

# **Factors Influencing the Implementation of Malaysia Sustainable Palm Oil (MSPO) Among Oil Palm Smallholders in Malaysia**

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## **Abstract**

The oil palm industry in Malaysia plays an important role in the growth of the agricultural sector in this country through its contribution to the Gross Domestic product (GDP), foreign exchange, and employment. Oil palm demands are continual increasing as it can produce high yield and low production cost. The present study aimed to investigate the factors influencing the implementation of Malaysia Sustainable Palm Oil (MSPO) among the independent smallholders in Malaysia. The result observed several socio-economic factors that can lead to the implementation practices such as smallholder's age, perceived benefits of MSPO, smallholder's education level, Cost of MSPO, knowledge towards MSPO and government support of MSPO. Empirical data shows that there is a need to introduce policies that will guide palm oil smallholders towards sustainable production in order to sustain our oil palm industries in the global market. This study reveals the factors influencing the implementation of Malaysia Sustainable Palm Oil (MSPO) among the independent smallholders in Malaysia.

## **Introduction**

The oil palm oil industry in Malaysia play a vital role in the growth of the agricultural sector through its contributing to the Gross Domestic development (GDP), foreign exchange and employment. According to World Bank 2016 database, agriculture contributes to USD21,206 million from USD 296,218 millions of total GDP. Agriculture employs 12.2% of the workforce in Malaysia. The palm oil industry is the largest agriculture sector and utilizes more than 70% of the country's agricultural land. Oil palm is the major agriculture sub-sector with 36%, followed by other agriculture products, 20.1% fisheries and aquaculture, 14.6% livestock, 13% forestry and logging and 5.5% rubber (Department of Statistic, 2013).

Oil palm (*Elaeis Guineensis*) is a tropical tree crop which is mainly grown for its industrial production of vegetable oil (Law et al, 2007). The oil palm tree in Malaysia have roots in West Africa where it was sprouting wild and later cultivated into an agricultural crop. Oil palm is a significant viable and efficient crop in many tropical regions of the world because oil palm is a typical crop grows well in rainy tropical lowlands. It is a mainstream estate crop, cultivated and harvested over large homogenous areas (Tan et al., 2009; Verheye, 2010). According to a report

from MPOB in the year 2014, one hectare of oil palm estate is able to produce up to ten times more oil than other leading oilseed crops (MPOB, 2014).

The first commercial planting of oil palm was done in 1911 at Tenammaran Estate Kuala Selangor after being brought over from Indonesia in 1871. (Sumathi et al., 2008). The development of the oil palm breeding and expansion of estate area in the 1960s, create an opportunity for an exchange programme with West African economies. This collaboration leads to the establishment of Oil Palm Generics Laboratory (MPOB, 2009).

Malaysian Palm Oil Board (MPOB) was founded following the union of Palm Oil Research Institute of Malaysia (PORIM) and Palm Oil Registration and Licensing Authority (PORLA). Its principal purposes are to conduct and promote research and development in oil palm breeding, palm oil nutrition and potential oleochemical use (MPOB, 2009). MPOB is the top research entity in Malaysia is sponsored by both public and private sectors. It dedicated to supporting the industry in maximizing output and production, expand product choices, pioneer technologies and create prospects for the Malaysian palm oil industry.

### **Issues on Palm Oil Estate**

Palm oil has been proven to be the fittest candidate among all vegetable oils as the source of biodiesel production. High yield of oil and low manufacture cost are two of the main factors that made this vegetable oil suitable in terms of economics and environment (Tan et al., 2009) However, there are negative issues concerning this crop area denting its image as an ecofriendly vegetable oil (Tan et al., 2009).

The hasty and heavy expansion of oil palm in the tropics has led to alarm over effects on, deforestation of natural habitat, extinction of biodiversity and global climate (Rist et al., 2010). Many sources stated that the damage of tropical forest due to palm oil agriculture in South East Asia pose the greatest immediate threat to the biodiversity in Southeast Asia (Fitzherbert et al., 2008). It is due to a rapid development of industrial oil palm estates, clearance of large areas upon expropriation of land and also the cutting of extensive forest areas that is needed to be carried out (Khan et al, 2009). It is shown from the magnitude of biodiversity losses associated with the process of converting forest into oil palm estate where 1,040,000-hectare of deforestation from 1990 to 2005.

