

IMPLEMENTATION OF CROP INTEGRATION WITH OIL PALM UNDER GOVERNMENT ASSISTANCE SCHEME BY OIL PALM INDEPENDENT SMALLHOLDERS (OPISH) IN MALAYSIA

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Abstract: *Crop integration with oil palm is one of the alternatives to encourage oil palm independent smallholders (ISH) to optimise their land use and increase farm productivity. The main purpose of crop integration with oil palm is to diversify source of income of the ISH through optimum utilisation of land and natural resources available in the oil palm area. Therefore, this study to identify the types of crops preferred by smallholders and their purpose towards practicing crop integration, also helps to investigate the smallholder's intention to practice crop integration in the near future. Data was collected by face to face interview assisted by a prepared questionnaire, then followed by field observation. Based on the findings, 79.6% of respondents are willing to continue planting crops integrated with oil palm in their farms. Nevertheless, 56.3% respondents have insufficient capital, which is one of the main obstacles in implementing crop integration. This issue needs to be addressed to ensure that crop integration practices will continue to be alternative source of income for smallholders in the future. A total of 67.7% of respondents have chosen banana as the crop to be integrated with oil palm, followed by pineapple and papaya. They prefer to sell the yields, instead of using them for their own consumption. Overall, the income derived from this scheme was estimated to be ranging from RM200 to RM600 per hectare per month, depending on the types of crops. The participants were satisfied with the competency of the extension agents.*

Keywords: *Crop Integration, Oil Palm, Oil Palm Independent Smallholder*

Introduction

Oil palm is a major commodity sector which contributes the most to the Malaysian economy and export earnings. In Malaysia, oil palm planting utilises about 77% of the agricultural land or about 15% of the total land area. However, the oil palm industry is dominated by plantation companies which are the main players in the industry. Other than that, independent smallholders exert a great influence on the oil palm industry, covering almost 16.7% of oil palm planted areas in Malaysia (MPOB Statistic, 2020) despite the domination by big plantation companies. Smallholders' livelihood and income are highly dependent on natural resources with limited social and economic capacity to adapt, especially with unpredictable weather and other extreme conditions (Dou *et al.*, 2020). Oil palm is a crop that fits well with smallholders because it is one of the most financially productive of all vegetable oil crops and is able to provide consistent income throughout the year. However, prices of agricultural commodities are very volatile and have impacted smallholders the most, especially to those who depend mostly on oil palm for their income (Khasanah *et al.*, 2020). A study by Zakaria *et al.* (2020) revealed that the average income of independent smallholders was still low, at about RM700 per month. Thus, most of the smallholders still face poverty and food insecurity issues (Silva *et al.*, 2020). Without support from the government or other agencies, they will remain undeveloped. In order to secure independent smallholders, remain sustainable and competitive, they must be developed in groups or cluster. It is also essential to equip them with relevant knowledge and skill, especially in good agriculture practices (GAP). An empirical study by Slingerland *et al.* (2019) found that independent smallholders should go for crop integration as the best solution to stabilise and diversify their sources of income. Crop integration is widely mentioned as one of the activities that smallholders can carry out to increase income. (FAO, 2011 and Faridah, 2001). In conjunction with that, under Eleventh Malaysian Plan, the government has allocated fund for Crop Integration Scheme through Malaysian Palm Oil Board (MPOB), to encourage independent smallholders to optimise their land use and increase farm productivity through integrating crops with oil palm.

