



**UNIVERSITI PUTRA MALAYSIA**

***FACTORS INFLUENCING ATTITUDE TOWARDS TECHNOLOGY  
ADOPTION AMONG PERMANENT FOOD PRODUCTION PARK  
PROGRAM PARTICIPANTS OF SELECTED STATES IN PENINSULAR  
MALAYSIA***

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**FP 2022 52**



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PARTICIPANTS OF SELECTED STATES IN PENINSULAR MALAYSIA**

By

**ZULQARNAIN**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra  
Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of  
Philosophy**

**June 2021**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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**ZULQARNAIN**

**June 2021**

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**Faculty : Agriculture**

The Malaysian government has been focusing on innovation, research and development through the integration of technology and agriculture. The Permanent Food Production Park (PFPP) programme was introduced by the government, aiming to increase food production, decrease foods import and to support the application of large scale of agriculture entrepreneurs. This study aimed to explore the factor influencing attitude towards technology adoption among PFPP programme participants in West Malaysia. The specific objectives of this study were: 1) To describe the socio-demographic and farm profile of PFPP participants; 2) to determine the attitude level towards technology adoption among PFPP farmers; 3) to determine the factors associated with farmers' attitude towards technology adoption. The study adopted a cross-sectional study design and was conducted in four states in Malaysia namely; Negeri Sembilan, Selangor, Perak and Johor. The studied population included the PFPP programme participants with a sample size of 275 farmers selected using a simple random sampling technique. The data were collected using a well-structured questionnaire that was initially pilot tested and validated. To achieve the stated objectives, five (5) main constructs were considered as independent variables based on relevant theories and previous studies. These constructs included respondents' socio-demographic characteristics, farm profile, perceived benefits of technology, perceived measures to improve technology adoption, and perceived role of agricultural officers. The obtained data were analyzed by applying descriptive analysis, independent T-tests, and multiple regression analysis using the Statistical Package for Social Sciences (SPSS, version 22). Most of the respondents in this study were males (93.5%), 45.5% were above 50 years old and 68.0% were Muslims. The majority of respondents were Malays (67.6%) followed by Chinese (29.1%), and less than 5% were Indians or belonging to other ethnicities. The majority (76.8%) of respondents had either primary or secondary education. In terms of farm profile, most respondents (96.7%) had farm size ranging from 1-30 hectares and 70.9% of

them used TKPM land for their farming activities. A higher proportion of respondents (36.7%) earned less or equal to RM10,000 as gross income while 25.8% earned between RM10,001 - RM50,000.

Based on the analysis of all items measuring farmers' attitude level, 89.1% of the respondents had good attitude towards technology adoption. Further analysis showed that only 31.6% of the participants had high adoption level of technology in agricultural practices. Farmers with primary to standard six education had a significantly lower attitude score ( $B = -2.06$ ; 95% CI -3.09, -1.04;  $P = 0.0001$ ) compared to those with higher education. The farmers who owned and rented a land for farming purposes tended to have higher attitude score ( $B = 2.41$ ; 95% CI -0.03, 4.86;  $P = 0.05$ ) compared to those belonging to the TKM and surrogate land owners. Furthermore, farmers with the minimum net income (less or equal RM 10,000) had a significantly lower attitude score ( $B = -1.89$ ; 95% CI -0.34, -3.44;  $P = 0.017$ ) compared to those earning more than RM 100,000. Each unit increase in farmers' scores for items measuring the impact of technology was associated with an increased attitude score towards technology adoption ( $B = 0.11$ ; 95% CI 0.14, 0.08;  $P = 0.0001$ ). Similarly, a unit increase in farmers' scores for measures perceived to motivate farmers was associated with an increased attitude score towards technology adoption ( $B = 0.19$ ; 95% CI 0.19, 0.07;  $P = 0.0001$ ). These findings indicated that these factors could be used by appropriate authorities when developing strategies to improve technology adoption amongst participants of PFPP.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia  
sebagai memenuhi keperluan untuk ijazah Master Sains

