**IMPACT OF MARKET PRESSURES ON PALM OIL SMALLHOLDERS' READINESS FOR SUSTAINABLE CERTIFICATION**

**ZANURUL HUZAIMA ZAINUDIN1**†**; FAZLIN ALI1**†**; JUWAIDAH SHARIFUDDIN1; KELLY WONG KAI SENG1; MUHAMMAD MU'AZ MAHMUD1; ZAKI AMAN2; NUR HANANI MANSOR2; NUR HANA BASARUDDIN2 AND AMER HAMZAH JANTAN3**

1*Faculty of Agriculture, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.*

2*Malaysian Palm Oil Board, 6 Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia.*

3*City University, 46100 Petaling Jaya, Selangor, Malaysia.*

\*For correspondence: fazlin\_ali@upm.edu.my

†Contributed equally to this work and are co-first authors

Received \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; Accepted \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; Published \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Novelty statement**

When studying attitudes towards sustainability certification, the impact of market pressure in the agricultural industry is rarely studied. This study investigates the impact of market pressure in understanding the relationship between attitudes towards sustainability and readiness to implement sustainability certification among smallholders of palm oil. The results indicate that market pressure has a significant effect on sustainability attitudes and the capacity to implement sustainability certification.

**Abstract**

The purpose of this paper is to investigate market pressure and attitudes toward the sustainability of palm oil smallholders, which could lead to readiness in implementing sustainability certification. Moreover, this study is also looking at the moderating role of market pressure in explaining the relationship between attitude toward sustainability and readiness to implement sustainability certification. This study collected data from 408 smallholders using a quantitative research design. Samples were chosen at random, and questionnaires were sent out to get their responses. The collected data were then analysed using PLS-SEM to test the hypotheses. The findings indicate that market pressure has a significant impact on attitude towards sustainability and readiness to implement sustainability certification. This study provides insights into how smallholders' readiness to implement sustainability certification can be improved by tapping into the awareness and knowledge of smallholders on market pressure which can influence their attitude towards sustainability. This study shall expand the literature related to attitudes toward sustainability, market pressure, and readiness for sustainability certification implementation.

**Keywords:** Attitudes towards sustainability, Market pressure, Readiness, Sustainability certification.

**Introduction**

Malaysia's natural riches include agriculture, forestry, and mining. Its economic stronghold has always been commodities, despite a shift to manufacturing in the 1980s and 1990s. As the world's population reaches 9 billion in 2050, agricultural commodities will need to grow 70%. As a result, agriculture has undergone profound change alongside other industries resulting in heightened consumer and environmental scrutiny (Kushairi *et al* 2019).

With a share of 11% of the world's cooking oils and 27% of foreign trade, Malaysia is the second-largest supplier and seller of palm oil after Indonesia. Producing this golden harvest has been very beneficial to Malaysia's economy (Nusaibah *et al* 2017). One of the most essential components in boosting this palm oil industry is the application of comprehensive agronomic principles (Azri *et al* 2018).

To meet the demand for a standardised set of sustainability principles and standards to produce verified sustainable palm oil, the Malaysian Palm Oil Board (MPOB) created a standard known as Malaysian Sustainable Palm Oil (MSPO). It represents the sustainability concerns of small and medium producers (Senawi *et al*. 2019; Shahida *et al*. 2018).

The palm oil industry supports more than 3 million smallholders and farmers worldwide, as well as employs more than half a million Malaysians and supports another million. Smallholders account for 40% of worldwide palm oil production, making them important contributors to a sustainable sector. They often lack understanding about cultivating palms and selling oil, and their yields are minimal. Smallholders produce oil palm and subsistence crops, with the family doing most of the labour and the farm providing most of the revenue.

In Malaysia, oil palm smallholders are categorised as independent or organised. Independent smallholders own or lease less than 40.46 ha of oil palm land and manage it individually or with help. As of December 2018, Malaysia has 255,615 independent smallholders with 994,022 ha, accounting for 17% of the total oil palm planted area of 5.85 million ha (Kushairi *et al*. 2019). According to Nagiah and Azmi (2012), smallholders in Indonesia and Malaysia generate 85% of the world's palm oil and account for 40% of the total planted area. Ab Rahman, Abdullah, Mohd Shariff, and Arif Simeh (2008) emphasized the significant importance of smallholders in the growth of the palm oil sector due to their cumulative magnitude. Therefore, helping smallholders meet international and national requirements for oil palm cultivation and diversify their livelihoods is crucial (Noor *et al*. 2017).

Food security can only be achieved through environmentally responsible farming practices (Rahmat *et al*. 2022). Due to pledges made by EU governments, exports of palm oil products to EU markets have been restricted from those that are deemed unsustainable. Exporters of palm oil in Malaysia and Indonesia face danger because of this (Rizal and Nordin 2022). Reduced production-related environmental consequences are an area where businesses, governments, and societies can all find common ground. However, it is important not to lose sight of the role the economy plays as a primary driver of sustainability (Bossle *et al*. 2016).

Research has shown that the policies and regulations may not be able to meet the needs of oil palm smallholders if there are no concerns about the sustainability of the approach (Gillespie 2012). Even though smallholders are crucial to oil palm planting (Jelsma *et al*. 2010), however, their understanding of sustainable agriculture techniques is still lacking (Begum *et al*. 2015). Dramatically risen of fertilizer prices, and market instability might rapidly make oil palm less appealing to smallholders as a crop (Ghazoul *et al*. 2015). Hidayat and team (2016) finding shows that smallholders' palm oil engagement in certification has led to organisational and technological innovations, which generate a higher production quality that helps smallholders indirectly and monetarily, however, it does not affect the farmer's economic vulnerability and market access.

