

MALAYSIAN PALM OIL MILL SUSTAINABILITY REGULATIONS: FROM ORGANISATION PRIORITY TO COMPLIANCE OPERATION

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ABSTRACT: This paper aims to investigate the performance of Malaysian Palm Oil Mills (POMs) in complying with the regulations and voluntary standards for sustainability. Using survey instrument the priority of the organisations and the current achievement of the POMs compliance operation according to the 18 main regulations, policies, and voluntary standards related to environmental, social and economic dimensions. From the sample of 51 POMs, the results suggested that the Malaysian POMs complied with the regulations, and voluntary standard but there is a slight difference in terms of POMs priority and the current achievement of the mills. The binomial test results indicate that Roundtable Sustainability Palm Oil (RSPO) certification and social responsibility standard, ISO 26000, were

unfavourable for Malaysian POMs' compliance performance. The study presented that sustainability-related regulations are one of the fundamental practices for the manufacturing organisation, in this case, palm oil, to achieve sustainability goal not only to the environment per se but to tackling economic aspect and protecting society at large.

KEYWORDS: *Malaysian Palm Oil Mills; Manufacturing Sustainability; Regulations Compliance*

1.0 INTRODUCTION

Recently, there has been rising trend in adoption of manufacturing sustainability in many industries. In the case of Palm Oil Mills (POMs) increasing awareness on the risk of destruction to the environment, causing adverse impacts on biodiversity and climate change put serious pressure for sustainable palm oil production [1]. Driven from stakeholder engagement, market competition, changing needs of sustainable palm oil, determination to make palm oil production more sustainable becoming the greatest challenge for Malaysia not just for the future success of the company, but for the health and well-being of future generations as well [2-3].

Within the POMs, a considerable number of efforts have been studied aimed at improving the sustainability performance in preventing and reducing the environmental impact at the operational level. The practice of environmental management is mainly driven by external impetus such as law enforcement incentive programmes from the local government [4]. Additionally, voluntary standards as alternatives to seeming State failure to enforce law could provide guidance for the industry to realise sustainability goals. The conventional approach to industrial pollution control is to establish laws requiring firms to cut emissions. Voluntary regulation, by contrast, provides incentives, but not mandates, for pollution control.

Compliance with the regulations and voluntary standards could guide the organisation to reduce wastes and pollutions, use resource efficiency and reduce greenhouse gasses (GHG) emissions. Improvement in brand and reputation, better access to international market and increase the productivity could be achieved for economic performance. For social performance, compliance to regulatory and voluntary standard could guide the organisation for better occupational safety and health (OSH) and reduce workplace accident, increase employee awareness of environmental protection, and

improve organisations relation with stakeholders [5]. However, considerable literature on industrialised countries' voluntary environmental programs certainly raises serious questions about whether developing countries' voluntary programs are likely to have environmental benefit [6-7]. The extent of priority and current achievement of the Malaysian POMs compliance with the sustainability regulations and voluntary standards have not been reported. Thus, this paper aims to investigate which of these regulations and voluntary standards are important to the Malaysian POMs and what are the current achievement of the POMs in complying with these regulations and voluntary standards. Following this introduction, Section 2 presents the background and literature review, highlighting the regulations and voluntary standards related to the Malaysian POMs sustainability. Section 3 describes the research methodology underpinning the survey questionnaire's development and analysis method. Section 4 presents survey results and discussions. Section 5 concludes the research.

2.0 PALM OIL MILLS SUSTAINABILITY REGULATION

2.1 Malaysian Laws and Regulations

The Malaysian government is responsible for authorising regulators to promulgate and enforce regulations as a form of coercive power over businesses. The government give full commitment to the expansion of the industry and encourages global expansion of palm oil production towards sustainability and constantly seeking to improve the sustainability of the palm oil industry [8]. Malaysian laws and regulations considered the triple bottom line of sustainability elements; environmental, social, and economic performance. The environmental policies and sustainability-focused law, currently being rolled out in Malaysia, are expected to have far-reaching impacts across a range of sectors notably palm oil industry. The requirements are to be imposed on individual POMs through conditions of license according to Environmental Quality Act (EQA) 1974. One of the three strategies embodied in EQA was the regulation of pollution. The other two strategies were preventing and abating any form of pollution, especially water pollution for the protection of public health and environment. The EQA is an enabling act and to date, there are 16 pieces of regulations and orders in force for the control of environmental pollution such as soil, inland waters and marine environment in the country [9].

