

PARTICIPATION OF THE OIL PALM SMALLHOLDERS TOWARD THE IMPLEMENTATION OF MECHANIZATION IN OIL PALM PLANTATION

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ABSTRACT

Malaysia is a developing country focusing on oil palm industry as one of the main commodity in the agricultural sector. In 2016, Malaysia had exported 15,854,654 tons palm oil. Malaysia has become the second biggest country exporting oil palm after Indonesia. This industry is targeted to contribute about 178 million to Gross National Income by 2020 Under NKEA. Smallholder is an important group contributing production of oil palm. Smallholders are one of the oil palm producers covering 35% planted area after private estate. The rapid expansion of oil palm plantations insists a high demand for foreign labor. Commendable for the smallholders to implement the oil palm mechanization. Mechanization can improve the productivity of palm oil. However, the acceptance level of palm oil mechanization is still not promising. Lots of factors affecting smallholders acceptance of mechanization. There, for this paper is to study the factors acceptance and repulsion of smallholders in implementing mechanization. Face to face interview was conducted using a structured questionnaire with a total of 178 respondents among the oil palm smallholders in Malaysia. The result indicates that the acceptance level of oil palm smallholders towards mechanization was still moderate in oil palm industry.

Keywords: mechanization, oil palm plantation, participation

INTRODUCTION

Oil palm industry is one of the national income sources to Malaysia. Oil palm industry is included as one of the fields in Economic Transformation Programme (Program Transformasi Ekonomi, 2013). Agricultural policy of Malaysia is an official document formulated by the government as a set of the strategic direction of the agricultural sector. The National Agro-Food Policy (NAP4) was formulated to address challenges in domestic and global markets to ensure sustainable production for food security and safety. The policy has been put in place to tackle the issue of sustainable agriculture. Efforts have also been taken to strengthen human capital and to ensure there is sufficient skill labor force in the agricultural sector including the use of modern technology and mechanization to reduce the dependency of manpower (Dardak, 2015). Currently, oil palm productivity is at stagnant stage (Murphy, 2014). The increment in oil palm productivity based on the statistic is because of the wider area of oil palm plantation. A high productivity will be achieved by good planting practices, mechanization application, and accurate materials and procedure (Wahid & Simeh, 2009). Implementation of mechanization will help in oil palm productivity. For example, Cantas help the oil palm growers to achieve a quick process and higher productivity. Cantas help the labor to harvest from 350 bunch per day to 525 bunch of oil palm per day (Zainon, 2012). By that, new mechanization invented to assist the smallholders in increasing their oil palm productivity.

Producers of oil palm can be grouped into four categories. They are private estates, government schemes, state schemes and independent smallholders. Smallholder is an important group contributing production of oil palm. In 2014, smallholders include schemed smallholders and independent smallholders cover 35% of oil palm hectareage. It is the second place after private estates, which is 62% (Azman Ismail, 2015). Lots of funds distributed to the smallholders to encourage them to compete in oil palm industry. Still, oil palm plantation is labor intensives. Foreign labors are hired to work in oil palm plantation. Research shows that acceptance level of oil palm mechanization is due to lack of awareness, lack of skill, and low buying power of high cost of mechanization (Nwaobiala & Ezech, 2012). Research by Chan et al., 2013 claim that it is insufficient training programs available and insufficient funding by the authorities results in failure to produce sufficient modern farmers. Also, factors affecting technology usage are farmers' perceptions and levels of education, extension-workers' knowledge, the management of the extension program, and the physical conditions of the area (Abdullah et al., 2013). the availability and abundance of cheap foreign labor is a priority option for the smallholders and it surpasses the use of mechanized equipment. Using mechanization in the farm too costly for the smallholders. In addition, the low acceptance in an adoption of technology and mechanization due to limited accessibility in oil palm plantation and limited access in hilly areas especially narrow terrace for machinery to access during operation in the plantation (Ayob & Sophia, 2017). Tending to use foreign labor increase the level of this group. In 2014, they consist of 488,090 people in the agricultural sector. This number has been increased to 497,840 in 2015 and 369,076 of

them are from Indonesia (Kementerian Dalam Negeri, 2015). Reduction on the dependency of foreign labor will be achieved with the implementation of mechanization. Therefore, this study is to explore the participation of oil palm smallholders in implementing mechanization in oil palm plantation sector and to analyze the factor of acceptance and repulsion of smallholders in the implementation of mechanization in oil palm plantation.