Certification is essential for market access and has traditionally been used to represent a product's reputation and quality. There has been a movement in the palm oil industry toward certified sustainable palm oil, which is in more demand. Achieving certification demonstrates a commitment to meeting rigorous requirements. To fulfil the three primary goals of sustainability (social, economic, and environmental), it is essential to implement and adopt sustainable practices and innovative approaches (Korhonen 2001). Sustainability initiatives can be influenced in several ways, including through market pressure (Arora and Gangopadhyay 1995), government subsidies, and public knowledge of environmental issues (Yalabik and Fairchild 2011).

The pressure from international countries with strict environmental rules on businesses towards developing countries is growing. Lestari's (2021) findings suggest that the demand from consumers is a key factor in promoting sustainable innovations. These results correspond with research that shows pressures can assist an organization to safeguard the environment (Zhu and Sarkis 2007). In other words, a company's sustainability performance depends on its readiness to foresee market dynamics like customer pressure. Where customers now consider purchasing more environmentally friendly products and are ready to pay a premium for them (Chekima *et al*. 2016). According to Zhu and Sarkis (2007), consumer or market demand moderates’ sustainable practices and outcomes. Their findings imply that customer pressure moderates the relationship and lack of customer pressure leads to customer loss and poor economic performance.

Therefore, the decision for smallholders to comply with the sustainability certification requirement is tied to the greater advantage than the loss they would experience. They enhanced their standard of living and income by being able to sell their palm oil at a higher price, which was more significant to them than the expenditures that were expended to comply with the certification requirement. This individual decision-making through cost-benefit analysis, where human activity is determined by choices can be explained through Rational Choice Theory (RCT). It implied a goal-oriented, introspective, evaluative, and consistent decision across time and choice situations. People who are rational act because they believe the advantages to be greater than the costs. RCT illustrates how a smallholder decides to apply sustainability certification in a situation when the value of implementing sustainable criteria surpasses the cost. Instead of making an irrational decision by ignoring its application and concentrating on the cost of implementing it, they made the rational choice to follow the requirements for sustainability certification because they obtained greater benefits from government support and a probable high price. Alternatively, they could have made the illogical choice to ignore its application and concentrate on the cost of implementing it. Therefore, this research intends to shed light on the relationship between attitude towards sustainability, market pressure, and readiness in implementing sustainability certification as illustrated in Figure 1. The hypotheses for this research are as follows:-

H1: There is a positive effect between attitude towards sustainability and readiness to implement sustainability certification.

H2: There is a positive effect between market pressure and readiness to implement sustainability certification.

H3: There is a positive moderating effect between attitude towards sustainability, market pressure and readiness to implement sustainability certification.

(Figure 1)

**Materials and Method**

**Research Design and Instrument Development**

This quantitative cross-sectional study aimed to evaluate hypotheses on the factors influencing smallholders' participation in sustainable certification. A seven-point Likert scale closed-ended questionnaire was used to assess respondents' replies in this study. Around 408 Malaysian palm oil smallholders were selected as the study's respondents and the unit of analysis. Smallholders are usually landowners who are allowed to grow oil palm on less than forty (40) ha of their land.

The questionnaire items used to measure the readiness level in implementing sustainability certificates are based on the Malaysian Sustainability Palm Oil (MSPO) standard comprising seven principles. Principle 1 indicates the requirement to demonstrate management's commitment to implementing MSPO. Principle 2 emphasizes transparency and traceability. Principle 3 states that oil palm facilities must adhere to all applicable laws and rules, including those on the cultivation of oil palms and the handling of FFB and other palm products. Principle 4 highlights societal duty, employee health and safety, and working circumstances. All of the environment, natural resources, biodiversity, and ecosystems fall under the purview of Principle 5's environmental considerations. According to Principle 6, to achieve maximum output, each organization must create the best management practices. Principle 7 addresses the concern of new crop planting in high-biodiversity zones. The PLS-SEM technique was then used to analyse the data. The structural model for this study tested path coefficient, forecast power, relevance, and impact size. SmartPLS 3 was used to do the analyses.

**Results and Discussion**

**Demographic Profile**

The questionnaire included questions on demographics, sustainable attitudes, political stability, market pressure, and sustainability certification ready. The demographic background of the respondents is illustrated in Table 1. It represents the frequency and percentage of the respondents according to their state, gender, age, ethnicity, status, number of households, household income, education, number of children, number of children involve in palm oil farms and number of schooled children working in palm oil farms.

(Table 1)

The highest number of respondents came from Johor (30%) followed by Sarawak (16%) and Sabah (11%). Most of the respondents are male 87%. More than 50% of the respondents age above 51 years old. Most of the respondents are married (93%) and have around 3 – 5 people in their households (67%). 227 out of 408 respondents are Malays, followed by 73 Chinese, 91 others ethnicity and 17 Indian. The two highest ranges of respondents’ income are income RM2,001 – RM3,000 (32%), followed by the income of RM1,000 – RM2,000 (30%). 204 out of 408 (50%) respondents has a high school education. Mostly the respondents have 3 children (32%), followed by 4 children (20%). 58% of respondents schooled children age above 18 years old help at the oil palm farm.

**Assessment of Structural Equation Modelling (SEM)**

According to Chin (2016), SEM is widely used in psychology, social science, and strategic management. SEM's aggregate factor analysis and multiple regression topographies are used to examine the theoretical model and measurement model structural characteristics. Weston and Gore (2006) note that SEM may estimate and test interactions among factors/latent variables. The first step in analysing the model is to look at the measurement model. Cronbach's and composite reliability are tested for construct reliability, and convergent and discriminant are tested for composite reliability and discriminant validity. Table 2 shows measurement model fit requirements and AVE of all latent variables calculated through PLS-Algorithm. Figure 2 illustrate the factor loadings/outer loadings and AVE of all latent variables calculated through the PLS-Algorithm.

(Table 2)

(Figure 2)

**Assessment Of The Structural Model**

After fitting the measurement model, the structural model is validated. According to Chin *et al* (2016), the structural model is a sequence of structural equations used to evaluate the inner path model. Path coefficient (β), R2 for endogenous variable, effect size (f2), prediction relevance (q2), and multicollinearity (inner VIF) were utilised to evaluate the structural model in this study (Gotz *et al*. 2010). Stepwise model testing shows each benchmark's threshold value and description.