The increase of oil palm estate is now one of the factors towards the extension of wild life. For example, it was informed that Sumatran Orangutans (*Pongo Abellii*) and Bornean Orangutans (*Pongo Pygmaeus*) which originate in Sumatra and Borneo Island are facing extinction owed to oil palm estate development. Orangutans rely on tropical forests for food and nesting sites. When their natural habitats are destroyed for agriculture purposes, they will have to migrate to less idyllic place. As a result, death rate rises and fewer births amongst females occur.

In current years, palm oil manufacturers exploring new estate locations have increasingly focused to peatlands, and the most common method used in clearing land for estates

producing palm oil, pulp, paper and other crops in Southeast Asia is using fire. Drained peatlands are highly flammable, and fires set in peatland can burn deep below the surface where such fires may fume for months or even years and are hard to put out. Constant deforestation and drainage of peatlands in Southeast Asia are making fire site more common and harder to control and climate change is expected to worsen this trend.

### **Sustainable Palm Oil**

Oil palm industry has been recognized for its contribution towards economic growth and rapid development. Hence it is vital that new estates are handled in a sustainable way to lower the effect of oil palm cultivation on ecosystem while capitalizing on yield and productivity (Phosri et al., 2010). International interest in sustainable agriculture needs a reevaluation of how the oil palm estates have progressed in warranting that palm oil is manufactured according to the set standards of accountable production practices. This has preceded to the founding of the Round Table of Sustainable Oil Palm (RSPO) (Basiron, 2007). RSPO developed a set of standards called Principles & Criteria (P&C) that outline the practices of sustainable palm oil production. These standards focus on the legal, economic, environmental and social necessities of producing sustainable palm oil (Aikanathan et al., 2011).

### **Issues of Smallholders**

With conspicuous environmental destruction and climate change, consumers worldwide are all stirring towards sustainable production of commodities (Connolly & Orothero, 2003). Furthermore, Indonesia (the main competitor of Malaysian oil palm) is moving towards Roundtable Sustainable Palm Oil (RSPO) (Schouten & Glasbergen, 2011). This poses a major threat towards Malaysia oil palm producers including the smallholders.

The independent oil palm smallholders sector is a small-scale production entity. Thus it is generally perceived that this sector is unproductive and inefficient as compared to the large-scale production system of the estate sector. The progress of the smallholder estate also normally linked with land tenure conflicts and issues of local and ownership (Verheye, 2010). Nevertheless, the survival of independent smallholders is vital and has played an important role in the progress of the agricultural industry in Malaysia. 40% of all palm oil estates in Malaysia are owned by smallholders, who have gained from oil palm cultivation. Palm oil has been one of the main factor in Malaysia in reducing poverty from 50% in the 1960s, down to less than 5% today where the palm oil industry is direct hiring more than 570,000 people, with another 290,000 people employed downstream (The Oil Palm, 2016).

### **Objective of the study**

The overall objective of this study is to identify the factors influencing the implementation of MSPO practices among the smallholders in Malaysia. It will look into the level of awareness towards MSPO practices, determine the level of MSPO implementation and identify the factors influencing the implementation of MSPO among the smallholders.

### **Literature Review**

#### **Sustainable Palm Oil Standard**

Roundtable Sustainable Palm Oil (RSPO) was founded to encourage sustainable agriculture and concentrate on the environment effect of the oil palm (D'antone & Spencer, 2014). RSPO certification was established by the oil palm business fraternity while Malaysia Sustainable Palm Oil (MSPO) and Indonesia Sustainable Palm Oil (ISPO) are both government initiative to assist the industry to comply with the international sustainability requirements. It represents the whole supply chain which comprises of seven core stakeholder groups from growers to large-scale estate companies, processors and traders, consumer goods manufacturers, retailers, investors, and social and environmental non-government organization (NGOs) all with equal rights and says on the executive board (Aikanathan et al., 2011).

Since 2009, Indonesia has started to surpassing Malaysia in becoming the largest producer of palm oil. This is due to support and assistant from Indonesia Palm Oil Producers Association (GAPKI) and government-sponsored Indonesia Palm Oil Board in implementing its sustainability scheme. Indonesia Palm Oil Commission has waived the fees for ISPO certification for small and medium size companies and smallholders which contribute to the 40% of Indonesia palm oil production volume (Aikanathan et al., 2011).