Literature Review

Recently, crop integration with oil palm has received an overwhelming attention among researchers (Slingerland *et al.*, 2019 and Khasanah *et al.*, 2020). Previous researchers conceptualised crop integration as crop diversification (Pfeifer *et al.*, 2009), mixed farming (Faridah, 2001), and polyculture (Feliciano, 2019). Crop integration is one of the diversified systems, which allows smallholders to limit the use of agricultural inputs through a development process (Asai *et al.*, 2018). Crop integration is one of the most successful ways of reducing uncertainties in the income generation of smallholders, especially among the poor (Silva *et al.*, 2020). Khasanah *et al.* (2020) stated that the integration of oil palm with cash crops will help smallholders to reduce the social and economic risks of depending on single crops only. Through crop integration, smallholders were given an alternative for increasing income and food security thus, improving their standard of living (Kiru, 2014). Makate *et al.* (2016) observed that through crop integration, farmers were able to increase their household income. For example, a study in West Africa by Douchamps *et al.* (2015) revealed that crop integration increased household income earnings from 360 to 640 USD, while integration with livestock could increase household income earnings from 990 USD to 1,040 USD, respectively.

Crop integration also helps to generate a higher economic efficiency by reducing production costs and risks (Russelle *et al.*, 2007; Wilkins, 2008). A previous study on crop integration with oil palm proved that through systematic management, it could help to reduce farm maintenance cost, especially the labour cost (Chavas and Holt, 1990). Faridah (2001) revealed that crop integration is one of the successful ways in optimising the use of existing resources for

maximising income. However, crop integration is dependent on the size of landholding, quantities of fertiliser, distance to the market, tillage time, and tillage method (Feliciano, 2019). According to Arifa and Shahriar (2016), the involvement of farmers in implementing crop integration is also influenced based on the area of land owned by farmers. Furthermore, in choice of crops, the smallholders have a wide range to select depending on the soil type, rainfall and hour of sunshine (Basir, 2005).

A study by Zaimah *et al.*, (2017) on the willingness of smallholders in Johor to continue crop integration in oil palm showed that most of them indeed intended to continue the practice in oil palm in the future. The increase in income of smallholders has been determined as the main factor which influences the intention. At the same time, the government's commitment and dedication to encourage for the integration project are a major driver of crop oil palm integration. However, the implementation of oil palm integration has various challenges, such as the lack of capital and land resources (Shafirul *et al.*, 2015; Zaimah *et al.*, 2017). Basir (2005) also supports the statement and emphasizes that constraints of implementing crop integration are the difficulty of obtaining workforce resources, lack of skills and knowledge required to optimize the system. According to FAO (2011), the smallholders need to have sufficient knowledge, asset and input to implement the crop integration.

In this study, we examined independent oil palm smallholder farmers who are not an employee but are directly related to a government agency that is responsible for the growth, development, and innovation related to the palm oil industry. The aims of this study are to identify the types of crops preferred by smallholders and their purpose towards practicing crop integration. This study also helps to investigate the smallholder's intention to practice crop integration in the near future.

Methodology

In this study, the respondents are ISH who have participated in the Crop Integration Scheme implemented by the MPOB between 2016 to 2017. A total of 285 farmers voluntarily participated in this survey. Number of samples was calculated based on Krejcie and Morgan (1970).

Data was collected using a questionnaire which comprises three sections. Respondents were interviewed face to face in order to obtain all the information needed. Section A are questions on demographic information, which include age, gender, status farmers, ethnicity, education, and farm management experience. Section B are questions on farm information and income generated by the respondents. For the Section C, respondents needed to indicate their agreement or disagreement on a 5-point Likert scale ranging from 1 = strongly disagree, to 5 = strongly agree on their intention and perception towards crop integration. The items used to measure intention were adopted from Ahmed *et al.* (2017) and items to measure perception towards crop integration were adopted from Zulkifli *et al.* (2018). The data was analysed using SPSS version 23.0. Descriptive statistics such as frequency, percentage, and mean were used to describe and analyse data on the respondents' background. Results were translated into graphs and tables, followed by a discussion that further elaborates the result obtained.

