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Factors Influencing Postharvest Technology Acceptance Among Fruit Vegetable Farmers in The East Coast Economic Region (ECER), Malaysia

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ABSTRACT. Nowadays, despite having many post-harvest technologies being introduced to the farmers in helping to maintain crop shelf life, the percentage of post-harvest losses is still high. Although the phenomenon of new post-harvest technology acceptance has been well appreciated, the increasing characteristics phenomenon of technology rejection is yet to be understood and studied. The objective of this study is to determine the factors influencing post-harvest technology acceptance among fruit vegetables farmers in the East Coast Economic Region (ECER). A structured questionnaire was designed based on combinations of the Technology Acceptance Model (TAM) and Theory of Planned Behaviour. This study has employed a simple random sampling technique in selecting 105 fruit vegetables in ECER to answer the questionnaire. The findings indicate that fruit vegetable farmers in ECER have accepted the post-harvest technology, but they do not use and apply the technology. The factors derived which are perceived usefulness (M = 4.11, SD = 0.622), perceived ease of use (M = 3.84, SD = 0.588) and attitude (M = 3.89, SD = 0.680) have all shown a high mean score. The findings of this study emphasise on the factor that influencing technology acceptance in improving and maintaining the quality of fruits vegetables to reduce the post-harvest losses.

INTRODUCTION

The importance of post-harvest technology is to prevent the deterioration of the production as much as increasing its potential between the period of harvest and use. Practices of post-harvest technologies can reduce the quantitative and qualitative losses of fresh fruits and vegetables and also maintain the production quality up to the final consumption. In attaining hygienic agricultural production, focus should be put on the varieties of higher post-harvest longevity [1]. The post-harvest losses usually occurred during collection, sorting, packing, and transportation. These losses occurred at farm level due to the lack of storage facilities and improper handling [2]. Suzzana [3] stated that the study by Malaysian Agricultural Research and Development Institute (MARDI) and Food and Agriculture Organization (FAO) indicated that although 1.4 million tonnes of vegetables were produced in 2014 in Malaysia, 20% of the production was lost during the post-harvest level. Besides, the losses can exceed 50% of production depending on the handling and distribution chain, and the data vary with different countries [4]. The basic principles of post-harvest handling for most crops are the same. The production must be handled with care to avoid damage like cutting, crushing, and bruising. They also must be immediately cooled and maintained at a low temperature.

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Technology and practice acceptance in agriculture among farmers are low [5], and it has been influenced by farmers' perceptions, levels of education, knowledge and physical conditions [6]. Solutions to existing problems in the post-harvest handling system require the use of available information and application of existing technologies at the appropriate scale rather than conducting new research, or developing new technologies [7]. Fruit vegetables are food crops that need precise post-harvest management because they are perishable crops. Fresh horticulture is highly perishable with some estimation suggesting that post-harvest losses of 30 to 50% occur due to high water content and high metabolic activities [8]. This sector suffers greatly from the problem of high post-harvest losses, resulting in significant decline in food quality and safety, competitiveness in the market, and profit earned by the producers [9]. Hence, this study attempts to determine the factors influencing post-harvest technology acceptance among fruit vegetables farmers in the East Coast Economic Region (ECER).

MATERIALS AND METHODS

The study was conducted in the ECER that involving Kelantan, Pahang and Terengganu as the states that have the highest vegetable farmers in Malaysia with 14, 918 farmers [10]. This study has employed a quantitative research design, and the data was obtained from 105 fruit vegetables farmers. The developed questionnaire consists of five parts which were all itemised based on a review of the literature and past studies namely, demographic profile, perceived usefulness, and perceived ease of use, attitude and post-harvest technology acceptance. The respondents were given a closed-ended option for the demographic profile part and the Likert-scale option for the other four the parts with the range of 1 to 5, which represents strongly disagree to strongly agree. There were 105 fruit vegetable farmers around ECER chosen through simple random sampling technique. The data collected were analysed using descriptive analysis.

RESULTS AND DISCUSSION

Socio-Demographic Profile

Table 1 shows the demographic profile including gender, race, age, marital status, education level, selling method, total income per month, and area of planting of fruit vegetable farmers in ECER. This study involved 69.6% male as compared to females who are only 30.5%. The race of fruit vegetables farmers in ECER are consists of Malay with 90.5%, followed by Chinese 4.8%, Indian 3.8% and others with 1%. As for the range of fruit vegetables, the age of fruit vegetable farmers is mostly between under 30 years old with the percentage of 31.4%, followed by the age range of 31-40 years old with 30.5%, 41-50 years old with 14.3%, 13.3% of 51-60 and 10.5% for the age older than 60. For the marital status of fruit vegetables farmers, most of them are married with a percentage of 62.9% and 37.1% for single. The highest respondent of education level is SPM which is 38.1%, followed by Degree with 21.9%, Diploma with 18.1%, UPSR with 9.5%, PMR with 7% and Certificates with 5.7%. Other than that, total income per month of fruit vegetables farmers with the highest composition is under RM2, 000 with 53.3%, followed by the income of RM2, 001 – RM3, 000 with 18.1%, income per month between more than RM5, 000 with 15.2%, income per month between RM3, 001 – RM4, 000 with 10.5% and only 2.9% of income per month between RM4, 001 to RM5, 000. In this study, most of them are selling their harvested fruits to the middlemen with 58.1%, and another 41.9% are selling the harvested fruits directly. On the other hand, most of the fruit vegetables farmers have less than 1 acres of planting area with 47.6%, followed by an area of planting of 2-5 acres with 39%, area of planting between 5-10 with 7.6%, and 5.7% of more than 10 acres of an area of planting.

TABLE 1. Socio-Demographic Profile of Fruit Vegetable Farmers in ECER.

