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TECHNOLOGY READINESS INDEX OF PADDY FARMERS IN MADA, KADA, AND IADA BLS, MALAYSIA

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ABSTRACT

This paper aims to determine the technology readiness level of paddy farmers in MADA, KADA, and IADA BLS, Malaysia. Primary data were obtained through a face-to-face survey with paddy farmers in MADA, KADA, and IADA BLS using a structured questionnaire. A total of 315 respondents of MADA, 295 respondents of KADA, and 178 respondents of IADA BLS actively involved in paddy cultivation were interviewed. The technology readiness level of paddy farmers from three main granary areas is evaluated objectively and subjectively. The technology readiness index of paddy farmers is calculated to analyse the readiness level of paddy farmers. Thirty indicators are used to measure four dimensions of technology readiness, i.e., optimism, innovativeness, discomfort, and insecurity. The present study shows that 72.4%, 74.58%, and 74.16% of paddy farmers in MADA, KADA, and IADA BLS have a moderate readiness level to adopt the new technology in paddy cultivation. The four dimensions of the technology readiness index was evaluated to provide a better picture of the technology readiness level. All three granary areas have a score mean index (0.51-1.0) for technology readiness driver, optimism, and innovativeness, which indicate that the paddy farmers have a moderate and high level of optimism and innovativeness to adopt the new technology. However, the score means index for the negative factors of technology readiness for all three granary areas is in the quantile range (0.51-0.75), which means the paddy farmers have a moderate level of discomfort and insecurity. Thus, the result suggests that although the paddy farmers exhibit innovativeness and optimism, they also experience some discomfort and insecurity.

Keywords: Paddy farmers, technology, paddy industry, readiness index, farmers.

INTRODUCTION

The rising challenges affecting paddy production have resulted in the use of technology to intensify agricultural outputs to fulfil an increasing demand for food. Technology plays an essential part in the development and progress of industrial and agricultural sectors. It can potentially raise income and standard of living. The use of technology in the agricultural sector is critical and necessary because it not only assists farmers but also boosts their productivity and livelihoods (Diao et al. 2016). Technology is regarded as a design of instrumental action aimed at minimising the cause-effect relationship involved in achieving the desired goal (Roger, 2003; Shahrina et al., 2014; James & Jeffrey, 2018). Technology in the agriculture industry is tools, processes, methods, and systems (Khalil, 2000). Maine et al. (2010) state that technologies refer to the use of irrigation systems and drainage, plough, harvester machinery, new rice varieties and fertilisation. For paddy production, examples of new technology in the paddy industry in Malaysia include mini harvesters, drones, high-tolerance tractors, tractor boom sprayers, transplanters, new rice varieties, and balers (straw rollers).

In the area of Muda Agriculture Development Authority (MADA), Kemubu Agriculture Development Authority (KADA), and IADA Barat Laut Selangor (IADA BLS), paddy farmers implement various technologies to increase their paddy production, such as mini harvesters, new rice varieties, high-tolerance tractors, drones, and transplanters. However, paddy farmers still have some adoption issues. Low education level, negative perception of technology, lack of capital, the small size of land areas, ineffective infrastructure facilities, and restricted capital of extension workers are factors influencing low technology adoption (Abdullah & Abu Samah, 2013; Hayrol Azril et al., 2009; Sobia Mannan et al., 2017; Truong & Ngoc, 2008). The age of farmers also influences technology adoption. Many local paddy farmers are from the older generation, with an average age of 60 years (MADA, 2022), who are less eager to learn and apply new technology. Mufara (2009) stated that one pertinent issue in agriculture is the involvement of senior citizens who struggle to comprehend the new paddy farming innovations.

Given the above factors, how ready are farmers to adopt the technology, given the issue of poor technology adoption among paddy farmers? Moreover, given the existing average age of our paddy farmers, who are mostly elderly, are our paddy farmers ready to adopt the new technology? A study on the readiness to adopt the technology is very important to ensure the success of government strategies, which depends on the anticipation and interest of the paddy farmers in the technology. It is also important to study technologies as they are widely implemented in the paddy industry and involve the entire rice cultivation process. Thus, this study intends to determine the paddy farmers' readiness index in adapting the new technology.

This study focuses on Muda Agriculture Development Authority (MADA) in Kedah and Perlis, Kemubu Agriculture Development Authority (KADA), and IADA Barat Laut Selangor (BLS). This paper is divided into five sections: (i) an introduction that describes the topic, problems, and technologies used in the paddy sector, (ii) a literature review that reviews previous empirical studies related to technology readiness level, (iii) methodology that describes the methods used to achieve the objectives of this study in terms of data collection, indicators, and analytical tools applied, (vi) result and discussion, and (v) conclusion.

LITERATURE REVIEW

There are two types of readiness. The first is willingness to do something immediately after seeing something, and the second is the need to decide whether to go after thorough preparation (Oetting et al., 2014; Fairuz et al., 2017). Technology readiness predicts technology acceptance (Blut & Wang, 2020). According to Parasuraman (2000), technology readiness refers to a person's ability to embrace and use new technology to achieve goals at work and home. Besides, technology readiness is an accumulation

of technology-related beliefs that determine an individual's proclivity to interact with technology-based products and services (Parasuraman & Colby, 2014). Kamble et al. (2018) stated that the technology readiness index (TRI) assesses people's broad technological beliefs and employs an individual's general predisposition toward technology. According to Na et al. (2021), the technology readiness index is one of the key factors in the extended model (i.e., technology readiness) and technology acceptance in acceptance theories, such as the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT). TRI has previously been used with TAM to forecast technology adoption (Pattansheti et al., 2016; Larasati & Santosa, 2017; Kamble et al., 2018).

