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MORTEX Technology Acceptance to Improve the Latex Production among RISDA Rubber Smallholder

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Abstract. The Malaysia Rubber Board (MRB) has introduced many technologies to increase latex production, such as the MORTEX technology. Unfortunately, production of natural rubber in Malaysia had decreased to 62.5% in 2020, and it became worst when technology adoption or acceptance among smallholders was relatively low. This study aims to identify the MORTEX technology acceptance among RISDA rubber smallholders in Kelantan. This study has adapted Technology Acceptance Model (TAM) for instrument development. A simple random sampling technique was employed in selecting 100 RISDA rubber smallholders in Kelantan. Descriptive analysis and Pearson correlation analysis were used to analyse the data. The finding indicates a negligible correlation between perceived usefulness and perceived ease of use on MORTEX technology acceptance. Besides, the level of MORTEX technology acceptance indicates an average mean score (M=3.18), while perceived usefulness and perceived ease of use both have shown a high mean score (M=4.04) and (M=4.03), respectively. This study is significant to the government, researchers, and smallholders or farmers to understand the factors and importance of agriculture technology adoption for improving crop productivities. The findings are important and valuable to investigate further factors affecting the acceptance and usage of agriculture technology such as MORTEX by smallholders.

INTRODUCTION

Nowadays, Malaysia is the fifth largest producer of natural rubber globally, behind Thailand, Indonesia, Vietnam, and China [1]**.** Rubber production plays a crucial role in promoting socio-economic development, with many rubber smallholders in Malaysia (486,712). The state of Kelantan (45,812) has the third-highest number of smallholders after Johor (64,769) and Pahang (63,514) [2]. Based on MRB [3], natural rubber production in Malaysia rises by 0.06%, from 0.603 million tons in 2018 to 0.639 million tons in 2019. Unfortunately, it was drastically dropped to 62.5% in 2020 with only 0.240 million tons of production. Technology act as an important indicator in developing the agricultural industry [4]. Agriculture technology such as devices, machines, and information has assisted in improving the quality and quantity of yield [5]. The Rubber Research Institute of Malaysia (RRIM) and MRB played a significant role in developing the domestic rubber-based industry in Malaysia. New technologies such as clones for new varieties of rubber have contributed to the impressive growth of the rubber industry and have profited many rubber producers

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in Malaysia [6]. Besides, MRB has also introduced many rubber technology to increase latex production, such as MORTEX technology. MORTEX technology can facilitate smallholders to get more latex and also to increase the production of the rubber. MORTEX technology is suitable to use only for the matured tree, which has reached at least 15 years old [7]. MORTEX is based on ethephon formulations and has been introduced to the rubber industry in the late 1960s and is still in use today. High yields can be maintained while skin dehydration is low, although the frequency of use is higher than the use of the ethephon. The MORTEX technology is the transfer of technology that helps in increasing the production of latex among smallholders [8]. However, technology adoption or acceptance level among rubber smallholders was relatively low in Malaysia [9, 10, 11]. Therefore it is crucial to examine and understand the factors of technological rejection among smallholders [12]. Previous researchers have used the technology acceptance model (TAM), a well-known technology adoption theory [13]. Perceived usefulness (PU) and perceived ease of use (PEU) are the main factors that have been constructed under TAM [14]. PU explains the user's perception of how workplace performance will be improved by technology while PEU affecting the acceptance of users and the behaviour of the use of information technology [15]. A previous study indicated that PU has affected the decision of technology acceptance [16, 17]. Furthermore, PEU is also the factor influencing the intention behavioural on technology acceptance [18, 19] because people tend to use technology that makes them easy to work [20]. Thus, this study aims to determine the MORTEX technology acceptance among RISDA rubber smallholders in Kelantan.