Variables	Frequency	Percentage (%)	Mean	SD
Gender			1.30	0.462
Male	73	69.5		
Female	32	30.5		
Race			1.15	0.514
Malay	95	90.5		
Chinese	5	4.8		
Indian	4	3.8		
Other	1	1.0		

TABLE 1. Socio-Demographic Profile of Fruit Vegetable Farmers in ECER (Continued…).

Variables	Frequency	Percentage (%)	Mean	SD
Age			2.40	1.335
<30	33	31.4		
31 – 40	32	30.5		
41 – 50	15	14.3		
51 – 60	14	13.3		
>60	11	10.5		
Status			1.62	0.485
Single	39	37.1		
Married	66	62.9		
Selling Method			1.14	0.495
Middleman	61	58.1		
Direct Selling	44	41.9		
Education			3.81	1.597
UPSR	10	9.5		
PMR	7	6.		
SPM	40	38.1		
SIJIL	6	5.7		
DIPLOMA	19	18.1		
IJAZAH	23	21.9		
Income			1.71	0.840
< RM2,000	56	53.3		
RM2,001 – RM3,000	19	18.1		
RM3,001 – RM4,000	11	10.5		
RM4,001 – RM5,000	3	2.9		
>RM5,000	16	15.2		
Farming area			1.71	0.840
< 1 acre	50	47.6		
2 acre – 4.9 acre	41	39		
5 acre – 9.9 acre	8	7.6		
> 10 acre	6	5.7		
Technology used			1.89	0.307
Yes	11	10.5		
No	94	89.5		

Factors Influencing Post-Harvest Technology Acceptance

Table 2 shows the factors influencing post-harvest technology acceptance among fruit vegetable farmers in ECER. Post-harvest technology acceptance has shown a Moderate mean score (M=2.79, SD=.785), even though only 10.5% of fruit vegetable farmers in ECER have been using post-harvest technology. It shows that most of the fruit vegetable farmers in ECER have accepted and aware of the function and usability of the post-harvest technology, yet they still refuse to use it. The previous study has revealed that financial barrier caused users' refusal to implement the technology [11, 12]. Moreover, Meuter [13] said that adoption or rejection of technology is impacted by the degree of individual technical anxiety and perceived risk associated with the use of these services.

Perceived usefulness shows the higher mean score (M = 4.11, SD = 0.622) in this study. It demonstrates that fruit vegetable farmers in ECER approximately agree to the perceived usefulness of fruit vegetable farmers in ECER towards post-harvest technology acceptance. Agreed by Malek et al. [14], people are turning into perceived usefulness towards the use of agriculture technology. Perceived usefulness is one factor that has affected the decision of accepting technology [15]. Agreed by Rezaei et al. [16, 17], perceived usefulness has positive impacts on technology acceptance. In conclusion, based on perceived usefulness towards post-harvest technology acceptance at the handling and storage level, the fruit vegetable farmers accept the usefulness of post-harvest technology at the handling and storage level.

The mean score explains that effect of perceived ease of use is (M = 3.84, SD = 0.588) that is categorised as a high mean score. Therefore, it can be asserted that fruit vegetable farmers in ECER approximately agree to the perceived ease of use towards post-harvest technology. According to Mohammed et al. [18], a person tends to use technology that makes them easy to work. Perceived ease of use has influenced acceptance when advanced features are used [19]. Supported by Zarafshani et al. [20], perceived ease of use has affected the behavioural intension on technology

acceptance. In this study, the variable of perceived ease of use shows that there is a significant influence on post-harvest technology acceptance among fruit vegetable farmers in ECER. Other than that, post-harvest technology gives more ease of use to the fruit vegetable farmers. However, it contradicts with Sharifzadeh et al. [21] whereby perceived ease of use does not influence farmers' behavioural intention on technology acceptance.

The final mean score explains the effect of attitude, which is (M = 3.89, SD = 0.680). This is categorised as a high mean score. Thus, it can be asserted that fruit vegetable farmers in ECER have a high level of attitude towards post-harvest technology at the handling and storage level. Rose et al. [22] reveal that attitude has affected the post-harvest losses of fruits and vegetables. Agreeing with past studies, farmers have positive attitudes towards post-harvest management practices [23, 24]. This is consistent with previous findings which mentioned that farmer's attitude has a positive impact [25] and can influence the adoption of agriculture technologies [26].

TABLE 2. Factor Influencing Post-Harvest Technology Acceptance.

Variables	Frequency	Percentage	Mean	SD
Post-harvest technology			2.79	.784
acceptance	25	23.8		
Low (1.00 – 2.33)	64	61		
Medium (2.34 – 3.66)	16	15.2		
High (3.67 – 5.00)				
Perceived Usefulness			4.11	.622
Low (1.00 – 2.33)	1	1.0		
Medium (2.34 – 3.66)	22	21.0		
High (3.67 – 5.00)	82	78.1		
Perceived Ease of Use			3.84	.588
Low (1.00 – 2.33)	2	1.9		
Medium (2.34 – 3.66)	41	39		
High (3.67 – 5.00)	62	59		
Attitude			3.89	.680
Low (1.00 – 2.33)	3	2.9		
Medium (2.34 – 3.66)	34	32.4		
High (3.67 – 5.00)	68	64.8		

CONCLUSION

This paper has discussed and reviewed the factors influencing post-harvest technology acceptance among fruit vegetable farmers in ECER. Adapted by TAM and TPB, three factors which are perceived usefulness, perceived ease of use and attitude shows a high mean score. Moreover, post-harvest technology acceptance indicates the moderate mean score, although most of the respondents do not use the technology. This signifies that even though they understand and aware of post-harvest technology, they are still refusing to implement the technology because of certain barriers. Thus, future acceptance barrier should be discussed for a better understanding of technology acceptance.

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