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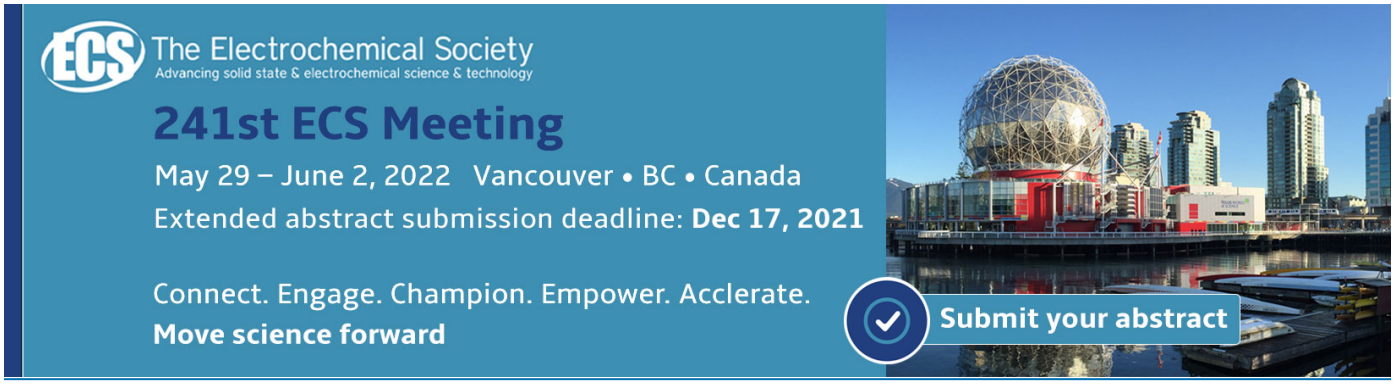

Factors impinging fruit farmers adoption of organic farming practices in Johor, Malaysia

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Abstract. A Malaysia Organic (myOrganic) Program is being promoted in Malaysia as a strategy to raise small-scale producers' income, protect the environment, and reduce food imports. However, from almost 144, 843 fruit farmers in Malaysia, only 63 farms received myOrganic certification. Unfortunately, Johor is the second-lowest state of myOrganic recipients even though they have the highest number of fruit farmers. Thus, this study aims to determine the factors impinging the organic farming practices adoption by fruits farmers in Johor, Malaysia. The quantitative research design was employed, and the questionnaire is structured based on a combination of Theory Planned Behavior (TPB) and Technology Acceptance Model (TAM). The probability sampling was employed by using simple random sampling technique that involved fruits farmers in Johor. SPSS version 25.0 had been used to analyse the data using descriptive analysis. Findings from this study showed moderate mean score for organic farming practices adoption (M= 2.597), perceived behavioural control (M=3.212) and perceived usefulness (M=3.499), while high mean score showed by attitude (M=3.711) and perceived ease of use (are M=3.860). This study is significant to the government, researchers and farmers to understand the factors and importance of organic farming practices adoption.

1. Introduction

Organic farming (OF) is a farming process that avoids using any synthetic pesticide, fertilisers, and additives of animal feed and growth regulators [1]. OF can also be defined as a stable ecosystem based on local and renewable sources [2]. OF practices in Malaysia has started with the National Agriculture Policy (NAP3) (1998-2010), where there has been a market opportunity identified for organic farming, especially for vegetables and fruit growers and it continues in the National Agro-Food Policy (2011-2020) [3], which is still one of agenda in the National Agro food Policy 2.0 (2021-2030). The agriculture department plays a role in promoting organic agriculture, including the allocation of funding, infrastructure improvements, the initiation of training and support services, and establishing a certification scheme [4]. According to the Department of Agriculture (DOA) [5] the total fruit farmers in Malaysia are 144, 843 with the production of 1, 616, 723 metric tons annually. However, Malaysia only has 63 farms that received Malaysia Organic (myOrganic) certification. Unfortunately, Johor, the state with the highest number of fruit farmers, is the second lowest state certified with myOrganic certificate [6]. Johor is the highest producer of pineapple, banana, papaya, sapodilla, duku and guava [7] in Malaysia, but there is no fruit farms that has received myOrganic certificate, as shown in Figure