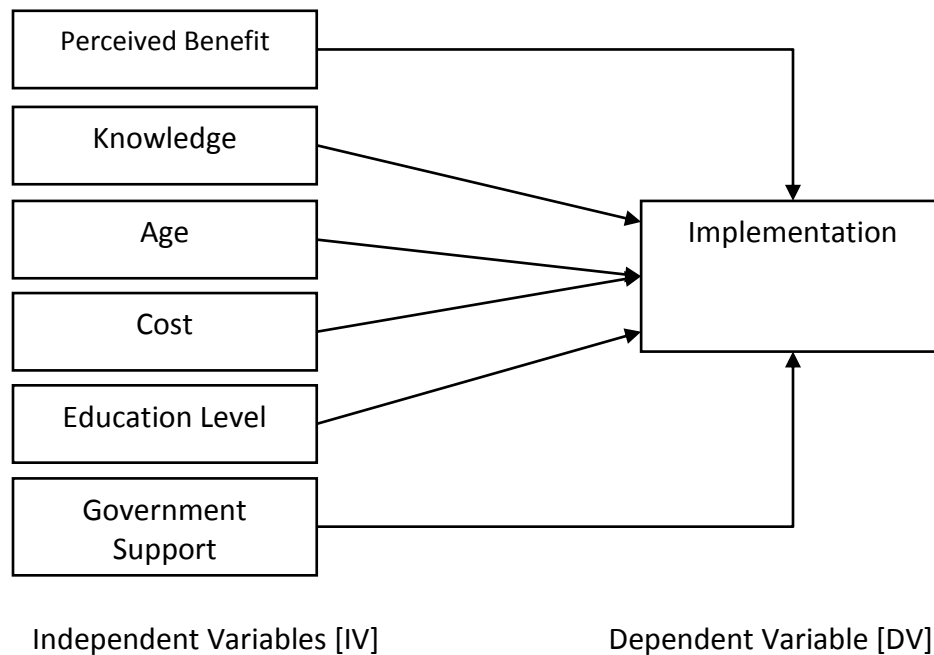
MSPO was officially announced at MPOB Palm Oil Congress (PIPOC) 2013. With the pressure on the oil palm industry to incorporate sustainability in a day to day business, it is imperative that Malaysia developed its own sustainable standard based on local agriculture and operation (MPOB, 2014). Its objectives are to reduce the environmental impact, assist buyers of MSPO in making a better purchase decision, invoke better appreciation of both suppliers and buyers and assist the independent smallholders to sustain in the global market (Singh et al., 2009).

#### **Implementation and Perception**

Implementation is the action that must follow any preliminary thinking in order for something to actually happen (Durlak & DuPre, 2008). An implementation needs to be well planned and constantly reviewed and adapted to changing conditions (Miller et al., 2009). Perception is the awareness or understanding of sensory information. An effective implementation occurs when positive perceptions and their subsequent actions occur throughout the lifecycle of the implementation. If at any stage throughout the lifecycle of an implementation has a negative perception at the individual level, it may result in low level of implementation (Miller et al., 2009).

As programs become more widely disseminated, the need to identify factors promoting or inhibiting implementation quality becomes essential (Mihalic et al., 2008). There are a lot of different factors that influencing independent smallholders to implement MSPO. Among the factors identified associated with the implementation of MSPO are stallholder’s age, smallholder’s education level, knowledge towards MSPO, perceived benefits of MSPO, cost needed for MSPO implementation and government support for MSPO.

