the model (Kock 2015). The recommended value for this test was to acquire a VIF value of less than 3.3; otherwise, it indicates that the pathological collinearity and the model may be contaminated by common method bias (Kock 2015). Nevertheless, in this research, all VIFs were lower than 3.3, indicating that the common method bias did not pose a serious threat to the research findings (Kock 2015). Therefore, in the data analytics that was performed, it is concluded that traditional process bias does not pose a serious concern.

4.5.5 Collinearity Test

Another statistical test to assess common method bias is the collinearity test, which is a systematic technique used to test both vertical and lateral collinearity simultaneously (Kock and Lynn 2012). This test was performed under SPSS regression. Multicollinearity (also known as collinearity and inter-correlation) is a condition that exists when the independent variables are highly correlated with one another. Indeed, only multiple regression models have this issue that simple regressions do not. As such, this distorts the coefficients t-test, making it impossible to decide where all of the independent variables are connected to the dependent variable linearly. It also makes interpreting the coefficients problematic; however, multicollinearity does not affect the f test of the analysis of variance. Multicollinearity inflates the variances of the parameter estimates, which may lead to a lack of statistical significance of individual predictor variables even though the overall model may be significant (Midi, Saroje and Sohel 2010). The presence of multicollinearity can consequently cause serious problems with the estimation of beta and the interpretation. Multicollinearity detection can be performed by analysing the matrix of correlation or using VIF and eigenvalues. In an ordinary least squares regression analysis, the VIF quantifies the multicollinearity frequency. It is an index that measures the extent to which the variance of the estimated coefficients is increased over the case of no correlation among the

X variables. The rule of thumb from Montgomery (2001) stated that if either of the VIF values exceeds 5 or 10, it infers that the associated regression coefficients are weakly estimated because of multicollinearity. The recommended value for this test was to acquire VIF values less than 3.3; otherwise, it indicates that the pathological collinearity is an indication that the model may be contaminated by common method bias (Kock 2015). However, in this research, all VIFs were less than 3.3, indicating that the model is considered free of common method bias (Kock 2015). In order to calculate the existence of multicollinearity, eigenvalues may also be used. If the predictor variables contain multicollinearity, one or more of the eigenvalues is small (near to zero) (Montgomery 2001). All the eigenvalues for dependent variables in this study were less than 0, meaning that there was the presence of multicollinearity.

Table 12: Collinearity Test

Constructs	**Items**	**Outer VIF Values**	**Inner VIF Values**
Performance Expectancy	PE1	2.895	2.321
	PE2	2.967	
	PE3	2.412	
	PE4	2.350	
Effort Expectancy	EE1	2.129	2.246
	EE2	2.923	
	EE3	2.518	
	EE4	3.060	
Social Influence	SI1	2.108	2.134
	SI2	2.318	
	SI3	2.062	
Facilitating Conditions	FC1	2.020	1.749
	FC2	2.956	
	FC3	2.411	
	FC4	2.223	
Perceived Cost	PC1	2.240	1.379
	PC2	2.445	
	PC3	2.324	
	PC4	2.682	
Technology Readiness Motivator	MS1	2.304	1.462
	MS2	2.428	
	MS3	1.532	
	MS4	1.641	
	MS5	1.695	
Technology Readiness Inhibitor	IS1	1.522	1.095

	IS2	1.554	
	IS3	1.686	
	IS4	1.662	
	IS5	1.463	

4.5.6 Correlation Matrix

The correlation matrix for this study is presented below.

Table 13: Correlation Matrix

Construct	Mean	Standard Deviation	PE	EE	SI	FC	PC	BI
Performance Expectancy	5.430	1.130	0.834					
Effort Expectancy	5.180	1.220	0.628	0.838				
Social Influence	5.060	1.230	0.635	0.554	0.831			
Facilitating Conditions	4.860	1.510	0.519	0.597	0.491	0.754		
Perceived Cost	5.010	1.420	0.499	0.265	0.501	0.321	0.726	
Behavioural Intention	5.320	1.190	0.662	0.615	0.656	0.606	0.452	0.830

4.6 Assessment of the Measurement Model

In this study, the research model was evaluated using PLS-SEM. SmartPLS 3.0 is often used to assess the measurement and structural model of a study (Ramayah et al. 2018). Here, PLS first assesses the measurement model's reliability and validity for reflective constructs (i.e. performance expectancy, effort expectancy, social influence and facilitating conditions) by analysing internal consistency reliability, indicator reliability, convergent validity, and discriminant validity. A formative construct, which was PC in this research, was assessed using the following analyses: convergent validity, collinearity between indicators and the significance and relevance of outer weights. The analysis and findings of the measurement model are presented in the following subsections.

4.6.1 Internal Consistency Reliability

The first criterion to be measured is commonly the reliability of internal consistency. Cronbach's alpha, which offers an approximation of reliability based on the inter-correlations of the predictor variables observed, is the standard criterion for internal consistency. The alpha of Cronbach is sensitive to the number of items on the scale and attempts to underestimate the efficiency of internal accuracy. Given this limitation, it is technically more appropriate to apply another measure, namely composite reliability (Hair et al. 2017). Composite reliability varies between 0 and 1, where higher values indicate higher levels of reliability. Specifically, composite reliability between 0.6 – 0.7 is considered acceptable in exploratory research, while 0.7 – 0.9 is considered satisfactory. However, values more than 0.9 and above 0.95 are undesirable since it shows that the same phenomenon is measured by all indicator variables and is therefore not likely to be a reliable measure of the construct. As shown in the reliability statistics below, it indicates that the composite reliability values ranged between 0.839 and 0.917, which is associated with the satisfactory level. Therefore, the findings show that the items used to describe the structure are accurate regarding internal consistency.

4.6.2 Indicator Reliability

The size of the outer loading is also commonly known as indicator reliability. Higher outer loadings on a construct indicate the associated indicators have much in common, which is captured by the construct. At a minimum, the outer loadings of all indicators should be statistically significant. A common rule of thumb suggests that the standardised outer loadings should be 0.708 or higher. Although 0.7 is considered to be close enough to 0.708 to be acceptable. On the other hand, according to Hulland (1999) and Byrne (2016), the satisfactory values for indicator reliability loadings should be more than 0.7, 0.6, 0.5 or 0.4, but only if the other items have high scores of loadings to complement the composite reliability and average variance extracted value. As shown in the reliability statistics below, it indicates that the values of the loading range between 0.622 and 0.873.

4.6.2.1 Assessment of Formative Construct

However, for a formative construct, which is PC, the outer weight is considered, in which the threshold value for outer loadings should be more than 0.5. One of the rules of thumbs for

formative measurement indicators states if the outer weight is non-significant, but the outer loading is relatively low (less than 0.5), one should strongly consider removing the indicator from the model. The outer weight for item PC1 is -0.380, and PC2 is -0.163. After progressing through the necessary analysis, the outer loading for PC1 does not meet the criterion; hence it is deleted from the model while PC2 is significant. The new outer loadings for PC2 after the removal of PC1 is -0.382 and is significant; thus, keeping the item. PC2 is an important item that contributes to PC - "I would have financial barriers (e.g., smartphone and data plan subscription) in order to use the *e-AgriFinance* app". This item gathers the response of farmers' on whether they are sensitive to PC incurred in the future and also needing to have a clearer idea of the financial barriers which may be imposed.

As such, this item is important to capture the construct's domain. In addition, the item also meets the requirement of a formative measurement model (i.e., significant outer weight). According to Ronald and Bassellier (2009), when negatively weighted items are not collinear or not suppressors, then the item should be included in the analysis. For PC2, the VIF is 1.707, which is less than 3.3, meaning that it does not have a collinearity issue. Also, correlation analysis was carried out for PC2, and the items correlated to the dependent variable. As such, this item was retained. Besides, the nature of the formative construct can have items that are positively or negatively related or not related (Petter, Detmar and Arun 2007, Mannan et al. 2017, Papista et al. 2018).

Table 14: Reliability Statistics

Construct	**Items**	**Loadings/Weights**	**Composite Reliability (CR)**	**Average Variance Extracted (AVE)**
Performance Expectancy	PE1	0.838	0.901	0.695
	PE2	0.860		
	PE3	0.815		
	PE4	0.822		
Effort Expectancy	EE1	0.788	0.904	0.703
	EE2	0.873		
	EE3	0.821		
	EE4	0.867		
Social Influence	SI1	0.796	0.870	0.691
	SI2	0.872		

	SI3	0.825		
Facilitating Conditions	FC1	0.622	0.839	0.569
	FC2	0.780		
	FC3	0.851		
	FC4	0.745		
Perceived Cost	PC2	-0.382	0.746	0.526
	PC3	0.797		
	PC4	0.501		
Behavioural Intention	BI1	0.838	0.917	0.688
	BI2	0.841		
	BI3	0.795		
	BI4	0.865		
	BI5	0.807		

4.6.3 Convergent Validity

Convergent validity is the extent to which a measure compares favourably with the same construct's alternate steps. Convergent validity is assessed by examining its average variance extracted (AVE). As such, convergent validity includes the degree to which individual indicators reflect in contrast to measures assessing other constructs, a construct converging (Urbach and Ahlemann 2010). This criterion is defined as the highest mean value of the squared loadings of the construct-related indicators. In other words, “it is the degree to which a latent construct explains the variance of its indicators” (Hair et al. 2016, 79, 114). Convergent validity is considered adequate when the constructs have an AVE value of 0.5 and above.

4.6.4 Discriminant Validity

Discriminant validity is the degree to which a construct by empirical criteria is different from other constructs (Hair et al. 2016). The measurement model’s discriminant validity can be assessed using the following assessments: 1) Cross-loading criterion, 2) Fornell and Larcker (1981) criterion, and 3) Heterotrait-Monotrait ratio of correlations (HTMT).

4.6.4.1 Cross Loading Criterion

The first method to assess descriptive validity is the cross-loading criterion. The criterion here is that the loading of the indicators on the allocated latent variable should be higher than the loadings on all other latent variables in the model (Ramayah et al. 2018). The other criterion is that the difference between the loadings across latent variables must not be less than 0.1

(Ramayah et al. 2018). Table 15 shows that all bolded numbers are more than 0.1, which meets the required criterion.

Table 15: Loadings and Cross Loadings

Construct	PE	EE	SI	FC	PC	BI
PE1	**0.838**	0.537	0.583	0.398	0.398	0.565
PE2	**0.860**	0.499	0.525	0.402	0.433	0.547
PE3	**0.815**	0.541	0.483	0.472	0.372	0.561
PE4	**0.822**	0.515	0.525	0.461	0.464	0.532
EE1	0.514	**0.788**	0.487	0.438	0.242	0.467
EE2	0.555	**0.873**	0.436	0.522	0.257	0.553
EE3	0.565	**0.821**	0.525	0.470	0.273	0.496
EE4	0.475	**0.867**	0.421	0.564	0.123	0.541
SI1	0.478	0.478	**0.796**	0.446	0.334	0.464
SI2	0.536	0.480	**0.872**	0.377	0.441	0.567
SI3	0.561	0.431	**0.825**	0.409	0.459	0.592
FC1	0.148	0.387	0.100	**0.622**	-0.019	0.296
FC2	0.305	0.526	0.300	**0.780**	0.087	0.371
FC3	0.450	0.507	0.438	**0.851**	0.224	0.503
FC4	0.536	0.400	0.508	**0.745**	0.502	0.571
PC2	0.174	0.031	0.303	0.057	**0.338**	0.153
PC3	0.456	0.229	0.474	0.306	**0.928**	0.420
PC4	0.404	0.187	0.477	0.197	**0.777**	0.351
BI1	0.539	0.520	0.532	0.484	0.298	**0.838**
BI2	0.537	0.513	0.538	0.512	0.292	**0.841**
BI3	0.556	0.490	0.604	0.436	0.503	**0.795**
BI4	0.538	0.547	0.500	0.555	0.336	**0.865**
BI5	0.570	0.483	0.546	0.526	0.438	**0.807**

4.6.4.2 Fornell and Larcker's Criterion

The second method used to assess discriminant validity is the Fornell and Larcker's Criterion; the results are obtained using SmartPLS's algorithm function. The criterion for this test is, "the AVE of a latent variable should be higher than the squared correlation between the latent variable and all other variables" (Ramayah et al. 2018, p. 85). This can also be assessed by acknowledging the square root of the AVE on the diagonal; it should be higher than the correlation on the off-diagonal (Ramayah et al. 2018). Recent research that critically examined the performance of cross-loadings and the Fornell and Larcker's criterion for discriminant

validity assessment found neither approach to reliably detect discriminant validity issues (Henseler et al. 2015). Hence, as a remedy, Henseler et al. (2015) proposed assessing the Heterotrait-Monotrait Ratio of Correlation (HTMT) of the correlations.

Table 16: Fornell and Larcker's Criterion

Construct	BI	EE	FC	PC	PE	SI
BI	**0.830**					
EE	0.615	**0.838**				
FC	0.606	0.597	**0.754**			
PC	0.452	0.265	0.321	**0.726**		
PE	0.662	0.628	0.519	0.499	**0.834**	
SI	0.656	0.554	0.491	0.501	0.635	**0.831**

4.6.4.3 Heterotrait-Monotrait Ratio of Correlation (HTMT)

The third and most reliable method that is used to assess discriminant validity is the Heterotrait-Monotrait Ratio of Correlation (HTMT) (Henseler 2015). HTMT refers to the ratio of correlations within the constructs to the correlations between the constructs (Ramayah et al. 2018). The criteria recommend that the HTMT value should not exceed 0.9; otherwise, there is a problem in the discriminant validity (Ramayah et al. 2018). Henseler et al. (2015) asserted that when the structures in the path model are conceptually distinct, a more conservative threshold value of 0.85 seems justified. The bolded elements are the HTMT values output using the SmartPLS algorithm. The values show that the discriminant validity determined in this research is where all the values are lower than 0.9. Though, since PLS-SEM does not rely on any distributional assumption, it is not possible to apply standard parametric significance tests to assess whether the HTMT statistic differs significantly from 1. Therefore, researchers need to run bootstrapping to derive a distribution of the HTMT statistic (Henseler, Ringle, and Sarstedt 2015). The bootstrapping technique is executed in SmartPLS along with a significance level of 0.1 from the two-tailed test and a 90% confidence interval. The output is presented in Table 17.

Overall, all necessary reliability and validity tests on the measurement model were undertaken, meeting all recommended criteria. The tests for the measurement model level confirmed that the indicators of this study were fit and accepted to be used in the structural model analyses.

