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The Acceptance Level of Fertigation Technology System among Farmers in Kelantan

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Abstract

Fertigation technology system has emerged as an assisted technology to ease the farmers' jobs in the field. This technology has been popularly used by chilli, cucumber, and eggplant growers as it can minimise farm labour use. However, due to the high installation and maintenance costs, farmers refuse because they cannot afford it on their farms. Additionally, this system may appear to have technical problems such as blockage, and the skilful person must attend to it. So, this study aims to examine farmers' acceptance level in Kelantan on the fertigation system technology. About 100 respondents from Kota Bharu, Tumpat, Pasir Mas and Bachok were interviewed using a structured questionnaire, and simple random sampling was used as a sampling method for this study. The descriptive analysis has also been used to identify the socio-demographic profile of the respondents and the acceptance level towards the fertigation system. The mean score was categorised into three categories: low (1 to 2.33), moderate (2.34 to 3.66) and high (3.67 to 5). The findings demonstrate a high mean score, with 70% of the farmers accepting the fertigation system to assist them on the farm. In conclusion, most farmers have opened their minds and are ready to get the fertigation system technology to generate more profit. It is hoped that more collaborations between government agencies, non-profit organisations, and investors will notice the need for this technology to boost farmers' livelihoods and Malaysian food security.

1. INTRODUCTION

Agriculture plays a significant role in the world population's food supply. Many advanced technologies emerged to improve the existing practices, such as crop fertigation systems, drone applications, and improved agriculture mechanisation to ease the farm processes. As the farmers aim to increase their income and productivity, technology use is crucial (Mohd et al., 2014). However, problems occurred when farmers refused to implement those technologies due to several factors, such as the high cost of installation, limited knowledge and skills, and insufficient extension approaches from the responsible agencies (Abdullah & Sharun, 2018). Hence, accepting and applying new technologies becomes unsuccessful, which leads to lower farm yields with non-impactful profit returns. Fertigation is an acronym for irrigation and fertiliser. This system uses water-soluble solid or liquid fertiliser through drip irrigation systems (Malhotra, 2016). The use of fertigation technology for crop planting is expanding, and the methods are successful. Business owners are increasingly using fertigation technology to plant chilli, cucumber and ginger as it can increase growth and yield by up to 3–4 times and also can optimise the utilisation of limited land to boost crop production capacity while the overall area of agricultural land is decreasing (Mohd et al., 2014, 2016; Reddy, 2016).

Additionally, the fertigation system has become a favour among crop farmers for specific reasons, such as the crop yields can be increased to maximum and ideal levels using the proper and effective fertigation planting method (Elasbah et al., 2019). In addition, fertigation crops employing modern technology can reduce farm expenses, protect the environment, and, most importantly, increase agricultural yields and quality (Giannoccaro et al., 2020). Besides, the acceptance of fertigation technology will also increase the farm supply chain's effectiveness. For instance, farmers will use water, fertiliser, and pesticides as necessary use even while agricultural supplies are delivered to entire farmlands, leading to precision farming (Al Jaffri Saad et al., 2023).

The Technology Acceptance Model by Davis et al. (1989) has been selected as the foundation of this study. The first determinant is the user's attitude, which determines whether the user will adopt or reject the technology (Mohamad Termezai et al., 2017). Besides, the user's attitude will also be influenced by the perceived usefulness and perceived ease of use. According to Davis (1989), perceived usefulness is an individual's belief in

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using a specific technology and that it will accelerate production. Meanwhile, perceived ease of use is understood as an individual's belief that the technology will be effortless and require minimum human monitoring (Davis, 1989). Hence, this model explains the differences in users' acceptance of a technology introduced in agriculture, manufacturing or other relevant areas (Mohamad Termezai et al., 2017).

The acceptance of the fertigation system in crop planting among Malaysian farmers has become essential to improve production and meet the population's demand. Kelantan state has been chosen for this study as it has high potential for this technology usage among crop farmers. Hence, it could become a reasonable and efficient technique to overcome food security issues and enhance technology use among agropreneurs in Malaysia, specifically in Kelantan (Wan Azman et al., 2022).

2. MATERIALS AND METHODS

A quantitative study was conducted among fertigation farmers from various crop backgrounds, such as chillies, eggplant, cucumbers, and stuffed green chilli pepper. The self-administered questionnaire employed 5-point Likert-type scale ranging from 1 (strongly disagree), 2 (disagree), 3 (moderately agree), 4 (agree) and 5 (strongly agree) was used to measure the acceptance level of fertigation technology. The pilot test has also been conducted to examine the instrument's reliability. Hence, it demonstrates 0.866 for the acceptance towards fertigation technology while 0.831, 0.767, and 0.789 for attitude, perceived usefulness and perceived ease of use, respectively. Simple random sampling has been used to collect the data among 100 farmers in several districts of Kelantan, including Tumpat, Kota Bharu and Pasir Mas and this sampling technique is considered the most appropriate as it has an equal chance of being selected (Sekaran, 2006). The data has been analysed using descriptive statistics, including the frequency, percentage, mean and standard deviation. In addition, the mean score indicates three (3) categories, namely low (1 – 2.33), moderate (2.34 – 3.66) and high (3.67 – 5). The framework of this study is explained in Figure 1 below.