Result and Discussion

Demographic Data

Table 1 shows the respondents' demographic. From the demographic data, most respondents are Malays (48%), Chinese (44%), Indians (1.6%), and other races (6.4%). Meanwhile, based on the age category, it was found that a majority of the respondents are more than 50 years old,

while the remaining 18.7% are within the age categories of 41–50 years old, 5.1% between 31–40 years old, and 4.3% are less than 30 years old. The mean age of respondents is 53.7, which shows that the respondents are relatively old. This in line with the findings by Tan *et al.* (2019) and Awang *et al.* (2017), who reported that the average age of smallholders in Malaysia is between 50 to 55 years old.

Most farmers (47.2%) reported having completed secondary level education, 34.9% completed primary education, 8.5% graduated from college/university, and 8.1% had no formal of education. The literacy level of the respondents could affect their choice of inputs and their willingness to adopt the latest technologies (Amejo *et al.*, 2018). A study by Mkuhlani *et al.* (2018) among smallholders in Zimbabwe revealed that highly educated smallholders show competent skills in increasing productivity while minimising external input.

In term of smallholders' status, most of them are full-time farmers (73.6%) and the rest are part-time farmers (26.4%). In term of experience in oil palm cultivation, 38.3% of respondents have had between 1–10 years of experience, 24.7% between 11–20 years, 21.7% between 21–30 years, 11.1% between 31–40 years, 2.1% with more than 40 years, while 2.1% of respondents had with no experience in oil palm cultivation.

Table 1: Respondents' Demographic

Ethnic	Frequency	Percent (%)
Malay	113	48
Chinese	103	44
Indian	4	1.6
Other	15	6.4
Age category		
< 30 years	10	4.3
31-40 years	12	5.1
41-50 years	44	18.7
> 50 years	169	71.9
Education level		
Primary school	82	34.9
Secondary school	111	47.2
College/ Universities	20	8.5
Informal education	19	8.1
Other	3	1.3
Status smallholders		
Full-time	173	73.6
Part-time	62	26.4
Experience in oil palm cultivation		
No experience	5	2.1
1-10 years	90	38.3
11-20 years	58	24.7
21-30 years	51	21.7
31-40 years	26	11.1
>40 years	5	2.1

Varieties of Crop Planted & Purpose of Practicing Crop Integration

Table 2 shows the types of crop planted by respondents. The majority respondents chose banana (67.7%) as the crop to integrate with oil palm, followed by pineapple (13.6%), and papaya (8.1%). Banana cultivation has evolved substantially with the people and has been part of their daily diet whether consumed fresh, cooked, or processed. The market for fresh consumption of banana has been increasing due to the increase in per capita consumption resulting from an increase in population (Siti and Ahmad, 2019). Based on report from the Department of Statistics Malaysia, in 2017, the per capita consumption (PCC) of banana was the second highest after coconut, which was 10 kg per year, followed by pineapple with 7.6 kg per year. Meanwhile, pineapple also is potentially a good crop for integration with oil palm (Soo-Fen *et al.* 2019). The Malaysian pineapple industry has been growing rapidly with an increase of 60% of export from the RM343mil recorded in 2018 (Shah, 2020). In the choice of crops, the smallholders have a wide range to select depending on the cost of input, market condition of the product and other factors of production to ensure that smallholders get a lucrative return

Table 2 shows that most respondents preferred to sell their harvested crops (85.5%) compared to own consumption (14.5%). Respondents that practice crop integration for their own consumption are mostly the from rural area of Sarawak and Sabah. The reason is due to the difficulty faced by the smallholders to sell them at a reasonable price since the market is very limited and they produce in small volume.