Table 17: Heterotrait-Monotrait Ratio of Correlation (HTMT) Criterion

Construct	BI	EE	FC	PC	PE	SI
BI						
EE	0.704 (0.612,0.795)					
FC	0.702 (0.601,0.778)	0.742 (0.665,0.824)				
PC	0.422 (0.300,0.529)	0.230 (0.140,0.328)	0.339 (0.262,0.398)			
PE	0.759 (0.697,0.828)	0.735 (0.633,0.820)	0.592 (0.476,0.693)	0.484 (0.374,0.571)		
SI	0.783 (0.707,0.846)	0.686 (0.580,0.789)	0.586 (0.457,0.691)	0.608 (0.490,0.702)	0.775 (0.681,0.847)	

4.7 Assessment of the Structural Model

The following subsections discuss the results from the structural model of the study generated using SmartPLS 3.0. This involved examining the model's predictive capabilities and the relationships between the constructs. To assess the validity of the structural model assessment, several tests were required, namely lateral collinearity assessment, path coefficients, coefficient of determination, effect size, predictive relevance, and hypothesis testing.

4.7.1 Lateral Collinearity

Even though discriminant validity was previously undertaken, the possibility is that lateral collinearity issues been neglected or overlooked. On commencing the structural model assessment, it is detrimental that the researcher addresses the collinearity issue (Ramayah et al. 2018). Therefore, it is safer to assess the construct separately (Ramayah et al., 2018). The criterion for the VIF is < 3.3 or < 5 (Diamantopoulos and Sigaw 2006); if the VIF values are greater than 3.3 or 5, it indicates that there is a potential collinearity problem (Diamantopoulos and Sigaw 2006). Table 16 shows that all VIF values are less than 3.3 and 5, meaning that there is no collinearity problem.

Table 18: Lateral Collinearity Test

Construct	Behavioural Intention (VIF)
Performance Expectancy	2.298
Effort Expectancy	2.109
Social Influence	2.011

Facilitating Conditions	1.695
Perceived Cost	1.486

4.7.2 Path Coefficients

Path coefficients must also be examined since they represent the hypothesised relationships that link the constructs (Ramayah et al. 2018). However, PLS does not make assumptions about the distribution of the data since it performs a non-parametric analysis, meaning that the t-value will be inflated or deflated, leading to a Type 1 error if the data is not normal (Ramayah et al. 2018). The path coefficient values should be between +1 and -1 (Hair et al. 2017). If the coefficients are closer to +1, it means a strong positive relationship exists, whereas coefficients closer to -1 represent a strong negative relationship. Whether a coefficient is significant ultimately depends on its standard error obtained by means of bootstrapping (Hair et al. 2016). The bootstrapping procedure in this research included 500 subsamples, a one-tailed test type and a significance level of 0.05. The significance of each relationship is revealed from the output of the t-statistics. The results of the path coefficient (β), standard error, t-value and p-value are consequently shown. Furthermore, the results are used to determine whether the proposed hypotheses of the study are accepted or rejected. Section 4.7.6 further discusses the testing of the hypotheses.

4.7.3 Coefficient of Determination (R Square)

The coefficient of determination is a measure of the predictive power of the model and is measured as the square correlation between the specific and predictive values of a given endogenous construct. The higher value of R square (R^2) indicates higher levels of predictive accuracy. The rule of thumb for obtaining appropriate R^2 values is challenging since it depends on the complexity of the model and the discipline of the research undertaken. In scholarly research that concentrates on marketing issues, R^2 values of 0.75, 0.5 and 0.25, respectively, are described as substantial, moderate, or weak (Hair et al. 2011; Henseler et al. 2009). The R^2 in this study was 0.605, which falls under moderate predictive accuracy.

4.7.4 Effect size (f Square)

In addition to evaluating the R^2 values of all endogenous constructs, if a specified exogenous construct is excluded from the model, the shift in the R^2 value may be used to determine if the excluded construct has a significant impact on the endogenous constructs. Accordingly, this

measure is referred to as the f square (f^2) effect size. Cohen (1988) provides guidelines for assessing f^2, in which a value of 0.02 represents small, 0.15 represents medium, and 0.35 represents a large effect. The effect size that is much smaller, a value less than 0.02, indicates no effect. The results generated by SmartPLS showed that the effect size of performance expectancy (0.056), effort expectancy (0.033), social influence (0.087), facilitating conditions (0.081), and perceived cost (0.014) were small in producing the f^2 for Behavioural Intention except for PC which had no significant effect.

4.7.5 Predictive Relevance (Q Square)

Q square (Q^2) is attained using the blindfolding process found in SmartPLS and is used to evaluate predictive relevance or out-of-sample predictive power. Blindfolding is a form of sample reuse that excludes the data point in the indicators of the endogenous construct and estimates the parameters with the remaining data points (Chin 1998; Henseler et al. 2009; Tenenhaus et al. 2005). A Q^2 value larger than zero indicates that the model has predictive relevance for a particular endogenous construct. On the other hand, a value less than zero signify a lack of predictive relevance (Hair, Hult, et al. 2016). The Q^2 of this study was 0.405, which is larger than 0. This suggests that the exogenous constructs have predictive relevance for the endogenous constructs.

4.7.6 Moderation Analysis

Multi-group analysis (MGA) in SmartPLS was applied to the moderating effect of TR between PC and behavioural intention. “The author of the technology readiness index suggested computing the overall TRI score and classifying it into low, medium and high following the terciles where a score of 1 to 2.74 are in a low category, 2.75 to 3.24 are in the medium category, and 3.25 to 5 are in the high category”. In addition, the author also recommends separating the sample into a ‘high’ and ‘low’ group depending on the nature and interest of the study. If the interest is primarily on what occurs when farmers’ TR is high, then select the upper one-third or so instead of the 50/50 split” (Charles Colby’s, 'Suggestion on TRI Segmentation', email, 2020). In this study, data were split into two groups following the latter recommendations, high and low, where the TRI of 1 - 3.4 is located in the low category with a total sample of 226, and TRI of 3.5 – 5 in the high category having a total sample number of 111. The results of Confidence Intervals

(Bias Corrected), Partial Least Squares Multi-Group Analysis (PLS-MGA), Parametric Test and Welch-Satterthwait Test are discussed below.

(a) Confidence Intervals (Bias Corrected)

This method calculates the bias-corrected confidence intervals for the group-specific estimations of parameters in the PLS path model. If the bias-corrected confidence intervals do not overlap, this means that the group-specific results of a path coefficient are significantly different (Hair et al. 2018).

Table 19a: Confidence Intervals (Bias Corrected)

Relationship	5.0% (High)	95.0% (High)	5.0% (Low)	95.0% (Low)
PC -> BI	0.112	0.415	-0.073	0.118

(a) Partial Least Squares Multi-Group Analysis (PLS-MGA)

This is a non-parametric significance test to determine the difference of group-specific results that build on the PLS-SEM bootstrapping results. If the p-value is smaller than 0.05 or larger than 0.95 for a particular difference of group-specific path coefficients, it implies that the result is significant at the 5% probability of error level (Hair et al. 2018). Therefore, the result is significant in this study.

Table 19b: Partial Least Squares Multi-Group Analysis (PLS-MGA)

Relationship	Path Coefficients-difference (High - Low)	p-value original 1-tailed (High vs Low)	p-value new (High vs Low)
PC -> BI	0.208	0.024	0.024

(b) Parametric Test

The parametric test examines the significant difference between different groups that presumes to have equal variances (Hair et al. 2018). In this study, the result is significant, where the p-value is less than 0.05.

Table 19c: Parametric Test

Relationship	Path Coefficients-difference (High - Low)	t-value (High vs Low)	p-value (High vs Low)
PC -> BI	0.208	1.969	0.025

(c) Welch-Satterthwait Test

The Welch-Satterthwait test examines the parametric significance test between different groups that assumes having unequal variances (Hair et al. 2018). The result is significant in this study, where the p-value is less than 0.05.

Table 19d: Welch-Satterthwait Test

Relationship	**Path Coefficients-difference (High - Low)**	**t-value (High vs Low)**	**p-value (High vs Low)**
PC -> BI	0.208	1.924	0.028

4.7.7 Hypothesis Testing

In order to evaluate the validity of the proposed hypotheses in the study, the path coefficient between latent variables and confidence interval bias is assessed. For the path coefficient, a one-tailed test has three different path coefficient rules that is; when the p-value < 0.01, t-value > 2.33, when the p-value < 0.05, t-value > 1.645, when the p-value < 0.10, t-value > 1.28 (Hair et al. 2017). Regarding the confidence interval bias, it affirms the significance and relevance of the structural model. The results were generated utilising the SmartPLS bootstrapping test. If 0 does not occur within the 95% confidence interval bias results, it implies that there is a significant relationship. Overall, with the entire criterion as mentioned, all proposed hypotheses were supported except for H5 and H6b. The results are shown below.

H1: Performance expectancy positively affects the behavioural intention of farmers to use e-AgriFinance in Sarawak.

H1 is supported since it has $\beta = 0.228$, $t = 4.074$, $p < 0.001$ and a 95% confidence interval bias of [0.135; 0.317] and is statistically significant. In other words, the study rejects the null hypothesis as the t-value is larger than the critical value, and the p-value is smaller than the significance level of 5%; therefore, it resides in the rejection region.

H2: Effort expectancy positively affects the behavioural intention of farmers to use e-AgriFinance in Sarawak.

H2 is supported since $\beta = 0.166$, $t = 2.632$, $p = 0.004$ and a 95% confidence interval bias of [0.064; 0.270] and is statistically significant. As such, the study rejects the null hypothesis as the t-value is larger than the critical value, and the p-value is smaller than the significance level of 5%; therefore, it resides in the rejection region.

H3: Social influence positively affects the behavioural intention to use e-AgriFinance in Sarawak.

H3 is supported because it has $\beta = 0.255$, $t = 4.173$, $p < 0.001$ and a 95% confidence interval bias of [0.153; 0.364] and is statistically significant. That is to say, the study rejects the null hypothesis as the t-value is larger than the critical value, and the p-value is smaller than the significance level of 5%; therefore, it falls in the rejection region.

H4: Facilitating conditions positively affects the behavioural intention to use e-AgriFinance in Sarawak.

H4 is supported since it has $\beta = 0.236$, $t = 3.539$, $p < 0.001$ and a 95% confidence interval bias of [0.125; 0.337] and is statistically significant. Accordingly, the study rejects the null hypothesis as the t-value is larger than the critical value, and the p-value is smaller than the significance level of 5%; therefore, it falls in the rejection region.

H5: Perceived cost negatively affects the behavioural intention to use e-AgriFinance in Sarawak.

H5 is not supported as it has $\beta = 0.098$, $t = 1.845$, $p = 0.033$ and a 95% confidence interval bias of [0.018; 0.178]. In other words, the hypothesis is rejected. It was debated in the study that farmers do not mind paying an extra cost to afford digital technology adoption.

H6a: When farmers' technology readiness is high, the relationship between perceived cost and behavioural intention to use e-AgriFinance is positive.

H6a is supported since it has $\beta = 0.253$, $t = 2.706$, $p = 0.004$ and a 95% confidence interval bias of [0.112; 0.415] and is statistically significant. Here, the TRI of 3.5 to 5 was located in the high category, with a total of 117 respondents, while 33% of the total samples were from the high group and having a positive moderating relationship towards behavioural intention.

H6b: When farmers' technology readiness is low, the negative relationship between perceived cost and behavioural intention is strengthened.

H6b is not supported since it has $\beta = 0.056$, $t = 0.638$, $p = 0.262$ and a 95% confidence interval bias of [-0.073; 0.118]. Also, it is not in the hypothesised direction and is, therefore, not statistically significant. Moreover, the relationship between PC and behavioural intention is weak. In this study, the TRI of 1 to 3.4 was located in the low category, with a total of 226 respondents; 67% of the total samples were from the low group.

Table 20: Results of the Hypothesis Testing

Hypothesis	Relationship	Path Coefficient (Beta)	Std. Error	t value	p value	95% Confidence Interval	Decision	R^2	f^2	Q^2
H1	PE -> BI (+)	0.228	0.055	4.074***	< 0.001	[0.135,0.317]	Supported	0.605	0.056	0.405
H2	EE -> BI (+)	0.166	0.063	2.632**	0.004	[0.064,0.270]	Supported		0.033	
H3	SI -> BI (+)	0.255	0.063	4.173***	< 0.001	[0.153,0.364]	Supported		0.087	
H4	FC -> BI (+)	0.236	0.066	3.539***	< 0.001	[0.125,0.337]	Supported		0.081	
H5	PC -> BI (-)	0.098	0.049	1.845*	0.033	[0.018, 0.178]	Not Supported		0.014	

Note: * p<0.05, ** p<0.01, ***p<0.001

(+): Positive Relationship, (-): Negative Relationship

Table 21: Results of the Moderation Analysis

Hypothesis	Relationship	Group	Path Coefficient (All Sample)	Path Coefficient	Path Coefficients-difference	Std. Error	t value	p value	95% Confidence Interval	Decision
H6a	PC -> BI	High	0.096	0.253	-0.157	0.091	2.706**	0.004	[0.112,0.415]	Supported
H6b	PC -> BI	Low	0.096	0.056	0.040	0.059	0.638	0.262	[-0.073,0.118]	Not Supported

Note: * p<0.05, ** p<0.01, ***p<0.001

4.8 Discussion of the Results

This section presents a discussion of the main findings of this study. The discussion of the hypotheses is also presented and explained according to the two research questions outlined in Chapter One of this study.

4.8.1 Summary of the Main Findings

Table 20 provides a summary of the proposed hypotheses, in which five hypotheses (H1, H2, H3, H4 and H6a) are supported, and two hypotheses (H5 and H6b) are unsupported. According to the findings of this study, the factors found to influence the behavioural intention among the farmers in Sarawak was found to be positively influenced by PE, EE, SI and FC.