1 [6]. Moreover, the total area of organic agriculture in Asia is almost 6.1 million hectares in 2017, but Malaysia only covers 10, 248 hectares which is the smallest organic agriculture area in Asia [8]. This issue has become serious in sustaining and pursuing green growth. OF practices is one of the influential factors in adopting sustainable development in Malaysia. However, farmers refuse to adopt OF practices, especially agriculture technologies [9; 10] because most of farmers are confused whether to invest in a new production process that may have a risk in the future or maintain the current system [11]. Besides, the farmers might have to face other problems such as decreasing income during the conversion period, high cost of OF certification and no specific subsidies for organic production [12], which is also some of the reasons to reject OF practices adoption. Nevertheless, Djokoto *et al*., [13] stated that by adopting appropriate technology or practices in OF it can prevent significant risks and avoid unpredictable problems. Still, the adoption of OF is important in sustainable agriculture, which seems to have helped the country to be self-sufficient in food production [14].

Technology or practicess adoption indicates a new technology or practicess acceptance period or process [15]. Many theories have been developed to explain technology or practicess adoption like Diffusion of Innovation Theory (DOI), Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) and Theory Planned Behaviour (TPB) [16]. This study has utilised the combination of TAM and TPB as theories that are capable of predicting technology or practicess. Attitude is the independent variable that is related to the constructs by TPB [17] and referred as a "mental or neutral state of readiness" which has been structured through experience that has a positive effect on an individual reaction or behaviour towards the phenomenon [18]. Attitude can help a person on how he or she sees the situation and how they react toward the situation or object [19]. Previous study has found that attitude influences tendency towards OF [20]. Whereas, Istrate *et al*., [21] demonstrates that attitude has moderate influence on OF. With the same construct by TPB, perceived behavioural control (PBC) is a significant aspect in understanding farmers' decisions to adopt OF due to human ability to control their behaviour [17]. Based on previous studies, PBC has moderate level towards organic production conversion [22]. However, Hattam [23] found that perceived behavioural control has high level of influnece towards adopting organic agriculture. Subjective norm is "the person's perception that most people who are important to him think that he should not perform the behaviour in question" [24]. However, based on a study by Terano *et al*. [25] using TBP model, only attitude and PCB are the main factors influencing Malaysian farmers to adopt OF, whereby subjective norm is not significant. In another view, subjective norms to adopt OF might be irrelevant for farmers [26].

The factor that is contracted by TAM is perceived ease of use (PEU) and perceived usefulness (PU). PU can be defined as a perception of consumers regarding the experience outcome [27]. PU is positive and significant in encouraging the adoption of OF practices [28]. Naspetti *et al*. [29] found that PU mainly determines farmers' intention to adopt advanced sustainable production strategies. PEU is an independent variable that is constructed by TAM [30]. There are some arguments from researchers that PEU is the extent to which individuals accept that no cost will be charged by using an exacting method [31]. Zeithaml *et al*. [32] stated that PEU is a degree in which an innovation is easy to understand and use. As demonstrated by the previous study, PEU has is a high-level factor on the decision of adopting agriculture technology [33]. However, there is too little attention has been given to TAM, even though TAM itself is the theory of adoption. Thus, the objective of this study to determine the factors impinging OF practices adoption by fruit farmers in Johor using a combination of TAM and TPB. This study is hoped to be significant to support OF practices adoption and to improve on the strategic plan for the sustainability of agriculture and to pursue green growth, especially for the fruit industry in Malaysia.