**Framework**



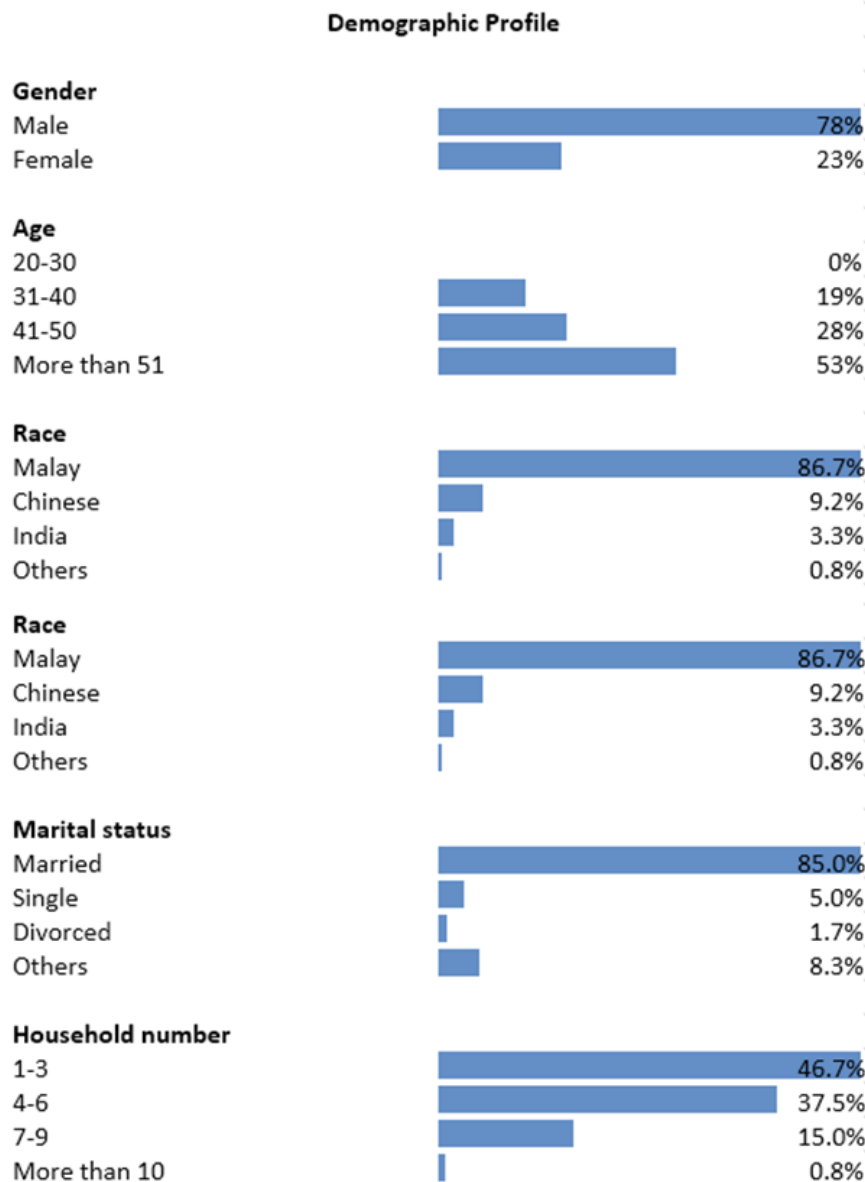
**Methodology**

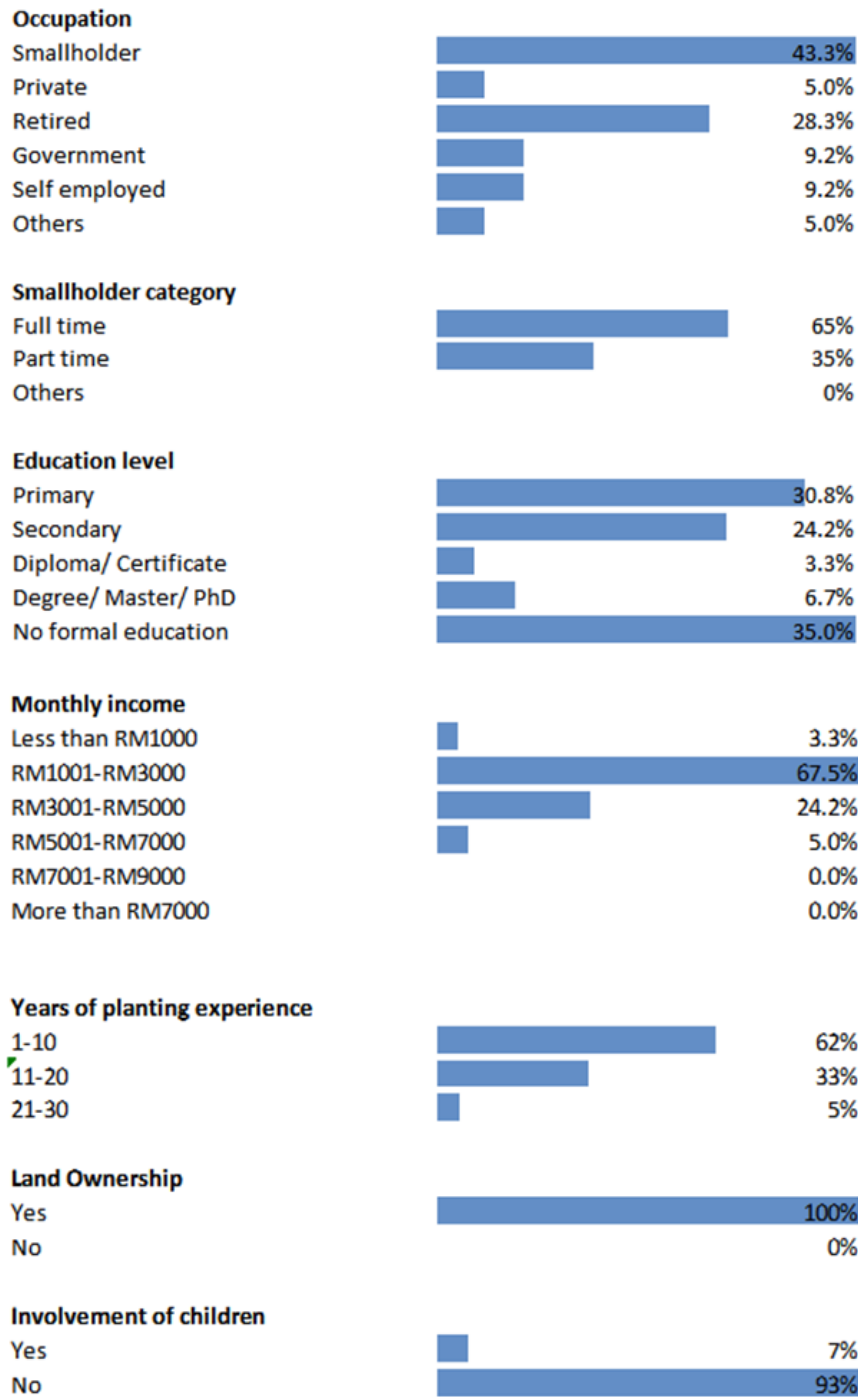
The study was carried out to the independent smallholders in oil palm industry in Selangor, Malaysia. Oil palm estates located in Pulau Indah, Port Klang, Selangor was chosen as a convenience sample. As the purpose of the study was to examine the factors influencing the implementation of MSPO among the smallholder based on empirical evidence and primary information, the study adopted a quantitative approach. A questionnaire-based survey was used to extract information from the smallholders. The number of respondents was 120. Respondents are randomly selected among the owner and employees in oil palm sector age 20 years and above from all levels of position such as oil palm estate owner, oil palm workers and oil palm collectors. Respondents were both interviewed and given a questionnaire to fill in during one month of data collection conducted from May to April 2016. The data gathered from the questionnaire survey was administered and analysed quantitatively using IBM SPSS software.

## Result and Discussion

### Demographic Profile

A total of 120 respondents were selected and demographic profile such as gender, age, race, marital status, household number, occupation, smallholder category, education level, monthly household income, years of planting experience, land ownership and involvement of children and were collected and analyst (see Figure 1).





**Figure 1:** Demographic Profile

The researcher received a better cooperation by male respondents as compared to female respondents during the interview session besides the fact the number of respondents of the male respondent is 93 out of 120 respondents compared to only 27 female respondents. Most

of the respondents' age that willing to participate is among those who are more than 51 years old is about 63 respondents and none of the respondents in age range below 30 years old. 104 respondents are Malay as the research area is nearby Malays village with only 16 respondents divert between Chinese, Indian and other race. Knowing marital status is important as it may affect the factors influencing the implementation of MSPO certificate, 102 of the respondents is married, followed by the remaining only 18 respondents is either single, divorced or the marital status is unknown. As stated above, 56 of the respondents have ranged between 1–3 household members, followed by 45 respondents who have 4–6 household members and remaining 19 have more than 7 household members.

Occupation can reveal the respondents, social class, thus helps in determine the factors influencing the implementation of MSPO certification. The majority of the respondents are among those who are smallholder and retiree which comprise of 86 out of 120 respondents with only 6 housewives while others either work with private, government or self-employed. 42 out of 120 respondents are a full-time smallholder where their monthly income depends solely on sales and production of oil palm. The majority of the respondents have only non-formal and primary school education exposure with 42 and 37 out of 120 respondents respectively, followed by 29 respondents attended secondary school and remaining 12 respondents have a higher level of education.