Table 22: Summary of the Results of Research Questions and Hypotheses

Research Question and Hypotheses Statements		**Results**
Research Questions 1: What are the antecedents to farmers' behavioural intention to adopt *e-AgriFinance* in Sarawak?		
H1	Performance expectancy positively affects the behavioural intention of farmers to use *e-AgriFinance* in Sarawak.	Supported
H2	Effort expectancy positively affects the behavioural intention of farmers to use *e-AgriFinance* in Sarawak.	Supported
H3	Social influence positively affects the behavioural intention to use *e-AgriFinance* in Sarawak.	Supported
H4	Facilitating conditions positively affects the behavioural intention to use *e-AgriFinance* in Sarawak.	Supported
H5	Perceived cost negatively affects the behavioural intention to use *e-AgriFinance* in Sarawak.	Not Supported
Research Questions 2: To what extent does the technology readiness moderate the relationship between the perceived cost and behavioural intention to adopt *e-AgriFinance*?		
H6a	When farmers' technology readiness is high, the relationship between perceived cost and behavioural intention to use *e-AgriFinance* is positive.	Supported

H6b	When farmers' technology readiness is low, the negative relationship between perceived cost and behavioural intention is strengthened.	Not Supported

4.8.2 Discussion of the Research Findings

This section discusses the consistency or inconsistency of the research findings and related previous literature, providing explanations for the findings.

The aim of this research was to investigate the behavioural intention of farmers in Sarawak to adopt digital finance in agriculture or *e-AgriFinance.* The conceptual framework of this study was developed based on the UTAUT and proposing PC as an additional antecedent and TR as a moderator to explain the behavioural intention of farmers to adopt *e-AgriFinance*. Data were collected from farmers operating in Sarawak, having a high production yield of four major crops, namely oil palm, rubber, cocoa, and pepper. The divisions within Sarawak included Kuching, Samarahan, Serian, Sarikei, and Miri. A total of 337 questionnaires were received from the respondents that were usable in collecting the data and were subsequently analysed using PLS-SEM. The SPSS statistics was used to generate descriptive statistical reports from the data, to check for missing data on every variable, and generate an analysis for a normality test, common method bias and collinearity test. PLS-SEM was used to assess the validity and reliability of the measurement model and the structural model pertaining to the research.

The analyses from the data collection revealed the following notable findings:

- Performance expectancy (PE) positively affects the behavioural intention of farmers to use *e-AgriFinance* in Sarawak.
- Effort expectancy (EE) positively affects the behavioural intention of farmers to use *e-AgriFinance* in Sarawak.
- Social influence (SI) positively affects the behavioural intention to use *e-AgriFinance* in Sarawak.
- Facilitating conditions (FC) positively affects the behavioural intention to use *e-AgriFinance* in Sarawak.
- Perceived cost (PC) does not negatively affect the behavioural intention to use *e-AgriFinance* in Sarawak.

- Technology readiness (TR) significantly moderates the relationship between perceived cost (PC) and behavioural intention when the farmer's technology readiness (TR) is high.
- Technology readiness (TR) does not significantly moderate the relationship between perceived cost (PC) and behavioural intention when the farmers' technology readiness (TR) is low.

As a result, all hypotheses were supported in this research except for H5 and H6b.

Research Question 1: What are the antecedents to farmers' behavioural intention to adopt *e-AgriFinance* in Sarawak?

The findings of research imply that performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and perceived cost (PC) are antecedents' influencing farmers' behavioural intention to adopt *e-AgriFinance* in Sarawak. Social influence (SI) is the strongest predictor among the other constructs since most local farmers resided in a longhouse where SI plays an important role in their livelihood and lifestyle. However, the proposed relationship between PC and behavioural intention is not supported.

Research Question 2: To what extent does technology readiness (TR) moderate the relationship between the perceived cost (PC) and behavioural intention to adopt *e-AgriFinance*?

The findings of the research illustrate that technology readiness (TR) significantly moderates the relationship between perceived cost (PC) and behavioural intention. When farmers' technology readiness (TR) is high, the relationship between PC and behavioural intention to use *e-AgriFinance* is positive. When farmers' TR is low, the negative relationship between PC and behavioural intention is not strengthened.

4.8.2.1 Performance Expectancy

Following UTAUT, the study theorises the use of innovative technology or system is determined by the PE of the user on the technology or system. Specifically, the user's PE on the system is a significant predictor for the use of intention, which then positively influences the actual use of the system. In this research, PE is identified as having a positive influence as one of the antecedents affecting the behavioural intention among the farmers. This result is consistent with previous studies that examined the performance (PE) expectancy on the intention towards technology adoption (Martins, Oliveira, and Popovič 2014, Junadi and Sfenrianto 2015,

Indrawati and Putri 2018), demonstrating empirically that PE could positively influence the intention to adopt technology. Performance expectancy (PE) measured the *e-AgriFinance* apps by the degree of performance improvement, time-saving, and convenience and usefulness enhancements in the mobile banking system among the farmers. For instance, farmers perceived that the use of *e-AgriFinance* apps would make trading in the agriculture sector to become easier and effective. From the analysis, it indicates that PE could influence the actual use behaviour of *e-AgriFinance* by the farmers in Sarawak.

4.8.2.2 Effort Expectancy

UTAUT also illustrates that EE is one of the factors that determine the intention and use of the system (Venkatesh et al. 2003). The behavioural intention of farmers in Sarawak was also identified to be influenced by their belief in EE. This result from the research is similar to the empirical findings of previous studies (Moore and Benbasat 1991, Thompson, Higgins, and Howell 1991, Zhou, Lu, and Wang 2010), revealing that EE positively influences the intention and actual use on technology adoption. Moreover, EE is considered as the extent to which farmers perceive the ease of use and complexity of *e-AgriFinance* apps. Therefore, based on this result, it implies that EE is a determinant that can influence farmers' behavioural intention to adopt the apps. Thus, if farmers believe that using the apps is easy, understandable, and flexible, they will be more willing to use the apps.

4.8.2.3 Social Influence

According to UTAUT, social influence (SI) can positively affect the user's intention of using the system, which influences the use behaviour of the user on the system (Venkatesh et al., 2003). Social influence (SI) refers to the influence of the expectation of other important people (e.g., family members, colleagues, and friends) around the farmers in adopting *e-AgriFinance* apps. For instance, a farmer may choose to adopt the apps because their friend(s) suggested using them. In this research, SI was shown to have a positive influence among farmers. This research result is consistent with previous studies which examined the SI on the intention on technology adoption (Soroa-Koury and Yang 2010, Karahanna, Straub, and Chervany 1999, Junadi and Sfenrianto 2015, Chaouali, Yahia, and Souiden 2016, Indrawati and Putri 2018) demonstrating empirically that SI could positively influence the intention on technology adoption. Similarly, from the analysis, SI was shown to be the strongest predictor of behavioural intention having a path coefficient of 0.263. This is because the farmers mostly stayed in the longhouse, having a

stronger bond towards each other, and were easily influenced by their peers. In other words, if the advantages and benefits of *e-AgriFinance* were promoted to the majority of the farmers in the longhouse in an interactive manner, the adoption of *e-AgriFinance* would most likely grow.

4.8.2.4 Facilitating Conditions

Based on the UTAUT, FC could directly and positively influence the use of a system (Venkatesh et al. 2003). In this research, FC is considered as the availability of technology and organisational resources able to adopt *e-AgriFinance* apps. It is measured by the extent of one's perception of accessing the necessary resources, knowledge, and technical support to use the apps. The result of this research confirms that FCs have a direct and significant effect on adopting the apps by local farmers. Accordingly, this result supports the hypothesised direct relationship between FC and 'use' behaviour. This finding is also consistent with the results of previous studies (Jong and Wang 2009; Lakhal, Khechine, and Pascot 2013; Moore and Benbasat 1991; Venkatesh et al. 2003; Venkatesh, Thong, and Xu 2012).

The possible explanation for FC is that the government has actually provided funds to build the infrastructure in rural areas. As such, many of the farmers may feel that it does not cause too much concern towards changing the behaviour of using digital technology especially mobile apps, in the context of this research (Behl and Pal 2016). Regarding the adoption of *e-AgriFinance* apps, FC includes digital devices (i.e. smartphones, tablets, and laptops), internet accessibility, necessary knowledge, and specialised induction to assist farmers in the process of trading. Interestingly, verbal communication by farmers during the data collection process mentioned that some of the villages had no proper telecommunications provider to contact. Some farmers would need to go out of their longhouse to contact a telecommunications provider or even to connect to the internet from nearby. Therefore, it is essential to develop facilitating conditions (FC) regarding human, educational, and technological resources for the farmers in Sarawak to promote the use of *e-AgriFinance* apps.

4.8.2.5 Perceived Cost

Perceived cost (PC) is defined as the probable expenses of using internet banking which include equipment costs, access costs, and transaction fees (Zhang, Zhu, and Liu 2012). In the current research, perceived cost (PC) is defined as the cost farmers incurred in the future, such as changing to a smartphone device, subscribing to an internet plan once *e-AgriFinance* is ready for

use. In other words, the perceived cost (PC) is the cost incurred in the technology implementation process (Machogu and Okiko 2012) and is important for the adoption of technology. It is argued that the quality of electronic training platforms provided is influenced by cost (Özbek et al. 2015). Also, perceived costs (PC) have been argued to be a barrier to technology adoption (Machogu and Okiko 2012), if the returns on investment are attractive enough, the adoption of technology may be considered. The result of this research indicates a significant but positive relationship between the PC and the behavioural intention to adopt *e-AgriFinance*.

According to Folorunso, Ogunseye, and Sharma (2006), the cost is one of the essential elements that affect the adoption of mobile devices, which is also supported by Kurnia, Smith, and Lee (2006). Moreover, according to Özbek et al. (2015), PC has been shown to have a positive effect on the acceptance of technology adoption. This finding is similar to that hypothesised by (Zainab, Muhammad and Mohammed 2017, Hong et al. 2008, Kuo and Yen 2009, Shin 2009, Chong et al. 2012). This could be because of the grain-oriented focus among the farmers in Sarawak. Even though the farmers may be aware of the possible costs of using the apps, they may instead choose to ignore the costs by paying greater attention to the higher gains earned from adopting the apps. Therefore, the PC is not a concern that may hinder farmers from adopting *e-AgriFinance* in this research.

4.8.2.6 Technology Readiness as Moderator

Technology readiness (TR) refers to "the propensity to adopt and embrace cutting-edge technology at home and in the workplace" (Parasuraman and Charles Colby 2000). In the current research, the data were split into a 'high and low' group following the latter recommendation. According to the result, it implies a significant moderating effect between the PC and the behavioural intention to adopt *e-AgriFinance* when farmers' TR is high. The results are similar to those hypothesised in prior literature (Sun et al. 2020; Kim, Lee and Preis 2020; Tsourela and Manos 2015). As such, the finding indicates that some of the farmers in Sarawak are optimistic to accept digital technologies.

However, when the farmers' technology readiness (TR) is low, it does not have a significant moderating effect of strengthening the adverse relationship between PC and behavioural intention when high. This is similar to that hypothesised by (Marthasari et al. 2020; Purani and

Sunil 2015; Borrero et al. 2014). Prior literature further concludes that when users' technology readiness (TR) is low, they will not be familiar with the technology, resulting in a weaker relationship. Therefore, the result remains not significant. This can be explained following H5, where farmers do not take the costs into consideration since they believed the apps would bring higher benefits. Thus, even when farmers' technology readiness (TR) is low, it does not strengthen the adverse relationship among them. Therefore, the different characteristics of groups have varied responses towards technology and thus, affecting the relationship between PC and behavioural intention.

4.9 Summary of the Chapter

This chapter initially discusses the preparation of the data and the analysis using SPSS 25. Descriptive statistics, missing data, outliers, and common method bias, and the collinearity test were performed using SPSS 25. SmartPLS 3.0 was then used to assess the measurement model and the structural model. The assessment of the measurement model included that of internal consistency reliability, indicator reliability, convergent validity and discriminant validity. The analysis results generated met all criteria stated, and therefore the model was valid and ready for assessment of the structural model. The structural model assessment contained a lateral collinearity test, path coefficient test, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2) and hypotheses testing. Of the seven hypotheses that were formulated in this study, only two were not supported; the relationship between PC and behavioural intention to adopt *e-AgriFinance and* the low technology readiness (TR) of farmers not having a significant moderating effect on the relationship hypothesised.

CHAPTER FIVE: IMPLICATIONS AND CONCLUSION

5.1 Chapter Overview

The chapter presents a summary of the research that recaps the major findings from the previous chapter. The chapter then illustrates the implication of the study, which includes theoretical and managerial implications. Research limitations and recommendations for future studies are also outlined, followed by ending this thesis by presenting an overall conclusion.

5.2 Recapitulation of the Main Findings

The conceptual framework of this study was developed based on the UTAUT and proposing PC as an additional antecedent and TR as a moderator in explaining the behavioural intention to adopt *e-AgriFinance*. By using a researcher-administered questionnaire survey, data were collected from 337 farmers in Kuching, Samarahan, Serian, Sarikei, and Miri. The farmers operated in the four major crop areas in Sarawak: oil palm, rubber, cocoa, and pepper. The collected data were then analysed using PLS-SEM. The research findings indicate that performance expectancy, effort expectancy, social influence, and facilitating conditions are positively related to behavioural intention to adopt *e-AgriFinance*. Similarly, SI was found to be the strongest predictor of behavioural intention. On the other hand, PC was also found to be positively related to behavioural intention, contradicting the hypothesised relationship in this study. The moderation analysis revealed that the relationship between PC and behavioural intention was strong and positive when farmers' TR was high vs low. Overall, all hypotheses were supported in this research, with the exception of two hypotheses. A brief recapitulation of the proposed hypotheses and findings are next discussed based on the research questions. The summary is next presented.

Research Question 1: What are the antecedents to farmers' behavioural intention to adopt *e-AgriFinance* in Sarawak?

The research findings indicate that performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and perceived cost (PC) are the main factors influencing the behavioural intention among farmers to adopt the mobile apps in Sarawak. Social influence (SI) is the strongest predictor compared with the other constructs.

Research Question 2: To what extent does the technology readiness moderate the relationship between the perceived cost (PC) and behavioural intention to adopt *e-AgriFinance*?

The findings demonstrate that technology readiness (TR) significantly moderates the relationship between PC and behavioural intention. When farmers' technology readiness (TR) is perceived to be high, the relationship between PC and behavioural intention to use *e-AgriFinance* is positive. Opposingly, when farmers' technology readiness (TR) is low, the negative relationship between PC and behavioural intention is not strengthened.

5.3 Research Implications

This section discusses the implications of the research presented in two subsections: theoretical and practical implications. A summary of the implications is discussed below.

5.3.1 Theoretical Implications

This study contributes to examining the adoption intention behaviour of *e-AgriFinance* apps among farmers in Sarawak since the context of mobile apps is relatively new to these farmers. The main theoretical implication is the application of the UTAUT in explaining the adoption of digital finance applications in the agriculture sector. Furthermore, this study offers further theoretical support relating to the role of performance expectancy, effort expectancy, social influence, facilitating conditions and perceived costs in the adoption of *e-AgriFinance*. The details of the theoretical implications are as follows.