The Labour Law is concerning to social sustainability which includes employers and employees is continuously evolving due to legal practices and modifications. The Employment Act 1955 is a statute that every employer and employee should be familiar with as it deals with the statutory minimum benefits of employees in the private sector. The Employment Act provides minimum terms and conditions (mostly of monetary value) to the certain category of workers. It provides minimum terms and conditions for the most part of financial worth to certain class of workers. Among other important considerations is the extension of maternity protection to all female employees irrespective of wages earned and a new part on sexual harassment which is also applicable to all employees irrespective of wages earned.

Workplace violence prevention program as outlined in the Occupational Safety and Health Acts (OSHA) guidelines includes hazard assessment and control elements, along with management commitment/employee involvement, recordkeeping and evaluation, and employee training [10]. The regulations under OSHA that palm oil mill need to comply are including Employers Safety and Health General Policy Statement (Exception) Regulation 1995, Control of Industry Major Hazards Regulations 1996, Safety and Health Committee Regulations 1996, Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease Regulation 2004, Classification, Packaging and Labelling of Hazardous Chemicals Regulations 1997, Safety and Health Officer Regulations 1997, and Use and Standards of Exposure of Chemicals Hazardous to Health Regulations 2000. Malaysian palm oil industry also must abide by the Factories and Machinery Act (FMA) 1967, which provides for the control of factories with respect to matters relating to the safety, health, and welfare of person therein, the registration and inspection of machinery and for matters connected therewith. The regulations that are related to the POMs are including Factories and machinery (Noise Exposure) regulations 1989, Factories and Machinery (Fencing of Machinery) Regulations 1970, Factories and machinery (Person in Charge) Regulations 1970, and Factories and machinery (Safety, Health, and Welfare) Regulations 1970.

On the basis of economic performance of palm oil for the country, Malaysian Palm Oil Board (Licensing) Regulations 2005 require that all those involved in the palm oil business obtain appropriate licenses from MPOB. The main objectives of these regulations are to legalise and coordinate all activities related to the palm oil industry, to check

malpractices that are detrimental to the industry, and to conduct quality control of palm oil products produced and traded.

2.2 Voluntary Standards

Apart from the regulations and acts from Malaysian Government concerning Sustainability POMs, there are various voluntary standard programs have established, some being encouraged and framed subsequently by national and international programs to secure the compliance with environmental and social criteria. The most prominent voluntary standards for palm oil are including International Organisation for Standardization ISO 9001- Quality Management, International Organisation for Standardization ISO 14001- Environmental Management, International Organisation for Standardization ISO 26000- social responsibility, Roundtable Sustainable Palm Oil (RSPO), Malaysian Sustainable Palm Oil (MSPO), International Sustainability and Carbon Certification (ISCC), and Roundtable on Sustainable Biofuels (RSB), summarised in Table 1. These relevant voluntary standards for Malaysian palm oil mill sustainability as there were already several pilot tests and, in the case of Malaysian palm oil, certified companies.