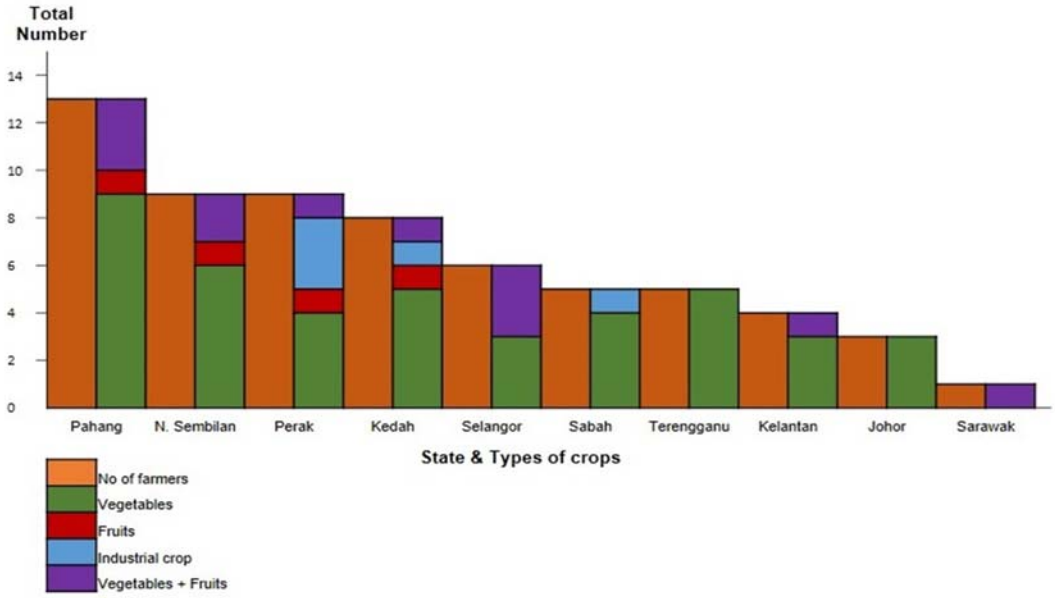

Figure 1. Total farm producer that received myOrganic certificate by state with types of crops in Malaysia [2]

2. Methodology

Johor was selected as the population study due to the highest number of fruit producers in Malaysia located in Johor [1], but at the same time has the lowest numbers of farmers that have myOrganic certification [2]. A structured questionnaire with six parts, counting socio-demographic, organic farming practicess adoption, attitude, PBC, PEU, and PU was constructed for data collection. A total of 119 fruit farmers were selected using simple random sampling techniques with sample frame from Malaysia Pineapple Board (MPB) and Department of Agriculture (DOA) in Johor. The number of fruit farmers in the population study was 34, 086 [1], but only 119 respondents were selected as sample size as a minimum of 30 or more respondents can provide an accurate result [34]. Descriptive analysis was employed to analyse all completed data through SPSS Software.

3. Result and Discussion

3.1. Socio-demographic profile of the respondents

Table 1 shows the socio-demographic profile of fruits farmers in Johor. The highest age of respondent was above 61 years old with 31.1%, followed by the age between 41 - 50 years old (21.0%), 31 - 40 years old (20.2%), 51 - 60 years old (20.2%) and age below 30 years old (7.6%). This indicates that most of the respondents are elderly fruits farmers. Male was the highest gender involved as respondents (85.7%), and only 14.3% was female. An education level is usually one factor that affects an individual's behaviour to adopt OF practices. However, only 10.1% of respondents had a higher education level, and the rest were secondary school (49.6%), did not attend school (31.9%) and primary school (8.4%). Most of the respondents' income in terms of profit per harvest was below RM 5,000.00 with 48.7% and between RM 5,001.00 to RM 10,000.00 with 45.4%, followed by above RM 10,001.00 with 5.9%.In this study, most of the planting area was below 5 hectares (94.2%).

Unfortunately, most respondents were not aware (86.6%) and never applied (97.5 %) the myOrganic certification before.