The first theoretical implication of this study aims to fill the research gap in the application of UTAUT in explaining the adoption of digital finance applications among farmers in the agriculture sector in Sarawak. This study is significant because it integrates the UTAUT with an additional antecedent of PC in a single research model in order to predict and explain the behavioural intention of using *e-AgriFinance*. The results of this research indicate that the direct relationships (PE, EE, SI, FC, and PC respectively relate to the adoption of e-AgriFinance) are all positively and significantly associated. Similarly, the results confirm that PE, EE, SI, FC, and PC are the antecedents to the behavioural intention of farmers to adopt *e-AgriFinance*. As such, the significant relationships enhance the study of the behavioural intention of rural farmers in the agriculture sector, which contribute to the UTAUT theory in a different context.

The second theoretical implication highlighted is the positive relationship between PC and behavioural intention. The result is somewhat different from that of most prior literature

hypothesised while PCs have been argued to be a barrier to technology adoption (Machogu and Okiko 2012). The adoption of technology is considered if the returns on investment are attractive. In this study, the different perceptions of farmers towards the PC could be the reason why there is a positive relationship between PC and behavioural intention. Also, farmers may foresee the benefits of adopting *e-AgriFinance* apps. Therefore, the research finding provides an alternate explanation of the relationship between PC and behavioural intention in the technology adoption literature. Similarly, this result contributes further to the advantage of implementing mobile apps and the adoption of digital technologies. This may accordingly lead to a positive future where PC may not be considered as an inhibitor according to the context of the research, particularly in the technology adoption studies.

Nevertheless, previous studies on the adoption of mobile payment technologies and mobile services are based on technology applications that exist already in the market. Having said that, this study is unique since it is based on a new prototype not yet in existence in the market. The benefits of using a prototype in this study allow the farmers to have a better perspective and understand how the apps function. In order to have more accurate results, the farmers first need to understand the research context and then provide their accurate response or answer accordingly. Therefore, in an indirect way, presenting a prototype during data collection does actually contribute to the methodological perspective since this is the platform for gathering their clear and precise response to the questionnaire. Additionally, prior studies seldom focused on the use of financial technology (FinTech) in the agriculture sector. By including the farmers in this research, it offered a more holistic understanding of *e-AgriFinance* adoption in the agriculture value chain.

Furthermore, Parasuraman's TR Model is widely adopted as a determinant of technology adoption in previous studies (Jaafar et al. 2007; Ramaseshan, Russel and Alisha 2015; Kim and Chiu 2019). As such, scholars can use TR to explain the dynamics between the variables in a technology-enabled context and as a diagnostic or control variable in experiments (Parasuraman and Colby 2015). Even though the UTAUT has been widely employed in relevant research, the use of TR as a moderator is scarce in the agriculture sector. Technology readiness (TR) can be an important moderating variable in research that involves a multivariate framework (Humbani and

Wiese 2018). However, technology readiness as a moderator has not been examined in the adoption of digital finance and, likewise, in the agriculture sector.

Accordingly, this study attempts to fill the gap by adopting the UTAUT with the additional antecedent of PC and incorporates TR as the moderator between PC and behavioural intention. As such, this study contributes to TR as a moderator, especially regarding Hypothesis 6a. Farmers with high TR have a significant moderating relationship between PC and behavioural intention, where the path coefficient shifts from weak to strong, in which the results are significant for all, including the high group. This is an interesting element of this study where the farmers' response and behavioural intention towards *e-AgriFinance* are quite optimistic. The theory works well in this research except for PC, which contrasts with the majority of prior studies, which could be because of the gain-oriented focus among the farmers in Sarawak. Even though they may be aware of the possible costs of using the apps, the farmers' may decide to ignore the costs and pay further attention to the higher gains that could be realised from adopting the apps.

The reasoning to include the PC in this study was to explore whether this variable would affect farmers' technology adoption since digital technology is relatively new in rural areas. The result shows that a positive relationship between PC and behavioural intention represents the uniqueness of this study where the government, board of agriculture and mobile apps developer would not need to be overly concerned about the sensitivity from farmers on the cost(s) incurred in the future.

Furthermore, significant relationships enhance the investigation of the behavioural intention of rural farmers in the agriculture sector, which contribute to the UTAUT theory in a different context. In this study, the different perceptions of farmers towards the PC may be the reason why there is a positive relationship between PC and behavioural intention. Also, farmers may anticipate the benefits of adopting *e-AgriFinance* apps. Therefore, the research finding provides an alternative explanation of the relationship between PC and behavioural intention in the technology adoption literature. Equally, this result contributes to the advantage of implementing mobile apps and the adoption of digital technologies.

Nevertheless, while the study is based on the Sarawak context to assess the behavioural intention of farmers in the agriculture value chain towards *e-AgriFinance*, it also offers further theoretical

support regarding the role of PE, EE, SI, and FC in the adoption of *e-AgriFinance* apps. Despite this, the hypothesis for PC is unsupported in this research. As SI has the strongest beta, it shows that the farmers in Sarawak are easily influenced and led by their peers.

5.3.2 Practical Implications

The findings of this research provide important implications from both a practical perspective and purpose. The *e-AgriFinance* apps indeed benefit the Sarawak government, agriculture stakeholders such as farmers, suppliers, distributors, mobile app developers, and village heads in addition to village folks. Furthermore, this study aligns with the Sarawak Government's agenda in its endeavours to digitise the state's economy, and so the findings are of significance to the Sarawak government, policymakers, digital finance providers and users in developing the overall robust digital financial system and platform in the Sarawak agriculture sector. Additionally, the current study is both relevant and timely since it focuses on the use of digital finance in the agriculture sector and is identified as one of the priority sectors in the Sarawak digital economy ecosystem. The customised prototype importantly acts as a guide to stakeholders by providing them with a better idea in developing mobile apps in the near future.

Since PE is reported to have a significant impact on behavioural intention, digital finance providers and the government (SAINS (Sarawak Information Systems Sdn Bhd) or SMA (Sarawak Multimedia Authority)) should direct their attention to PE in the mobile app in order to boost the adoption rate. It is also believed that the intention to adopt tends to be higher when *e-AgriFinance* apps are demonstrated to provide more features or functionality to perform daily activities that aid the lifestyle of farmers. For example, the user-friendliness' of the apps would enable farmers to find the apps easy to access and understandable. The farmers who participated in this study believed that this mobile app could help them to accomplish their tasks quickly and in earning a higher income than presently without the need or presence of middlemen and intermediaries. Therefore, the PE of the *e-AgriFinance* app is important towards the widespread adoption of the apps.

Moreover, digital finance providers and the government should consider the operation and design of *e-AgriFinance* apps. Most farmers in the rural areas of Sarawak do not have a high educational level but are willing to learn and follow the trend in an urban area where the smartphone and internet play a key part in their daily life. Since EE is reported to have a

significant impact on behavioural intention, the design of the *e-AgriFinance* app by mobile application service providers and within input from respective boards of palm oil, cocoa, pepper, and rubber should enable the app to be relatively easy and understandable from the farmers' perspective. The Sarawak Government and respective boards may also refer to the prototype developed in this study, where the farmers found it easy to understand along with ideas for further improvements. This would further help to lead to increasing the number of farmers accepting the *e-AgriFinance* app in the future.

Social influence (SI), as highlighted in this study, is the most important antecedent, which coincides with the findings by other researchers (Soroa-Koury and Yang 2010, Chaouali, Yahia, and Souiden 2016, Junadi and Sfenriato 2015, Indrawati and Putri 2018). Given that SI influence is reported to have a significant impact on behavioural intention, digital finance providers, the government, and respective boards should consider organising training, talks or campaigns for the community prior to implementation and using *e-AgriFinance* apps. The head of the community, known as the head of the longhouse (Tuai), plays an important role in leading the farmers' behavioural intention. The community leader may also request respective boards or third parties to provide talks or involvement in campaigns on the concept of digital technologies, to showcase the application and function of the internet in urban daily lives, including the advantages and risks of adopting digital technologies in the daily lives of the farming community in Sarawak. Similarly, the Sarawak government may consider appointing a community leader, more capable and open-minded towards digital technologies for the smooth adoption of *e-AgriFinance*. In other words, opinions shared by friends, relatives and superiors are quite influential to farmers. Therefore, SI acts as the main antecedent in technology adoption.

Also, given the fact that FC influences the behavioural intention of farmers towards the adoption of technology, the Sarawak government should consider speeding up the process of building the necessary infrastructure and platforms in rural areas. Of the questionnaires obtained from the respondents in this research, only 58% of the farmers had a smartphone. The main reason mentioned by other farmers who did not own a smartphone was that some of the villages had inadequate telecommunication lines due to rural location and remoteness. Indeed, some farmers needed to seek internet connection by leaving the longhouse.

Accordingly, this study supports the development of appropriate infrastructure by the government that aligns with the objectives set by the government under the Sarawak digital economy initiative to satisfy the needs of farmers to adopt *e-AgriFinance*. One of the objectives is to optimise the utilisation of existing and new telecommunication and network infrastructure, in addition to increasing broadband coverage and upgrading its speed and reliability. Notably, the needs of improving the surrounding infrastructure are aligned with 'Action 33' as stated in the government's digital strategy to provide affordable and high-speed internet access for the masses through carrier-independent backhaul and backbone data transmission services. The Sarawak government should also continue to monitor the progress of building communication towers in those areas where the government plans to target building 600 telecommunication towers in the state.

Surprisingly, given PC is not negatively related to behavioural intention, this shows that the farmers need to bear the additional cost of purchasing smartphones to include monthly internet data subscription costs as well. However, the result suggests that not only is PC positively associated with behavioural intention, but local farmers do not mind bearing the extra costs to adopt *e-AgriFinance* and are willing to learn. According to the farmers in this study, they are willing to learn how to incorporate agriculture apps in their daily life and to utilise them through proper teaching and guidance from the respective board. This finding, although new, is significant to the Sarawak government from the farmers' perspective in adopting digital technology. Likewise, it streamlines the adoption of mobile apps in future when the government intends to implement digital technologies, particularly for farmers. Therefore, this finding benefits and aligns with the Sarawak Digital Economy Strategy (2018-2022) to improve the agriculture sector.

Furthermore, technology readiness (TR) in the context of this study is used to moderate the relationship between PC and behavioural intention, which helps to provide the government, application developers, telecommunication service providers and respective boards to have a clearer picture of when farmers in Sarawak are ready to move towards a digital lifestyle and are willing to accept this lifestyle when their TR is high. As mentioned earlier, community leaders in the longhouse may also progress digital technology-related campaigns regarding digital technologies to enhance the TR among farmers.

Likewise, the investigation of TR in this study importantly also benefits the Sarawak government, agriculture stakeholders such as farmers, suppliers, distributors, and mobile application developers. With increasing TR, farmers in Sarawak will better their present lifestyle and perform tasks more efficiently with the aid of digital technology. Similarly, the government, application developers, telecommunication service providers and respective boards may consider launching activities o the benefits of digital technologies and showcasing agriculture apps that are used in other countries to target those farmers having low TR. In this sense, farmers having relatively low TR may become more aware of the benefits and improve their TR. As for the farmers with high TR, the government, applications developers, and community leaders may proactively plan to implement related apps and influence them to adopt these apps. This progress would consequently benefit telecommunication service providers and respective boards in gaining more profit and monitoring agricultural trading activities in these areas more visibly and transparently. This action will no doubt also benefit the local community in moving towards digitisation and influencing farmers to adopt mobile apps.

5.4 Research Limitations and Recommendations for Future Research

This section discusses the limitations of the research, followed by proposing recommendations for future research. Bhattacherjee and Premkumar (2004) asserted that understandings the effects on the constructs in the UTAUT will change over time and consequently have a different effect on behaviour. Given this research is a cross-sectional study, according to Carlson and Morrison (2009), a cross-sectional study has limitations, given its ability to establish causality between the predictor and outcomes since it measures only one point in time (Chiu, Huang, and Yen 2010). Thus, it can be suggested that longitudinal studies be considered for future research.

Furthermore, while this study focuses on the variables of the UTAUT and the PC of behavioural intention to adopt *e-AgriFinance* in Sarawak, it does not examine other factors that may be considered important such as perceived risk and perceived security. Also, the moderators in the UTAUT have been excluded. This study excludes those variables since the *e-AgriFinance* app is not yet in existence. As such, farmers may not be aware of the risk and security aspects since digital technology is relatively new to them. Also, by excluding these variables, the present study might not have captured the entire view or picture of the other aspects of antecedents that may affect the farmers to adopt *e-AgriFinance*. Therefore, it is recommended that future research

should consider other antecedents, such as perceived risk and perceived security, in acquiring a complete picture or view when the app is ultimately released and used.

One of the limitations highlighted in this study is that it does not include government factors in the model. From the observations and communication with farmers throughout the data collection process, the acceptance by farmers is highly affected by the support of government and strategies, not forgetting the political environment. Therefore, future research should include aspects of the government as one of the factors to investigate the implications for the Sarawak government to promote digital and financial inclusivity for the community.

In addition, the farmers in this study were from a collectivist country, and as such, there are cultural differences in individualism and collectivism amongst different countries (Lu et al. 2017). Therefore, the findings may not be generalisable to individualistic countries. Accordingly, it is recommended to consider the needs of other individualistic countries in a similar context to this study in making a comparison between the different cultures of farmers.

Additionally, the sample population in this study only consisted of the farmers from four crop types from Miri, Sibu, Sarikei, Serian, Samarahan, and Kuching, and may not be representative of all Sarawak farmers' operating different crop types towards behavioural intention. If further areas are included, such as Betong, Sri Aman, Bintulu, Mukah, Kapit and other small towns under these districts, the magnitude and direction of the relationship between the independent variables and behavioural intention to adopt the *e-AgriFinance* app may be different.

Aside from that, this study only focused on Sarawak, and therefore results may differ if including other states in Malaysia such as Sabah, Selangor, Perlis, Perak, Johor, etc., to investigate the antecedents affecting the behavioural intention of farmers to adopt the *e-AgriFinance* app in rural areas, since SI may not be seen as the strongest predictor.

Lastly, this study only covered four crop types: palm oil, pepper, cocoa and rubber. As the agriculture sector consists of various crop types (i.e. paddy, pineapple, coconut, corn, banana, etc.) as well as livestock (chicken, duck, goat, poultry etc.), future research could consider including other crop types and livestock to investigate the behavioural intention of farmers. Likewise, future research may extend the participants to include other agriculture stakeholders

such as suppliers, distributors, and government representatives in addition to respective boards to provide a holistic view of the agriculture value chain in Malaysia.