Table 1: Voluntary Standard for POMs Sustainability

Sustainability Voluntary Standards	Type of process	Geographic focus	Sustainability elements		
			Economic management	Environmental management	Social management
ISO 9001	All	Global	•		
ISO 14001	All	Global		•	
ISO 26000	All	Global		•	•
RSPO	Palm Oil	Global	•	•	•
MSPO	Palm Oil	Malaysia	•	•	•
ISCC	All biofuel	Global		•	
RSB	All biofuel and bio-materials	Global	•	•	•
SIRIM Carbon Footprint Labelling Policy	All	Malaysia		•	
SIRIM Eco-labelling Certification	All	Malaysia		•	

3.0 MATERIALS AND METHODS

The study began with problem refinement and literature review. Review of the sustainability regulations and voluntary standards in the Malaysian POMs was conducted to understand the necessity and emergence of this area. The questionnaire was structured based on the rating of a five-point Likert scale. It was developed in dual language, English and *Bahasa Melayu* for respondent easily understand the questions and provide answers. The glossary section was added at the end of questionnaires for respondent reference of terminologies used.

A pilot survey to test the content validity before the main survey questionnaire was administered to increase the clarity and readability of items, reduce item difficulty, and use of appropriate terminologies as suggested by Amrina and Yusof [11]. The comments and feedback were analysed and a few minor modifications were made especially in questionnaire format. In order to provide a broad overview of the sustainability practices in the Malaysia POMs, distribution of survey questionnaires was done across a wide geographical area of the mills. The selection of the 250 mills was taken randomly from 426 registered mills in 2015 from the directory of registered palm oil under the Malaysian Palm Oil Board (MPOB), a premier government agency under the Ministry of Plantation Industries and Commodities that entrusted to serve the country's oil palm industry.

4.0 RESULTS AND DISCUSSION

4.1 Malaysian Laws and Regulations

From the total of 55 mills completed and returned the questionnaire, 51 completed with useful information were accepted for further analysis. Although this study received 51 completed responses that sounds a small number of questionnaire surveys nevertheless, it was believed to be reasonably representative of this industry due to its relatively small size as a whole. It is representing 11.97% of population with response rate of 20.4%. The Cronbach's α value for all group variables in terms of priority and achievements of Malaysian POMs were 0.795 and 0.853, respectively. These results indicate that the data set has high internal consistency and are reliable, thus enabling further analysis. The demographic analysis in Figure 3 shows that two states, Johor and Pahang accounted for the majority of the received questionnaires with the response of 36% and 30%, respectively.

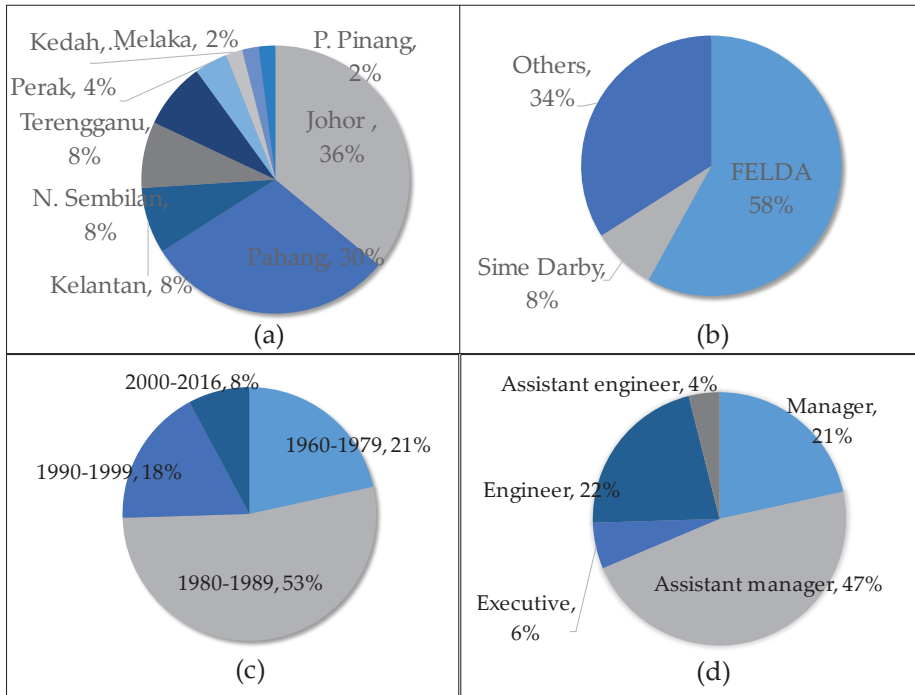


Figure 1: Results of demographics analysis: (a) mills geographical location by state, (b) mills ownership, (c) mills establishment and (d) position held by the respondents