METHOD

Research data had been collected from 178 respondents which were oil palm smallholders in Malaysia through a research survey using the descriptive analysis based on a set of questionnaire that has been designed for this study. A reliability analysis was done to measure the consistency of the data and the Cronbach’ Alpha was used as the index of reliability of the data (Tavakol & Dennick, 2011). As suggested by Nunnally (1978) the Cronbach’s Alpha reliability test should have a minimum value of 0.6 for the data to be considered as consistent in the early stage of research. KMO and Barlett’s test was also been done for participation towards implementation of oil palm mechanization. Descriptive analysis was conducted to analyze the demographic factor information study which consisted of the respondent’s background and oil palm farm background. Correlation and chi square also analyzed to know the relationship of the factor affecting smallholders in implementing mechanization.

RESULT AND DISCUSSION

Table 1: Reliability Test for Attraction Factor

| Components | Cronbach’Alpha | Based No of Item |
|-------------------|----------------|------------------|
| Economy | 0.945 | 5 |
| Geography | 0.778 | 5 |
| Government Scheme | 0.616 | 9 |
| Knowledge | 0.923 | 6 |
| Perception | 0.945 | 9 |

Table 2: Reliability Test for Repulsion Factor

| Components | Cronbach’Alpha | Based No of Item |
|-------------------|----------------|------------------|
| Economy | 0.957 | 11 |
| Geography | 0.922 | 4 |
| Government Scheme | 0.971 | 10 |
| Knowledge | 0.859 | 4 |
| Perception | 0.976 | 14 |

In Table 1 and Table 2, the Cronbach’ Alpha was used to check the positivity of consistency of the data in attraction and repulsion factor. The Cronbach’ Alpha value for the component economy, geography, government scheme, knowledge, and perception in attraction factor are 0.945, 0.778, 0.616, 0.923, and 0.945 respectively. Meanwhile, for repulsion factor, the components have the values of 0.957, 0.922, 0.971, and 0.859 and 0.976. These values are higher than the reliability test which is 0.6. This shows that there is consistency among the smallholders toward the implementation of mechanization based on this perception and it concludes that this research based on the questionnaire is suitable and fit for this study.

Table 3: KMO and Bartlett’s Test for participation towards implementation of oil palm mechanization in oil palm plantation for attraction factor

| Variables | Economy | Geography | Government Scheme | Knowledge | Perception |
|------------------------------|---------|-----------|-------------------|-----------|------------|
| Kaiser-Meyer-Olkin (KMO) | .860 | .602 | .843 | .775 | .920 |
| Barlett’s Test of Sphericity | 496.856 | 349.540 | 1103.925 | 910.426 | 1137.899 |
| Df | 10 | 10 | 36 | 15 | 36 |
| Sig | .000 | .000 | .000 | .000 | .000 |

Table 4: KMO and Bartlett’s Test for participation towards implementation of oil palm mechanization in oil palm plantation for repulsion factor

| Variables | Economy | Geography | Government Scheme | Knowledge | Perception |
|------------------------------|----------|-----------|-------------------|-----------|------------|
| Kaiser-Meyer-Olkin (KMO) | .920 | .782 | .925 | .755 | .874 |
| Barlett’s Test of Sphericity | 1697.148 | 391.847 | 2116.998 | 346.657 | 1547.645 |
| f | 55 | 6 | 45 | 6 | 91 |
| Sig | .000 | .000 | .000 | .000 | .000 |

In Table 3 and Table 4, the Kaiser-Meyer-Olkin, Measure of sampling adequacy shows that the value of economy (0.860), geography (0.602), government scheme (0.843), knowledge (0.775), and perception (0.920) for attraction factor and in repulsion factor the give the value of 0.920, 0.782, 0.925, 0.755, and 0.874. All of the values are higher than the minimum index, which is 0.5 (Bret, 2010). Theoretically, the overall MSA index shows an evidence of strong correlation for all component that involves in this research. All the value is indicated as the component or factors analysis was suited to all the variable from all component. The Barlett’s Test of Sphericity in all component shows the value of 0.000 means there was a significant level that indicates the factor analysis was useful with the presence of all the component data.