Parasuraman developed the Technology Readiness Index (TRI), a multi-item scale that assesses people's propensity to adopt new technology. The model exemplifies people's feelings and attitudes toward a particular new technology. It is more concerned with determining how well people understand how and when to use technology than their acceptance of such a new technological transformation. Based on his research, he developed the TRI, which consists of 36 items divided into four dimensions: optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2000; Kamble et al., 2018; Na et al., 2021). Later, Parasuraman and Colby (2014) developed TRI 2.0 with 16 items only.

TRI consists of positive and negative factors. Optimism and innovativeness are identified as technology readiness drivers, while insecurity and discomfort are categorised as inhibitors to using the technology (Parasuraman, 2000; Lin et al., 2007; Mastura et al., 2007; Pericles et al., 2008; Mukerjee et al., 2018; Kamble et al., 2018; Jarrar et al., 2020). Optimism refers to people's positive views and beliefs in the technology offered to people for increased control, flexibility, and efficiency. Innovativeness refers to a tendency to be the founder of technology and thought leader. Discomfort refers to the people's sense of lack of control over the technology and feeling devastated by it. Lastly, insecurity refers to people's distrust of technology and doubt about its ability to work properly.

According to Parasuraman (2000) and Mukerjee et al. (2018), a person who is more optimistic and innovative and with less discomfort and insecurity is more likely to use new technology. Mastura et al. (2007) assert that technological readiness assesses the whole state of people's minds due to a combination of intellectual facilitators and inhibitors in determining their willingness to adopt new technology. TRI assesses a person's preparedness to employ new technologies (Mukerjee et al., 2018). Besides, TRI acts as a moderator in the link between the factors influencing technological acceptance and customer attitudes (Tsourela & Roumeliotis, 2015; Meng et al., 2017; Na et al., 2021). Lastly, Lin et al. (2007) state that at the measurement level, the TRI was developed to measure the individual general beliefs on technology. The correlation between an individual's technological readiness and tendency to employ technology was empirically confirmed by Parasuraman (2000).

METHODOLOGY

Primary data were obtained from a survey conducted on 315 paddy farmers in the four main regions of MADA, which are region I (Perlis), region II (Jitra), region III (Pendang), and region IV (Kota Sarang Semut), 295 paddy farmers in six Pejabat KADA Jajahan (PKJ) of KADA, which are Kota Bharu Utara, Kota Bharu Selatan, Bachok, Pasir Mas, Pasir Putih and Tumpat, and 178 paddy farmers in three main Pertubuhan Peladang Kawasan (PPK) of IADA Barat Laut Selangor (IADA BLS), which are Tanjung Karang, Pasir Panjang, and Sungai Besar. The respondents were selected by using a stratified random sampling method based on the regions of the farmers. The technology readiness index was developed to determine the level of readiness among paddy farmers to adopt the new technology introduced. The index used was created by Hahn et al. (2009). The technology readiness index was analysed by using the following indicator:

$$Index_{sdj} = \frac{S_{d-i} - S_{min-i}}{S_{max-i} - S_{min-i}} \quad (1)$$

where $index_{sdj}$ is the index for each indicator for each respondent, S_{d_j} is the value answered by respondent for indicator j in group of community d and S_{min_j} and S_{max_j} were the minimum and maximum values respected for indicator j which is determined from data collected from the survey. Then, an aggregate mean index for each paddy farmer was created by finding the average of all indicators used in the study. The technology readiness index was grouped according to a quantile category where 0-0.25 as being not ready, 0.26-0.5 as having a low level of readiness, 0.51-0.75 as having a moderate level of readiness, and 0.76-1.0 as having a high level of readiness.

For data analysis, descriptive statistics such as frequency and percentage were used to explain the demographics of survey data. The readiness score was used to determine the level of readiness for each independent variable. The score was derived from the average of each dimension after the scores on discomfort and insecurity were reverse-coded. The mean score was then matched with the four stages of readiness, which were not ready (0-0.25), low level of readiness (0.26-0.5), moderate level of readiness (0.51-7.5), and high level of technology readiness (0.76-1.0). If the score mean index is less than 0.5, the farmers are not ready to adopt the technology. If the score mean index is more than 0.51, the farmers are ready to adopt the new technology. The data were analysed by using IBM-SPSS version 26.

Questionnaire forms were prepared and used as the instrument to collect the data. The items in the questionnaire were based on the technology readiness index developed by Parasuraman (2000) and modified to suit the paddy industry. The questionnaire had four sections. Section one assessed the respondent's demographic factors such as gender, age, education level, and experience, whereas sections two to four assessed the technology readiness to adopt the new technology. Sections two to three used a five-point Likert scale that ranged from 1 "strongly disagree" to 5 "strongly agree". In section two, 30 items were used as indicators to measure the TRI of the farmers, of which 8 items were related to optimism, 9 items were related to innovativeness, 8 items were related to discomfort, and 5 items were related to insecurity. The questionnaire was distributed between February 2021 and March 2022.

RESULTS AND DISCUSSION

Paddy Farmers' Socio-Demographic Profile

The socio-demographic profile is summarised in Table 1. All respondents are Malay. Male respondents dominated the survey with 89.2% in MADA, 97.29% in KADA, and 94.38% in IADA BLS. In MADA, the majority of the respondents are senior citizens who are over 50 years old (61%), whereas 28.3% are between 50 and 59 years old, and 32.7% are above 60 years old. In KADA, the majority of the respondents are also over 50 years old (59.32%), whereas 24.07% are between 50 and 59 years and 35.25% are above 60 years old. However, in IADA BLS, the majority was between 40 and 49 years old (81.46%). Regarding educational level, in MADA, 98.8% attended school where 75.6% attended up to secondary school and 1.3% did not have any formal education. In KADA, 94.58% attended school where 33.56% attended lower secondary school, and 5.42% did not have any education. In IADA BLS, 97.19% attended school where 40.45% attended upper secondary school, and 2.81% did not have any formal education. Many respondents in MADA and KADA have less than 10 years experiences in paddy cultivation, while many in IADA BLS have experiences more than 31 years.