Respondents with a monthly income of RM1001-RM3000 is the majority in the research sample which comprise of 81 out of 120 respondents followed by 29 respondents with a monthly income of RM3001-RM5000. The monthly income might be related to years of experience in planting oil palm where the majority of the respondents with 1-10 years and 11-20 years comprises of 74 and 40 of the respondents respectively. All the respondent's interview has own oil palm estate thus indicate there is no conflict of implementing MSPO at their respective estate. The majority of these smallholders does not involve their children in managing the oil palm estate with only 8 out of 120 respondents have such arrangement with their children.

### **Knowledge on MSPO Certificate**

Beside the demographic profile information, the study also examines the respondent's knowledge towards Malaysia Sustainable Palm Oil (MSPO) certificate (see Figure 2).



<b>Knowledge about Palm Oil (MSPO) Certification and its content</b>	<b>Yes</b>	<b>No</b>	<b>Do not know</b>
<i>Do you know about sustainable palm oil?</i>	2.5%	97.5%	0%
<i>Do you know about MSPO certification?</i>	13.3%	86.7%	0%
<i>Do you know MSPO focus in people, planet and economy</i>	0.0%	3.3%	96.7%
<i>Do you know MSPO practices can increase oil palm production</i>	5.8%	1.7%	92.5%
<i>Do you know MSPO practices can increase income of smallholders</i>	15.0%	1.7%	83.3%
<i>Do you know MSPO practices bring good impact to environment</i>	15.0%	80.0%	84.2%
<i>Do you know MSPO practices can focus on worker's welfare</i>	15.0%	80.0%	84.2%
<i>Do you know process application of MSPO?</i>	0.0%	1.7%	98.3%
<i>Do you own MSPO certificate?</i>	0.0%	99.2%	0.8%
<i>Do you interest to own MSPO certificate?</i>	89.2%	10.0%	0.8%

**Figure 2:** Knowledge about Malaysia Sustainable Palm Oil (MSPO) certificate

Above finding show that the level of awareness on sustainable oil palm is still very low among the respondents in Pulau Indah, Port Klang. The respondents also shown lack of knowledge on elements of MSPO on people, planet and economy and its purposes in increasing oil palm production and income of smallholders, its impact on environment and workers welfare, and also the process of applying for MSPO certificate although they are very interested in the certification as none of the respondents owns the certificate.

**Reliability**

The study measures the factors in the implementation of MSPO certificate using 49 items in a questionnaire. The questionnaire measure reliability of 7 variables using Cronbach’s Alpha value as an index of reliability analysis to ensure validity and accuracy to the interpretation of data. The factors are that have the highest reliability is education level (0.842), followed by knowledge towards implementation of MSPO certification (0.818), government support of

implementation of MSPO (0.774), cost of implementation of MSPO (0.693), level of implementation of MSPO (0.675), smallholder age (0.664) and lastly perceived benefits of implementation of MSPO (0.645). The tested result of all variables are greater than 0.6 and thus is accepted.

### **Factor Analysis**

There are 6 factors studied in the literature review of this study which has been generated from the factor analysis. All of these factors have eigenvalues greater than 1 and accounted a total variance accumulated at 70.471% for the original 22 items as stated in the questionnaire is significant. The first factor is smallholders' age which consists of 6 sub-variables that have a total variance of 30.292%. The result shows that the elderly the smallholders, the lower the chance of implementation of MSPO. The second factor is knowledge towards MSPO implantation which consists of 4 sub-variables that have a total variance of 11.341%. It shows that the smallholders are willing to implement MSPO if they have better knowledge about it. The third factor is smallholders' education level which consists of 4 sub-variables with a total variance of 9.748%. The result shows that the higher the education level, the higher the implementation level of MSPO. The fourth factor is government support towards MSPO which consist of 3 sub-variables with a total variance of 7.257%. It indicates that respondent willing to implement MSPO if there are an assistance and support by the government. The fifth factor is cost needed to implement MSPO which consist of 3 sub-variables with a total variance of 6.788%. This result shows that the higher the cost, the lower the implementation of MSPO. The sixth factor if the perceived benefits of MSPO which consist of 2 sub-variables with a total variance of 5.045%. It indicates that the relationship that the higher perceived of benefit, the higher level of implementation of MSPO.