The coefficient of Determination (R2) shows endogenous variance. Table 3 displays the R2 findings of this investigation, where the R2 value of R.Certification is 0.600, revealing a large coefficient of determination as the value above 25% demonstrates a respectable prediction level in empirical research (Cohen 1988).

(Table 3)

The researcher uses Cohen's f2 to analyse predictor constructs. The f2 compares a predictor to an endogenous component (Cohen 1988). It measures how well an external component explains an endogenous construct using f2. Large, medium, and small f2 values are 0.35, 0.15, and 0.02. In Table 4, A.T. Sustainability and M.Pressure have little influence on f2.

(Table 4)

In Smart-PLS, the VIF value must be less than five to avoid collinearity difficulties. In the current investigation, inner VIF values are less than 5. Pallant (2007) says VIF values between 10 and 0.1 indicate multicollinearity. Table 5 shows the highest VIF was 3.342.

(Table 5)

Geisser's Q2 may be determined using the blinding technique in most PLS software programmes. A blindfolding test was done to determine the model's predictive relevance (Q2) (Geisser 1975). Table 6 shows that the model's Q2 values are greater than zero, indicating a good fit and strong predictive significance.

(Table 6)

Smart-path PLS's coefficient is comparable to multiple regression standardisations. Bootstrapping was used by Chin *et al* (2016) to predict t statistics and confidence ranges because PLS has no distribution assumption constraints. Table 7 presented the path coefficient assessment result where the two hypotheses revealed statistically not significant relationship as the p-values are 0.195, 0.348 and 0.948 respectively which is more than 0.05 and the t-values are 1.298 and 0.065 respectively which is lower than 1.96 confirming of a not significant relation between A.T.Sustainability and R.Certification, and M.Pressure and R.Certification. Figure 3 shows a t-valued Structural Model (Bootstrapping result).

(Table 7)

(Figure 3)

**Moderation Effect Analysis**

After assessing core model direct path linkages, we examined M.Pressure's moderating influence. Bootstrapping was employed to observe moderating impact in the current investigation. This method is recommended if independent or moderator variables are continuous (Henseler and Fassott, 2010). Table 8 demonstrates that the hypothesis was statistically significant since the t-values were more than 1.96 and the p-values were less than 0.05. M.Pressure modifies the link between A.T.Sustainability and R.Certification (H3).

(Table 8)

**Summary Of The Hypotheses Testing Result**

The summary of all the hypotheses can be seen in Table 9, which can be found below. Out of the three hypotheses, only one hypothesis was accepted, while the other two hypotheses were rejected.

(Table 9)

A hypothesised measurement model was developed for testing with a two-stage Structural Equation Modelling method. A total of 22 items were used to test the model which comprised three variables. PLS Algorithm was conducted to analyse the sub-constructs of those variables where all the items have got sufficient factor loadings which are higher than 0.5. Composite reliability scores for all constructs are greater than 0.7. The measurement model also had good convergent validity because AVE was greater than 0.50, all manifest variables loaded on their corresponding latent variables, and the square roots of AVE for each construct were greater than their intercorrelation. Convergent validity, construct reliability, and discriminant validity were obtained by all variables. Second, the results of the structural model's validation were satisfactory. The R2 was substantial. This shows high explanatory power. Moreover, all proposed paths within the structural model were supported. Finally, the structural model exhibited one significant moderation relationship.

Knowledge transfer and sustainable practises should be prioritised for independent smallholders so that they are more prepared to achieve sustainability certification and grow the palm oil industry. Most of the coverage that isn't positive about the palm oil industry focuses on the industry's impact on climate change and the destruction of wildlife habitats. Considering the European Union's decision to impose import restrictions on palm oil and the industry's contribution to global warming, Malaysia's palm oil sector must make the transition to sustainability. Farmers encounter difficulties due to climate change because of the potential influence on the productivity and efficiency of oil palm fruit bunch production. Sustainable agriculture is crucial to the health of our planet, our communities, and our economies.

**Conclusion**

This investigation was inspired by constraints in academic literature and industrial practices. Sustainability is a concern; hence sustainable certification has been introduced. Although extensive measures have been taken to guarantee that smallholders are being certified, the outcomes have fallen short of expectations. The study was useful since it revealed the underlying elements that impact smallholders' decision to participate in the certification. This study adds new information by looking at the topic of market influence on sustainability readiness. The findings of this study suggested that market pressure might be responsible for the decisions made by smallholders in implementing sustainability certification. These findings were supported by an attitude toward sustainability. As a result, our research offers guidance to policymakers and practitioners that is based on research. The results of this research showed that when the market put pressure on them, smallholders started engaging in more sustainable practices.

However, the study had several limitations. The feasibility of introducing sustainability certification: a more in-depth study. Since it is necessary to first understand the underlying content challenges in each area, the conclusion cannot be applied to those fields. Sustainability in-depth reports can be examined by other researchers to broaden the scope of the study.

**Acknowledgement**

The authors wish to thank the Malaysian Palm Oil Board (MPOB) for their assistance and cooperation in facilitating interviews and survey with palm oil farmers.

**Author Contribution**

Zanurul Huzaima Zainudin, Fazlin Ali, Juwaidah Sharifuddin and Amer Hamzah Jantan take part in the design of the study and write up; Zaki Aman, Nur Hanani Mansor and Nur Hana Basaruddin take part in the field work; and Zanurul Huzaima Zainudin,Kelly Wong Kai Seng and Muhammad Mu'az Mahmud take part in the analysis and interpretation of the result.

**Conflict of Interest**

All authors declare no conflict of interest.

**Data Availability**

Data presented in this study will be available on a fair request to the corresponding author.

**Ethics Approval**

Not applicable to this paper.