The majority (58%) of responding organisations were owned by FGV Holding Bhd., subsidiary of Federal Land Development Authority (FELDA), the largest palm oil-based company in Malaysia. Noticeably, the number of participants from FELDA POMs were the highest due to FELDA's significant role in the development of oil palm in Malaysia. In fact, it is the single largest palm oil player in the industry in Malaysia. Sime Darby was contributed 8% to the overall result. The rest of 34% were owned by other independent organisations and a part of the group such as Kulim Plantation (M) Sdn. Bhd., Kuala Lumpur Kepong Bhd., Southern Group, etc. The establishment year of the Malaysian POMs was varied. The result shows that 58% of the mills were established between the year of 1980-1989, 12% were between 1960-1979, 18% between the year 1990-1999, and 8% were established in the year between 2000-2016. The positions held by the respondent within the organisations were including Assistant Manager (47%), Engineers (22%), Mills Manager (21%), Executives (6%) and Assistant Engineer (4%). The respondents were from management positions and have more than two years' working experience in the industry. Careful targeting of a

knowledgeable respondent can assist in overcoming potential problems with common method variance.

4.2 Comparison of POMs' Priority and Compliance

The results of the mean and Binomial test were summarised in Table 2 indicated that more than 50% of the respondents rate the factors for sustainability regulatory in Malaysian POMs are equal or greater than 3 on the scale of 5 at p-value greater than 0.05. The mean score for mills' achievement was lower than the priority. This pointed out that the mills have a higher target for better compliance in sustainability regulatory in the future. The highest priority was Occupational Safety and Health Act (OSHA) 1994, mean score 4.569. Other higher score for sustainability regulatory compliance showed in Employment Act 1955, mean score 4.549, Factories & machinery (noise exposure) regulations 1989, mean score 4.529, Environmental Quality Act 1974, mean score 4.529, and Environmental Quality (scheduled wastes) Regulations, 2005, mean score 4.510.

The results of the mean comparison show that the operational compliance was focused on the Employment Act 1955, mean score 4.098, Environmental Quality (scheduled wastes) Regulations, 2005, mean score 4.020, Factories & machinery (noise exposure) regulations 1989, mean score 3.961, Occupational Safety and Health Act (OSHA) 1994, mean score 3.902, and Environmental Quality Act 1974, mean score 3.882. The smallest achievement of Malaysian POMs were in compliance to the Roundtable on Sustainable Biomaterials (RSB) certification, mean score 0.588, SIRIM Carbon Footprint Labelling Policy, mean score 0.824, Malaysian Sustainable Palm Oil (MSPO) certification, mean score 1.412, Eco-labelling Certification, mean score 1.431, International Sustainability & Carbon Certification (ISCC, mean score 1.667 and Social responsibility standard (ISO 26000), mean score 1.902). These items were part of the voluntary certification scheme for sustainability.

From Table 2, the binomial test results showed that all the sustainability regulatory elements were favourable level except for the Roundtable Sustainability Palm Oil (RSPO) certification (SL9) for mills' priority. Social responsibility standard, ISO 26000 (SL18), were low level for both priority and achievements of Malaysian POMs sustainability regulatory compliance. The result of correlation matrix based on the Spearman's rho correlation analysis to investigate the relationship of each sustainability regulatory compliance elements for Malaysian POMs is summarised in Table 3. The correlation of the

elements was observed for both priority and current achievement of Malaysian POMs. In terms of priority, the correlation coefficient in the range of -0.712 to 0.961. The results of the correlation analysis indicate that the greatest significant correlations are obtained with Occupational Safety and Health Act (OSHA) 1994 (SL15) and Employment Act 1955 (SL16) with the 0.961 significant positive correlation at p-value 0.01, 99% confidence level.