### **Pearson Correlation Analysis**

The study used Pearson Correlation to determine the factors influencing the implantation of MSPO certificate in Pulau Indah, Port Klang. The study shows positive correlation between independent variables of smallholders' education level (0.306), government support of implementation of MSPO (0.218), knowledge toward implementation MSPO (0.216) and perceived benefits of implementation of MSPO (0.196); and a negative correlation of smallholder's age (-0.247) and cost needed for implementation of MSPO (-0.201) with dependent variable of level of MSPO implementation. Thus, according to the strength of the correlation, all the independent variables has a small but definite relationship with the level of MSPO implementation.

### **Hypothesis Testing**

Perceived benefits and government support of implementation towards implementation of MSPO are significant for predicting toward the level of implementing MSPO. Whereas knowledge toward implementation, smallholder's age, smallholder's education level and cost needed is not significant for predicting towards the level of implementation of MSPO. Therefore, the level of MSPO implementation depends on 2 main independent variable (IV)

which is perceive benefits of MSPO implementation and also government support towards MSPO implementation.

### **Conclusion and Recommendation**

Malaysia palm oil industry has been accused of conducting unsustainable practices in developing this industry. These constant pressure might disturb the wellbeing of the industry in the future. So it is very important to implement sustainable palm oil practices in order to sustain and expand our palm oil industry in the global market.

From this study, it is clearly shown that the awareness of Malaysia Sustainable Palm Oil (MSPO) standard practice is very low among the independent smallholders. It is important to identify the factors that influencing the level of MSPO implementation for future research and policy implementation. The most influencing factors identified toward the implementation of MSPO is the perceived benefits get from the MSPO practice and the government support of MSPO implementation. Thus it is important for the government to play a more effective role as a catalyst to encourage smallholders to implement the sustainable practices. The government should also provide more awareness campaign and program to the community of independent smallholders so that they able to know more about the benefit of MSPO practices.

MPOB being the agency responsible for geared the palm oil industry in Malaysia should be more proactive in assisting independent smallholders to comply with all national regulations and recruiting more members to involve in MSPO practices. The Ministry of Agriculture and Malaysia Palm Oil Council (MPOB) should also monitor their resources and capacities to run MSPO certification in order to generate trust from the local and international stakeholder for more efficient management. Malaysia government should establish and enforce a transparent MSPO implementation mechanism to encourage more smallholders practicing towards MSPO implementation.

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### **References**

- Ador, S. F., Shafiai, M. H., & Ismail, M. A. (2014). Islamic Micro Financing For Sustainable Oil Palm Farming: Case Of Independent Smallholders. 9th PERKIM's Proceeding, 1-13. Retrieved from [http://www.ukm.my/fep/perkem/pdf/perkem2014/PERKEM\\_2014\\_1A1.pdf](http://www.ukm.my/fep/perkem/pdf/perkem2014/PERKEM_2014_1A1.pdf)
- Aikanathan, S., Chenayah, S., & Sasekumar, A. (2011). Sustainable Agriculture: A Case Study On The Palm Oil Industry. *Malaysia Journal Of Science*, 30(1), 66-75.
- Basiron, Y. (2007). Palm Oil Production Through Sustainable Plantations. *European Journal Of Lipid Science And Technology*, 109(4), 289-295. Doi:10.1002/ejlt.200600223
- Basiron, Y., & Weng, C. K. (2004). The Oil Palm And Its Sustainability. *Journal Of Oil Palm Research*, 16(1), 1-10.