**FAKTOR YANG MEMPENGARUHI SIKAP TERHADAP PENGGUNAAN  
TEKNOLOGI DALAM KALANGAN PESERTA PROGRAM TAMAN KEKAL  
PENGELUARAN MAKANAN TETAP NEGERI TERPILIH DI SEMENANJUNG  
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Di Malaysia kerajaan telah memberi tumpuan kepada inovasi, penyelidikan dan pembangunan melalui penyatuan teknologi dan pertanian. Taman Pengeluaran Makanan Tetap Program Program (TKPM) diperkenalkan oleh pemerintah, yang bertujuan untuk meningkatkan produksi makanan, mengurangi import makanan dan untuk mendukung aplikasi pengusaha pertanian skala besar. Kajian ini bertujuan untuk meneroka faktor yang mempengaruhi sikap terhadap penggunaan teknologi di kalangan peserta program PFPP di Malaysia Barat. Objektif khusus kajian ini adalah: 1) Untuk menerangkan sosio-demografi dan profil ladang peserta PFPP; 2) untuk menentukan tahap sikap terhadap penggunaan teknologi di kalangan petani PFPP; 3) untuk menentukan faktor-faktor yang berkaitan dengan sikap petani terhadap penggunaan teknologi. Kajian ini menggunakan reka bentuk kajian keratan rentas dan dilakukan di empat negeri di Malaysia iaitu; Negeri Sembilan, Selangor, Perak dan Johor. Populasi yang dikaji termasuk peserta program PFPP dengan ukuran sampel 275 petani yang dipilih menggunakan teknik persampelan rawak mudah. Data dikumpulkan menggunakan soal selidik berstruktur yang baik yang pada awalnya diuji coba dan disahkan. Untuk mencapai objektif yang dinyatakan, lima (5) konstruk utama dianggap sebagai pemboleh ubah bebas berdasarkan teori yang relevan dan kajian sebelumnya. Konstruk ini merangkumi ciri sosio-demografi responden, profil ladang, manfaat teknologi yang dirasakan, langkah-langkah yang dirasakan untuk meningkatkan penggunaan teknologi, dan peranan pegawai pertanian yang dirasakan. Data yang diperoleh dianalisis dengan menerapkan analisis deskriptif, uji T bebas, dan analisis regresi berganda menggunakan Statistical Package for Social Sciences (SPSS, versi 22). Sebilangan besar responden dalam kajian ini adalah lelaki (93.5%), 45.5% berumur 50 tahun ke atas dan 68.0% beragama Islam. Majoriti responden adalah orang Melayu (67.6%) diikuti oleh orang Cina (29.1%), dan kurang dari 5% adalah orang India atau berasal dari etnik lain. Majoriti (76.8%) responden

mempunyai pendidikan rendah atau menengah. Dari segi profil ladang, kebanyakan responden (96.7%) mempunyai ukuran ladang antara 1-30 hektar dan 70.9% daripadanya menggunakan tanah TKPM untuk aktiviti pertanian mereka. Sebilangan besar responden (36.7%) memperoleh kurang atau sama dengan RM10,000 sebagai pendapatan kasar sementara 25.8% memperoleh antara RM10,001 - RM50,000.

Berdasarkan analisis semua item yang mengukur tahap sikap petani, 89.1% responden mempunyai sikap yang baik terhadap penggunaan teknologi. Analisis lebih lanjut menunjukkan bahawa hanya 31.6% peserta mempunyai tahap penggunaan teknologi yang tinggi dalam amalan pertanian. Petani dengan pendidikan rendah hingga enam mempunyai skor sikap yang jauh lebih rendah ( $B = -2,06$ ; 95% CI  $-3,09, -1,04$ ;  $P = 0,0001$ ) berbanding dengan mereka yang berpendidikan tinggi. Petani yang memiliki dan menyewa tanah untuk tujuan pertanian cenderung mempunyai skor sikap yang lebih tinggi ( $B = 2.41$ ; 95% CI  $-0.03, 4.86$ ;  $P = 0.05$ ) berbanding dengan yang dimiliki oleh TKM dan pemilik tanah pengganti. Tambahan pula, petani dengan pendapatan bersih minimum (kurang atau sama dengan RM 10,000) mempunyai skor sikap yang jauh lebih rendah ( $B = -1,89$ ; 95% CI  $-0,34, -3,44$ ;  $P = 0,017$ ) berbanding dengan mereka yang berpendapatan lebih dari RM 100,000. Setiap kenaikan skor petani untuk item yang mengukur kesan teknologi dikaitkan dengan peningkatan skor sikap terhadap penggunaan teknologi ( $B = 0.11$ ; 95% CI  $0.14, 0.08$ ;  $P = 0.0001$ ). Begitu juga, peningkatan satuan skor petani untuk langkah-langkah yang dianggap memotivasi petani dikaitkan dengan peningkatan skor sikap terhadap penggunaan teknologi ( $B = 0.19$ ; 95% CI  $0.19, 0.07$ ;  $P = 0.0001$ ). Penemuan ini menunjukkan bahawa faktor-faktor ini dapat digunakan oleh pihak berkuasa yang tepat ketika mengembangkan strategi untuk meningkatkan penggunaan teknologi di kalangan peserta PFPP.

## ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious, the Most Merciful, I began this work with the believe that if God wants goodness for one of his followers, his wish shall be deemed to be, no matter anyone else's wish for it not to be. I direct my heartfelt gratitude to God for covering me with His love and care. Also praises be for Holy Prophet Muhammad (S.A.W), whose teaching are complete code of life and has been send to Rahmat-UI Almeen for mankind. I would like to thank, with gratefulness, my supervisor, Associate Prof. Dr. Norsida Man for her valuable advice and guidance. I truly appreciate her patience and understanding throughout my studies. I would like to mention to thank all the faculty members and those who willingly to participate in this study for granting me an access to information and opinions. May God bless us all. Last but not least, I would like to extend my appreciation to my family. I express highest regard to my caring parents, sister and elder brothers without their support. I also thank my elder brother Muhammad Ismail and sister in law Normazlina Tan for their encouragement, support and endless love. Without them, this thesis would have not become a reality.



This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

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## LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CATPCA	Categorical Principal Component Analysis
DOI	Theory of Diffusion
EIA	Environmental Impact Assessment
FTAM	Farmers Technology Acceptance Model
JTAUT	Joined Theory of Acceptance and Use Of Technology
ICT	Information and Communications Technology
MOA	Ministry of Agriculture
NAP	National Agricultural Plan
OECD	Organisation for Economic Co-operation and Development
PFPP	Permanent Food Park Production
PEOU	Perceived Ease-Of-Use
PU	Perceived Usefulness
SD	Standard Deviation
TAM	Technology Adoption Model
TPB	Theory of Planned Behaviour
UTAUT	Unified Theory of Acceptance and Use of Technology

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

This chapter highlights the agricultural sector in Malaysia by focusing on the recent development in the area of agro-food policy and agricultural extension services. Also, this chapter emphasises the role of the Department of Agriculture in relation to the Permanent Food Production Park Programme (PFPP). Thereafter, the problem statement and significance of the study are discussed. The aims and objectives of PFPP are presented with the research questions to be answered based on the expected study findings.

### 1.2 Background of the Study

Agriculture contributes to the growth and development of the economy of many countries worldwide. The benefits of agricultural practices include income generation, provision of employment opportunities, improvements in rural development and poverty reduction in most developing countries (Diao et al., 2007). Aside from the positive benefits on national economies, agriculture is associated with environmental, cultural, and social benefits (Murad et al., 2008).

In modern agricultural practice, the transfer and dissemination of technology are one of the most important aspects. Technological innovations contribute immensely to the rapid development of the agriculture sector. However, the developed countries are the main sources and origin of most agricultural innovation and it is challenging to implement some of the technologies in developing nations. Agricultural technologies are at the forefront in attaining poverty alleviation in developing and under-developing countries but the adoption rates of these innovations remain a big challenge (Bandira and Rasul, 2002). Nonetheless, the role of adoption of novel technology is pertinent for the transformation of the agricultural sector. This reinstates the importance of farmers' learning behaviour as reported in several studies (Conley and Udry, 2010).

Despite the aforementioned benefits of technology in agriculture, its adoption by farms remains the major bottleneck in the sector. Several studies have reported the adoption rates of agricultural technology and associated factors in developing countries (Akudugu et al., 2012; Abdullah and Abu Samah, 2013; Silva and Brroekel, 2016). Overall, two main drivers have been identified to influence the successful adoption of agricultural technology and they include, (1) availability and affordability of new agricultural technologies and, (2) farmers'

expectations of profitability in the long term as projected by the new technology and its developers (Foster & Rosenzweig, 2010). Akudugo (2012) categorised the factors influencing farmers' adoption of new agricultural technologies into three aspects: economic factors, institutional factors and social factors. Specifically, the economic factors include the cost of adoption, farm size, expected benefits, access to credit facilities, and off-income generation actions. The factors explaining the social perspective are farmers' age, education and gender, whereas the institutional factors are related to access to and efficiency of extension services.

This leads to the stages of agriculture technology transfer. The first stage involves the transfer and dissemination of agricultural technology to farmers, while the second entails the motivation of farmers to adopt and implement such technologies on their farms (Tai, 2012). For the two stages of agricultural technology transfer to be effective, the process needs to be conducted by experienced specialists in agricultural extension.