The result of this survey indicated that the Malaysian POMs are committed to adopting sustainability practices according to the regulations and voluntary standards guidelines. The compliance with the regulations and voluntary standards also become a gauge in identifying strategy of organisations participate in realising the sustainability in the manufacturing operation. It is consistent in Millar and Russel [12] that the Caribbean constituted pressure from governments for manufacturers to undertake sustainable practices and the manufacturers believe there is a greater role for governments to encourage the uptake of sustainability.

Table 2: Results of the mean and binomial test for sustainability regulation compliance in Malaysian POMs

Malaysian POMs Sustainability Regulation compliance		Priority			Current Achievement			
		Mean	Category Observed Proportion		Mean	Category Observed Proportion		Sig. (P-value)
			>3	≤3		>3	≤3	
SL1	Environmental Quality Act 1974	4.529	1.00	0.00	0.000	0.96	0.04	0.000
SL2	Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulation 1977	4.490	1.00	0.00	0.000	0.98	0.02	0.000
SL3	Environmental Quality (Clean Air) Regulation 1978	4.294	0.98	0.02	0.000	0.92	0.08	0.000
SL4	Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987	4.059	0.94	0.06	0.000	0.92	0.08	0.000
SL5	Environmental Quality (scheduled wastes) Regulations, 2005	4.510	1.00	0.00	0.000	0.98	0.02	0.000
SL6	Environmental Quality (Industrial Effluent) Regulation 2009	4.000	0.92	0.08	0.000	0.90	0.10	0.000
SL7	Quality Management Standard (e.g. ISO 9001)	3.706	0.80	0.20	0.000	0.76	0.24	0.000
SL8	Environmental Management Standard (e.g. ISO 14001)	3.471	0.76	0.24	0.000	0.73	0.27	0.002
SL9	Roundtable Sustainability Palm Oil (RSPO) certification	3.216	0.75	0.25	0.001	0.31	0.69	0.011
SL10	SIRIM Eco-labelling Certification	1.745	0.55	0.45	0.006	0.65	0.35	0.051
SL11	International Sustainability & Carbon Certification (ISCC)	1.980	0.51	0.49	0.000	0.57	0.43	0.001
SL12	Roundtable on Sustainable Biomaterials (RSB) certification	0.686	0.80	0.20	0.000	0.86	0.14	0.000
SL13	SIRIM Carbon Footprint Labelling Policy	0.863	0.75	0.25	0.001	0.80	0.20	0.000
SL14	Malaysian Sustainable Palm Oil (MSPO) certification	1.549	0.59	0.41	0.026	0.65	0.35	0.049
SL15	Occupational Safety and Health Act (OSHA) 1994	4.569	1.00	0.00	0.000	0.98	0.02	0.000
SL16	Employment Act 1955	4.549	1.00	0.00	0.000	1.00	0.00	0.000
SL17	Factories & machinery (noise exposure) regulations 1989	4.529	1.00	0.00	0.000	0.98	0.02	0.000
SL18	Social responsibility standard (ISO 26000)	2.098	0.55	0.45	0.046	0.49	0.51	1.000

Table 3: Comparison of Correlation of sustainability regulatory compliance in Malaysian POMs