**Reference**

Ab Rahman, A. K., Abdullah, R., Mohd Shariff, F., and Simeh, M. A. (2008). The Malaysian palm oil supply chain: The role of the independent smallholders. *Oil Palm Industry Economic Journal*, *8*(2), 17-27.

Arora, S., and Gangopadhyay, S., (1995). Toward a theoretical model of voluntary over compliance. *Journal of Economic Behavior and* O*rganization, 28*(3), 289–309.

Azmi, R., and Nagiah, C. (2012). *A Review of Smallholder Oil Palm Production*. Kuala Lumpur: Wild Asia Malaysia

Azri, M. H., Ismail, S., & Abdullah, R. (2018). Effects of Bacillus salmalaya strain 139SI inoculation on yield and nutrients uptake of oil palm. *International Journal of Agriculture and Biology*, *20*, 499-506.

Begum, H., Choy, E. A., Siwar, C., Alam, F., and Ishak, S. (2015). Smallholder’s practices towards environment sustainability. *Advanced Science Letters, 21*(6), 1742-1745.

Bossle, M. B., De Barcellos, M. D., and Vieira, L. M. (2016). Why food companies go green? The determinant factors to adopt eco-innovations. *British Food Journal, 118*(6), 1317-1333.

Chekima, B., Wafa, S. A. W. S. K., Igau, O. A., Chekima, S., and Sondoh Jr, S. L. (2016). Examining green consumerism motivational drivers: does premium price and demographics matter to green purchasing? *Journal of Cleaner Production, 112*, 3436-3450.

Chin, W. W., Mills, A. M., Steel, D. J., and Schwarz, A. (2016). Multi-group invariance testing: An illustrative comparison of PLS permutation and covariance-based SEM invariance analysis. In *The Multiple Facets of Partial Least Squares and Related Methods: PLS, Paris, France, 2014 8* (pp. 267-284). Springer International Publishing.

Cohen, S. (1988). Perceived stress in a probability sample of the United States. *The Social Psychology of Health*, 31-67.

Geisser, S. (1975). The predictive sample reuse method with applications. *Journal of the American Statistical Association, 70*(350), 320-328.

Ghazoul, J., Levang, P., Garcia, C., and Garcia-Ulloa, J. (2015). *Declining palm oil prices: Good news and bad news for smallholders.* Mongabay.com. https://news.mongabay.com/2015/03/declining-palm-oil-prices-good-news-and-bad-news-for-smallholders/

Gillespie, P. (2012). Participation and power in Indonesian oil palm plantations*. Asia Pacific Viewpoint, 53(*3), 254-271.

Henseler, J., and Fassott, G. (2010). Testing moderating effects in PLS path models: An illustration of available procedures. In *Handbook of Partial Least Squares* (pp. 713-735). Springer, Berlin, Heidelberg.

Hidayat, N. K., Offermans, A., and Glasbergen, P. (2016). On the profitability of sustainability certification: An analysis among Indonesian palm oil smallholders. *Journal of Economics and Sustainable Development, 7*(18), 45-62.

Jelsma, I., Giller, K. E., and Fairhurst, T. (2010). *Smallholder oil palm production systems in Indonesia: Lessons from the NESP Ophir project*. Wageningen University.

Korhonen, J. (2001). Four ecosystem principles for an industrial ecosystem. *Journal of Cleaner Production, 9*(3), 253-259.

Kushairi, A., Ong-Abdullah, M., Nambiappan, B., Hishamuddin, E., Bidin, M. N. I. Z., Ghazali, R., and Parveez, G. K. A. (2019). Oil palm economic performance in Malaysia and RandD progress in 2018. *Journal of Oil Palm Research, 31*(2), 165-194.

Noor, F. M. M., Gassner, A., Terheggen, A., and Dobie, P. (2017). Beyond sustainability criteria and principles in palm oil production: addressing consumer concerns through in setting. *Ecology and Society*, *22*(2).

Nusaibah, S. A., Saad, G., & Tan, and G. H. (2017). Antagonistic efficacy of Trichoderma harzianum and Bacillus cereus against Ganoderma disease of oil palm via dip, place and drench (DPD) artificial inoculation technique. *International Journal of Agriculture and Biology*, *19*(2), 299-306.

Pallant, J. (2007). *SPSS survival manual 3rd edition*. McGrath Hill, 15, 361-371.

Rahmat, S. R., Purwaningrum, F., Salim, A. M., Shamsurijan, M. S., Ann, L. C., and Mohamad, M. F. B. (2022). The Readiness of Smallholders to Pursue The Malaysian Sustainable Palm Oil Certification For Conservation And Sustainability Initiative: A Qualitative Study In 2020. *Journal of Positive School Psychology, 6*(9), 2341-2362.

Rizal, A. R. A., and Nordin, S. M. (2022). Smallholders’ participation in sustainable certification: The mediating impact of deliberative communication and responsible leadership. *Frontiers in Psychology*, *13*.

Senawi, R., Rahman, N. K., Mansor, N., and Kuntom, A. (2019). Transformation of oil palm independent smallholders through Malaysian sustainable palm oil. *Journal of Oil Palm Research, 31*(3), 496-507.

Shahida, S., Hafizuddin-Syah, B. A. M., and Fuad, S. H. (2018). The effect of sustainability certification for export on operational profitability of Malaysian palm oil companies. *Jurnal Ekonomi Malaysia, 52*(2), 55-67.

Weston, R., and Gore Jr, P. A. (2006). A brief guide to structural equation modelling. *The Counselling Psychologist, 34*(5), 719-751.

Yalabik, B., and Fairchild, R. J. (2011). Customer, regulatory, and competitive pressure as drivers of environmental innovation. *International Journal of Production Economics*, *131*(2), 519-527.

Zhu, Q., and Sarkis, J. (2007). The moderating effects of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research, 45*(18-19), 4333-4355.