Table 1
Summary of socio-demographic profile of paddy farmers in MADA, KADA, and IADA BLS

Respondent's demographic	Group	MADA		KADA		IADA BLS	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender	Male	281	89.2	287	97.29	168	94.38
	Female	34	10.8	8	2.71	10	5.62
Age	0-29 years	23	7.3	28	9.49	7	3.93
	30-39 years	52	16.5	42	14.24	26	14.61
	40-49 years	49	14.9	50	16.95	145	81.46
	50-59 years	89	28.3	71	24.07	0	0
	Above 60 years	103	32.7	104	35.25	0	0
Education level	No education	4	1.3	16	5.42	5	2.81
	Non-formal	1	0.3	3	1.02	2	1.12
	education	39	12.4	59	20	37	20.79
	Primary school	80	25.4	99	33.56	41	23.03
	Lower Secondary school (PMR/SRP/LCE)	158	50.2	83	28.14	72	40.45
	Upper Secondary school (SPM/MCE/SPVM)	30	9.5	25	8.47	18	10.11
	STPM/Diploma/ Certificated	3	1.0	10	3.39	3	1.69
	Degree and above						
Experiences	Less than 10 years	127	40.3	125	42.37	42	23.60
	11-20 years	73	23.2	87	29.49	47	26.40
	21-30 years	72	22.9	46	15.59	35	19.66
	More than 31 years	42	13.3	37	12.54	54	30.34

To evaluate the readiness level of paddy farmers, the Technology Readiness Index (TRI) was generated based on four dimensions. They are optimism, innovativeness, discomfort, and insecurity. The descriptive analysis of all indicators used is shown in Table 2, Table 3, and Table 4. The mean scores for the indicators of optimism and innovativeness are greater than 3, and the mean scores for the indicators of discomfort and insecurity are lower than 3, as these two dimensions have a negative relationship.

Table 2
Descriptive analysis of indicators used in Technology Readiness Index (TRI) in MADA

Label	Likert scale	1	2	3	4	5	Mean	Sd.
Optimism								
Ai	Technology facilitates rice production operations	0 (0)	7 (2.2)	97 (30.8)	128 (40.6)	83 (26.3)	3.91	0.809
Aii	I have enough finances to use technology in rice cultivation.	16 (5.1)	52 (16.5)	141 (44.8)	79 (25.1)	27 (8.6)	3.16	0.970
Aiii	I am confident that involvement in the use of rice cultivation technology does not give me a financial burden.	7 (2.2)	50 (15.9)	148 (47.0)	80 (25.4)	30 (9.5)	3.24	0.909
Aiv	There is no obstacle for me to cultivate rice using the latest technology.	1 (0.3)	20 (6.3)	135 (42.9)	121 (38.4)	38 (12.1)	3.56	0.798

Av	I am willing to use advanced technology in rice cultivation.	1 (0.3)	19 (6.0)	103 (32.7)	145 (46.0)	47 (14.9)	3.69	0.808
Avi	I can do more with the help of the latest technology	0 (0)	15 (4.8)	110 (34.9)	134 (42.5)	56 (17.8)	3.73	0.805
Avii	I can solve problems more effectively by using technology	1 (0.3)	15 (4.8)	125 (39.7)	129 (41.0)	45 (14.3)	3.64	0.795
Aviii	I am ready to share the advantages of this technology with other farmers	0 (0)	18 (5.7)	113 (35.9)	125 (39.7)	59 (18.7)	3.71	0.834
Innovativeness								
Bi	Others come to me for advice on the latest technology.	22 (7.0)	96 (30.5)	113 (35.9)	64 (20.3)	20 (6.3)	2.89	1.106
Bii	Involvement in practical training (hands-on) encouraged me to use technology in rice cultivation	14 (4.4)	73 (23.2)	132 (41.9)	87 (27.6)	9 (2.9)	3.01	0.896
Biii	In-depth knowledge related to rice plants encourages me to use technology in rice cultivation	2 (0.6)	64 (20.3)	139 (44.1)	92 (29.2)	18 (5.7)	3.19	0.846
Biv	I have resources (land, finance, workers) and sufficient knowledge to use agricultural technology related to rice crops	10 (3.2)	103 (32.7)	137 (43.5)	49 (15.6)	16 (5.1)	2.87	0.893
Bv	I am willing to spend time to learn the latest technology of rice cultivation	4 (1.3)	37 (11.7)	169 (53.7)	74 (23.5)	31 (9.8)	3.29	0.846
Bvi	I like to explore information about the latest rice cultivation technology	6 (1.9)	33 (10.5)	165 (52.4)	81 (25.7)	30 (9.5)	3.31	0.854
Bvii	In general, I was one of the first among my friends to acquire the latest technology when it appeared.	29 (9.2)	106 (33.7)	117 (37.1)	43 (13.7)	20 (6.3)	2.74	1.016
Bviii	I keep up with the latest technology in my area	3 (1.0)	30 (9.5)	158 (50.2)	102 (32.4)	22 (7.0)	3.35	0.785
Bix	I am always open to learning new and different technologies	3 (1.0)	28 (8.9)	147 (46.7)	115 (36.5)	22 (7.0)	3.40	0.785
Discomfort								
Ci	The technical support team did not help me understand well	10 (3.2)	125 (39.7)	98 (31.1)	71 (22.5)	11 (3.5)	2.84	0.930
Cii	The high cost of production makes me not interested in using technology in rice cultivation	6 (1.9)	104 (33.0)	118 (37.5)	75 (23.8)	12 (3.8)	2.95	0.892
Ciii	I find it difficult to use agricultural technology.	16 (5.1)	112 (35.6)	123 (39.0)	55 (17.5)	9 (2.9)	2.77	0.894
Civ	The use of technology in the existing paddy fields is not suitable for implementation	25 (7.9)	150 (47.6)	80 (25.4)	52 (16.5)	8 (2.5)	2.58	0.942
Cv	I think that technology systems are not designed to be used by ordinary people.	25 (7.9)	124 (39.4)	103 (32.7)	52 (16.5)	11 (3.5)	2.68	0.958
Cvi	The manual/user guide is not written in an easy-to-understand language	8 (2.5)	89 (28.3)	143 (45.4)	58 (18.4)	17 (5.4)	2.96	0.886
Cvii	Most of the latest technology has health or safety risks	45 (14.3)	109 (34.6)	96 (30.5)	59 (18.7)	6 (1.9)	2.59	1.010
Cviii	I'm having a hard time getting up to date with technology.	19 (6.0)	121 (38.4)	106 (33.7)	56 (17.8)	13 (4.1)	2.76	0.955