- Connolly, J., & Prothero, A. (2003). Sustainable Consumption: Consumption, Consumers And The Commodity Discourse. *Consumption Market & Culture*, 6(4), 275-291. Doi:10.1080/1025386032000168311
- D'Antone, S., & Spencer, R. (2014). Concerns And Marketization: The Case Of Sustainable Palm Oil. *Concerned Markets: Economic Ordering For Multiple Values*. London: E. Elgar, 72-101. Doi:10.4337/9781782549758.00011
- Fitzherbert, E. B., Struebig, M. J., Morel, A., Danielson, F., Bruhl, C. A., Donald, P. F., & Phalan, B. (2008). How Will Oil Palm Expansion Affect Biodiversity? *Trends In Ecology And Evolution*, 23(10), 538-545. Doi:10.1016/j.tree.2008.06.012
- Khan, M. S., Zaidi, A., & Wani, P. A. (2009). Role Of Phosphate Solubilizing Microorganisms In Sustainable Agriculture – A Review. *Sustainable Agriculture*, 27(29), 551-570. Doi:10.1051/agro:2006011
- Law, K. N., Daud, W. R.W., & Ghazali, A. (2007). Morphological And Chemical Nature Of Fiber Strands Of Oil Palm Empty-Fruit-Bunch (OPEFB). *Bioresources*, 2(3), 351-362.
- Malaysia Department Of Statistic. (2013). Selected Agriculture Indicator. Retrieved From [https://www.statistics.gov.my/index.php?R=Column/Cthemebycat&Cat=72&Bul\\_Id=Bnr4zfjnbxvoqmt6tdhnmh3m0y5dz09&Menu\\_Id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09](https://www.statistics.gov.my/index.php?R=Column/Cthemebycat&Cat=72&Bul_Id=Bnr4zfjnbxvoqmt6tdhnmh3m0y5dz09&Menu_Id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09)
- Malaysia Palm Oil Board (2014) Premier Government Agency. Retrieved From <http://www.mpob.gov.my/en/about-us/about>
- Malaysia Palm Oil Council (2009). MPOC Malaysian Palm Oil Industry. Retrieved From [http://www.mpoc.org.my/malaysian\\_palm\\_oil\\_industry.aspx](http://www.mpoc.org.my/malaysian_palm_oil_industry.aspx)
- Ng, W. P. Q., Lam, H.L., Ng, F. Y. Kamal, M., & Lim, J. H. E. (2012). Waste-To-Wealth: Green Potential From Palm Biomass In Malaysia. *Journal Of Cleaner Production*, 34, 57-65. Doi:10.1016/j.jclepro.2012.04.004
- Phosri, C., Rodriguez, A., Sanders, I. R., & Jeffries, P. (2010). The Role Of Mycorrhizas In More Sustainable Oil Palm Cultivation. *Agriculture, Ecosystems And Environment*, 135(3), 187-193. Doi: 10.1016/j.agee.2009.09.006
- Rist, L., Feintrenie, L. & Levang, P. (2010). The Livelihood Impact Of Oil Palm: Smallholders In Indonesia. *Biodiversity And Conservation*, 19(4), 1009-1024. Doi: 10.1007/s10531-010-9815-z
- Schouten, G., & Glasbergen, P. (2011). Creating Legitimacy In Global Private Governance: The Case Of The Roundtable On Sustainable Palm Oil. *Ecological Economics*, 70(11), 1191-1899. Doi: 10.1016/j.ecolecon.2011.03.012
- Singh, G., Huan, L. K., Leng, T., & Weng, C. K. (2009). Sustainable Production Of Palm Oil: A Malaysian Perspective. *Persatuan Minyak Sawit Malaysia*.
- Sumathi, S., Chai, S.P. & Mohamad, A. R. (2008). Utilization Of Oil Palm As A Source Of Renewable Energy In Malaysia. *Renewable And Sustainable Energy Reviews*, 1(9), 2404-2421. Doi: 10.1016/j.rser.2007.06.006
- Tan, K. T., Lee, K.T., Mohamed, A. R., & Bhatia, S. (2009). Palm Oil: Addressing Issues And Towards Sustainable Development. *Renewable And Sustainable Energy Reviews*, 13(2), 420-427. Doi: 10.1016/j.rser.2007.10.001

- The Oil Palm (2016). Small Farmers. Retrieved From <http://Theoilpalm.Org/About/>
- The World Bank (2016). Employment In Agriculture. International Labour Organization, Key Indicators Of The Labour Market Database. Retrieved From <Http://Data.Worldbank.Org/Indicator/SL.AGR.EMPL.ZS?Locations=MY>
- Verhey, W. (2010). Growth and Production of Oil Palm. In: Verhey, W. (ed.), Land Use, Land Cover and Soil Science. Encyclopedia of Life Support System (EOLSS), UNESCO-EOLSS Publisher, Oxford, UK. Retrieved from <https://biblio.ugent.be/publication/1009126/file/6718220.pdf>
- Wilcove, D. S., & Koh, L. P. (2010). Addressing The Threats To Biodiversity From Oil Palm Agriculture. *Biodiversity And Conservation*, 19(4), 999-1007. Doi:10.1007/s10531-009-9760-x