**Figures**

Figure 1 presents the model that was constructed for this study based on the hypotheses and the previous research that was reviewed.

H3

Market Pressure

Attitudes towards sustainability

* Economy
* Politic
* Social

H1

Readiness to Implement Sustainability Certification.

H2

*Figure 1 Conceptual framework of the study*



*Figure 2 Presented the factor loadings/outer loadings and AVE of all latent variables calculated through the PLS-Algorithm.*



*Figure 3 Structural Model with t-values (Bootstrapping result)*

**Tables**

**Table 1: Demographic Profile Of The Respondents**

|  |  |  |
| --- | --- | --- |
|  | Frequency | Percentage |
| State |  |  |
| Sabah | 45 | 11 |
| Sarawak | 64 | 16 |
| Pahang | 31 | 8 |
| Selangor | 18 | 4 |
| Melaka | 6 | 1 |
| Johor | 124 | 30 |
| Negeri Sembilan | 12 | 3 |
| Perak | 36 | 9 |
| Kedah | 9 | 2 |
| Pulau Pinang | 12 | 3 |
| Perlis | 10 | 2 |
| Kelantan | 8 | 2 |
| Terengganu | 33 | 8 |
| Gender |  |  |
| Male | 355 | 87 |
| Female | 53 | 13 |
| Age |  |  |
| 18-30 | 17 | 4 |
| 31-40 | 69 | 17 |
| 41-50 | 110 | 27 |
| 51-60 | 137 | 34 |
| Above 61 | 75 | 18 |
| Ethnic |  |  |
| Malay | 227 | 56 |
| Chinese | 73 | 18 |
| Indian | 17 | 4 |
| Others | 91 | 22 |
| Status |  |  |
| Single | 19 | 5 |
| Married | 381 | 93 |
| Divorced/ Widowed | 8 | 2 |
| Number of Household |  |  |
| Less than 2 | 40 | 10 |
| 3 -5 | 274 | 67 |
| 6 – 10 | 89 | 22 |
| More than 11 | 5 | 1 |
| Household income |  |  |
| Less than RM1000 | 31 | 7 |
| RM1001 – RM2000 | 121 | 30 |
| RM2001 – RM3000 | 130 | 32 |
| RM3001 – RM4000 | 68 | 17 |
| RM4001 – RM5000 | 33 | 8 |
| More than RM5001 | 25 | 6 |
| Education |  |  |
| No formal education | 14 | 3 |
| Primary school | 78 | 19 |
| High school | 204 | 50 |
| Certificate | 42 | 10 |
| Diploma | 47 | 12 |
| Undergraduate | 3 | 1 |
| Postgraduate | 20 | 5 |
| Number of children |  |  |
| 1 | 24 | 6 |
| 2 | 64 | 16 |
| 3 | 131 | 32 |
| 4 | 82 | 20 |
| 5 | 60 | 15 |
| More than 6 | 47 | 11 |
| Number of children involved in palm oil farm |  |
| 1 | 17 | 4.2 |
| 2 | 47 | 11.5 |
| 3 | 117 | 28.7 |
| 4 | 42 | 10.3 |
| 5 | 32 | 7.9 |
| More than 6 | 30 | 7.4 |
| None | 123 | 30 |
| A number of schooled children work in palm oil farm |  |
| Age under 15 years old | 16 | 4 |
| Age 16 – 18 years old | 34 | 8 |
| Age above 18 years old | 235 | 58 |
| None | 123 | 30 |