5.5 Conclusion

This research examines the antecedents influencing the behavioural intentions among farmers to adopt *e-AgriFinance* in Sarawak. In order to attain the research objectives, a questionnaire survey was used to collect data from several villages in Sarawak. The research also carried out a comprehensive literature review on the theories of UTAUT and TR. Two research questions, along with seven hypotheses and the conceptual framework of this study, were developed. Four of five paths in the research model were discovered to be significant in the context of this study. The findings showed that performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and perceived cost (PC) played a significant role in the adoption of *e-AgriFinance*. Notably, technology readiness (TR) had a significant moderating relationship in adopting *e-AgriFinance*.

As the progress of the government in Sarawak progresses towards a wider utilisation of digital technology to advance the agriculture industry and economy in Sarawak, the government and respective boards need to collaborate in leading farmers towards digitalisation. Overall, the findings of this study are anticipated to be helpful for the Sarawak government, policymakers, and digital finance providers in addition to users in the agriculture sector, telecommunications sector and mobile applications sector in identifying the needs of farmers and develop applications where the functionality of these applications suit the local context. Finally, there is a distinct, if not a high possibility, that Sarawak can advance towards achieving digital and financial inclusivity for all communities contributing to the state's economic growth and development by 2030.

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APPENDICES

Appendix 1: Survey Questionnaire (English Version)

Curtin University
Malaysia

Dear Participant,

Participant's Consent: I have received all the relevant information of this research and I am voluntarily participating in this research.

☐Yes ☐No

I would like to invite you to participate in a survey. The purpose of this study is to determine the factors affecting the behavioural intention of farmers in adopting *e-AgriFinance* in Sarawak.

This survey contains 4 sections, which may take about 10-15 minutes to complete. This survey is completely anonymous and does not contain any personal information that could identify you. The information collected will be kept for 7 years after the completion of the research according to the research and development policies of Curtin University.

Please answer all the questions in this questionnaire and give the most accurate views based on your experience. There is no right or wrong answer. Please note that your answer will be treated with strict confidentiality.

Curtin University Human Research Ethics Committee (HREC) has approved this study (Approval number: HRE2019-0753). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Thank you for your cooperation and valuable time.

Tina

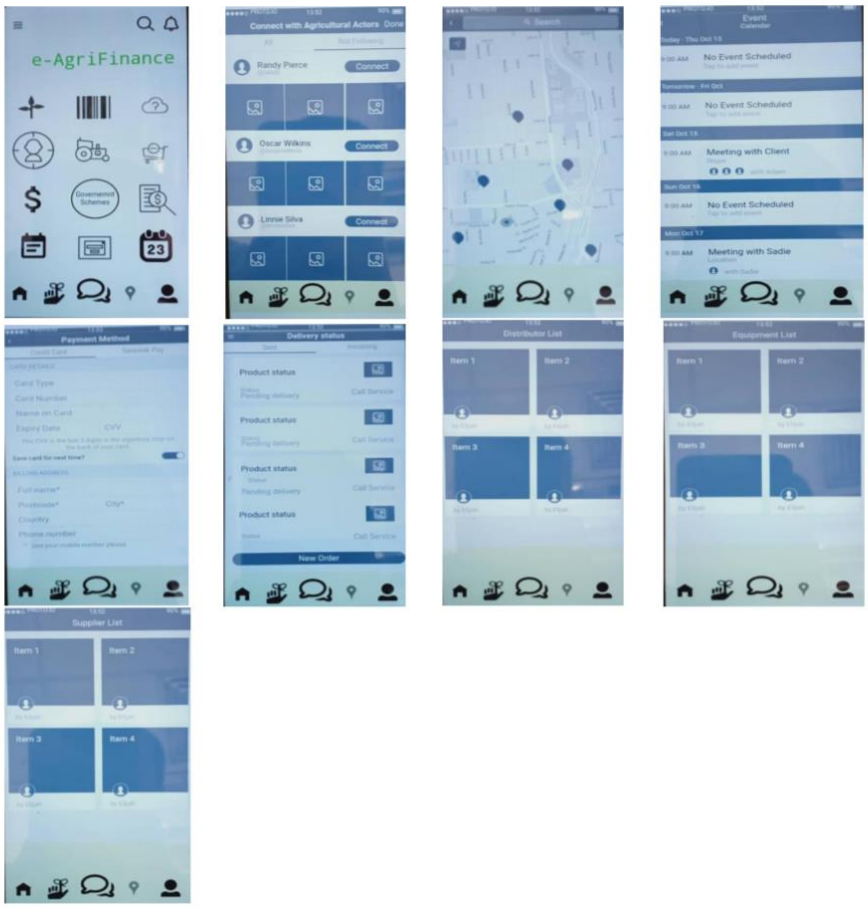
E-mail: tina@postgrad.curtin.edu.my

1

Curtin University
Malaysia

Description and demonstration for e-AgriFinance apps

e-AgriFinance apps is a mobile app incorporating agriculture and financial transactions apps such as Sarawak pay. Farmers can freely access this app and directly contact suppliers, distributors and government by eliminating the presence of the middlemen. Trade of crops can be done in this apps. Besides, farmers can know where the exact location of other agriculture actors. Below is the prototype interface of *e-AgriFinance* app.



Curtin University
Malaysia

Section 1: Factors influencing behavioural intention of farmers to adopt e-AgriFinance in Sarawak

This section asks for your opinion regarding the adoption of *e-AgriFinance* app. Please indicate the extent to which you agree or disagree with each statement below using a 7-points Likert scale as follow:

(1) = strongly disagree; (2) = somewhat disagree; (3) = disagree; (4) = neutral; (5) = agree; (6) = somewhat agree; (7) = strongly agree

	Performance Expectancy							
1.	I would find the *e-AgriFinance* app useful in my job.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	Using the *e-AgriFinance* app enables me to accomplish tasks more quickly.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	Using the *e-AgriFinance* app increases my productivity.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	If I use the *e-AgriFinance* app, I will increase my income.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Effort Expectancy							
1.	My interaction with the *e-AgriFinance* app would be clear and understandable.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	It would be easy for me to become skilful at using the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	I would find the *e-AgriFinance* app easy to use.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	Learning to operate the *e-AgriFinance* app is easy for me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Social Influence							
1.	People who influence my behaviour think that I should use the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	People who are important to me think that I should use the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	In general, the board of association has supported the use of the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Facilitating Condition							
1.	I have the necessary resources to use the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	I have the necessary knowledge to use the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	Using *e-AgriFinance* app is entirely within my control.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	I can get help from others when I have difficulties using *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Perceived Cost							
1.	I believe the *e-AgriFinance* app would be expensive.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	I would have financial barriers (e.g. smartphone and data plan subscription) in order to use the *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	I believe I would have to make effort to obtain the information that would make me feel comfortable in adopting *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	It takes time to go through the process of moving to *e-AgriFinance*.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Section 2: Behavioural intention of farmers to adopt e-AgriFinance in Sarawak

This section asks for your opinion regarding behavioural intention towards the adoption of *e-AgriFinance* apps. Please indicate the extent to which you agree or disagree with each statement below using a 7-points Likert scale as follow:

(1) = strongly disagree; (2) = somewhat disagree; (3) = disagree; (4) = neutral; (5) = agree; (6) = somewhat agree; (7) = strongly agree

	Behavioural Intention							
1.	I intend to use the *e-AgriFinance* apps in the next few months.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	I predict I would use the *e-AgriFinance* apps in the next few months.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	I plan to use the *e-AgriFinance* app when it is available to the public.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	I will often use *e-AgriFinance* app in the future.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5.	I will recommend others to use *e-AgriFinance* app.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

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Malaysia

Section 3: Technology Readiness

We are interested in your views on how technology influences your life. Please indicate how much you agree with the following statements using 5-points scale from "strongly disagree" to "strongly agree".

	Motivator Statements					
1.	Technology gives me more freedom of mobility.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
2.	Technology makes me more productive in my personal life.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
3.	Other people come to me for advice on new technologies.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
4.	In general, I am among the first in my circle of friends to acquire new technology when it appears.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
5.	I keep up with the latest technological developments in my areas of interest.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree

	Inhibitor Statements					
1.	Technical supports lines are not helpful because they don't explain things in terms I understand.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
2.	Sometimes, I think that technology systems are not designed for use by ordinary people.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
3.	People are too dependent on technology to do things for them.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
4.	Too much technology distracts people to a point that is harmful.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
5.	Technology lowers the quality of relationships by reducing personal interaction.	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree

Curtin University
Malaysia

Section 4: Demographic Information

1. What is your gender?
☐ Male ☐ Female

2. What is your age?
☐ 20-30-year-old
☐ 31-40-year-old
☐ 41-50-year-old
☐ 51-60-year-old
☐ 61-70-year-old

3. What is your ethnicity?
☐ Malay
☐ Chinese
☐ Dayak
☐ Other: _____

4. What is your highest educational level?
☐ No formal education
☐ Primary school
☐ Secondary school
☐ Technical school/ Vocational school
☐ Diploma
☐ University degree and above
☐ Other

5. Prior experience in using mobile apps (e.g., Grab, Whatsapps)
☐ No
☐ Less than 1 year
☐ Between 1-3 years
☐ More than 3 years

6. How much is your monthly income?
☐ Less than RM1500
☐ RM 1500 – RM 3500
☐ RM 3500 – RM 5500
☐ RM 5500 – RM 8500
☐ More than RM 8500

7. Which type of major crop you plant?
☐ Oil Palm
☐ Pepper
☐ Cocoa
☐ Rubber

8. Number of years of farming
☐ 1-10
☐ 11-20
☐ 21-30
☐ 31-40
☐ More than 40

9. Have your heard of Sarawak Government's Digital Economy Strategy?
☐ Yes
☐ No

10. What is the size of your plantation (in hectare)?

_____

11. Which type of mobile phone you are using now (e.g., Cell phone, Feature phone, Smartphone)?

_____

12. What is the type of data plan subscription?

_____

END OF THE QUESTIONNAIRE

Thank you for completing the questionnaire.

Appendix 2: Survey Questionnaire (Malay Version)

Curtin University
Malaysia

Peserta yang dihormati,

Pengakuan peserta: Saya telah menerima semua maklumat berkaitan kajian ini dan saya secara sukarela mengambil bahagian dalam penyelidikan ini.

☐Ya ☐Tidak

Saya ingin menjemput anda untuk mengambil bahagian dalam kaji selidik. Tujuan kajian ini adalah untuk menentukan faktor-faktor yang mempengaruhi niat tingkah laku petani dalam mengamalkan e-AgriFinance di Sarawak.

Tinjauan ini mengandungi 4 bahagian, yang mungkin mengambil masa kira-kira 10-15 minit untuk disiapkan. Tinjauan ini adalah tanpa nama dan tidak mengandungi sebarang maklumat peribadi yang dapat mengenal pasti anda. Maklumat yang dikumpulkan akan disimpan selama 7 tahun selepas selesai penyelidikan mengikut dasar penyelidikan dan pembangunan Universiti Curtin.

Sila jawab semua soalan dalam soal selidik ini dan beri pandangan yang paling tepat berdasarkan pengalaman anda. Tidak ada jawapan yang betul atau salah. Sila ambil perhatian bahawa jawapan anda akan dirawat dengan kerahsiaan yang ketat.

Jawatankuasa Etika Penyelidikan Manusia Universiti Curtin (HREC) telah meluluskan kajian ini (Nombor kelulusan : HRE2019-0753). Sekiranya anda ingin membincangkan kajian dengan seseorang yang tidak terlibat secara langsung, khususnya, apa-apa perkara yang berkaitan dengan kelakuan kajian atau hak anda sebagai peserta, atau anda ingin membuat aduan sulit, anda boleh menghubungi Pegawai Etika pada (08) 9266 9223 atau Pengurus, Integriti Penyelidikan di (08) 9266 7093 atau e-mel hrec@curtin.edu.au.

Terima kasih kerana kerjasama anda dan masa yang berharga.

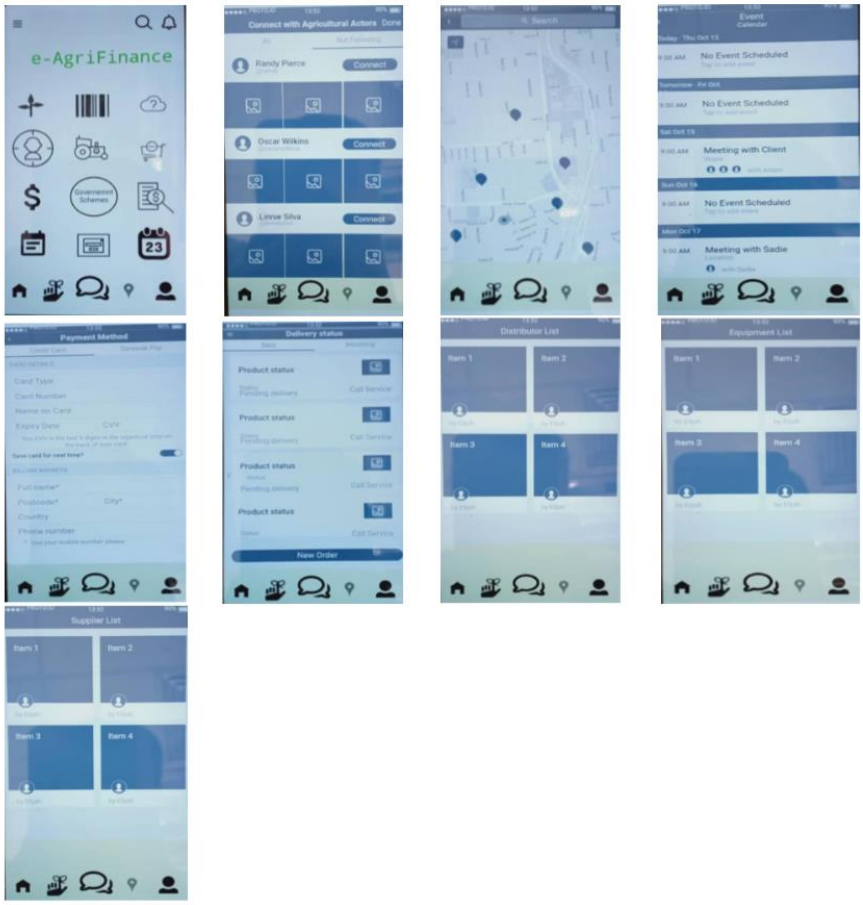
Tina

E-mel: tina@postgrad.curtin.edu.my

1

Penerangan dan demonstrasi untuk aplikasi e-AgriFinance

Aplikasi e-AgriFinance adalah aplikasi mudah alih yang menggabungkan aplikasi transaksi pertanian dan kewangan seperti membayar Sarawak. Petani boleh mengakses aplikasi ini secara bebas dan terus menghubungi pembekal, pengedar dan kerajaan dengan menghilangkan kehadiran orang tengah. Perdagangan tanaman boleh dilakukan dalam aplikasi ini. Selain itu, para petani dapat mengetahui di mana lokasi sebenar pelaku pertanian yang lain. Berikut adalah antara muka prototaip aplikasi e-AgriFinance.



