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Influence of Knowledge, Attitude and Skill on Good Agriculture Practices of Seedling Assistance Scheme Participant toward Oil Palm Production in Sabah and Sarawak

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ABSTRACT

Oil palm industry has contributed significantly to the Malaysian economy. In both Malaysia and Indonesia, about 35%-40% of oil palms were planted by the smallholders, which produced an average of 33% from the total production of crude palm oil. Under the 9th Malaysian Plan (2006-2010), a grant amounted RM37.6 million in the form of good quality of oil palm seedling have been allocated to 5697 smallholders through Oil Palm Seedling Assistance Scheme (SBABB) implemented by Malaysian Palm Oil Board (MPOB). Previous study showed that only 10% of SBABB participants produced fresh fruit bunch (FFB) up to 10 t/ha/yr, while others produced less than this yield. Thus, this study was to investigate the level of Knowledge, Attitudes and Skill (KAS) towards GAP among the SBABB participants. This study was carried out in Sabah and Sarawak and the data were collected from a total of 180 respondents selected through Simple Random Sampling Method. They were interviewed using five section structured questionnaires. Most smallholders were between 48-59 years old and they had medium knowledge and skill in operating their farms. Majority of them owned between 1-7 ha of farm. In term of yield, majority respondent produced FFB between 10-20 t/ha/yr, which was lower than the average production of 20 t/ha/yr. The results also showed that 65% change in FFB production was affected by seven factors, five of which were positively correlated with production. These five factors were farm size, followed by farm management knowledge, farm operation skills, perception towards SBABB itself and perception toward MPOB as implementer agency. These factors were important determinants to enhance the farmers' yield. The study indicated that farm size, knowledge and skill were important determinants affecting the implementation of GAP among the participants of SBABB.

Keywords: good agriculture practices, oil palm, FFB, attitude, knowledge, skills.

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INTRODUCTION

The oil palm industry is the Malaysia's key socio-economic driver that has successfully eradicated poverty and provided direct employment. In 2018, the total oil palm planted area reached 5.85 million hectares, an increase of 0.7% from 5.81 million hectares recorded in 2017 (Kushairi, 2019). The expansion growth rate on oil palm planted areas was slowly decreasing, mainly due to limitations in suitable arable land and coupled with other issues including labour shortage. In addition, the Malaysian oil palm industry is also currently facing strong pressure from non-government organisations (NGO) against any further clearing of tropical forest land to plant oil palm. Furthermore, the restriction on getting foreign labour has become a national issue.

Smallholders are important sector in the oil palm industry supply chains. In the two major producing countries such as Malaysia and Indonesia, smallholders accounted for 35% to 40% of the total oil palm planted areas and contributed as high as 33% of the outputs (Vermeulen, 2006). In the Malaysian oil palm industry, independent smallholders (ISH) contributed 17% of landholding from the total of 5.85 million hectares of oil palm planted area (MPOB, 2019). However, independent smallholders always associated with various issues, including low yield, insufficient capital and uneconomical landholding, which restraint their maximum productivity.

In order to sustain them and to be competitive with other sectors, the 9th Malaysian Plan (2006-2010) has allocated RM37.6 million grants to implement the Oil Palm Seedlings Assistance Scheme (SBABB) (EPU, 2008). The aim of the scheme is to upsurge output and earnings of independent smallholders through cultivation of good quality oil palm seedlings. Furthermore, the scheme also encourages smallholders to plant oil palm in Sabah and Sarawak.

The scheme had benefited 5697 independent smallholders in Malaysia. The eligible participants are independent smallholders with land holding not more than five hectares in Peninsula and seven hectares in Sabah and Sarawak. For participants with a land area of more than five hectares, the maximum land areas for scheme approval were limited to 5 hectares. In the early stage of implementation, the scheme components included oil palm seedlings aged 12-14 months and a bag of 50 kg of phosphate fertiliser per hectare. Starting in September 2008, the scheme has added half a tonne of MPOB F1 compound fertilisers for each hectare.