Source: Author’s primary survey

**Table 2: Internal consistency and convergence validity results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Constructs** | **Items** | **F.L** | **CA** | **CR** | **AVE** |
| **BP** | BP1 | 0.818 | **0.916** | **0.930** | **0.548** |
|  | BP11 | 0.674 |  |  |  |
|  | BP12 | 0.630 |  |  |  |
|  | BP13 | 0.682 |  |  |  |
|  | BP14 | 0.685 |  |  |  |
|  | BP15 | 0.665 |  |  |  |
|  | BP2 | 0.852 |  |  |  |
|  | BP3 | 0.749 |  |  |  |
|  | BP4 | 0.762 |  |  |  |
|  | BP5 | 0.792 |  |  |  |
|  | BP6 | 0.797 |  |  |  |
| **CLR** | CLR1 | 0.919 | **0.913** | **0.938** | **0.757** |
|  | CLR2 | 0.937 |  |  |  |
|  | CLR3 | 0.941 |  |  |  |
|  | CLR4 | 0.896 |  |  |  |
|  | CLR5 | 0.608 |  |  |  |
| **ECO** | ECO1 | 0.803 | **0.946** | **0.957** | **0.788** |
|  | ECO2 | 0.914 |  |  |  |
|  | ECO3 | 0.902 |  |  |  |
|  | ECO4 | 0.921 |  |  |  |
|  | ECO5 | 0.898 |  |  |  |
|  | ECO6 | 0.884 |  |  |  |
| **ENB** | ENB1 | 0.832 | **0.951** | **0.956** | **0.579** |
|  | ENB10 | 0.802 |  |  |  |
|  | ENB11 | 0.827 |  |  |  |
|  | ENB12 | 0.808 |  |  |  |
|  | ENB13 | 0.764 |  |  |  |
|  | ENB14 | 0.787 |  |  |  |
|  | ENB16 | 0.814 |  |  |  |
|  | ENB2 | 0.833 |  |  |  |
|  | ENB24 | 0.634 |  |  |  |
|  | ENB25 | 0.684 |  |  |  |
|  | ENB26 | 0.641 |  |  |  |
|  | ENB27 | 0.665 |  |  |  |
|  | ENB3 | 0.825 |  |  |  |
|  | ENB7 | 0.685 |  |  |  |
|  | ENB8 | 0.764 |  |  |  |
|  | ENB9 | 0.759 |  |  |  |
| **ENV** | ENV1 | 0.887 | **0.948** | **0.958** | **0.744** |
|  | ENV2 | 0.932 |  |  |  |
|  | ENV3 | 0.938 |  |  |  |
|  | ENV4 | 0.930 |  |  |  |
|  | ENV5 | 0.905 |  |  |  |
|  | ENV6 | 0.611 |  |  |  |
|  | ENV7 | 0.739 |  |  |  |
|  | ENV8 | 0.904 |  |  |  |
| **IMP** | IMP1 | 0.937 | **0.949** | **0.963** | **0.868** |
|  | IMP2 | 0.967 |  |  |  |
|  | IMP3 | 0.935 |  |  |  |
|  | IMP4 | 0.885 |  |  |  |
| **MRC** | MRC10 | 0.855 | **0.893** | **0.921** | **0.574** |
|  | MRC11 | 0.875 |  |  |  |
|  | MRC12 | 0.873 |  |  |  |
|  | MRC13 | 0.857 |  |  |  |
|  | MRC14 | 0.857 |  |  |  |
|  | MRC2 | 0.796 |  |  |  |
|  | MRC3 | 0.746 |  |  |  |
|  | MRC9 | 0.874 |  |  |  |
|  | ﻿MRC1 | 0.790 |  |  |  |
| **MT** | MT1 | 0.904 | **0.891** | **0.917** | **0.650** |
|  | MT2 | 0.716 |  |  |  |
|  | MT3 | 0.823 |  |  |  |
|  | MT4 | 0.746 |  |  |  |
|  | MT5 | 0.827 |  |  |  |
|  | MT6 | 0.809 |  |  |  |
| **NDP** | NDP1 | 0.806 | **0.849** | **0.888** | **0.519** |
|  | NDP3 | 0.698 |  |  |  |
|  | NDP4 | 0.772 |  |  |  |
|  | NDP5 | 0.801 |  |  |  |
|  | NDP6 | 0.755 |  |  |  |
|  | NDP7 | 0.744 |  |  |  |
|  | NDP8 | 0.797 |  |  |  |
| **SOC** | SOC1 | 0.866 | **0.959** | **0.966** | **0.781** |
|  | SOC2 | 0.919 |  |  |  |
|  | SOC3 | 0.913 |  |  |  |
|  | SOC4 | 0.908 |  |  |  |
|  | SOC5 | 0.919 |  |  |  |
|  | SOC6 | 0.890 |  |  |  |
|  | SOC7 | 0.895 |  |  |  |
|  | SOC8 | 0.747 |  |  |  |
| **SSW** | SSW10 | 0.783 | **0.956** | **0.962** | **0.638** |
|  | SSW11 | 0.838 |  |  |  |
|  | SSW12 | 0.816 |  |  |  |
|  | SSW15 | 0.894 |  |  |  |
|  | SSW16 | 0.899 |  |  |  |
|  | SSW17 | 0.824 |  |  |  |
|  | SSW18 | 0.896 |  |  |  |
|  | SSW19 | 0.889 |  |  |  |
|  | SSW2 | 0.394 |  |  |  |
|  | SSW20 | 0.846 |  |  |  |
|  | SSW21 | 0.884 |  |  |  |
|  | SSW32 | 0.564 |  |  |  |
|  | SSW34 | 0.627 |  |  |  |
|  | SSW8 | 0.820 |  |  |  |
|  | SSW9 | 0.817 |  |  |  |
| **TRA** | TRA1 | 0.862 | **0.957** | **0.964** | **0.710** |
|  | TRA10 | 0.881 |  |  |  |
|  | TRA11 | 0.886 |  |  |  |
|  | TRA2 | 0.879 |  |  |  |
|  | TRA3 | 0.544 |  |  |  |
|  | TRA4 | 0.793 |  |  |  |
|  | TRA5 | 0.814 |  |  |  |
|  | TRA6 | 0.865 |  |  |  |
|  | TRA7 | 0.879 |  |  |  |
|  | TRA8 | 0.904 |  |  |  |
|  | TRA9 | 0.898 |  |  |  |

**Table 3: R-Square Result**

|  |  |  |
| --- | --- | --- |
| **Endogenous Variable** | **R Square** | **R Square Adjusted** |
| R.Certification | 0.600 | 0.586 |

Substantial > 0.25; Moderate > 0.12, Weak > 0.02 (Cohen, 1988)

**Table 4: F-Square Result**

|  |  |
| --- | --- |
| **Exogenous Variables** | **R.Certification** |
| A.T.Sustainability | 0.008 |
| M.Pressure | 0.000 |

Large: f2 effect size > 0.34; Medium effect > 0.14; Small: 0.0 > 0.01 (Cohen, 1988)

**Table 5: Result Of Multicollinearity – Inner VIF Values**

|  |  |
| --- | --- |
| **Exogenous Variables** | **R.Certification** |
| A.T.Sustainability | 3.342 |
| M.Pressure | 3.033 |

**Table 6: Result Of Predictive Relevance**

|  |  |  |
| --- | --- | --- |
| **Endogenous Variable** | **CCRQ² (=1-SSE/SSO)** | **CCCQ² (=1-SSE/SSO)** |
| R.Certification | 0.225 | 0.370 |

CCC=Construct Cross-validated Communality, CCR=Construct Cross-validated Redundancy

**Table 7: Path Coefficient Result**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hypotheses** | **OS/Beta** | **LL** | **UL** | **T** | **P** | **Decision** |
| H1: A.T.Sustainability -> R.Certification | 0.106 | -0.037 | 0.262 | 1.298 | 0.195 | Not Significant |
| H2: M.Pressure -> R.Certification | -0.004 | -0.115 | 0.107 | 0.065 | 0.948 | Not Significant |

Significant: p < 0.05

**Table 8: Moderation Result**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hypotheses** | **OS/Beta** | **LL** | **UL** | **T** | **P** | **Decision** |
| H3: A.T.Sustainability\*M.Pressure -> R.Certification | -0.151 | -0.269 | -0.021 | 2.356 | 0.019 | Significant |