The dissemination of technology to potential users is key in technology adoption. Reliable and technical guidance is necessary for the efficient dissemination of novel technology. This has been highlighted in several studies focusing on the significance of the dissemination process for revolutionising the agricultural sector (OECD, 2001, Rogers, 2003). Farmers that are interested in novel agricultural technology are exposed to various media and information platforms. Moreover, farmers may acquire more knowledge through self-experimentation, from agricultural extension services and their colleagues. However, the social learning approach is commonly used in developing countries for farmers' learning. In addition, traditional farmers are recognised to learn through passive means provided by change agents. Thus, technology dissemination is often conducted in rural communities by extension officers, representing the developers of novel technologies (Rogers, 1995). In urban areas, technology is disseminated through training courses in various locations of agricultural extension and communication (Ann, 2013). Today, many countries have established national research programs and institutions to develop and introduce agricultural technologies and good management practices to the farmers.

### **1.2.1 Agriculture in Malaysia**

As stated in the ninth five-year plan of Malaysia, agriculture is one of the main drivers in the nation's economy, which makes. In fact, the agricultural sector ranks third in income generation and contribution to the nations' gross domestic product (Hassan, 2010). The five-year plan also emphasises large scale farming and more application of technology to produce high quality and value-added products and services. This aim is to be achieved by integrating agricultural technology with information and communications technology (ICT), exploring the profits of biotechnology (Economic Planning Unit, 2006).

Malaysian development aligns with the commitment to science and technology. It was between 1986 and 1989, that the domestic science and technology policy

mentioned developing the implementation of technology for economic development and social improvement. A central focus was to increase the innovation in research and development through the combination of technology. Furthermore, the auxiliary focus was to increase creativeness among individuals by creating a better working environment (Rahman, 2012).

The government has recognised that it is simply through agriculture they can feed the population of Malaysia. Therefore, they have invested in both financial and training terms in agriculture. Examples of the training courses are related to biotechnology, horticulture, and agribusiness, to improve the vision of individuals and promoting research and development. The focus has shifted from basic farming to generating value-added products such as fruits, livestock and vegetables. Based on the success recorded in the agricultural industry during the eighth five-year plan (RMK8), the Malaysian government has distributed a further six billion Malaysia ringgit in the agricultural sector to assist the paddy industry (Hayrol et al., 2010; Alam et al., 2010).

Malaysia is known for its heavy rain and all-year-round tropical climate which makes the farmlands one of the fertile grounds for agriculture around the world. Despite the endowed fertile land, Malaysia has always imported food principally from European Union and has to produce more to attain a food trade balance. Malaysia targets to be among the top high-income nation by 2020; hence, there is an emphasis on the agricultural sector to make use of every available opportunity and to take full advantage (Malaysia Ministry of Agriculture, 2018).

One of the recent programs implemented to improve Malaysia agricultural sector is the Permanent Food Production Park (PFPP). The PFPP was planned as a strategy under the Third National Agriculture Plan (NAP3) to support large-scale commercial agriculture and the application of technology in food production. The private sector is also expected to play a huge role in the success of the programme. PFPP places high concern on food production especially fruits and vegetables. In addition, the programme was enforced to tackle the problem of land shortage – a common challenge faced by farmers and entrepreneurs in the private sector. PFPP also plays an important role in graduate training and business incubator of the Department of Agriculture (DOA). The project encourages the provision of basic infrastructure necessary for the adoption of new technologies such as system drainage, irrigation system, farm road perfect, electricity and water supply.

The development concept of the PFPP programme involves the federal government, state government and employers. In Malaysia, the food permanent park is well-known and the facility encourages the continuous food supply in the country. The main objective is for the park to be a permanent food park zone, a source of opportunity and motivation to produce maintainable and eligible foods, and to increase the number of entrepreneurs in viable food production.

### 1.3 Problem Statement

The creation of PFPP dates back to 2009 and the project was designed to achieve specific objectives in Malaysia's agriculture sector. In general terms, the project was created to facilitate means to meet up with increasing food demand and produce entrepreneurs in the agricultural sector for national development. New technologies in agriculture need to be implemented for the objectives of PFPP to be achieved and sustained. Also, participants in PFPP need to internalise the concept of new technologies and implement them on their farms and other related areas.