Table 5: Respondent Background

| | | Frequency | % |
|-----------------------------|-------------------------------|-----------|------|
| Gender | Male | 126 | 70.8 |
| | Female | 52 | 29.2 |
| Age | <25 | 3 | 1.7 |
| | 26-45 | 37 | 20.8 |
| | 46-55 | 28 | 14.6 |
| | >56 | 112 | 62.9 |
| Education Level | Never been to school | 16 | 9 |
| | Primary School | 32 | 18 |
| | Finish Primary School | 46 | 25.8 |
| | PMR | 19 | 10.7 |
| | SPM | 49 | 27.5 |
| | STAM/STPM | 4 | 2.2 |
| | Diploma | 8 | 4.5 |
| | Degree | 2 | 1.1 |
| Number of Family Members | Master | 2 | 1.1 |
| | <3 | 19 | 10.7 |
| | 4-6 | 76 | 42.7 |
| | 7-9 | 50 | 28.1 |
| | 10-12 | 26 | 14.6 |
| Experience in Oil Palm Farm | >13 | 7 | 3.9 |
| | <1 year | 11 | 6.2 |
| | 2-5 years | 39 | 21.9 |
| | 6-10 years | 35 | 19.7 |
| | 11-15 years | 12 | 6.7 |
| | 16-20 years | 18 | 10.1 |
| | 21-25 years | 3 | 1.7 |
| Spend for mechanization | > 26 years | 60 | 33.7 |
| | < RM1000 | 71 | 39.9 |
| | RM1000-RM5000 | 32 | 18 |
| | RM 5001 - RM 10000 | 6 | 3.4 |
| | RM 10001 - RM 50000 | 1 | 0.6 |
| | RM 50001 - RM 100000 | 12 | 6.7 |
| | > RM 100000 | 2 | 1.1 |
| | Never spend for mechanization | 54 | 30.3 |

Table 5 Table 5 shows the demographic information for all 178 respondents that involved in this research. All of the respondents were oil palm smallholders from Malaysia. 126 respondents are the male and 52 respondent are female. In ranges below 25 years old, the respondents were 3 people (1.7%), while 26-45 range years old of age was 37 respondents (29%), range 46-55 years old was 28 respondents (14.6%) and 112 respondents (62.9%) are above 56 years old. For education level sections, 16 respondents have never been to school (9%). 32 respondents (18%) were studied until primary school level. 46 respondent finished their primary school (25.8%). 19 respondents (10.7%) had seated the PMR examination. 49 persons (27.5%) have seat for SPM examination, 4 respondents (2.2%) STAM/STPM. 8 respondents have Diploma certificate (4.5%) and 2 respondents (1.1%) have the degree and 2 respondents have master (1.1%). 19 respondents had ranges of lower than 3 of their family number (10.7%), 76 respondents had ranges of 4-6 of their family number (42.7%). 50 respondents had ranges 7-9 peoples in the family (28.1%), ranges of 10-12 persons in a family got 26 respondents (14.6%) and more than 13 persons in the family got 7 respondents (3.9%). For the experience in oil palm farm, 11 respondents experience less than a year in oil palm industry (6.2%). 2-5 years have 39 respondents (21.9%), 6-10 years have 35 respondents (19.7%), 11-15 years have 12 respondents (6.7%), 16-20 years have 18 respondents (10.1%), 21-25 years have 3 respondents (1.7%), and more than 26 years got 60 respondents experiencing in oil palm farm (33.7%). For the spend for mechanization section, 71 respondents had spent below than RM1000 for oil palm mechanization (39.9%). 32 respondents spent about RM 1000- RM 5000 for mechanization (18%), RM 5001 - RM 10000 was voted by 5 respondents (3.4%). RM 10001 - RM 50000 is by a respondent (0.6%), RM 500001 - RM 1000000 is by 12 respondents (6.7%). More than RM 1000000 column was chosen by 2 respondents (1.1%). 54 respondents never spend for mechanization (30.3%). Respondents background showed that most of the smallholders are old with moderate education level, having a large family and they preferably spend much to support the family rather than buying mechanization for their oil palm farm.