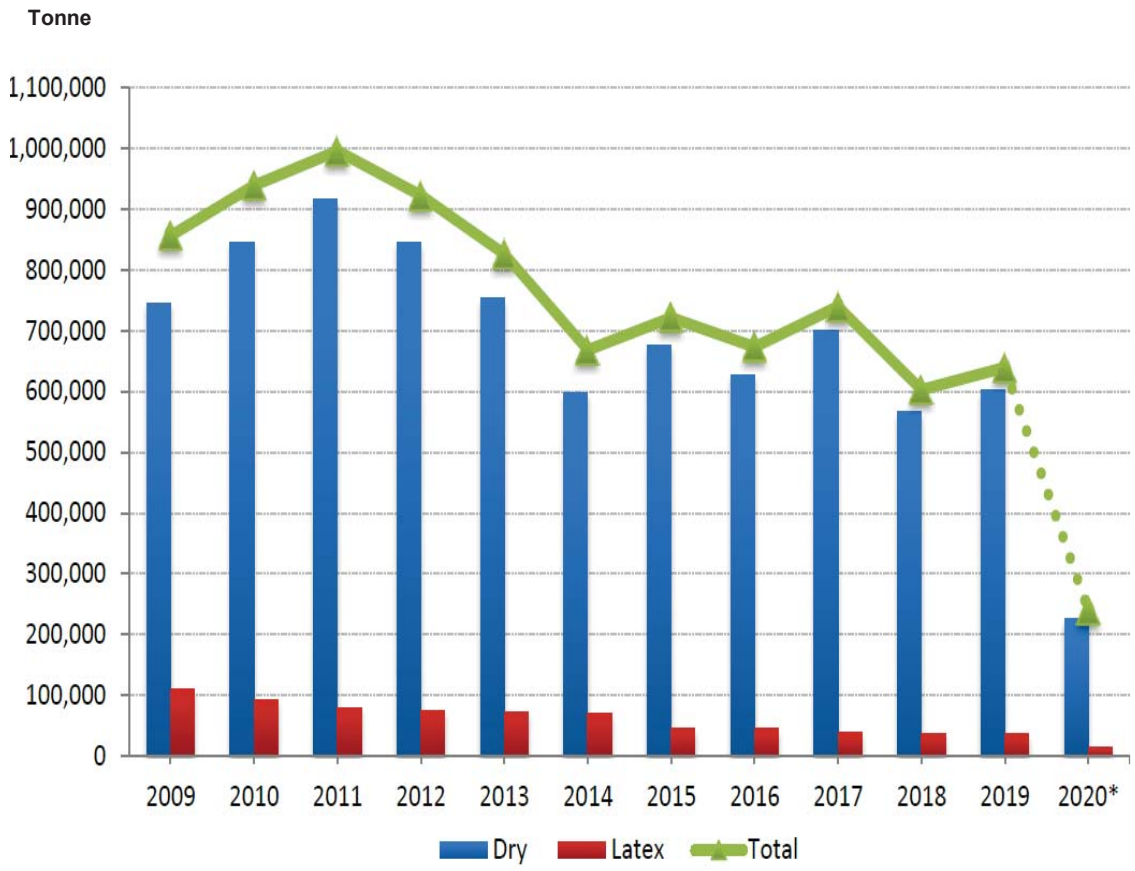

FIGURE 1. Malaysia's Natural Rubber Production [3]

METHODOLOGY

This study was conducted in Kelantan as the third state with a higher number of rubber smallholders in Malaysia, with 45,812 rubber smallholders [2]. By employing a simple random sampling technique, a total of 100 questionnaires were distributed among rubber smallholders based on the registered databased from RISDA Kelantan. According to Sekaran [21], 30 respondents are enough to use for accurate results and 100 respondents are medium rate for sample size [22]. The questionnaire was adapted from the technology acceptance model (TAM) [23], containing four parts. Part A consists of the demographic profile; meanwhile, Parts B and C selected as independent variables consist of PU and PEU. Lastly, part D contains the MORTEX technology acceptance as the dependent variable. All items are measured using the Likert Scale ranging from 1 to 5, which is represented by strongly disagree, disagree, slightly agree, agree, and strongly agree. The complete data was analysed using descriptive and correlation analysis to answer the study objectives.

RESULTS AND DISCUSSION

Socio-Demographic Profile of RISDA Rubber Smallholders

TABLE 1. Socio-Demographic Profile of RISDA rubber smallholders

Variables	Frequency	Percentage (%)	Mean	SD
Gender			1.11	0.314
Male	89	89.0		
Female	11	11.0		
Race			1.29	0.624
Malay	80	80.0		
Chinese	11	11.0		
Indian	9	9.0		
Age			2.57	0.879
30-40	10	10.0		
41-50	38	38.0		
51-60	38	38.0		
61-70	13	13.0		
>70	1	1.0		
Marital Status			1.96	0.315
Single	10	10.0		
Married	90	90.0		
Education Level			2.23	0.941
UPSR	20	20.0		
PMR	46	46.0		
SPM	29	29.0		
High Level education	5	3.0		
Monthly Income (RM)			1.76	0.622
100-999	32	32.0		
1000-1999	62	62.0		
2000-2999	4	4.0		
>3000	2	2.0		

The demographic profile comprises gender, race, age, marital status, education level, and monthly income. Table 1 shows the socio-demographic profile of the respondents. Most of the respondents are male, 89%, compared to female, with only 11%. The race of respondents is Malay, Chinese, and India with 80%, 11%, and 9%, respectively. Most of the respondents are elderly with ages of more than 40 years old (90%). For the marital status of respondents, married status is the highest with 90%, while single status is only 10%. The educational level of respondents regularly

affects the behaviour and relates to the usability of the rubber technology [24]. Unfortunately, most of the respondents did not complete their secondary school level (66%). Only 46 % have completed SPM, and 3% have a higher education level. On the other hand, the monthly income of respondents with the highest compositions is between RM1000-1999 (62%), followed by income per month between RM100-999 (32%), RM2000-2999 (4%), and income RM3000-3999 (2%).