The application of Good Agriculture Practise (GAP) is the basis for improving smallholder's productivity. Therefore, the implementation of GAP has been added to the requirement of Malaysia Sustainable Palm Oil (MSPO) certification. In general, the average fresh fruit bunch (FFB) yield produced by smallholders was between 14.0 and 18.0 t/ha/yr, slightly lesser than the national average of 18-22 t/ha/yr (*Table 1*). However, with good implementation of GAP, smallholders can achieve outstanding yield performance up to 30 t/ha/yr, as proven by the 30 tonner's club members (Idris, 2007).

Previous studies have found that attitude, knowledge, and skills are the main factors affecting production. Bergevoet (2004) found a positive relationship between attitude, goals, and objectives towards entrepreneurial behaviour and productivity increment. Azman (2013) have discussed the farmer's knowledge as an important element in developing them, especially in this challenging era. In early 1945, the knowledge approach was driven by main objectives to maximise productivity and profit. Various researchers highlighted that knowledge, attitude and skills (KAS) on agriculture are the 'fourth factor of production'.

However, the level of KAS and its influence among SBABB participants on oil palm production were still lacking in Malaysia. The main objective of this study was to elucidate the relationship between knowledge, attitude, and skill of SBABB participants on GAP in oil palm production.

LITERATURE REVIEW

Ismail (2002) indicated that the average FFB yield of oil palm has increased from 5.3 t/ha/yr at the age of three years to 21.6 t/ha/yr at the age of eight years. The average FFB yield reached the maximum of 23.3 t/ha/yr at the age of 13 years after planting. Thereafter, the FFB yield decreased gradually to 18.1 t/ha/yr at the age of 25 years, followed by 17.1 t/ha/yr and 13.1 t/ha/yr at the ages of 30 and 35 years after planting, respectively. In conclusion, oil palm trees exceeding 25 years have low productivity.

In the smallholder's sector, the productivity of oil palm was affected by several factors such as agriculture extension, financial, soil type, climate factors and farming practices (GAP). Advancement in oil palm planting technologies has been made since 25 years ago. Furthermore, these technologies in oil palm planting have been documented as guidelines to be followed by smallholders to improve productivity in the coming years. According to Akkaya (2006), GAP is a set of principles that brings harmlessness and health to food and non-food agricultural

TABLE 1. OIL PALM FFB YIELD OF INDEPENDENT SMALLHOLDERS (2012-2018)

Region	FFB yield (t ha^{-1} yr^{-1})						
	2012	2013	2014	2015	2016	2017	2018
Peninsular	18.87	19.14	18.49	17.57	14.29	17.74	17.11
Sabah	18.52	15.49	15.42	16.10	14.47	14.88	15.72
Sarawak	16.82	17.84	18.49	17.87	17.32	17.90	17.54
Malaysia	18.53	18.21	18.00	17.33	16.12	17.19	16.90

Source: MPOB (2019).

production processes while considering economic, social and environmental sustainability. GAP can be applied to a broader range of farming systems, of varying scales. They are applied through sustainable agricultural methods, such as integrated pest and fertiliser management agriculture.

In the case of independent smallholders in Malaysia, MPOB has introduced GAP certification as the first step for independent smallholders to adopt sustainable oil palm managements before participating in more stringent certification in the near future. Through GAP certification, smallholders were only required to comply for at least 23 requirements from a total of 27 requirements (Nurhanani, 2016).

To increase independent smallholders' adoption of sustainable palm oil practices, MPOB has introduced the Sustainable Palm Oil Industry Cluster (SPOC). The main objective was to group smallholders into a manageable group to facilitate the implementation of development program, thereby increasing productivity and income. Two main activities of SPOC are improving the adoption of GAP and establishing smallholders' cooperative. As certification requires smallholders to adhere and adopt the GAP, it is estimated that the FFB yield will increase by at least 30% from the present productivity within three years (Nurhanani, 2016).