Table 6: Farm Background

| | | Frequency | % |
|-----------------|------------------------|-----------|------|
| Farm Topography | Swampy | 99 | 55.6 |
| | Flat | 71 | 39.9 |
| | Undulating | 62 | 34.8 |
| | Hilly | 49 | 27.5 |
| Soil condition | Mineral and Sandy Soil | 53 | 29.7 |
| | Clay Soil | 32 | 18 |

| | | | |
|-----------------------|-----------|-----|------|
| | Peat Soil | 108 | 60.7 |
| Planted oil palm area | < 2 ha | 13 | 7.3 |
| | 3-5 ha | 76 | 42.7 |
| | 6-10 ha | 67 | 37.6 |
| | 11-20 ha | 10 | 5.6 |
| | >20 ha | 12 | 6.7 |
| Flood | Yes | 17 | 9.6 |
| | No | 161 | 90.4 |
| Farm Distance | <5km | 124 | 69.7 |
| | 6-10km | 48 | 27 |
| | 11-15km | 3 | 1.7 |
| | >16km | 3 | 1.7 |

Based on Table 6, the farm topography consists of swampy, flat, undulating, and hilly topography. 99 respondents had swampy topography (55.6%), flat 71(39.9%), undulating 62(34.8%), and hilly 49(27.5%). For the soil condition, 53 respondents with mineral and sandy soil (29.7%). 32 respondents with clay soil (18%), and 108 respondents with peat soil (60.7%). For planted oil palm area, 13 respondents plant less than 2 ha (7.3%). 76 respondents planted 3-5 ha (42.7%). 67 respondents planted oil palm for 6-10 ha (37.6%). 10 respondents planted at for 11-20 ha (5.6%), and 12 respondents planted for more than 20 ha (6.7%). 17 respondents (9.6%) claimed there is the flood in the rainy season and 161 respondents (90.4%) claimed that there is no flood in the rainy season. For farm distance column, in the range below than 5km, there are 124 respondents (69.7%), 6-10km there are 48 respondents, 11-15km there were 3 respondents (1.7%), and more than 16km respondents there were respondents (1.7%). Most of the respondents having a swampy farm topography with a moderate scale of farm area. This showed difficulties in implementing mechanization in their oil palm farm.

Table 7: Correlation analysis for Attraction Factor in Implementing Mechanization

| | | Economy | Geography | Government Scheme | Knowledge | Perception |
|-------------------|---------------------|---------|-----------|-------------------|-----------|------------|
| Economy | Pearson correlation | 1 | 0.134 | 0.314 | 0.087 | 0.426 |
| | Sig. (2-tailed) | | 0.750 | 0.000 | 0.250 | 0.000 |
| Geography | Pearson correlation | 0.134 | 1 | -0.014 | 0.075 | 0.107 |
| | Sig. (2-tailed) | 0.075 | | 0.850 | 0.322 | 0.154 |
| Government Scheme | Pearson correlation | 0.314 | -0.041 | 1 | 0.131 | 0.415 |
| | Sig. (2-tailed) | 0.000 | 0.850 | | 0.081 | 0.000 |
| Knowledge | Pearson correlation | 0.087 | 0.075 | 0.131 | 1 | -0.050 |
| | Sig. (2-tailed) | 0.025 | 0.322 | 0.081 | | 0.510 |
| Perception | Pearson correlation | 0.426 | 0.107 | 0.415 | -0.050 | 1 |
| | Sig. (2-tailed) | 0.000 | 0.154 | 0.000 | 0.510 | |

Based on Table 7, in attraction factor, the economy showed a positive and significant p-value for government scheme (0.000) and perception (0.000). The economy has positive but not significant value for geography (0.750), and knowledge (0.250). this showed that Geography had a positive relationship with all the others. Government scheme showed a positive and significant p-value for the economy (0.000) and perception (0.000) and having a positive relationship but not significant to the knowledge (0.081). But government scheme had a negative and not significant p-value with geography. Knowledge showed a positive and significant p-value for the economy (0.000). Knowledge has positive but not significant value for geography (0.750), government scheme (0.081), and perception (0.510). Perception showed a positive and significant p-value for the economy (0.000) and government scheme (0.000) and having a positive relationship but not significant to the geography (0.154). But perception had a negative and not significant p-value with knowledge. From the table of attraction factor (Table 7), it showed that with the support from the government in financing, it will increase the economy and encourage the smallholders to implement the mechanization.