Level of Factors Influence MORTEX Technology Acceptance

The level of factors that influence MORTEX technology acceptance has been shown in Table 2. MORTEX technology acceptance demonstrates a moderate mean score (M=3.18). This result shows that most of the rubber smallholders in Kelantan know the function and usability of the MORTEX technology, which is to improve latex production, and unfortunately, they refuse to use it. Supported by a previous study, agriculture technology acceptance among farmers is indicated at a moderate level [25]. Opposite to past studies, farmers and smallholders tend to exhibit a high level of agriculture technology usage [26]. The research by Meuter et al. [27] found that adoption or rejection of technology is impacted by factors of the degree of individual technical anxiety and perceives risk associated with the use of these services. Moreover, PU (M=4.04) and PEU (M=4.03), which are factors that influence MORTEX technology acceptance, indicated a higher mean score, showing that rubber smallholders approximately agree that MORTEX technology can improve latex production and this is practically to use. Consistent with other previous studies, PEU has had a high degree factor on decision adoption of agriculture technology [28, 29, 30].

TABLE 2. Level of Factors Influence MORTEX Technology Acceptance

Variables	Frequency	Percentage	Mean	SD
MORTEX Technology Acceptance			3.18	.61
Low (1.00 – 2.33)	4	4		
Medium (2.34 – 3.66)	78	78		
High (3.67 – 5.00)	18	18		
Perceived Usefulness (PU)			4.04	.63
Low (1.00 – 2.33)	0	0.0		
Medium (2.34 – 3.66)	30	30		
High (3.67 – 5.00)	70	70		
Perceived Ease of Use (PEU)			4.03	.87
Low (1.00 – 2.33)	2	2		
Medium (2.34 – 3.66)	22	22		
High (3.67 – 5.00)	76	76		

Relationship between Perceived Usefulness and Perceived Ease of Use on MORTEX Technology Acceptance

Table 3 shows the results of correlation analysis which is applied to measure the relationship between PU and PEU on MORTEX technology acceptance. Based on the rule of thumb for interpreting the size of a correlation coefficient [31], both PU (r=.190) and PEU (r=.077) are negligibly correlated with MORTEX technology acceptance. Supported by other studies, PEU [32] and PU [18] do not influence farmers' decisions to accept technology. However, the finding contradicts Zheng et al. [33], whereby PU has a positive correlation with technology acceptance. Zarafshani et al. [19] has also revealed that PEU had influenced the decision to use agriculture technology. This is supported by Quayson et al. [34], the study which reveals that it is easy to use innovative technology that can improve smallholders' vulnerability in the cocoa supply chain. Nevertheless, it is the opposite with this study that reveals RISDA rubber smallholders understand the benefits of MORTEX technology but application in their farming activities is still low. This is due to the education level of RISDA rubber smallholders, which is low, indicated by 46% of rubber smallholders who have only obtained PMR/SRP. Corner-Thomas et al. [35] proved that demographic factors such as education, farm size, and age influenced their PU and PEU. Zhang et al. [24] have also found that education level affects the technology acceptance.

TABLE 3. Relationship between Perceived Usefulness and Perceived Ease of Use on MORTEX Technology Acceptance

		Perceive Usefulness (PU)	Perceive Ease of Use (PEU)
MORTEX Technology Acceptance	Pearson Correlation	0.190**	0.077**
	Sig. (2-tailed)	0.059	0.446

**Correlation is significant at the 0.01 level (2-tailed)

CONCLUSION

This study can conclude that RISDA rubber smallholders in Kelantan have agreed that MORTEX technology can improve latex production with a high mean score of PE (M=4.04) and PEU (M=4.03). Unfortunately, they are not too interested in accepting and using MORTEX technology (M= 3.18). Besides, the finding also indicates a negligible correlation between PU and PEU on MORTEX technology acceptance which is the rubber smallholders awareness and understanding of the benefit of MORTEX technology but, unfortunately, do not use and apply the technology. The results have helped investigate the technology acceptance among RISDA rubber smallholders towards MORTEX technology from the public perspective. However, the future study should focus on the rubber smallholders in other states that might be different in their population, strata, and socio-economic condition to determine the factor affecting their technology acceptance.

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