Significant; \*p < 0.05

**Table 9: Summary Of All Hypotheses Results**

|  |  |  |
| --- | --- | --- |
| No. | Hypotheses | Results |
| H1 | A.T.Sustainability -> R.Certification | Rejected |
| H2 | M.Pressure -> R.Certification | Rejected |
| H3 | A.T.Sustainability\*M.Pressure -> R.Certification | Accepted |

 **Appendix: Construct Items**

|  |  |
| --- | --- |
| **CONSTRUCT**  | **ITEMS** |
| MANAGEMENT RESPONSIBILITY AND COMMITMENT (MRC) | 1. I am aware of the existence of policies that bind me to MSPO practice
 |
| 1. I agree to be bound by the policies with respect to the MSPO
 |
| 1. I agree to register a policy that binds me to the MSPO
 |
| 1. I refuse to be bound by MSPO policy
 |
| 1. I refused to sign the MSPO policy
 |
| 1. I am aware that there is an action plan for continuous improvement
 |
| 1. I understand the importance of continuous improvement
 |
| 1. I think that continuous improvement of MSPO is important for MSPO practice
 |
| 1. I am aware that there are systems that help to improve MSPO practices among smallholders
 |
| 1. I always receive the latest MSPO information from the management
 |
| 1. I always accept the latest techniques like planting and harvesting to smallholders
 |
| 1. The system assists in the dissemination of the latest information on MSPO practices
 |
| 1. This system helps in disseminating information on new cultivation techniques
 |
| 1. The management team meets with us regularly to disseminate information
 |
|  |  |
|  |  |
| TRANSPARENCY (TRA) | 1. I keep records of input usage in my farm
 |
| 1. I keep records of the activities carried out in my farm
 |
| 1. I have a computerized system to record all important documents for traceability purposes
 |
| 1. I use a manual system to record all important documents for traceability purposes
 |
| 1. My record system allows me to track information efficiently
 |
| 1. I always record all my sales results
 |
| 1. I record my sales on time
 |
| 1. I filed all the sales documents
 |
| 1. I keep records for each FPB shipment/ transportation
 |
| 1. I keep all records for my BTS buyers
 |
| 1. I filed all the transportation documents correctly
 |
|  |  |
| COMPLIANCE WITH LEGAL REQUIREMENTS (CLR) | 1. I comply with all applicable local regulations
 |
| 1. I comply with all applicable state regulations
 |
| 1. I comply with all applicable state regulations
 |
| 1. I comply with all applicable international laws and regulations
 |
| 1. All the land I cultivate at the present time belongs to me
 |
| 1. All the land that I use for the purpose of oil palm cultivation is registered under my name only
 |
| 1. All the land that I use for the purpose of oil palm cultivation is registered in partnership with family members
 |
| 1. I have permission from my family members to use this land
 |
| 1. I have the authority to use this land for the purpose of oil palm cultivation
 |
| 1. The land I am working on now belongs to my family members
 |
| 1. The land I am working on is leasehold land
 |
| 1. I can prove that I have an agreement with the landowner to use this land for the purpose of planting oil palm
 |
| 1. I have never used the land to plant oil palm without permission
 |
| 1. I have never had any disputes about ownership with the land I am cultivating now
 |
| 1. I think that work/ use of land that does not belong to me will cause problems in the long run
 |
| 1. I now use customary land to grow oil palm
 |
| 1. I have the legal right to use customary land to plant oil palm
 |
| 1. I have documents to prove that I have the right to use customary rights land
 |
| 1. I have a map to show the areas I use under customary rights to plant oil palm
 |
|  |  |
| SOCIAL RESPONSIBILITY, HEALTH, SAFETY AND WORKING CONDITIONS (SSW) | 1. I act immediately (to resolve the issue) if there is any dispute with my neighbour
 |
| 1. I have a recorded system for complaints received from my neighbours
 |
| 1. I have a recorded system for complaints received from interested parties
 |
| 1. I am open to any discussion regarding complaints against me
 |
| 1. How many complaints do you usually receive in a month?
 |
| 1. The method I use to resolve a complaint can resolve any dispute
 |
| 1. What percentage of complaints can you afford to resolve in a month?
 |
| 1. I always think about ensuring the health and safety of the workers in my farm
 |
| 1. The safety and health plan I provide in my farm is adequate to ensure the health and safety of my employees
 |
| 1. I make routine enforcement to ensure the health and safety status of my employees
 |
| 1. I prioritize the health and safety of my employees while working on my farm
 |
| 1. Safety measures in the farm are my top priority
 |
| 1. I always make verbal agreements when I employ temporary workers
 |
| 1. I discuss salaries and benefits transparently before I hire temporary employees
 |
| 1. I do not differentiate the opportunities given to my employees based on race
 |
| 1. I do not differentiate the opportunities given to my employees based on skin colour
 |
| 1. I do not differentiate the opportunities given to my employees based on gender
 |
| 1. I do not differentiate the opportunities given to my employees based on religion
 |
| 1. I do not differentiate the opportunities given to my employees based on political understanding
 |
| 1. I do not differentiate the opportunities given to my employees based on personal character
 |
| 1. I treat all my staff equally
 |
| 1. I pay different wage rates for different groups of people in the same position
 |
| 1. I pay all employees no less than the minimum wage set by the government
 |
| 1. I provide minimum benefits (OT, insurance, leave) to all my employees
 |
| 1. I provide on-site accommodation for my employees
 |
| 1. Quarters are in good condition to stay
 |
| 1. Quarters are provided with basic amenities (water and electricity)
 |
| 1. I have a family member under the age of 18 who works on my farm
 |
| 1. I make sure that there is adult supervision when family members under the age of 18 work in my farm
 |
| 1. I make sure that the education of the family members who work for me is not neglected
 |
| 1. I have workers under the age of 18 working on my farm
 |
| 1. I often attend courses to improve my knowledge and skills to manage my farm
 |
| 1. Plantation education is very important to increase my competitiveness in oil palm plantation management