Table 2: Types of Crop Planted & Purpose of Practicing Crop Integration

Type of crop	Frequency	Percent (%)
Banana	159	67.7
Pineapple	32	13.6
Papaya	19	8.1
Vegetable	16	6.8
Dry paddy land	4	1.7
Sugarcane	2	0.9
Ground nut	2	0.9
Maize	1	0.4
Main purpose integration		
Own use	34	14.5
Sell	201	85.5

Table 3 illustrates the profit gained by the individual smallholders per hectare per month based on the type of crops. Results showed that respondents who planted pineapple had the highest income with a total of RM600 per hectare, followed by banana with RM483 per hectare, papaya with RM454 per hectare, and groundnut with RM430 per hectare. Pineapple is one of the best options for those who are interested in practicing crop integration with oil palm. Jaji *et al.* (2018) highlighted that credit access, varieties, distance to the market, cost of inputs, price, and extension services are among the factors affecting the pineapple market supply in Johor.

The table also shows the total cost by types of crop per hectare, which comprises the costs of land preparation, materials, and labour. The results showed that pineapple has the highest production cost, followed by papaya, banana, and other crops.

Table 3: The Average Profit Per Hectare Per Month by Types of Crop

Type of crop	Maturity/ Productivity period	Revenue (RM)	Cost (RM)	Profit (RM)	Profit/month (RM)
Pineapple	15	20,000	11,000	9,000	600
Banana	24	19,600	8,000	11,600	483
Papaya	12	15,950	10,500	5,450	454
Ground nut	4	5,000	3,281	1,719	430
Maize	3	6,600	5,500	1,100	367
Sugarcane	21	9,000	3,500	5,500	262
Vegetables	4	6,000	5,000	1,000	250
Dry paddy land	6	2,400	1,200	1,200	200

Extension Agents' Competencies

This information is important for the agency to evaluate the effectiveness of the scheme, which includes the allocation, quality and distribution of inputs, services, and policies that have been formulated. In this study, a 5-point Likert scale was employed to indicate the level of agreement to all indicators (1- strongly disagree to 5- strongly agree). The mean values of the studied variables were further categorised into three levels which are low, moderate, and high. The mean value is considered “weak” if it is between 1.00 to 2.33; mean values between 2.34 to 3.67 are categorised as “moderate,” and a mean value between 3.68 to 5.00 is considered as a “high” level of response.

Figure 1 shows the scores that measure respondents' perception of the extension agents' competencies is as follows: respondents are satisfied with the guidance and advice provided by extension agents (4.01), the extension agents are helpful in the application process (4.00), the extension agents/officers are honest and trustworthy with their duties (4.02), and lastly, the extension agents/officers have wide experience in the field of oil palm integration and cultivation (3.70). The results are in line with the findings by Awang *et al.* (2017), stating that the most important skill an extension agent should acquire for transferring technology knowledge effectively is the ability to communicate with the smallholders.