Fertiliser is the most important contributor to the sustainability and profitability of oil palm smallholders, particularly when commodity prices are uncertain (Goh *et al.*, 2009). Application of fertilisers is closely related to the yield achievement. Nutrients taken by oil palm will disappear after producing fresh fruit bunch (FFB). Therefore, to maintain the high FFB production, the soil nutrient must be replaced by effective manuring work. Fertiliser should be applied at recommended rate, right methods, place and timing. Fertiliser application at very dry weather or high rainfall should be avoided.

Extension work begins when there is a need to improve agricultural techniques and disseminate agricultural information within a private organisation or agricultural societies (Comer, 2006). Leagans (1964) defined an extension is a non-formal education. An important element of extension could be expressed as two-way communication between clients and sources. Technology transfer could also occur through extension work. Technology transfer is defined as an integral part or only part of the extension process, involving the disseminating of technology and technical information or know-how from information foundations or designers through those who transfer it to recipients.

Knowledge is defined as the fact or condition of knowing familiar things gained through experience or association (Shannon, 2013). It is also defined as awareness or knowledge gained by experience of a fact or condition. The acquisition of knowledge involves complex cognitive processes: perception, communication, and reasoning; while knowledge is also said to be related to the capacity of acknowledgement in human beings.

Attitudes are important determinants of human behaviours, they provide direction and purpose for behaviour and performance. In psychology, attitude is a psychological concept, a mental and emotional thing that inheres in or describes a person (Wegner, 1999). They are complex and can learn state through experiences. It is a person's predisposed state of thoughts about the value and it is triggered through a responsive manifestation concerning an individual, place, thing, or event (the attitude thing), which in turn affects person's beliefs and behaviours. Prominent psychologist Gordon Allport (1936) defined this dormant psychological concept as 'the most unique and crucial idea in modern social psychology.' Attitude can be designed from an individual's past and present. Main subjects in the study of attitudes comprise attitude forte, attitude variation, consumer behaviour, and attitude-behaviour relationships (Lynn, 2012).

A skill is the capability to perform a task with pre-determined outcomes, usually within a given extent of time, drive, or both. Skills can frequently be distributed into area-general and area-specific skills. For example, in the area of work, some general skills would include time management, cooperation and leadership, self-enthusiasm and others, whereas area-specific skills would be only valuable for a certain job. Skill regularly needs certain environmental motivations and circumstances to measure the level of skill being revealed and applied (Ryu, 2017).

METHODOLOGY

The study was carried out in Sabah and Sarawak as these two states have the highest number of SBABB's participants of almost 1803 stallholders. To determine the appropriate number of participants required in the analyses, the G-Power analysis was employed. The recommended sample size was 180 respondents. Since the population is homogeneous, this study uses a Simple Random Sampling Method in which each member in the population has an equal chance of being selected. As a result, 90 respondents were sampled in each of Sabah and Sarawak. The primary data was obtained through a face to face interview with the aid of structured questionnaires. The questionnaire was constructed into five sections, covering part A (demographic profiles), part B (personal and farm background), part C (general farm practices and behaviour on GAP,) and part D (perception toward the scheme and MPOB as the scheme implementer).

Descriptive statistics were used to analyse the data, including frequency, mean, standard deviation and cross tabulation. An analysis of variance (ANOVA) was performed to determine the differences in level of perception on SBABB and MPOB, level of knowledge, attitude and skills toward oil palm production. The Pearson Product Moment Correlation (PPMC) was used to measure the relationship between the independent variables tested towards oil palm production. The study used multiple linear regression analysis to determine the relationship between the dependent variable (oil palm production) and the independent variables (level of knowledge, attitude and skill on GAP, perception on SBABB and MPOB). The data were analysed using SPSS 20.