 |
| 1. I am always looking for additional information that helps me to manage my farm
 |
|  |  |
| ENVIRONMENT, NATURAL RESOURCES AND BIODIVERSITY (ENB) | 1. I always evaluate the impact of my actions on the environment before taking any action
 |
| 1. I realize that all the actions I take will have an impact on the environment
 |
| 1. I am aware that certain business decisions I make will have an impact on the environment
 |
| 1. I support the use of renewable energy for energy needs in my farm
 |
| 1. I am willing to invest in a renewable energy station to meet the energy needs of my farm
 |
| 1. I always take the opportunity to use renewable energy as much as possible
 |
| 1. I have a good logging system for tracking chemical disposal
 |
| 1. I identified all the waste
 |
| 1. I identified all sources of pollution
 |
| 1. I dispose of all waste including hazardous chemicals and their containers in accordance with local laws and regulations
 |
| 1. I dispose of all waste including hazardous chemicals and their containers in accordance with international laws and regulations
 |
| 1. I use water responsibly
 |
| 1. I make sure that I do not contaminate the water
 |
| 1. I make sure my employees use water responsibly
 |
| 1. I make sure my employees don’t pollute the water
 |
| 1. I make sure there is a consistent supply of water for use in my farm
 |
| 1. I have a man-made reservoir pond to harvest rainwater
 |
| 1. I keep a tank in my farm to harvest water
 |
| 1. There are various species of flora around my farm area
 |
| 1. There are various species of the fauna around my farm area
 |
| 1. I always get information from government agencies about endangered species of flora and fauna
 |
| 1. I know the conservation needs of the plants and/or animals around my farm area
 |
| 1. I worry about the state of flora and fauna in my area when I do farm activities
 |
| 1. I have never practised open burning in my farm
 |
| 1. I make sure my employees don’t practice open burning
 |
| 1. I have never used the open-burning method to clean the area during soil preparation
 |
| 1. I would not practice open burning if I did not get permission from the state authorities
 |
|  |  |
| BEST PRACTICES ACTION (BPA) | 1. I am knowledgeable about the MPOB code of practice
 |
| 1. My farm is managed according to the MPOB code of practice
 |
| 1. I am knowledgeable about Malaysian standards and ISO standards
 |
| 1. My farm is managed in accordance with Malaysian standards/ ISO standards
 |
| 1. I know about the Smallholder Code of Good Practice (GAP)
 |
| 1. My farm is managed according to the Smallholder Code of Good Practice (GAP)
 |
| 1. I have an identification (signboard) for each oil palm planting block
 |
| 1. I have a reference system for each oil palm planting block
 |
| 1. Everyone will know my block based on the signage
 |
| 1. The boundaries of my farm area can be clearly seen
 |
| 1. I often communicate and ask opinions from dealers to get transparent prices and deal fairly
 |
| 1. I often communicate and ask opinions from manufacturers to get transparent prices and deal fairly
 |
| 1. I often communicate and ask for opinions from the local community to get transparent prices and deal fairly
 |
| 1. I often communicate and ask for opinions from palm oil industry stakeholders to get transparent prices and deal fairly
 |
| 1. I often go into negotiations with one or more relevant stakeholders to get a reasonable price
 |
|  |  |
| NEW DEVELOPMENT AND PLANTATION (NDP) | 1. I do not plant in areas that have been identified as of high biodiversity value by local, state, and national laws
 |
| 1. I plant palm oil in areas of high biodiversity value because that’s the only place I own
 |
| 1. I know that it is a mistake to plant oil palm on land with high biodiversity value
 |
| 1. I know that preserving natural eco-systems is important for future generations
 |
| 1. I would not plant in areas of high biodiversity value even in desperation
 |
| 1. The government provides information on soil types, topography and suitability for oil palm cultivation
 |
| 1. I usually check information on soil type, topography, and suitability for oil palm cultivation from the relevant government agencies before starting oil palm cultivation
 |
| 1. I usually talk to development officials from government agencies about the suitability of the land to plant oil palm on my land.
 |
| 1. Before planting oil palm, I check if the soil is suitable, and the terrain is safe
 |
| 1. I only plant palm oil in areas approved by local law
 |
| 1. Planting in areas of steep terrain, and infertile and brittle soils is dangerous
 |
|  |  |
| ATTITUDE TOWARDS THE CONCEPT OF SUSTAINABILITYENVIRONMENT (ENV) | 1. Practising sustainability in business operations will not drop my business performance
 |
| 1. We need to preserve natural resources
 |
| 1. We need to protect the environment
 |
| 1. We live more harmoniously if the environment can be maintained
 |
| 1. I support efforts towards environmental conservation
 |
| 1. I am willing to invest my resources (financial or otherwise) for the sake of the environment
 |
| 1. My business operates without compromising the environment
 |
| 1. Environmental management practices should be a priority for all businesses
 |
|  |  |
| SOCIAL (SOC) | 1. I will make sure that the community will not be affected on top of any of my business decisions
 |
| 1. I never made any business decisions that would affect my culture
 |
| 1. I have always prioritized fairness in fairness in doing business
 |
| 1. I always put the welfare of my employees first
 |
| 1. I provide a good work environment for my employees
 |
| 1. Employee safety and health are my top priority
 |
| 1. I place an emphasis on career-family balance for my employees
 |
| 1. I am very involved in community activities
 |
|  |  |
| ECONOMY (ECO) | 1. I run a business with the aim of growing, innovating, and developing
 |
| 1. Improving the economic status of my household is my top priority
 |
| 1. I am always thinking about doing my responsibility in contributing to the increasing revenue of the country’s palm oil industry
 |
| 1. I support efforts to make my business profitable
 |
| 1. Profit is my main purpose of running this business
 |
| 1. Getting more profit is the most important thing for me
 |