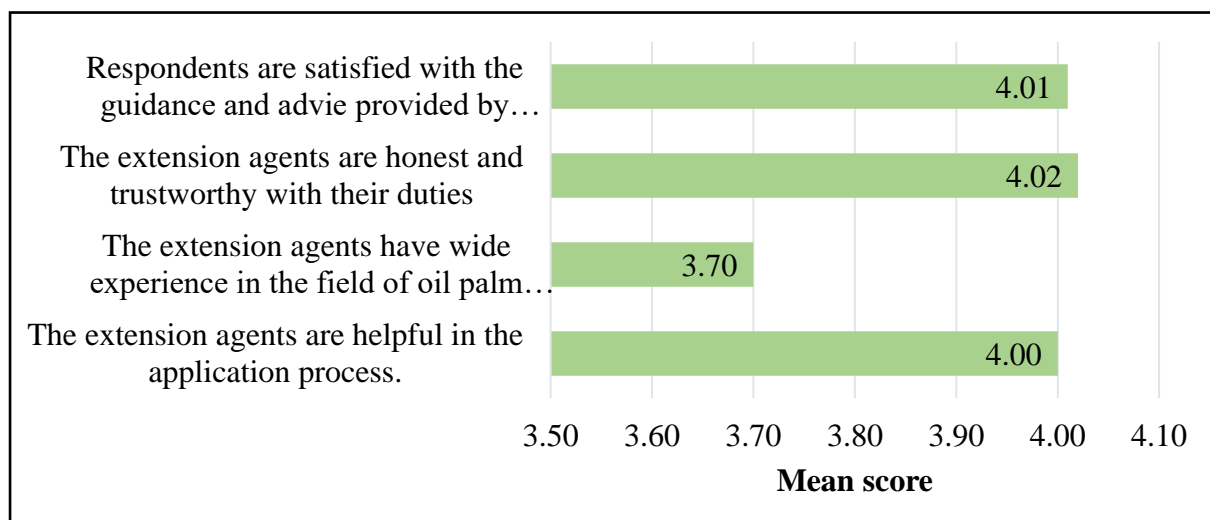


Figure 1: The Scores That Measure Respondent's Perception of The Extension's Agent's Competencies

Intention to Continue Crop Integration

Figure 2 provides the responses from statements aimed at determining respondents' intention to continue the crop integration practice with oil palm. A majority of respondents or 79.6% of them agreed to continue the crop integration. This is because through crop integration, smallholders would be able to increase and diversify their household income, and their standard of living would also increase (Makate *et al.*, 2016). Meanwhile, 20.4% of respondents refused to continue crop integration in the near future. It was observed that the lack of knowledge, skills, and experience would prompt individuals to give up easily from practicing crop and livestock integration (Peterson *et al.*, 2020). The obstacles of implementing crop integration in oil palm farms include insufficient capital (56.3%), difficulties of obtaining seedlings, and the lack of knowledge (16.7%).

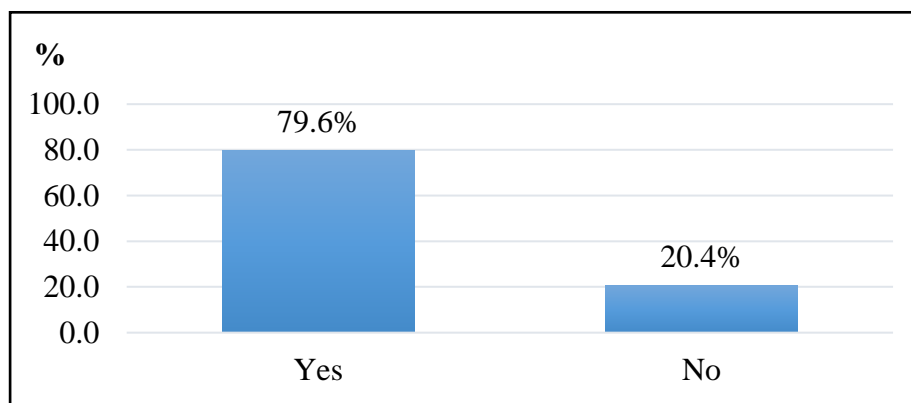


Figure 2: Intention of Respondents to Continue the Crop Integration in the Future

Conclusion

Most respondents have chosen banana as a potential crop to be integrated with oil palm, followed by pineapple and papaya. They preferred to sell the crop yields rather than using for their own consumption. Some respondents refused to sell their harvested crops because of the difficulty to get a reasonable price. Overall, the income derived from the crop integration ranged from RM200 to RM600 per hectare per month depending on the type of crops. Planting pineapple generated the highest income, followed by banana and papaya. This study also found that the majority of respondents was satisfied with the extension services provided. The result also showed that crop integration is relevant to smallholders and has benefited them. The majority of respondents agreed to continue with the implementation of crop integration in the future. Through this study, it was found that insufficient capital was the main obstacle against practicing crop integration with oil palm.

The study has identified the impact of the crop integration with oil palm and the obstacles in the implementation of crop integration with oil palm. Therefore, based on the findings of this study, the government can improve the implementation in upcoming projects on crop integration. The extension services provided by the extension agents can also be improved to educate and motivate farmers towards productive and profitable farming practices.

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