The adoption of the new agricultural technology is expected after the concept of such technologies is disseminated to the users. Since the agricultural technologies are based on farmers' needs, it is essential to persuade them to adopt such techniques on their farms or production systems. However, the adoption of agricultural technologies among farmers differs between production systems and influenced by several factors (Abdullah and Abu Samah, 2013). For instance, farmers' perceptions, levels of education, knowledge of extension workers and the physical conditions of the area were reported to affect technology adoption among farmers in Malaysia (Abdullah and Abu Samah, 2013). Upadhyaya (2020) opined that extension service and households' education level were the main aspects to be considered in technology adoption among farmers. Other authors reported that lack of resources, farmers' socio-demographic profiles, incompatibility and complexity of new technology, socio-economic and cultural constraints were the major constraints affecting technology adoption (Johnson and Kristina, 2009; Mignouna et al., 2011; Silva and Brroekel, 2016; Dhareif et al., 2018). In some instances, factors peculiar to the government or the agency might be more influential in the adoption of technology among certain groups (Fernandez-Cornejo et al., 2007; Keelan et al., 2010). These studies highlight the multidimensional perspectives relating to farmers' technology adoption levels.

Ever since the creation of the PFPP programme in Malaysia, no study has been conducted to assess the progress in achieving its primary objectives. To date, there is no available data on the factors influencing the attitude towards technology adoption among the participants in the PFPP programme, despite the creation of the project almost a decade ago. It is crucial to understand the reasons for the slow pace in achieving technology adoption among participants in PFPP. Likewise, it is pertinent to educate farmers on the current and advanced agriculture information and the dissemination of technology to boost innovation in the industry. This information is key for policymakers to make necessary adjustments and strategies to ensure the aim of the programme is realised. The following research questions were designed to enable the researcher to gain the necessary information and achieve the stated objectives of this thesis.

## **1.4 Research Questions**

- 1) What is the farmers' adoption level of technology through PFPP?
- 2) What is the farmers' attitudes level toward technology adoption through PFPP?
- 3) What are the factors influencing technology adoption among the participants of the PFPP?

## **1.5 Objectives of the Study**

The objectives of the study are categorised into general and specific objectives.

### **1.5.1 General Objective**

To determine the factors influencing attitude towards technology adoption among permanent food production park (PFPP) programme participants of selected states in Peninsular Malaysia.

### **1.5.2 Specific Objectives**

The specific objectives of this study are:

- 1) To determine the participants' adoption level of technology through the PFPP
- 2) To assess the attitudes of participants of the PFPP towards technology adoption
- 3) To determine the factors influencing participants' attitude toward technology adoption.

## **1.6 Significance of the Study**

The study explored the attitude towards agricultural technology adoption among PFPP programme participants. The findings of this study may serve as a reference for policy and decision-makers in the agricultural sector to understand the current status of technology adoption level among farmers enrolled in the PFPP. This study is the first attempt to assess the farmers' attitudes towards technology adoption in the agricultural sector. Such information will reveal the



challenges and prospects of the programme. Also, organisers, policymakers and related personnel can strategise interventions to accomplish specific targets and goal of the programme. Hence, this study can be described as an appraisal of the project. Information from this study will educate policymakers and appropriate bodies on the areas that need to be strengthened to improve technology adoption among the participants. Policies and strategies can be streamlined with the research findings to gain positively from agriculture technology and boosting the nations' production.

Another significance of this study is the provision of socio-demographic characteristics of PFPP participants and opening the potential for future research in agricultural technologies. The data from this study can be employed in creating an effective communication and farming community between PFPP, extension agencies or extension officers and private organisations. Aside from the knowledge and information transfer on new technologies in agriculture, this study will provide the means of demonstrating novel technologies under farm settings.

## **1.7 Thesis Organisation**

This thesis consists of five (5) chapters which are the introduction, literature review, methodology, result and discussion, and conclusion and recommendation. Each chapter describes the conduct of the study systematically. In chapter 1, a brief introduction to the agriculture sector in general and in Malaysia was presented. This was followed by the study background, problem statement, research questions and objectives, and significance of the study. Chapter 2 presents a comprehensive review of related studies. It consists of a literature review of previous and latest work on agricultural technology adoption. Next, Chapter 3 explains the methodology of the study in detail. It also explains the procedure for sampling, data collection and analysis of data. Chapter 4 presents the result and discussion of the research findings. Finally, Chapter 5 concludes the thesis which includes the discussion of the results, inferences from the findings, limitations, and recommendations for future research.

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