Table 1. Socio-demographic profile of respondents

Variables		Frequency	Percentage (%)
Age	<30 years old	9	7.6
	31 - 40 years old	24	20.2
	41 - 50 years old	25	21.0
	51 - 60 years old	24	20.2
	>61 years old	37	31.1
Gender	Male	102	85.7
	Female	17	14.3
Education level	No school	38	31.9
	Primary	10	8.4
	Secondary	59	49.6
	Higher education	12	10.1
Income per harvest (RM)	<RM 5,000	58	48.7
	RM 5,001 - RM 10,000	54	45.4
	>RM 10,001	7	5.9
Planting area (Hectares)	< 1.00	61	51.3
	1.01-5.00	51	42.9
	5.01-10.00	3	2.5
	>10.01	4	3.4
Type of farming practices	Organic farming	3	2.5
	Conventional farming	116	97.5
Awareness of myOrganic certificate	Yes	16	13.4
	No	103	86.6
myOrganic certification application	Yes	3	2.5
	No	116	97.5

3.2. Level of factors impinging organic farming practicess adoption

Table 2 describes the OF practices adoption level, which showed moderate mean score (M= 2.597). Fruit farmers in this study area were not too interested in practicing OF due to lack of knowledge of on the correct or proper OF management, especially on issues involving pest and disease control during OF peactices.Similar to Berbeć *et al*. [35] study, OF adoption was also in the medium level. The main reason why the respondents tend to avoid adopting OF practices is due to the risk that needs to be taken. According to Nandi *et al*. [14], the farmers need to face many problems to adopt OF such as decreasing income, expensive cost to apply for certification, and no specific subsidies for OF. Djokoto *et al*. [15] highlights that OF could avoid significant risks as previously mentioned by having appropriate technologies and unpredictable problem rejection.

The finding showed two factors explaining why OF has a high mean score, which is attitude and PEU. Attitude towards OF adoption practicess among fruit farmers in Johor with high mean score (M=3.711) was consistent with Malek-Saeidi *et al*. [20] and Abu *et al*. [36] studies . Most of respondents were aware and confident that OF practices give profits and benefits to them as well can help to control greenhouse effects and pollution. PEU also had high mean score (M=3.860) in this study suggesting that most of fruit farmers in Johor agreed that OF practices could produce high quality and safety food. Additionally, they believed that OF practices can promote healthy life and environment friendly. Aubert *et al*. [33] also found that PEU had a high degree factor on decision adoption of agriculture technology. Other factors (PBC and PU) had moderate mean score with M=3.212 and M=3.499 respectively. Issa and Hamm [22] supports PBC finding from this study, which results in the average level towards organic production conversion. This indicates that fruit farmers tend to refuse to adopt OF practices because reasons such as OF cannot control crop pest and disease effectively and its cost is not cheap. Consistent with PBC finding, PU also has a moderate mean score (M=3.499). This is because fruit farmers in Johor perceived OF practices as challenging to handle and crop production is questionable. According to Adrian *et al*. [37], producers who perceived the usefulness are more likely to adopt agriculture technology.

Table 2. Level of factors impinging organic farming practicess adoption

Variables	Frequency	Percentage	Mean	SD
Organic Farming Practicess Adoption			2.597	.442
Low (1.00 – 2.33)	56	47.0		
Medium (2.34 – 3.66)	59	49.7		
High (3.67 – 5.00)	4	3.3		
Attitude			3.711	.367
Low (1.00 – 2.33)	0	0.0		
Medium (2.34 – 3.66)	48	40.3		
High (3.67 – 5.00)	71	59.7		
Perceived Behavioural Control (PBC)			3.212	.534
Low (1.00 – 2.33)	0	0.0		
Medium (2.34 – 3.66)	74	62.2		
High (3.67 – 5.00)	45	37.8		
Perceive Usefulness (PU)			3.499	.373
Low (1.00 – 2.33)	0	0.0		
Medium (2.34 – 3.66)	72	60.6		
High (3.67 – 5.00)	47	39.4		
Perceived Ease of Use (PEU)			3.860	.403
Low (1.00 – 2.33)	0	0.0		
Medium (2.34 – 3.66)	12	10.1		
High (3.67 – 5.00)	107	89.9		

4. Conclusion

As a conclusion, fruit farmers in Johor, Malaysia has a moderate level of OF adoption, and most of them do not adopt OF practices and never apply for myOrganic certification. Meanwhile, this study showed that the factors impinging OF practices among fruit farmers in Johor was high level for attitude and PEU and moderate level for PBC and PU. The findings from this study will contribute to

existing literature on factors impinging OF practices adoption, but further studies using different adoption theories or models or using different study populations could be applied for comparison.

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