Bahagian 1: Faktor-faktor yang mempengaruhi niat tingkah laku petani untuk mengamalkan e-AgriFinance di Sarawak

Bahagian ini meminta pendapat anda mengenai penggunaan aplikasi e-AgriFinance. Sila bulatkan sejauh mana anda bersetuju atau tidak bersetuju dengan setiap penyataan di bawah menggunakan skala Likert 7-mata seperti berikut:

(1) = sangat tidak bersetuju; (2) = agak tidak bersetuju; (3) = tidak bersetuju; (4) = neutral; (5) = setuju; (6) = agak setuju; (7) = sangat setuju

	Jangkaan Prestasi							
1.	Saya akan mencari aplikasi e-AgriFinance yang berguna dalam tugas saya.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	Menggunakan aplikasi e-AgriFinance membolehkan saya mencapai tugas dengan lebih cepat.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	Menggunakan aplikasi e-AgriFinance meningkatkan produktiviti saya.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	Jika saya menggunakan aplikasi e-AgriFinance, saya akan meningkatkan pendapatan saya.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Harapan Usaha							
1.	Interaksi saya dengan aplikasi e-AgriFinance akan jelas dan mudah difahami.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	Ia mudah bagi saya untuk menjadi mahir menggunakan aplikasi e-AgriFinance.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	Saya akan mendapat aplikasi e-AgriFinance yang mudah digunakan.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	Saya berasa mudah belajar mengendalikan aplikasi e-AgriFinance.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	Pengaruh Sosial							
1.	Orang yang mempengaruhi kelakuan saya berfikir bahawa saya harus menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7
2.	Orang yang penting kepada saya berfikir bahawa saya harus menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7
3.	Pada umumnya, lembaga persatuan telah menyokong penggunaan aplikasi e-AgriFinance.	1	2	3	4	5	6	7

	Keadaan Memudahkan							
1.	Saya mempunyai sumber-sumber yang diperlukan untuk menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7
2.	Saya mempunyai pengetahuan yang diperlukan untuk menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7
3.	Menggunakan aplikasi e-AgriFinance adalah dalam kawalan saya.	1	2	3	4	5	6	7
4.	Saya boleh mendapatkan bantuan daripada orang lain apabila saya menghadapi kesukaran menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7

	Kos Perceived							
1.	Saya percaya aplikasi e-AgriFinance akan mahal.	1	2	3	4	5	6	7
2.	Saya akan mempunyai kesukaran kewangan (contohnya Langganan telefon pintar dan pelan data) untuk menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7
3.	Saya percaya saya perlu berusaha untuk mendapatkan maklumat yang akan membuatkan saya berasa selesa dalam menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7
4.	Ia mengambil masa untuk melalui proses menggunakan aplikasi e-AgriFinance.	1	2	3	4	5	6	7

Curtin University
Malaysia

Bahagian 2: Hasrat tingkah laku petani untuk mengamalkan e-AgriFinance di Sarawak

Bahagian ini meminta pendapat anda tentang niat tingkah laku terhadap penggunaan aplikasi e-AgriFinance. Sila bulatkan sejauh mana anda bersetuju atau tidak bersetuju dengan setiap penyataan di bawah menggunakan skala Likert 7-mata seperti berikut:

(1) = sangat tidak bersetuju; (2) = agak tidak bersetuju; (3) = tidak bersetuju; (4) = neutral; (5) = setuju; (6) = agak setuju; (7) = sangat setuju

	Niat Tingkah Laku							
1.	Saya berhasrat menggunakan aplikasi e-AgriFinance dalam beberapa bulan akan datang.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	Saya meramalkan saya akan menggunakan aplikasi e-AgriFinance dalam beberapa bulan akan datang.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	Saya merancang untuk menggunakan aplikasi e-AgriFinance apabila ia tersedia kepada orang ramai.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	Saya akan selalu menggunakan aplikasi e-AgriFinance pada masa akan datang.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5.	Saya akan mengesyorkan orang lain menggunakan aplikasi e-AgriFinance.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Bahagian 3: Kesediaan Teknologi

Kami berminat dengan pandangan anda tentang bagaimana teknologi mempengaruhi kehidupan anda. Sila bulatkan berapa banyak yang anda bersetuju dengan kenyataan berikut menggunakan skala 5-point dari "sangat tidak setuju" untuk "sangat setuju".

	Penyataan Motivator					
1.	Teknologi memberi saya lebih banyak kebebasan bergerak.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
2.	Teknologi membuat saya lebih produktif dalam kehidupan peribadi saya.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
3.	Orang lain tanya saya untuk mendapatkan nasihat mengenai teknologi baru.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
4.	Secara umum, saya ialah yang pertama antara kawan saya untuk memperoleh teknologi baru apabila ia menubuhkan.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
5.	Saya teruskan dengan perkembangan teknologi terkini dalam bidang minat saya.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju

	Pernyataan Penghambat					
1.	Talian sokongan teknikal tidak membantu kerana mereka tidak menerangkan perkara dalam istilah yang saya fahami.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
2.	Kadang-kadang, saya berfikir bahawa sistem teknologi tidak direka untuk digunakan oleh orang biasa.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
3.	Orang terlalu bergantung pada teknologi untuk melakukan sesuatu untuk mereka.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
4.	Teknologi terlalu banyak mengalih perhatian orang ke tahap yang berbahaya.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju
5.	Teknologi merendahkan kualiti hubungan dengan mengurangkan interaksi peribadi.	Sangat tidak bersetuju	Agak tidak bersetuju	Neutral	Agak bersetuju	Sangat bersetuju

Seksyen 4: Maklumat Demografik

1. Apakah jantina anda?
☐ Lelaki ☐ Perempuan

2. Berapakah umur anda?
☐ 20-30 tahun
☐ 31-40 tahun
☐ 41-50 tahun
☐ 51-60 tahun
☐ 61-70 tahun
☐ 71-80 tahun

3. Apakah etnik anda?
☐ Melayu
☐ Cina
☐ Dayak
☐ Lain-lain: _____

4. Apakah tahap pendidikan tinggi anda?
☐ Tiada pendidikan formal
☐ Sekolah rendah
☐ Sekolah menengah
☐ Sekolah teknikal / sekolah Vokasional
☐ Diploma
☐ Ijazah universiti dan ke atas
☐ Lain-lain

5. Pengalaman terdahulu dalam menggunakan aplikasi mudah alih (e.g., Grab, Whatsapps)
☐ Tidak
☐ Kurang daripada 1 tahun
☐ 1-3 tahun
☐ Lebih daripada 3 tahun

6. Berapa pendapatan bulanan anda?
☐ Kurang daripada RM1500
☐ RM 1500 – RM 3500
☐ RM 3500 – RM 5500
☐ RM 5500 – RM 8500
☐ Lebih daripada RM 8500

7. Jenis tanaman utama yang anda tanam?
☐ Kelapa sawit
☐ Lada
☐ Koko
☐ Getah

8. Bilangan tahun pertanian
☐ 1-10
☐ 11-20
☐ 21-30
☐ 31-40
☐ Lebih daripda 40

9. Pernahkah anda mendengar mengenai Strategi Ekonomi Digital Kerajaan Sarawak?
☐ Ya
☐ Tidak

10. Apakah saiz ladang anda (hektar)?

_____

11. Jenis telefon bimbit yang anda gunakan sekarang (e.g., Telefon bimbit Telefon ciri Telephone pintar (Smartphone))?

_____

12. Apakah jenis langganan pelan data?

_____

TAMAT SOAL SELIDIK

Terima kasih kerana melengkapkan soal selidik.

Appendix 3: Consent Form (English Version)

Curtin University

Factors Influencing Behavioural Intention to Adopt e-AgriFinance among the Farmers in Sarawak

CONSENT FORM

HREC Project Number:	HRE2019-0753
Project Title:	Factors Influencing Behavioural Intention to Adopt e-AgriFinance among the Farmers in Sarawak
Principal Investigator:	Dr. Ching Seng Yap
Co-researcher:	Qusitina Omar, Dr William Keling & Dr. Poh Ling Ho
Version Number:	1
Version Date:	1/10/2019

For the Participant to Tick

- I have read, the information statement version listed above and I understand its contents.
- I believe I understand the purpose, extent and possible risks of my involvement in this project.
- I voluntarily consent to take part in this research project.
- I have had an opportunity to ask questions and I am satisfied with the answers I have received.
- I understand that this project has been approved by Curtin University Human Research Ethics Committee and will be carried out in line with the National Statement on Ethical Conduct in Human Research (2007).
- I understand I will receive a copy of this Information Statement and Consent Form.

☐ I do consent to the storage and use of my information in future ethically-approved research projects related to this (project/disease)

Participant Name	
Participant Signature	
Date	

For the Researchers to Complete

Declaration by researcher: I have supplied an Information Letter and Consent Form to the participant who has signed above, and believe that they understand the purpose, extent and possible risks of their involvement in this project.

Researcher Name	Quistina Omar
Researcher Signature	
Date	

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Appendix 4: Consent Form (Malay Version)

Curtin University

Faktor-faktor yang Mempengaruhi Niat Tingkah Laku untuk Mengamalkan e-AgriFinance di kalangan Petani di Sarawak

Borang Persetujuan

Nombor Projek HREC:	HRE2019-0753
Nama Projek:	Faktor-faktor yang Mempengaruhi Niat Tingkah Laku untuk Mengamalkan e-AgriFinance di kalangan Petani di Sarawak
Ketua Penyelidik:	Dr. Ching Seng Yap
Penyelidik Bersama:	Quistina Omar, Dr William Keling & Dr Poh Ling Ho
Nombor Versi:	1
Tarikh Versi:	2/10/2019

Untuk Peserta menanda

- Saya sudah membaca, versi pernyataan maklumat yang tertera di atas and memahami kandungannya.
- Saya percaya bahawa saya memahami tujuan, tahap dan kemungkinan risiko tentang penglibatan saya dalam projek ini.
- Saya bersukarela bersetuju untuk mengambil bahagian dalam projek penyelidikan ini.
- Saya mempunyai peluang untuk bertanya soalan dan saya berpuas hati dengan jawapan yang diterima.
- Saya memahami projek ini telah diluluskan oleh Jawatankuasa Etika Penyelidikan Manusia di Curtin University dan projek ini akan dijalankan mengikut Kod Etika untuk Penyelidikan Manusia dalam Pernyataan Nasional.
- Saya memahami bahawa saya akan terima Pernyataan Maklumat dan Borang Persetujuan ini.

☐ Saya bersetuju bahawa simpanan dan penggunaan maklumat saya bagi projek penyelidikan yang diluluskan secara etika pada masa akan datang (projek / penyakit).

Nama Peserta	
Tandatangan Peserta	
Tarikh	

Untuk Disiapkan oleh Penyelidik

Deklarasi Penyelidik: Saya telah memberi Surat Maklumat dan Borang Persetujuan kepada peserta yang bertandatangani di atas, dan percaya bahawa dia mamahami tujuan, tahap dan kemungkinan risiko tentang penglibatannya dalam projek ini.

Nama Penyelidik	Quistina Omar
Tandatangan Penyelidik	
Tarikh	

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Appendix 5: Participant Information Statement (English Version)

Curtin University
Malaysia

Dear Participant,

I would like to invite you to participate in a survey. At the start of the questionnaire there is a checkbox to indicate you have understood the information provided here in the information sheet. The purpose of this study is to determine the antecedents affecting the behavioural intention of farmers in adopting e-AgriFinance in Sarawak. Your answer to this survey will help government to have a better idea to understand the local farmers need and intention. This project is grant by Sarawak Multimedia Authority and being conducted by Curtin Malaysia and that it will be contributing to a Master by Research. Please note that your participation of this study is entirely voluntary. You have the right to refuse participating in the survey. Also, participants will receive a token of appreciation after taking part in this survey. The results of this research will become available once published.

This survey contains 3 sections, which may take about 10-15 minutes to complete. This survey is completely anonymous and does not contain any personal information that could identify you. Electronic data will be password-protected and hard copy data will be in locked storage. The information we collect in this study will be kept under secure conditions at Curtin University for 7 years after the research is published and then it will be destroyed. The information collected will be non-identifiable. Please respond all the questions in this survey and give the most accurate views based on your opinions, perceptions and experiences. There is no right or wrong answer. Please note that your answer will be treated with strict confidentiality.

Curtin University Human Research Ethics Committee (HREC) has approved this study (HRE2019-0753). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on +618 9266 9223 or the Manager, Research Integrity on +618 9266 7093 or email hrec@curtin.edu.au.

Thank you for your cooperation and valuable time.

Yap Ching Seng
E-mail: yapchingseng@curtin.edu.my
Tel: +6 016-3143867
Quistina Omar
E-mail: tina@postgrad.curtin.edu.my
Tel: +6 016-8693212

Appendix 6: Participant Information Statement (Malay Version)

Curtin University
Malaysia

Tuan/ Puan,

Kami ingin menjemput anda untuk mengambil bahagian dalam kaji selidik. Tujuan kajian ini adalah untuk menentukan pendahuluan yang mempengaruhi niat tingkah laku petani dalam mengamalkan e-AgriFinance di Sarawak. Jawapan anda kepada kaji selidik ini akan membantu kerajaan untuk mempunyai idea yang lebih baik untuk memahami keperluan petani dan niat tempatan. Projek ini diberikan oleh Pihak Berkuasa Multimedia Sarawak dan dijalankan oleh Curtin Malaysia dan ia akan menyumbang kepada Master oleh Penyelidikan. Sila ambil perhatian bahawa penyertaan anda dalam kajian ini adalah secara sukarela. Selain itu, peserta akan menerima hadiah apabila mengambil bahagian dalam kaji selidik ini. Anda mempunyai hak untuk tidak mengambil bahagian dalam soal selidik ini.