RESULTS AND DISCUSSION

Demographic Profiles

Most of the respondents (80.6%) were grouped into other races since they did not cite their race in the questionnaire (*Table 2*). Malays accounted for 16.7%, while Chinese accounted for only 2.8%. For marital status, it was found that the majority of the respondents were married (97.2%) and the other 2.8% were single farmers. In terms of age distribution, 27.2% of farmers aged between 48 and 59 years old. A total of 5.6% of SBABB participants were young farmers, aged between 24 and 35 years old. Educational level was one of the important characteristics of the respondent profile for evaluating the effect of knowledge towards farm management and productivity performance. In this study, the minimum educational level attained by respondents was primary school (42.8%), the highest educational level attained by farmers was college or university (4.4%). Some of farmers (17.2%) did not attend school.

Based on oil palm cultivation experience, more than half of the farmers (60.6%) experienced oil palm cultivation between 1 and 10 years, while only 3.9% of the farmers claimed they did not have any experiences in this sector. Three farmers had more than 30 years' experience in oil palm cultivation. As mentioned earlier, almost 100% of the farmers participating in the SBABB were married. Therefore, information on the number of households in each family was also included. From the analysis, it was found that most farmers (65.0%) had 1 to 4 family members, and only 2.2% of farmers had more than 10 households. Only 1.1% of farmers did not have any family members.

In this study, majority or 94.4% of the respondents were farmers who grew oil palm on their own farms. A total of 73.9% of farmers were full-time farmers, while 25.0% were part-time farmers. Status and source of income were important information presented in this study (*Table 2*). Most of the farmers (49.4%) had a monthly income between RM1000 and RM2500. Some farmers (3.3%) gained more than RM4500 per month. The study also found that 66.7% of farmers claimed that they did not have any additional income, while 33.3% of them gained additional income from various sources, but the sources were not cited. The reasons of farmers involved in oil cultivation were also assessed in this study. Of the 200 respondents, about 70.0% of farmers chose to involve in oil palm cultivation because they were interested in joining the industry. While 18.9% claimed that they have to continue the business from their elder or late family members.

Farm Background

Information of farm backgrounds are necessary to be collected as its sometime directly affected the yield performance of smallholders. In this study, only two farm information were determined and included in regression

TABLE 2. SOCIO-DEMOGRAPHIC PROFILE OF THE SBABB RESPONDENTS

Variables	Categories	Frequencies	Percentage (%)
Race	Malay	30	16.7
	Chinese	5	2.8
	Others	145	80.6
Status	Single	5	2.8
	Married	175	97.2
Age (yr)	24-35	10	5.6
	36-47	33	18.3
	48-59	49	27.2
	60-71	37	20.6
	72-83	12	6.7
	Above 84	39	21.7
Education	Not attained schooling	31	17.2
	Primary school	77	42.8
	Secondary school	64	35.6
	College/University	8	4.4
Income status (RM)	<1 000	37	20.6
	1 000-2 500	89	49.4
	2 501-3 500	43	23.9
	3 501-4 500	5	2.8
	>4 500	6	3.3
Household number	1-4	117	65.0
	5-7	50	27.8
	8-10	7	3.9
	>10	4	2.2
	No family dependent	2	1.1
Sources of additional income	No	120	66.7
	Yes	60	33.3
Why oil palm cultivation	Interest	126	70.0
	Fulfil leisure time	5	2.8
	Inheritance	34	18.9
	Others	15	8.3
Farm status	Owned	170	94.4
	Contract	2	1.1
	Both	8	4.4
Ownership status	Full time	133	73.9
	Part-time	45	25.0
	Others	2	1.1
Experience in oil palm plantation	1-10	109	60.6
	11-20	47	26.1
	21-30	14	7.8
	31-40	1	.6
	>40	2	1.1
	No experience	7	3.9

analysis, namely farm size and yield of oil palm smallholders. *Table 3* presents the essential farm background information of the SBABB respondents.

Table 3 summarises the frequency distribution of farm size and yield production data. From the table, it was found that around 88.3% of farmers owned farms with an area between 1 and 6.99 ha, while only 0.6% of farmers owned oil palm farm with an area of more than 32 ha. For the yield of fresh fruit bunch (FFB), only one farmer was able to obtain more than 30 t/ha/yr of FFB. A total of 30.6% farmers produced FFB yield less than 9.99 t/ha/yr. Most of the respondents (59.4%) produced FFB between 10 and 19.99 t/ha/yr.