Item	Priority		Achievement	
	Moderate (0.400-0.599)	Strong – Very Strong (0.600-1.000)	Moderate (0.400-0.599)	Strong – Very Strong (0.600-1.000)
SL1	SL6, SL16	SL2, SL3, SL4, SL5, SL15, SL17	SL8	SL2, SL3, SL4, SL5, SL6, SL7, SL15, SL16, SL17
SL2	SL6, SL16	SL1, SL3, SL4, SL5, SL15, SL17	SL6, SL8	SL1, SL3, SL4, SL5, SL7, SL15, SL16, SL17
SL3	SL6, SL15, SL16	SL1, SL2, SL4, SL5, SL17	SL8	SL1, SL2, SL4, SL5, SL6, SL7, SL15, SL16, SL17
SL4	SL7, SL8, SL15, SL16, SL17	SL1, SL2, SL3, SL5, SL6	SL8	SL1, SL2, SL3, SL5, SL6, SL7, SL15, SL16, SL17
SL5	SL7, SL16	SL1, SL2, SL3, SL4, SL6, SL15, SL17	SL7, SL8	SL1, SL2, SL3, SL4, SL6, SL15, SL16, SL17
SL6	SL1, SL2, SL3, SL7, SL8, SL17	SL4, SL5	SL2, SL7, SL8, SL16	SL1, SL3, SL4, SL5, SL15, SL17
SL7	SL4, SL5, SL6, SL9, SL15, SL16, SL17	SL8	SL5, SL6, SL9, SL15, SL16	SL1, SL2, SL3, SL4, SL8, SL17
SL8	SL4, SL6, SL10, SL15, SL16, SL17	SL7	SL1, SL2, SL3, SL4, SL5, SL6, SL15, SL16, SL17	SL7
SL9	SL7	-	SL7	-
SL10	SL8, SL12	-	SL11, SL12, SL13, SL14	-
SL11	-	-	SL10, SL12, SL13	-
SL12	SL10, SL14	SL13	SL10, SL11, SL14	SL13
SL13	SL14	SL12	SL10, SL11, SL14, SL18	SL12
SL14	SL12, SL13	-	SL10, SL12, SL13	-
SL15	SL3, SL4, SL7, SL8	SL1, SL2, SL5, SL16, SL17	SL7, SL8,	SL1, SL2, SL3, SL4, SL5, SL6, SL16, SL17
SL16	SL1, SL2, SL3, SL4, SL5, SL7, SL8	SL15, SL17	SL6, SL7, SL8	SL1, SL2, SL3, SL4, SL5, SL15, SL17
SL17	SL4, SL6, SL7, SL8	SL1, SL2, SL3, SL5, SL15, SL16	SL8	SL1, SL2, SL3, SL4, SL5, SL6, SL7, SL15, SL16
SL18	-	-	SL13	-

While RSPO has emerged as alternatives to Government failure to enforce the law, however, the employment of the RSPO certification in the Malaysian POMs is still small. This is due to several reasons as agreed by Basiron and Yew [13], stated that the unresponsive interest of certified sustainable palm oil by the consumers at only 45% of that produced. It showed that the extra revenue obtained from sales of certified sustainable palm oil and certified sustainable palm kernel oil cannot cover the expenditure incurred for certification. As a result, the Malaysian palm oil industry will have to bear a total loss of RM758 million annually.

Serious challenges remain for RSPO to mainstream environmentally sustainable and socially responsible practices throughout the supply chain has been observed not only in Malaysia, but other top palm oil producer and exporter Including Indonesia and Thailand as shown in the [14-16]. The main barriers to the adoption of the standards by smallholders, often lack of knowledge and capacity for certification demands. This is agreed by Brandi et al. [17] that the most important compliance challenges for independent smallholders outlined how smallholders can be supported so that they can be included in certification schemes.

The main barriers to the adoption of the standards by smallholders, often lack knowledge and capacity for certification demands. For the low rating of ISO 26000 (SL18) priority and achievement among respondents are supported by Millar and Russel [12] study that provides a comprehensive and thorough analysis of ISO 26000 for business governance document in the manufacturing organisation. The ISO 26000 weakness can be seen as being too broad in scope to be useful in the context of specific industries and sectors, but too costly and time-consuming for many small and medium-sized enterprises to implement, and, unlike most other ISO international standards, it is not a certifiable management system, therefore leading to flaws in assessing its usefulness.