Insecurity								
Di	I am not convinced by the existing agricultural technology	35 (11.1)	196 (62.2)	57 (18.1)	24 (7.6)	3 (1.0)	2.25	0.788
Dii	The use of technology does not help to increase production	33 (10.5)	170 (54.0)	78 (24.8)	30 (9.5)	4 (1.3)	2.37	0.844
Diii	I don't trust the capabilities of technology to exceed the capabilities of humans	29 (9.2)	181 (57.5)	67 (21.3)	36 (11.4)	2 (0.6)	2.37	0.828
Div	The rapid development of technology influenced me to choose technology	10 (3.2)	104 (33.0)	126 (40.0)	55 (17.5)	20 (6.3)	2.91	0.938
Dv	I may face spare parts and service constraints if I buy a high-tech product	23 (7.3)	65 (20.6)	124 (39.4)	82 (26.0)	21 (6.7)	3.04	1.013

Table 3

Descriptive analysis of indicators used in Technology Readiness Index (TRI) in KADA

Label	Likert scale	1	2	3	4	5	Mean	Sd.
Optimism								
Ai	Technology facilitates rice production operations	8 (2.7)	16 (5.4)	36 (12.2)	119 (40.3)	116 (39.3)	4.08	0.986
Aii	I have enough finances to use technology in rice cultivation.	41 (13.9)	75 (25.4)	66 (22.4)	80 (27.1)	33 (11.2)	2.96	1.238
Aiii	I am confident that involvement in the use of rice cultivation technology does not give me a financial burden.	20 (6.8)	58 (19.7)	73 (24.7)	98 (33.2)	46 (15.6)	3.31	1.154
Aiv	There is no obstacle for me to cultivate rice using the latest technology.	12 (4.1)	28 (9.5)	63 (21.4)	114 (38.6)	78 (26.4)	3.74	1.077
Av	I am willing to use advanced technology in rice cultivation.	5 (1.7)	16 (5.4)	49 (16.6)	129 (43.7)	96 (32.5)	4.00	0.929
Avi	I can do more with the help of the latest technology	4 (1.4)	16 (5.4)	36 (12.2)	142 (48.1)	97 (32.9)	4.06	0.888
Avii	I can solve problems more effectively by using technology	5 (1.7)	14 (4.7)	47 (15.9)	139 (47.1)	90 (30.5)	4.00	0.900
Aviii	I am ready to share the advantages of this technology with other farmers	6 (2.0)	16 (5.4)	49 (16.6)	122 (41.4)	102 (34.6)	4.01	0.956
Innovativeness								
Bi	Others come to me for advice on the latest technology.	28 (9.5)	36 (12.2)	59 (20)	109 (36.9)	63 (21.4)	3.48	1.223
Bii	Involvement in practical training (hands-on) encouraged me to use technology in rice cultivation	24 (8.1)	31 (10.5)	59 (20)	120 (40.7)	61 (20.7)	3.55	1.168
Biii	In-depth knowledge related to rice plants encourages me to use technology in rice cultivation	15 (5.1)	22 (7.5)	66 (22.4)	123 (41.7)	69 (23.4)	3.71	1.064
Biv	I have resources (land, finance, workers) and sufficient knowledge to use agricultural technology related to rice crops	23 (7.8)	58 (19.7)	72 (24.4)	100 (33.9)	42 (14.2)	3.27	1.161