Table 8: Correlation analysis for Repulsion Factor in Implementing Mechanization

| | | Economy | Geography | Government Scheme | Knowledge | Perception |
|-------------------|---------------------|---------|-----------|-------------------|-----------|------------|
| Economy | Pearson correlation | 1 | 0.451 | 0.227 | -0.113 | 0.531 |
| | Sig. (2-tailed) | | 0.000 | 0.002 | 0.132 | 0.000 |
| Geography | Pearson correlation | 0.451 | 1 | 0.410 | -0.026 | 0.501 |
| | Sig. (2-tailed) | 0.000 | | 0.000 | 0.728 | 0.000 |
| Government Scheme | Pearson correlation | 0.227 | 0.410 | 1 | 0.198 | 0.390 |
| | Sig. (2-tailed) | 0.002 | 0.000 | | 0.008 | 0.000 |

| | | | | | | |
|------------|---------------------|--------|--------|-------|--------|--------|
| Knowledge | Pearson correlation | -0.113 | -0.026 | 0.198 | 1 | -0.074 |
| | Sig. (2-tailed) | 0.132 | 0.728 | 0.008 | | 0.329 |
| Perception | Pearson correlation | 0.531 | 0.501 | 0.390 | -0.074 | 1 |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.329 | |

Based on Table 8, in repulsion aspect, the economy showed a positive and significant p-value for geography (0.000), government scheme (0.002) and perception (0.000). The result showed that the repulsion factor of showed correlation with the economy, government scheme, and perception. The economy has negative and not significant value for knowledge (0.132). Geography had a positive and significant relationship to the economy (0.000), government scheme (0.000) and perception (0.000). Geography has negative and not significant value for knowledge (0.728). Government scheme showed a positive and significant p-value with all another factor. Perception showed a positive and significant p-value for the economy (0.000), geography (0.000), and government scheme (0.000). Perception has negative and not significant value for knowledge (0.329). It showed that varieties of topography in a farm is not economical for smallholders to implement mechanization. Besides, there is a lack of government policy on mechanization. It discourages the smallholders to implement mechanization in their farm. Knowledge showed a positive and significant p-value for government scheme (0.008). Knowledge has negative and not significant value for the economy (0.132), geography (0.728), and perception (0.329). It showed that the government is one of the medium for the smallholders to gain knowledge.

Table 9: Chi Square Analysis of Attraction

| Spend for mechanization | Economy | Geography | Government Scheme | Knowledge | Perception |
|-------------------------|---------|-----------|-------------------|-----------|------------|
| p-value | 0.146 | 0.709 | 0.736 | 0.704 | 0.037 |

The p-value showed that the economy (0.146), geography (0.709), government scheme (0.736), knowledge (0.704), perception (0.037). Only the perception factor that was statistically significant with the expenditure incurred for implementing the mechanization in oil palm plantation. The result showed that the respondents will spend on mechanization based on their perception of the performance of mechanization in their farm. Therefore, the smallholders should be exposed to the knowledge and benefits of mechanization.

Table 10: Chi Square Analysis of Repulsion

| Spend for mechanization | Economy | Geography | Government Scheme | Knowledge | Perception |
|-------------------------|---------|-----------|-------------------|-----------|------------|
| p-value | 0.000 | 0.011 | 0.380 | 0.546 | 0.827 |

The p-value showed that the economy (0.000), geography (0.011), government scheme (0.380), knowledge (0.546), perception (0.827). The factor of economy and geography was statistically significant with the cost of mechanization. This result showed that most of the respondents had financial constraints to implement the mechanization in their oil palm farm. Geography also statistically significant with the cost involved for mechanization. The farm which located in hilly and swampy area discourage the respondents to implement the mechanization. The innovation of the mechanization cannot access all the road in oil palm farm. This lead to the refusal in implementing mechanization in their oil palm farms.

CONCLUSION

The outcomes of this research can be concluded that the implementation of mechanization in oil palm plantation by the smallholders are still at a moderate level. It showed that respondents will spend on mechanization based on their perception of the performance of mechanization in their farm. And they had financial constraints to implement the mechanization in their oil palm farm. The limited access of the mechanization in the farm discourage the respondents to implement the mechanization. The innovation of the mechanization cannot access all the road in oil palm farm. Without a full commitment from smallholders, which is one of the important community in oil palm sector, implementation of mechanization cannot be achieved. Thus, the nation cannot increase the productivity of oil palm per hectare and highly dependent on foreign labor. This contributed to a stagnant productivity which Malaysia will remain the same in the productivity per hectare. This scenario indicates that they are already aware and willing to practice the system, but due to repulsion factors such as economic and geography, they refuse in taking the risk to implement the mechanization. Therefore, to achieve the NAP4, the government needs to review the policy of encouragement to implement the mechanization in oil palm plantation such as subsidy and incentives for the oil palm smallholders. There must be more incentives to the new innovation of mechanization. They should be user-friendly to attract the smallholders to use them. Besides, the smallholder's concern also must be a part of the policy as smallholders are one of the important oil palm growers.

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