Tinjauan ini mengandungi 3 bahagian, yang mungkin mengambil masa kira-kira 10-15 minit untuk disiapkan. Tinjauan ini adalah tanpa nama dan tidak mengandungi sebarang maklumat peribadi yang dapat mengenal pasti anda. Data elektronik akan dilindungi kata laluan dan data keras akan disimpan dalam simpanan terkunci. Maklumat yang kami kumpul dalam kajian ini akan disimpan di bawah syarat-syarat yang selamat di Curtin University selama 7 tahun selepas penyelidikan diterbitkan dan kemudiannya akan dimusnahkan. Maklumat yang dikumpul akan tidak dapat dikenalpasti.

Sila jawab semua soalan dalam kaji selidik ini dan beri pandangan yang paling tepat berdasarkan pengalaman anda. Tidak ada jawapan yang betul atau salah. Sila ambil perhatian bahawa jawapan anda akan dirawat dengan kerahsiaan yang ketat.

Jawatankuasa Etika Penyelidikan Manusia Universiti Curtin (HREC) telah meluluskan kajian ini (nombor HRE2019-7053). Sekiranya anda ingin membincangkan kajian dengan seseorang yang tidak terlibat secara langsung dalam kajian ini, khususnya, apa-apa perkara yang berkaitan dengan cara pengendalian kajian atau hak anda sebagai peserta, atau anda ingin membuat aduan sulit, anda boleh menghubungi Pegawai Etika pada talian +618 9266 9223 atau Pengurus, Integriti Penyelidikan pada talian +618 9266 7093 atau email hrec@curtin.edu.au.

Kerjasama anda didahului dengan ucapan ribuan terima kasih.

Yap Ching Seng
E-mail: yapchingseng@curtin.edu.my

Tel: +6 016-3143867

Quistina Omar
E-mail: tina@postgrad.curtin.edu.my

Tel: +6 016-8693212

Appendix 7: Ethics Approval Letter

Curtin University

Research Office at Curtin

GPO Box U1987
Perth Western Australia 6845

Telephone +61 8 9266 7863
Facsimile +61 8 9266 3793
Web research.curtin.edu.au

30-Oct-2019

Name: CS Yap Yap
Department/School: CBS International
Email: Csyap.Yap@curtin.edu.au

Dear CS Yap Yap

RE: Ethics Office approval
Approval number: HRE2019-0753

Thank you for submitting your application to the Human Research Ethics Office for the project **Factors Influencing Behaviour Intention to Adopt e-AgriFinance among the Farmers in Sarawak**.

Your application was reviewed through the Curtin University Negligible risk review process.

The review outcome is: **Approved**.

Your proposal meets the requirements described in the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007).*

Approval is granted for a period of one year from **30-Oct-2019** to **29-Oct-2020**. Continuation of approval will be granted on an annual basis following submission of an annual report.

Personnel authorised to work on this project:

Name	Role
Yap, CS Yap	CI
Omar, Quistina	Student

Approved documents:

Document

Standard conditions of approval

1. Research must be conducted according to the approved proposal
2. Report in a timely manner anything that might warrant review of ethical approval of the project including:
   - proposed changes to the approved proposal or conduct of the study
   - unanticipated problems that might affect continued ethical acceptability of the project
   - major deviations from the approved proposal and/or regulatory guidelines
   - serious adverse events
3. Amendments to the proposal must be approved by the Human Research Ethics Office before they are implemented (except where an amendment is undertaken to eliminate an immediate risk to participants)
4. An annual progress report must be submitted to the Human Research Ethics Office on or before the anniversary of approval and a completion

report submitted on completion of the project
5. Personnel working on this project must be adequately qualified by education, training and experience for their role, or supervised
6. Personnel must disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation, that bears on this project
7. Changes to personnel working on this project must be reported to the Human Research Ethics Office
8. Data and primary materials must be retained and stored in accordance with the Western Australian University Sector Disposal Authority (WAUSDA) and the Curtin University Research Data and Primary Materials policy
9. Where practicable, results of the research should be made available to the research participants in a timely and clear manner
10. Unless prohibited by contractual obligations, results of the research should be disseminated in a manner that will allow public scrutiny; the Human Research Ethics Office must be informed of any constraints on publication
11. Approval is dependent upon ongoing compliance of the research with the Australian Code for the Responsible Conduct of Research, the National Statement on Ethical Conduct in Human Research, applicable legal requirements, and with Curtin University policies, procedures and governance requirements
12. The Human Research Ethics Office may conduct audits on a portion of approved projects.

Special Conditions of Approval

If the survey changes in anyway after the pilot study is conducted please provide an amendment request with the altered questionnaire.

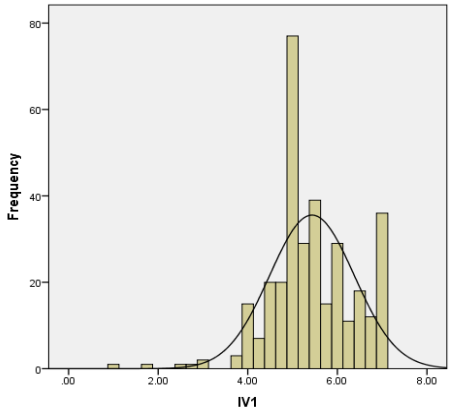
This letter constitutes low risk/negligible risk approval only. This project may not proceed until you have met all of the Curtin University research governance requirements.

Should you have any queries regarding consideration of your project, please contact the Ethics Support Officer for your faculty or the Ethics Office at hrec@curtin.edu.au or on 9266 2784.

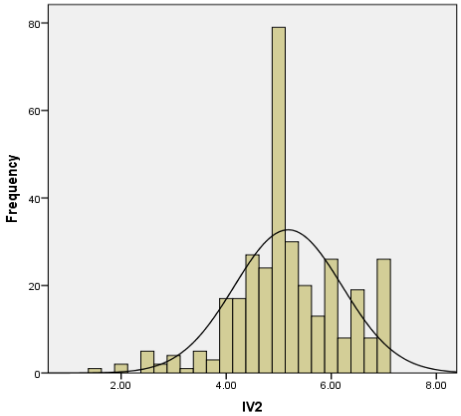
Yours sincerely

Amy Bowater
Ethics, Team Lead

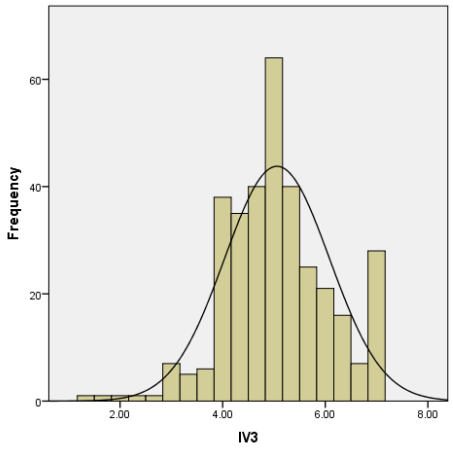
Appendix 8: Histograms of Constructs Normality Distribution



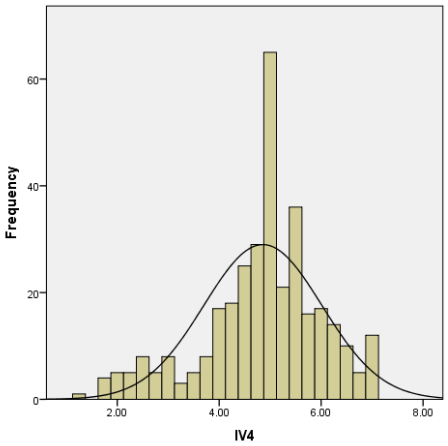
(Histogram of Performance Expectancy)



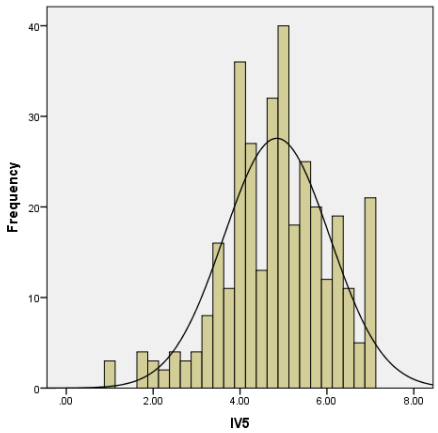
(Histogram of Effort Expectancy)



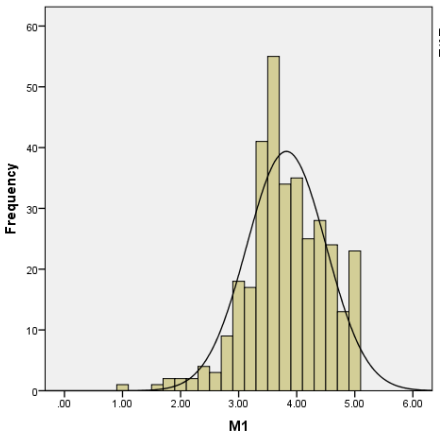
(Histogram of Social Influence)



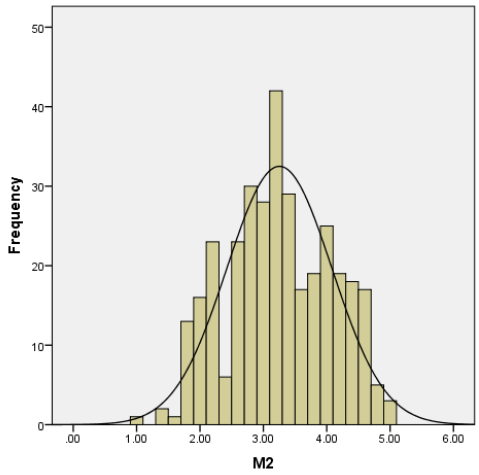
(Histogram of Facilitating Conditions)



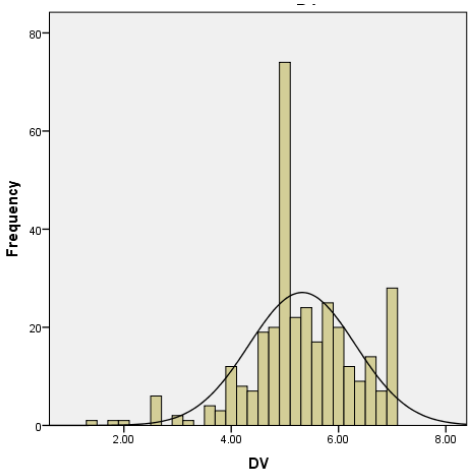
(Histogram of Perceived Cost)



(Histogram of Motivator Statements)



(Histogram of Inhibitor Statements)



(Histogram of Behavioural Intention)

Appendix 9: HTMT Inferential

HTMT Inferential					
Hypothesis	**Original Sample (O)**	**Sample Mean (M)**	**Bias**	**2.50%**	**97.50%**
PE -> BI	0.243	0.249	0.006	0.134	0.354
EE -> BI	0.160	0.158	-0.002	0.052	0.300
SI -> BI	0.270	0.260	-0.010	0.152	0.402
FC -> BI	0.239	0.241	0.002	0.102	0.361
PC -> BI	0.052	0.063	0.011	-0.065	0.150

Appendix 10: Harman's Single-factor Test Result

Factor	Initial Eigenvalues			Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.595	31.162	31.162	10.004	29.424	29.424
2	3.072	9.036	40.198			
3	2.604	7.659	47.857			
4	1.818	5.346	53.204			
5	1.393	4.097	57.301			
6	1.253	3.686	60.987			
7	1.041	3.063	64.050			
8	1.035	3.044	67.094			
9	.919	2.702	69.795			
10	.828	2.434	72.230			
11	.764	2.248	74.478			
12	.739	2.174	76.652			
13	.690	2.029	78.681			
14	.618	1.819	80.500			
15	.602	1.771	82.271			
16	.568	1.671	83.943			
17	.511	1.502	85.445			
18	.467	1.373	86.818			
19	.435	1.280	88.098			
20	.425	1.249	89.347			
21	.383	1.128	90.475			
22	.361	1.061	91.536			
23	.339	.997	92.533			
24	.314	.925	93.457			
25	.303	.891	94.349			
26	.287	.844	95.193			
27	.251	.740	95.933			
28	.242	.712	96.645			
29	.218	.643	97.287			
30	.213	.628	97.915			
31	.205	.602	98.517			
32	.194	.572	99.088			
33	.171	.502	99.590			
34	.139	.410	100.000			

Extraction Method: Principal Axis Factoring.