Bv	I am willing to spend time to learn the latest technology of rice cultivation	16 (5.4)	26 (8.8)	58 (19.7)	121 (41)	74 (25.1)	3.72	1.101
Bvi	I like to explore information about the latest rice cultivation technology	16 (5.4)	19 (6.4)	62 (21)	130 (44.1)	68 (23.1)	3.73	1.051
Bvii	In general, I was one of the first among my friends to acquire the latest technology when it appeared.	30 (10.2)	64 (21.7)	79 (26.8)	87 (29.5)	35 (11.9)	3.11	1.177
Bviii	I keep up with the latest technology in my area	17 (5.8)	27 (9.2)	69 (23.4)	127 (43.1)	55 (18.6)	3.60	1.071
Bix	I am always open to learning new and different technologies	13 (4.4)	17 (5.8)	58 (19.7)	133 (45.1)	74 (25.1)	3.81	1.020
Discomfort								
Ci	The technical support team did not help me understand well	37 (12.5)	98 (33.2)	66 (22.4)	64 (21.7)	30 (10.2)	2.84	1.198
Cii	The high cost of production makes me not interested in using technology in rice cultivation	33 (11.2)	79 (26.8)	75 (25.4)	82 (27.8)	26 (8.8)	2.96	1.161
Ciii	I find it difficult to use agricultural technology.	40 (13.6)	94 (31.9)	82 (27.8)	55 (18.6)	24 (8.1)	2.76	1.149
Civ	The use of technology in the existing paddy fields is not suitable for implementation	46 (15.6)	124 (42)	62 (21)	42 (14.2)	21 (7.1)	2.55	1.129
Cv	I think that technology systems are not designed to be used by ordinary people.	46 (15.6)	105 (35.6)	79 (26.8)	42 (14.2)	23 (7.8)	2.63	1.141
Cvi	The manual/user guide is not written in an easy-to-understand language	36 (12.2)	105 (35.6)	68 (23.1)	50 (16.9)	36 (12.2)	2.81	1.213
Cvii	Most of the latest technology has health or safety risks	48 (16.3)	89 (30.2)	87 (29.5)	54 (18.3)	17 (5.8)	2.67	1.124
Cviii	I'm having a hard time getting up to date with technology.	31 (10.5)	72 (24.4)	98 (33.2)	64 (21.7)	30 (10.2)	2.97	1.136
Insecurity								
Di	I am not convinced by the existing agricultural technology	69 (23.4)	134 (45.4)	38 (12.9)	36 (12.2)	18 (6.1)	2.32	1.140
Dii	The use of technology does not help to increase production	81 (27.5)	132 (44.7)	42 (14.2)	23 (7.8)	17 (5.8)	2.20	1.101
Diii	I don't trust the capabilities of technology to exceed the capabilities of humans	65 (22)	129 (43.7)	48 (16.3)	36 (12.2)	17 (5.8)	2.36	1.125
Div	The rapid development of technology influenced me to choose technology	45 (15.3)	70 (23.7)	80 (27.1)	65 (22)	35 (11.9)	2.92	1.241
Dv	I may face spare parts and service constraints if I buy a high-tech product	32 (10.8)	76 (25.8)	74 (25.1)	66 (22.4)	47 (15.9)	3.07	1.246

Table 4
Descriptive analysis of indicators used in Technology Readiness Index (TRI) in IADA BLS.

Label	Likert scale	1	2	3	4	5	Mean	Sd.
Optimism								
Ai	Technology facilitates rice production operations	3 (1.7)	3 (1.7)	37 (20.8)	71 (39.9)	64 (36.0)	4.07	0.887
Aii	I have enough finances to use technology in rice cultivation.	13 (7.3)	41 (23.0)	54 (30.3)	47 (26.4)	23 (12.9)	3.15	1.136
Aiii	I am confident that involvement in the use of rice cultivation technology does not give me a financial burden.	5 (2.8)	23 (12.9)	52 (29.2)	65 (36.5)	33 (18.5)	3.55	1.025
Aiv	There is no obstacle for me to cultivate rice using the latest technology.	2 (1.1)	11 (6.2)	37 (20.8)	84 (47.2)	44 (24.7)	3.88	0.891
Av	I am willing to use advanced technology in rice cultivation.	2 (1.1)	5 (2.8)	33 (18.5)	86 (48.3)	52 (29.2)	4.02	0.833
Avi	I can do more with the help of the latest technology	1 (0.6)	5 (2.8)	32 (18.0)	92 (51.7)	48 (27)	4.02	0.785
Avii	I can solve problems more effectively by using technology	2 (1.1)	3 (1.7)	39 (21.9)	85 (47.8)	49 (27.5)	3.99	0.816
Aviii	I am ready to share the advantages of this technology with other farmers	2 (1.1)	2 (1.1)	35 (19.7)	93 (52.2)	46 (25.8)	4.01	0.778
Innovativeness								
Bi	Others come to me for advice on the latest technology.	12 (6.7)	19 (10.7)	46 (25.8)	75 (42.1)	26 (14.6)	3.47	1.080
Bii	Involvement in practical training (hands-on) encouraged me to use technology in rice cultivation	5 (2.8)	15 (8.4)	46 (25.8)	85 (47.8)	27 (15.2)	3.64	0.936
Biii	In-depth knowledge related to rice plants encourages me to use technology in rice cultivation	5 (2.8)	8 (4.5)	49 (27.5)	82 (46.1)	34 (19.1)	3.74	0.915
Biv	I have resources (land, finance, workers) and sufficient knowledge to use agricultural technology related to rice crops	8 (4.5)	25 (14.0)	57 (32.0)	66 (37.1)	22 (12.4)	3.39	1.020
Bv	I am willing to spend time to learn the latest technology of rice cultivation	4 (2.2)	12 (6.7)	49 (27.5)	78 (43.8)	35 (19.7)	3.72	0.933
Bvi	I like to explore information about the latest rice cultivation technology	2 (1.10	11 (6.2)	42 (23.6)	80 (44.9)	43 (24.2)	3.85	0.899
Bvii	In general, I was one of the first among my friends to acquire the latest technology when it appeared.	8 (4.5)	32 (18.0)	59 (33.1)	57 (32.0)	22 (12.4)	3.30	1.045
Bviii	I keep up with the latest technology in my area	4 (2.2)	11 (6.2)	43 (24.2)	88 (49.4)	32 (18.0)	3.75	0.901