TABLE 3. FARM BACKGROUND OF THE SBABB RESPONDENTS

Variables	Categories	Frequencies	Percentage (%)
Farm size (ha)	1.00-6.99	159	88.3
	7.00-11.99	12	6.7
	12.00-16.99	3	1.7
	17.00-21.99	2	1.1
	22.00-26.99	2	1.1
	27.00-31.99	1	0.6
	32.00-36.99	1	0.6
Yield (t/ha/yr)	0.0-9.99	55	30.6
	10.00-19.99	107	59.4
	20.00-29.99	17	9.4
	30.00-39.99	1	0.6

Interaction between Knowledge, Attitude and Skills (KAS), Perception of SBABB and MPOB towards FFB Yield

The independent variables of this study included the knowledge, attitude and skill (KAS), perception toward SBABB scheme and MPOB as the implementing agency. The Likert Scale was used to measure these variables and Exploratory Factor Analysis (EFA) was also conducted prior further analysis as to reduce more items in the variables. A cross-tabulation analysis for the independent variables toward yield production was conducted (*Table 4*). This study showed that the respondents with a medium perception level of SBABB scheme had higher FFB yield than farmers who claimed to have a good perception of SBABB. The result showed that 11 farmers with medium perception were grouped as higher yield categories

TABLE 4. CROSS TABULATION BETWEEN KAS, PERCEPTION TOWARDS MPOB AND SBABB AND FFB YIELD

Variables	Categories	Yield categories (t/ha/yr)		
		Lower (1.00-10.99)	Medium (11.00-20.99)	Higher (21.00-39.99)
SBABB	Poor	16	7	0
	Medium	33	52	11
	Good	6	48	7
MPOB	Poor	9	7	0
	Medium	41	51	14
	Good	5	49	4
Knowledge	Poor	1	2	0
	Medium	48	49	7
	Good	6	56	11
Attitude	Poor	13	55	5
	Medium	31	39	5
	Good	11	13	8
Skill	Poor	24	7	1
	Medium	29	66	10
	Good	2	34	7

and 52 farmers with the same level of perception were grouped as medium yield categories. In addition, the study also presented that the 16 respondents who have a poor perception of SBABB produced yield in lower category. It was also noticed that six respondents with good perception level has also produced yield in the lower category.

Respondents at medium perception levels were able to produce more FFB yield than respondents at good perceptions and poor perceptions. There were 51 respondents with medium perception in medium yield categories, and 14 respondents with the same level produced FBB in high yield categories. While, only five farmers who have good perception produced lower yield. The result indicated that respondents with at least medium perception of SBABB and MPOB as implementer will be sufficient to lead to higher oil palm yields. This is supported by a study of Theory of Reasoned Action (TRA), which stated that individual perception or belief will lead to their behaviour.
Results on knowledge showed that respondents with medium (49) and good level (56) of knowledge in oil palm cultivation mostly produced FFB yield in the medium yield categories. It was also observed that a total of 48 respondents with medium knowledge belonged to the lower yield categories. Only 11 respondents who had good knowledge in oil palm cultivation produced higher yield than the respondents with a medium (7) knowledge. There were few respondents (6) who had good knowledge, but produced yield in the lower group categories.

For different attitudes, it can be clearly seen that this variable did not really affect the respondents' production of oil palm. In general, regardless of attitude, most respondents were able to produce FFB yield between low- and medium-yield categories.

The last factor assessed by the study was the skill level of the respondents in operating their oil palm farms. It was obviously observed that respondents with medium to good skill in oil palm management were able to produce more FFB yield. There were 34 respondents with good skill produced FFB in the medium yield categories. While, 66 respondents with medium skill also produced FFB in the medium yield categories. In the lower yield categories, there were 24 respondents of poor skill farmers, 29 respondents of medium skill and only two respondents of good skill farmers.