Appendix 11 SPSS Output

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	193	57.3	57.8	57.8
	Female	141	41.8	42.2	100.0
	Total	334	99.1	100.0	
Missing	System	3	.9		
Total		337	100.0		

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	34	10.1	10.2	10.2
	31-40	50	14.8	15.0	25.1
	41-50	76	22.6	22.8	47.9
	51-60	94	27.9	28.1	76.0
	61-70	67	19.9	20.1	96.1
	71-80	12	3.6	3.6	99.7
	81-90	1	.3	.3	100.0
	Total	334	99.1	100.0	
Missing	System	3	.9		
Total		337	100.0		

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	107	31.8	32.0	32.0
	Chinese	23	6.8	6.9	38.9
	Dayak	177	52.5	53.0	91.9
	Other	27	8.0	8.1	100.0
	Total	334	99.1	100.0	
Missing	System	3	.9		
Total		337	100.0		

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No formal education	36	10.7	10.8	10.8
	Primary school	100	29.7	29.9	40.7
	Secondary school	151	44.8	45.2	85.9
	Technical school / Vocational school	10	3.0	3.0	88.9
	Diploma	21	6.2	6.3	95.2
	Degree and above	13	3.9	3.9	99.1
	Other	2	.6	.6	99.7
	8	1	.3	.3	100.0
	Total	334	99.1	100.0	
Missing	System	3	.9		
Total		337	100.0		

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	135	40.1	40.4	40.4
	Less than 1 year	44	13.1	13.2	53.6
	1-3 years	45	13.4	13.5	67.1
	More than 3 years	109	32.3	32.6	99.7
	11	1	.3	.3	100.0
	Total	334	99.1	100.0	
Missing	System	3	.9		
Total		337	100.0		

Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than RM1500	234	69.4	70.3	70.3
	RM1500 - RM3500	68	20.2	20.4	90.7
	RM3500 - RM5500	21	6.2	6.3	97.0
	RM5500 - RM8500	10	3.0	3.0	100.0
	Total	333	98.8	100.0	
Missing	System	4	1.2		
Total		337	100.0		

Crop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Oil Palm	107	31.8	31.8	31.8
	Pepper	42	12.5	12.5	44.2
	Cocoa	89	26.4	26.4	70.6
	Rubber	99	29.4	29.4	100.0
	Total	337	100.0	100.0	

FarmingYears

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1- 10	183	54.3	54.6	54.6
	11-20	67	19.9	20.0	74.6
	21-30	29	8.6	8.7	83.3
	31-40	23	6.8	6.9	90.1
	More than 40	33	9.8	9.9	100.0
	Total	335	99.4	100.0	
Missing	System	2	.6		
Total		337	100.0		

DES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	152	45.1	45.1	45.1
	No	185	54.9	54.9	100.0
	Total	337	100.0	100.0	

Phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2	.6	.7	.7
	Cell Phone	125	37.1	41.0	41.6
	Feature Phone	1	.3	.3	42.0
	Smartphone	177	52.5	58.0	100.0
	Total	305	90.5	100.0	
Missing	System	32	9.5		
Total		337	100.0		

DataPlan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	5	1.5	1.9	1.9
	Digi	86	25.5	32.8	34.7
	Maxis	45	13.4	17.2	51.9
	Celcom	115	34.1	43.9	95.8
	TuneTalk	11	3.3	4.2	100.0
	Total	262	77.7	100.0	
Missing	System	75	22.3		
Total		337	100.0		

Hectare

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.5	3	.9	.9	.9
	.6	1	.3	.3	1.2
	1.0	78	23.1	23.7	24.9
	1.2	2	.6	.6	25.5
	1.4	2	.6	.6	26.1
	1.5	11	3.3	3.3	29.5
	1.8	1	.3	.3	29.8
	2.0	59	17.5	17.9	47.7
	2.1	4	1.2	1.2	48.9
	2.2	1	.3	.3	49.2
	2.3	1	.3	.3	49.5
	2.5	7	2.1	2.1	51.7
	3.0	31	9.2	9.4	61.1
	3.1	1	.3	.3	61.4
	3.2	1	.3	.3	61.7
	3.5	2	.6	.6	62.3
	3.6	1	.3	.3	62.6
	3.8	2	.6	.6	63.2
	4.0	17	5.0	5.2	68.4
	4.1	8	2.4	2.4	70.8
	4.2	3	.9	.9	71.7
	4.3	5	1.5	1.5	73.3
	4.4	3	.9	.9	74.2
	4.5	2	.6	.6	74.8
	4.6	1	.3	.3	75.1
	4.8	1	.3	.3	75.4
	4.9	2	.6	.6	76.0
	5.0	22	6.5	6.7	82.7
	5.2	2	.6	.6	83.3
	6.0	4	1.2	1.2	84.5

	6.1	1	.3	.3	84.8
	7.0	4	1.2	1.2	86.0
	9.2	1	.3	.3	86.3
	10.0	20	5.9	6.1	92.4
	11.0	1	.3	.3	92.7
	12.0	2	.6	.6	93.3
	13.0	1	.3	.3	93.6
	15.0	6	1.8	1.8	95.4
	16.0	2	.6	.6	96.0
	17.8	1	.3	.3	96.4
	20.0	7	2.1	2.1	98.5
	29.0	1	.3	.3	98.8
	30.0	1	.3	.3	99.1
	40.5	1	.3	.3	99.4
	50.0	1	.3	.3	99.7
	300.0	1	.3	.3	100.0
	Total	329	97.6	100.0	
Missing	System	8	2.4		
Total		337	100.0		

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PE1	337	1	7	5.36	1.133
PE2	337	1	7	5.50	1.116
PE3	337	1	7	5.38	1.182
PE4	337	1	7	5.50	1.105
EE1	337	1	7	5.23	1.096
EE2	337	1	7	5.18	1.284
EE3	337	1	7	5.23	1.156
EE4	337	1	7	5.09	1.353
SI1	337	1	7	4.77	1.377
SI2	337	1	7	5.07	1.103
SI3	337	1	7	5.34	1.215
FC1	337	1	7	4.72	1.664
FC2	337	1	7	4.58	1.642
FC3	337	1	7	4.72	1.544
FC4	337	1	7	5.40	1.202
PC1	337	1	7	4.36	1.638
PC2	337	1	7	4.64	1.623
PC3	337	1	7	5.28	1.241
PC4	337	1	7	5.11	1.402
BI1	337	1	7	5.12	1.222

VBI2	337	1	7	5.09	1.268
BI3	337	1	7	5.48	1.118
BI4	337	1	7	5.32	1.217
BI5	337	1	7	5.60	1.148
MS1	337	1	5	4.15	.841
MS2	337	1	5	4.09	.857
MS3	337	1	5	3.63	.986
MS4	337	1	5	3.30	1.112
MS5	337	1	5	3.94	.937
IS1	337	1	5	3.00	1.193
IS2	337	1	5	2.99	1.341
IS3	337	1	5	3.41	1.207
IS4	337	1	5	3.36	1.267
IS5	337	1	5	3.50	1.303
Valid N (listwise)	337				

Appendix 12: PLS-SEM Output

Outer Loadings						
Construct	**PE**	**EE**	**SI**	**FC**	**PC**	**BI**
PE1	0.838					
PE2	0.860					
PE3	0.815					
PE4	0.822					
EE1		0.788				
EE2		0.873				
EE3		0.821				
EE4		0.867				
SI1			0.796			
SI2			0.872			
SI3			0.825			
FC1				0.622		
FC2				0.780		
FC3				0.851		
FC4				0.745		
PC2					0.338	
PC3					0.928	
PC4					0.777	
BI1						0.838
BI2						0.841
BI3						0.795
BI4						0.865
BI5						0.807

Construct Reliability and Validity				
Construct	**Cronbach's Alpha**	**rho_A**	**Composite Reliability**	**Average Variance Extracted (AVE)**
PE	0.854	0.854	0.901	0.695
EE	0.858	0.864	0.904	0.703
SI	0.777	0.787	0.870	0.691
FC	0.754	0.781	0.839	0.569
PC	0.815	-0.060	0.746	0.526
BI	0.887	0.886	0.917	0.688

Fornell and Larcker Criterion						
Construct	**BI**	**EE**	**FC**	**PC**	**PE**	**SI**
BI	0.830					
EE	0.615	0.838				
FC	0.606	0.597	0.754			
PC	0.452	0.265	0.321	0.726		
PE	0.662	0.628	0.519	0.499	0.834	
SI	0.656	0.554	0.491	0.501	0.635	0.831

HTMT						
Construct	**BI**	**EE**	**FC**	**PC**	**PE**	**SI**
BI						
EE	0.704					
FC	0.702	0.742				
PC	0.422	0.23	0.339			
PE	0.759	0.735	0.592	0.484		
SI	0.783	0.686	0.586	0.608	0.775	

Cross Loadings						
Construct	**PE**	**EE**	**SI**	**FC**	**PC**	**BI**
PE1	**0.838**	0.537	0.583	0.398	0.398	0.565
PE2	**0.860**	0.499	0.525	0.402	0.433	0.547
PE3	**0.815**	0.541	0.483	0.472	0.372	0.561
PE4	**0.822**	0.515	0.525	0.461	0.464	0.532
EE1	0.514	**0.788**	0.487	0.438	0.242	0.467
EE2	0.555	**0.873**	0.436	0.522	0.257	0.553
EE3	0.565	**0.821**	0.525	0.470	0.273	0.496
EE4	0.475	**0.867**	0.421	0.564	0.123	0.541
SI1	0.478	0.478	**0.796**	0.446	0.334	0.464
SI2	0.536	0.480	**0.872**	0.377	0.441	0.567
SI3	0.561	0.431	**0.825**	0.409	0.459	0.592
FC1	0.148	0.387	0.100	**0.622**	-0.019	0.296
FC2	0.305	0.526	0.300	**0.780**	0.087	0.371
FC3	0.450	0.507	0.438	**0.851**	0.224	0.503
FC4	0.536	0.400	0.508	**0.745**	0.502	0.571
PC2	0.174	0.031	0.303	0.057	**0.338**	0.153
PC3	0.456	0.229	0.474	0.306	**0.928**	0.420
PC4	0.404	0.187	0.477	0.197	**0.777**	0.351
BI1	0.539	0.520	0.532	0.484	0.298	**0.838**
BI2	0.537	0.513	0.538	0.512	0.292	**0.841**
BI3	0.556	0.490	0.604	0.436	0.503	**0.795**
BI4	0.538	0.547	0.500	0.555	0.336	**0.865**
BI5	0.570	0.483	0.546	0.526	0.438	**0.807**

Outer Weights						
Construct	**PE**	**EE**	**SI**	**FC**	**PC**	**BI**
PE1	0.307					
PE2	0.298					
PE3	0.305					
PE4	0.289					
EE1		0.270				
EE2		0.320				
EE3		0.287				
EE4		0.313				
SI1			0.343			
SI2			0.420			
SI3			0.438			
FC1				0.223		
FC2				0.280		
FC3				0.379		
FC4				0.430		
PC2					-0.382	
PC3					0.797	
PC4					0.501	
BI1						0.234
BI2						0.237
BI3						0.246
BI4						0.242
BI5						0.247

Outer Loadings						
Construct	**PE**	**EE**	**SI**	**FC**	**PC**	**BI**
PE1	0.838					
PE2	0.860					
PE3	0.815					
PE4	0.822					
EE1		0.788				
EE2		0.873				
EE3		0.821				
EE4		0.867				
SI1			0.796			
SI2			0.872			
SI3			0.825			
FC1				0.622		
FC2				0.780		
FC3				0.851		
FC4				0.745		
PC2					0.338	
PC3					0.928	
PC4					0.777	
BI1						0.838
BI2						0.841
BI3						0.795
BI4						0.865
BI5						0.807

Variance Inflation Factor		
Construct	**Outer VIF**	**Inner VIF**
PE1	2.423	
PE2	2.628	
PE3	1.945	
PE4	2.028	2.298
EE1	1.777	
EE2	2.367	
EE3	1.950	
EE4	2.361	2.109
SI1	1.637	
SI2	1.888	
SI3	1.486	2.011
FC1	1.496	
FC2	2.114	
FC3	1.976	
FC4	1.304	1.695
PC2	1.707	
PC3	1.774	
PC4	2.186	1.486
BI1	3.192	
BI2	3.260	
BI3	2.020	
BI4	2.616	
BI5	1.972	

Construct	R Square	R Square Adjusted
BI	0.605	0.599

Construct	f2
BI	
PE	0.056
EE	0.033
SI	0.087
FC	0.081
PC	0.014

Construct	SSO	SSE	Q^2 (=1-SSE/SSO)
BI	1685	1001.788	0.405
PE	1348	1348	
EE	1348	1348	
SI	1011	1011	
FC	1348	1348	
PC	1011	1011	

Path Coefficients					
Relationship	**Original Sample (O)**	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
PE -> BI	0.226	0.222	0.057	3.946	0.000
EE -> BI	0.166	0.160	0.061	2.709	0.003
SI -> BI	0.263	0.260	0.062	4.251	0.000
FC -> BI	0.232	0.239	0.064	3.605	0.000
PC -> BI	0.090	0.098	0.054	1.666	0.048

Confidence Interval Bias					
Relationship	**Original Sample (O)**	**Sample Mean (M)**	**Bias**	**5.00%**	**95.00%**
PE -> BI	0.226	0.222	-0.004	0.138	0.325
EE -> BI	0.166	0.16	-0.005	0.076	0.275
SI -> BI	0.263	0.26	-0.003	0.167	0.368
FC -> BI	0.232	0.239	0.006	0.131	0.333
PC -> BI	0.09	0.098	0.008	-0.015	0.163

Outer Weights					
Items	**Original Sample (O)**	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
PE1 <- PE	0.307	0.307	0.022	13.669	0.000
PE2 <- PE	0.298	0.298	0.018	16.798	0.000
PE3 <- PE	0.305	0.306	0.025	12.261	0.000
PE4 <- PE	0.289	0.290	0.019	15.332	0.000
EE1 <- EE	0.270	0.270	0.021	13.177	0.000
EE2 <- EE	0.320	0.319	0.018	18.082	0.000
EE3 <- EE	0.287	0.287	0.022	13.329	0.000
EE4 <- EE	0.313	0.315	0.020	15.561	0.000
SI1 <- SI	0.343	0.343	0.020	17.534	0.000
SI2 <- SI	0.420	0.420	0.021	20.291	0.000
SI3 <- SI	0.438	0.438	0.023	19.417	0.000
FC1 <- FC	0.223	0.219	0.044	5.055	0.000
FC2 <- FC	0.280	0.277	0.029	9.723	0.000
FC3 <- FC	0.379	0.377	0.031	12.420	0.000
FC4 <- FC	0.430	0.432	0.050	8.684	0.000
PC2 <- PC	-0.382	-0.375	0.143	2.666	0.004
PC3 <- PC	0.797	0.791	0.123	6.489	0.000
PC4 <- PC	0.501	0.491	0.151	3.316	0.000
BI1 <- BI	0.234	0.235	0.010	23.611	0.000
BI2 <- BI	0.237	0.237	0.008	28.163	0.000
BI3 <- BI	0.246	0.246	0.011	21.994	0.000
BI4 <- BI	0.242	0.244	0.011	21.705	0.000
BI5 <- BI	0.247	0.246	0.012	20.439	0.000

PLS-MGA			
Relationship	**Path Coefficients-diff (High - Low)**	**p-Value original 1-tailed (High vs Low)**	**p-Value new (High vs Low)**
PC -> BI	0.208	0.024	0.024

Confidence Interval				
Relationship	**5.0% (High)**	**95.0% (High)**	**5.0% (Low)**	**95.0% (Low)**
PC -> BI	0.112	0.415	-0.073	0.118

Parametric Test			
Relationship	**Path Coefficients-diff (High - Low)**	**t-Value(|High vs Low|)**	**p-Value (High vs Low)**
PC -> BI	0.208	1.969	0.025

Welch-Satterthwait Test			
Relationship	**Path Coefficients-diff (High - Low)**	**t-Value(|High vs Low|)**	**p-Value (High vs Low)**
PC -> BI	0.208	1.924	0.028

Relationship	Path Coefficients Original (High)	Path Coefficients Mean (High)	STDEV (High)	t-Value (High)	p-Value (High)
PC -> BI	0.246	0.256	0.091	2.706	0.004
Relationship	**Path Coefficients Original (Low)**	**Path Coefficients Mean (Low)**	**STDEV (Low)**	**t-Value (Low)**	**p-Value (Low)**
PC -> BI	0.038	0.057	0.059	0.638	0.262

Appendix 13: Structural Model