Bix	I am always open to learning new and different technologies	4 (2.2)	12 (6.7)	39 (21.9)	84 (47.2)	39 (21.9)	3.80	0.935
Discomfort								
Ci	The technical support team did not help me understand well	19 (10.7)	43 (24.2)	60 (33.7)	44 (24.7)	12 (6.7)	2.93	1.089
Cii	The high cost of production makes me not interested in using technology in rice cultivation	13 (7.3)	39 (21.9)	63 (35.4)	43 (24.2)	20 (11.2)	3.10	1.095
Ciii	I find it difficult to use agricultural technology.	22 (12.4)	44 (24.7)	56 (31.5)	46 (25.8)	10 (5.6)	2.88	1.103
Civ	The use of technology in the existing paddy fields is not suitable for implementation	29 (16.3)	48 (27.0)	53 (29.8)	41 (23.0)	7 (3.9)	2.71	1.111
Cv	I think that technology systems are not designed to be used by ordinary people.	21 (11.8)	44 (24.7)	65 (36.5)	39 (21.9)	9 (5.1)	2.84	1.058
Cvi	The manual/user guide is not written in an easy-to-understand language	13 (7.3)	41 (23.0)	53 (29.8)	44 (24.7)	27 (15.2)	3.17	1.164
Cvii	Most of the latest technology has health or safety risks	14 (7.9)	37 (20.8)	73 (41.0)	42 (23.6)	12 (6.7)	3.01	1.017
Cviii	I'm having a hard time getting up to date with technology.	16 (9.0)	40 (22.5)	64 (36.0)	45 (25.3)	13 (7.3)	2.99	1.066
Insecurity								
Di	I am not convinced by the existing agricultural technology	24 (13.5)	64 (36.0)	58 (32.6)	2 (12.9)	9 (5.1)	2.60	1.038
Dii	The use of technology does not help to increase production	31 (17.4)	68 (38.2)	45 (25.3)	30 (16.9)	4 (2.2)	2.48	1.037
Diii	I don't trust the capabilities of technology to exceed the capabilities of humans	32 (18.0)	55 (30.9)	62 (34.8)	26 (14.6)	3 (1.7)	2.51	1.004
Div	The rapid development of technology influenced me to choose technology	14 (7.9)	41 (23.0)	74 (41.6)	39 (21.9)	10 (5.6)	2.94	0.996

Paddy Farmer's TRI

Table 5 shows that the majority of paddy farmers in MADA, KADA, and IADA BLS have a moderate level of technology readiness (0.51-0.75), while the second highest percentage of the farmers have a low level of technology readiness in MADA, KADA, and IADA BLS. On the other hand, the highest level of technology readiness in MADA is 5.4%, in KADA 5.08%, and in IADA BLS 6.8%. Only 0.3% of paddy farmers in MADA are not ready to adopt the technology. In addition, the overall technology readiness index scores mean value for MADA is 0.57, in KADA 0.60, and in IADA BLS 0.58. This means that the paddy farmers in these three granary areas are ready to adopt the technology introduced in paddy cultivation.

Table 5

Technology readiness index of paddy farmers

Granary areas	MADA		KADA		IADA BLS	
Technology readiness level	No.	%	No.	%	No.	%
Not Ready (0-0.25)	1	0.3	0	0	0	0

Low readiness level (0.26-0.50)	69	21.90	60	20.34	35	19.66
Moderate readiness level (0.51-0.75)	228	72.40	220	74.58	132	74.16
High readiness level (0.76-1.0)	17	5.40	15	5.08	11	6.80
Mean	0.57		0.60		0.58	

To provide a better picture of technology readiness level, the index of the four dimensions of technology readiness (i.e., optimism, innovativeness, discomfort, and insecurity) was assessed. Figure 1 shows the technology readiness index of paddy farmers based on four dimensions for MADA, KADA, and IADA BLS. All three granary areas have a score mean index of 0.51-1.0 for technology readiness drivers, i.e., optimism and innovativeness. The result indicates that the paddy farmers have a moderate and high level of optimism and innovativeness to adopt the new technology. However, the score mean index for the negative factors of technology readiness for all three granary areas are in the quantile range of 0.51-0.75, which means that the paddy farmers have a moderate level of discomfort and insecurity. Although the paddy farmers exhibit innovativeness and optimism, they also experience some level of discomfort and insecurity. This is in line with Parasuraman (2000), Ramayah et al. (2003), and Mastura et al. (2007), who discovered that even those who are optimists and innovators experience technology-related anxiety.

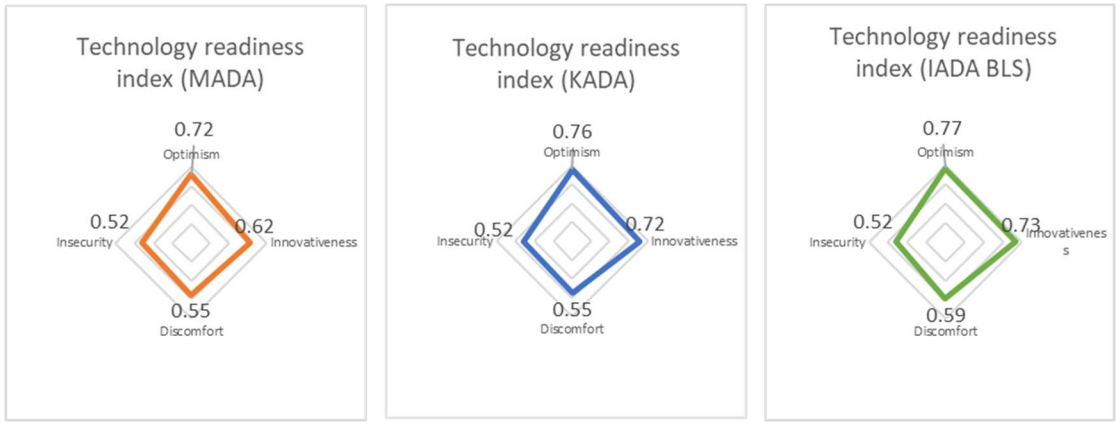

Figure 1. *Technology readiness index of the paddy farmers based on four dimensions.*

To provide a more accurate view of technology readiness, the index was assessed using variables from each dimension of technology, i.e., optimism, innovativeness, discomfort, and insecurity. Figures 2, 3, 4, and 5 show the variable index of each dimension for MADA, KADA, and IADA BLS. Figure 2 shows the variable index of the paddy farmers' optimisms level. For variable Aii (I have enough finances to use technology in rice cultivation), the score mean index in all three granary areas is lower than other variables, especially in KADA. The score mean index is 0.49, which means that the paddy farmers in KADA face some financial issues in adopting the technology.