Relationship between Independent Variables and FFB Yield

Table 5 presents the correlation analysis between independent variables and the FFB yield. Of the seven variables tested, only one variable (attitude) showed no correlation with the FFB yield produced by farmers in 2015. Six variables had significant correlation ($p<0.01$) with FFB yield produced by the respondents. The farm size ($r=0.67$) recorded the highest relationship with FFB yield, followed by knowledge ($r=0.39$) and skill ($r=0.36$) in farm management. The age of farmers ($r=-0.20$) showed negative relationship with the FFB yield.

Factors Affecting FFB Yield Production

In the present study, seven variables were chosen and used in the regression analysis to measure the factors that affect the FFB production of the SBABB respondents.

The recorded analysis showed that the adjusted R^2 was 0.65, indicating that these 7 factors could explain the 65% of yield variation among smallholders involved in this study (*Table 6*). The Durbin-Watson analysis was 0.97, which was still in the good range. The VIF value represented the multicollinearity index for each regressor. Based on the VIF value, no multicollinearity between independent variables in this study was recorded. Out of the seven regressors, only four regressors were significant ($p<0.05$). Two regressors, age and level of perception on SBABB and MPOB as the scheme implementer agency did not significantly affect farmers' yields in this study.

As mentioned earlier, the regression analysis was used to determine the factors affecting the FFB yield production. The beta value was used as the benchmark to decide which of the factors is the determinant in this model. The analysis found that the farm size was the highest beta value (0.65) recorded, suggesting this variable was the determinant factor in this study. Other determinants were skill of farmers in farm management (0.32), knowledge in farm operation (0.21) as well as the farmer attitude (0.19).

CONCLUSION

The study showed that the Program Theory Evaluation could be utilised in conceptualised the influence level of knowledge, attitude, skill level of GAP implementation on oil palm production among MPOB' SBABB participants in Sabah and Sarawak. Based on the results obtained, it could be concluded that the level of farmer's knowledge, skills and attitude in oil palm farming were still at a medium level. Independent smallholders were scattered geographically, disorganised and highly dependent on a middleman to manage their farm and send FFB to mills. Currently, the ratio of extension officer (TUNAS) to the smallholders was too big, it

TABLE 5. CORRELATION ANALYSIS BETWEEN INDEPENDENT VARIABLES AND FFB YIELD

Variables	Age	Farm size	SBABB	MPOB	Knowledge	Attitude	Skill
Yield	-.205**	.674**	.315**	.311**	.399**	.055	.364**
Age	1	-.123	-.102	-.198**	-.245**	.061	-.366**
Farm Size		1	.056	.069	.049	.108	-.048
SBABB			1	.702**	.624**	-.310**	.426**
MPOB				1	.657**	-.322**	.475**
Knowledge					1	-.382**	.615**
Attitude						1	-.359**
Skill							1

Note: ** significantly different at p<0.01.

TABLE 6. MULTIPLE REGRESSION RESULTS

Variables	Significant	Standardised beta value	VIF values
(Constant)	.000		
Age	.427	.038	1.203
Farm size	.000	.658	1.055
SBABB	.184	.087	2.209
MPOB	.823	-.015	2.382
Knowledge	.003	.210	2.449
Attitude	.000	.199	1.245
Skill	.000	.322	1.855
R^2			
Adjusted R^2 = 0.65			
Durbin Watson = 0.97			

was difficult for TUNAS to reach smallholders to disseminate the information and technologies. Therefore, it was recommended that independent smallholders to be clustered and managed by organised cooperative.

The smallholders had the same perceptions on the SBABB scheme itself and MPOB as the implementer. Finally, the analysis showed that farm size was the highest determinant factor affecting GAP on oil palm production. Other determinants were skill of farmers in farm management, knowledge in farm operation and the farmer attitude. This evaluation study on SBABB participants would give an answer on the impact of GAP implementation and it could be used to improve any program plan in the future.

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