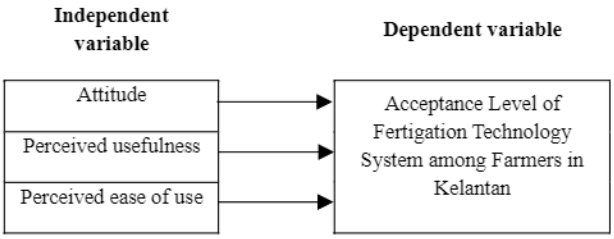

Figure 1: The research framework.

3. RESULT AND DISCUSSION

The result shown in Table 1 demonstrates that most of the farmers are male and have completed their education with Sijil Pelajaran Malaysia (SPM). Meanwhile, the mean age of the farmers was 34.8 years, and the majority had about 6.8 years of experience in crop farming. The farmer's age range demonstrates that most of them are among youth, and it shows a good sign as the youngsters are ready to get involved in the agriculture sector (Abdullah & Abu Samah, 2014; Sazila et al., 2018; Sidek et al., 2021). On the other hand, adopting the fertigation technology system is believed to increase farm productivity and enhance farmers' profits (Sazila et al., 2018). Hence, the findings found that the mean income of the farmers is Ringgit Malaysia (RM) 5,989, which can be considered a reasonable step for them as migrating from the traditional method of farming as it can reduce the cost of human resources and become more effective in managing their farm (Naglova & Vlasicova, 2016).

Table 1: Demographic profile of the respondents.

Item (s)	Frequency, n = 100	Mean	Standard deviation (SD)
Gender			
Male	78		
Female	21		
Education level			
Sekolah Rendah	1		
SRP/PMR	13		
SPM	62		
STPM/STAM/Diploma	15		
Ijazah/Master/PhD	9		
Age (years)		34.8	11.6
20 – 30	49		
31 – 40	25		
41 – 50	16		
51 – 60	6		
61 – 70	4		
Experience (years)		6.8	7.0
1 - 10	33		
11 - 20	26		
21 - 30	14		
31 - 40	9		
41 - 50	18		
Income (RM)		5989.0	5897.9
< 500	15		
1,000 – 5,000	45		
5,001 – 10,000	27		
10,001 – 15,000	5		
15,001 – 20,000	3		
20,001 – 25,000	5		
Types of plant			
Chilli	19		
Eggplant	24		
Cucumber	27		
Stuffed green chilli pepper (*Cili solok*)	17		

Furthermore, Table 2 displays the acceptance of the fertigation technology system among farmers in Kelantan. About 83 farmers are familiar with fertigation technology, while 78 agreed that it is simple and easy to use in their crop farming activities (Wan Azman et al., 2022). Besides, about 82 farmers also agreed that they know about the latest agriculture technology. However, at

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the same time, 11 farmers did not agree that fertigation could be considered a priority in their agricultural activities as they were not aware of fertigation technology. Hence, more exposure and training for improvement in the use of fertigation systems is needed among those farmers (Al Jaffri Saad et al., 2023). Meanwhile, regarding the cost of fertigation technology, about 88 farmers agreed that this kind of technology is affordable and reasonable for crop farmers. This statement is supported by Al Jaffri Saad et al. (2023), who state that fertigation technology is a cost-effective method for crop farming.

Additionally, as referred to Table 3, about 72 farmers highly accepted the fertigation technology system in Kelantan. Scholars have also agreed that farmers are ready with technology or innovation introduced in their farms (Abdullah et al., 2022, 2023). Still, it must come with guidance and assistance from the responsible agencies or farmer's associations (Kiptot et al., 2016; Kiptot & Franzel, 2015).

Table 2: The acceptance of the fertigation technology system among farmers in Kelantan.

Item(s)	Frequency, n=100				
	1 Strongly disagree	2 Disagree	3 Moderately agree	4 Agree	5 Strongly agree
I know about fertigation technology.	0	0	17	36	47
I think fertigation technology is simple.	0	2	20	29	49
I am aware about the latest agricultural technology.	1	0	17	35	47
I consider fertigation technology to be a priority in my agriculture activities.	1	10	17	35	47
I think the cost of using fertigation technology is reasonable.	0	12	20	27	41

Table 3: Acceptance level of fertigation technology system among farmers in Kelantan.

Variable		Frequency	Mean	Standard deviation (SD)
Acceptance of the fertigation technology system			3.992	0.523
	Low (1.00 – 2.33)	0		
	Moderate (2.34 – 3.65)	28		
	High (3.66 – 5.00)	72		

4. CONCLUSION

Since the fertigation system has emerged as an essential crop technology in modern days, it is believed that this system may provide a higher crop production and make profits for the crop farmers. Strong engagement from the industries, primarily private sectors, will encourage those crop farmers to get involved and indirectly will ease their job tasks at the farm. The farmers are aware of the most recent agricultural technology, but they must consider several factors before integrating it into their business practices. Rock melon, cucumbers, eggplants, tomatoes, and gourds are just a few fruits and vegetables that may be grown using fertigation technology. These compact crops have a short cycle, giving farmers good yields. Hence, all responsible parties must play a crucial role in promoting the fertigation system to sustain our country's agricultural productivity and food security.

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