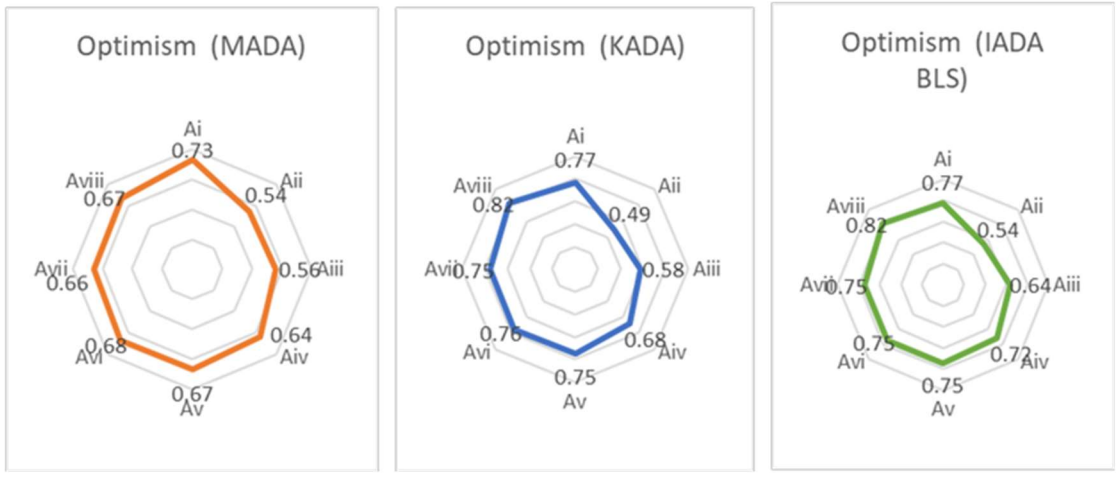

Figure 2. *The variable index of optimism dimension.*

Figure 3 shows the variable index of the paddy farmers' innovativeness level. For variable Bv (I am willing to spend time learning the latest technology of rice cultivation), the score mean index of the paddy farmers in all three granary areas shows a moderate level of readiness, which means that most paddy farmers are eager to learn the new technology.

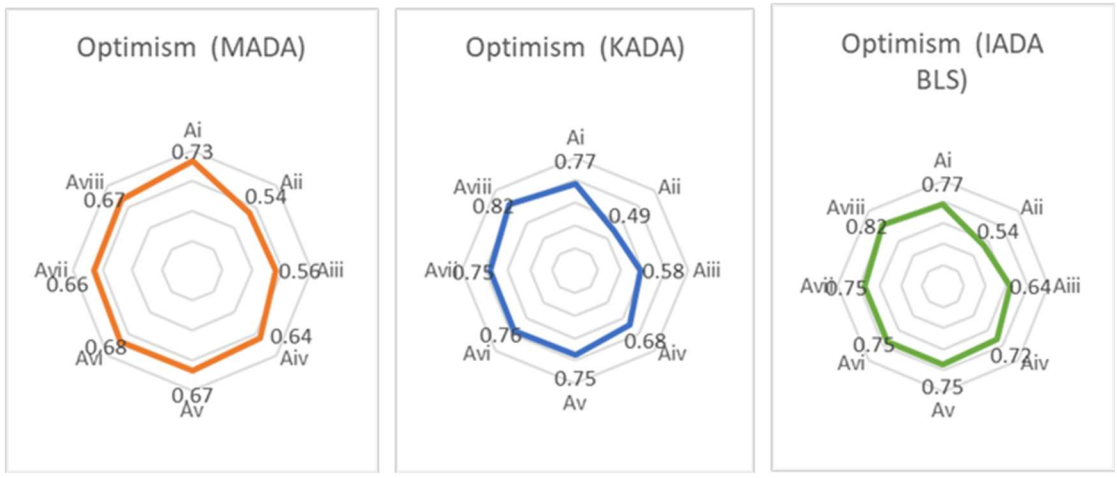

Figure 3. *The variable index of innovativeness dimension.*

Figure 4 shows the negative factors of technology readiness level, i.e., discomfort. Discomfort arises as paddy farmers perceive a lack of management and marginalisation from technology (Na et al., 2021). Figure 4 shows that for Cii (The high cost of production makes me not interested in using technology in rice cultivation), the score mean index for IADA BLS is higher than MADA and KADA, which means

that most paddy farmers in IADA BLS are disinterested in adopting the technology to cut the cost of paddy production.

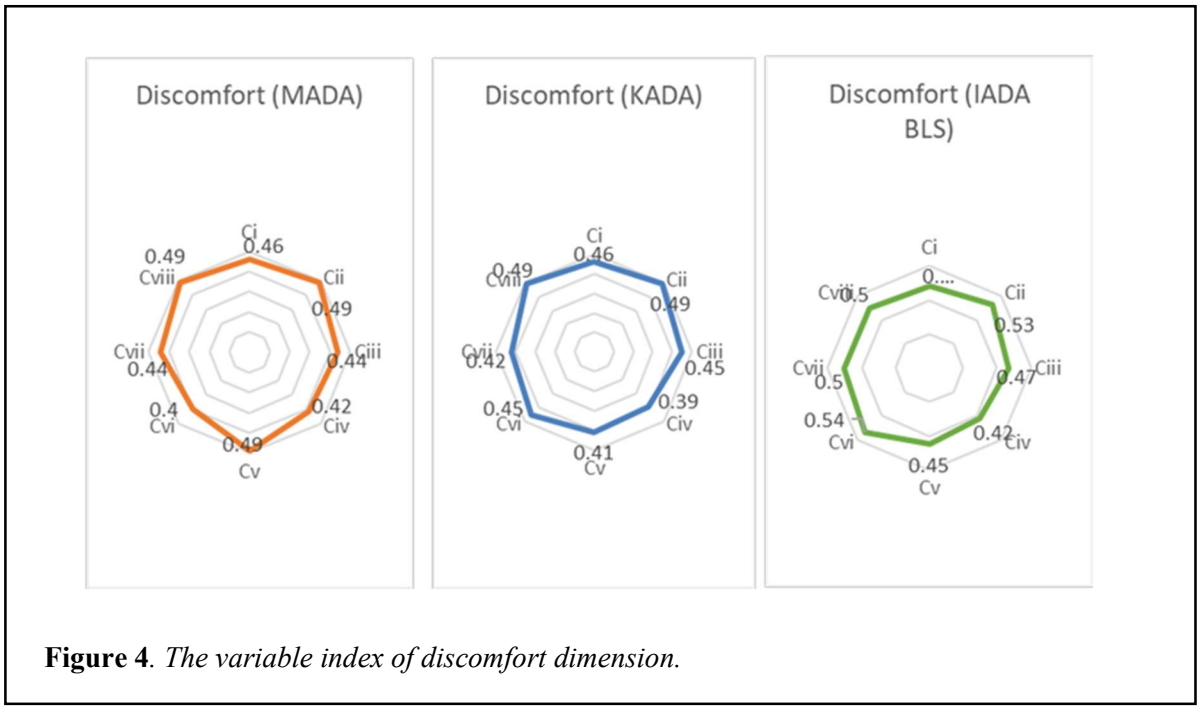

Figure 4. *The variable index of discomfort dimension.*

Figure 5 shows the negative factor of insecurity. Insecurity is the emotional state of being uneasy with new technology and doubting its viability (Na et al., 2021). Variable Dv (I may face spare parts and service constraints if I buy a high-tech product) shows the highest score mean index for all three granary areas compared to the other variables. This indicates that most paddy farmers are insecure about using the new technology as they expect problems with repairing the technology when it is broken.

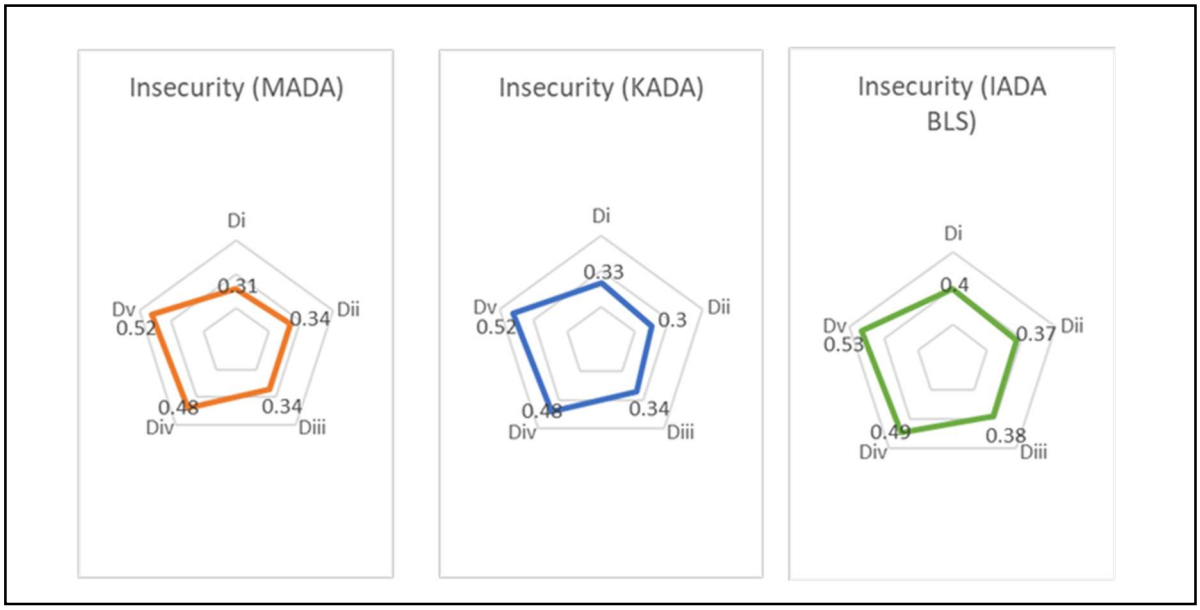

Figure 5. *The variable index of insecurity dimension.*

CONCLUSION

The results suggest that paddy farmers are excited to embrace the technology as the majority is ready to adopt it. They are optimistic and innovative, but at the same time, feel some discomfort and insecurity. The balancing of these two drivers and inhibitors will determine the level of readiness to adopt the technology.

The Malaysian government implements numerous schemes such as *Skim Baja Padi Kerajaan Persekutuan (SBPKP), Skim Insentif Pengeluaran Padi, Skim Baja dan Racun Padi Bukit dan Huma, Skim Insentif Benih Padi Sah, Skim Subsidi Harga Padi (SSHP), Skim Pemilikan Jentera dan Peralatan Kecil Peladang* (myMETRO, 2022) and the Farmers' Organization Authority (2010) to assist paddy farmers in enhancing production. The present study shows that the government should prioritise farmers who are male, educated, with experience of fewer than 10 years, and of all ages to receive the grants as this group of farmers show high readiness to adopt the technology. The issues of food security and low paddy production require the adoption of mechanisation technology as one of the best options to improve national paddy productivity and increase local paddy production over the years.

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