The result of this survey directed that the Malaysian POM are committed in adopting sustainability practices according to the regulations and voluntary standards guidelines. The compliance to the regulations and voluntary standards has turn into a gauge in identifying strategy of organisations participation in realising the sustainability in the manufacturing operation, as agreed by Ocampo and Clark [18]. It is consistent with Matuszak-Flejszman [19] survey on the Polish manufacturing organisations that the respondents

considered compliance with legal regulations to be one of the most important internal benefits. It was suggested to increase employee consciousness on the sustainability issues, so that employees' involvement in any environmental protection and sustainability campaigns or actions can be realised in the manufacturing organisation. Theyel and Hofmann [20] affirmed that conformance to environmental regulations and common industry practices were corresponding to stakeholder pressures for sustainability. Additionally, Millar and Russell [12] highlighted that constituted pressure from governments to manufacturers to undertake sustainable practices and the manufacturers believe there is a greater role for governments to encourage the uptake of sustainability. Moreover, compliance with regulations on sustainability stems from the obligation of each organisation to adhere to country law.

5.0 CONCLUSION

This study investigated Malaysian POMs' performance in complying with the regulations and voluntary standards by comparing POMs' priority against the current achievement of the sustainability regulations and standards compliance. Using survey approach, the results of the statistical analysis were presented. The sample of 51 respondents from POMs across Peninsula Malaysia is reported. The results indicated that the highest priority for Malaysian POMs is OSHA, but the achievement of operational compliance is slightly low. It is also found that all regulations and standards apart from RSPO certification and social responsibility standard, ISO 26000, were placed in favourable level for sustainability in Malaysian POMs. From the correlation test, the result showed that the greatest significant correlations were obtained between OSHA and Employment Act. The study provides some insights into the priority of organisations' management and their operations' commitment to sustainability regulation compliance. It identifies applicable laws and regulatory obligations, as well as voluntary standards and embeds compliance into the day-to-day business processes. The limitation is that the study only focuses on the regulations and voluntary standards compliance in the Malaysian POMs. There is a need to explore the performance of POMs from other palm oil producer to gather more information on this issue. Besides, further study on the drivers and barriers to the compliance of sustainability regulations and voluntary standards from the POMs perspective need to be considered.

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REFERENCES

- [1] P. Oosterveer, "Promoting sustainable palm oil: viewed from a global networks and flows perspective", *Journal of Cleaner Production*, vol. 107, pp. 146-153, 2015.
- [2] M.H.O. Umar and A. Elkamel, "New composite sustainability indices for cradle-to-cradle process design: case study on thinner recovery from waste paint in auto industries", *Journal of Cleaner Production*, vol. 166, pp. 253-262, 2017.
- [3] K.T. Tan, K.T. Lee, A.R. Mohamed, and S. Bhatia, "Palm oil: addressing issues and towards sustainable development", *Renewable and Sustainable Energy Reviews*, vol. 13, no. 2, pp. 420-427, 2009.
- [4] C. Gutzler, K. Helming, D. Balla, R. Dannowski, D. Deumlich, M. Glemnitz, A. Knierim, W. Mirschel, C. Nendel, C. Paul, S. Sieber, U. Stachow, A. Starick, R. Wieland, A. Wurbs, and P. Zander, "Agricultural land use changes - A scenario-based sustainability impact assessment for Brandenburg, Germany", *Ecological Indicator*, vol. 48, pp. 505-517, 2015.
- [5] D. Fan, C.K.Y. Lo, V. Ching, and C.W. Kan, "Occupational health and safety issues in operations management: a systematic and citation network analysis review", *International Journal of Production Economics*, vol. 158, pp. 334-344, 2014.
- [6] A. Blackman, B. Lahiri, W. Pizer, M. Rivera Planter, and C. Muñoz Piña, "Voluntary environmental regulation in developing countries: Mexico's Clean Industry Program", *Journal of Environmental Economics and Management*, vol. 60, no. 3, pp. 182-192, 2010.
- [7] H. Muzaimi, S.R. Hamid, and B.C. Chew, "Integrated management system for quality management system accreditation", *Journal of Advanced Manufacturing Technology*, vol. 12, no. 1(1), pp. 87-100, 2018.
- [8] C. Guan and A. Mckay, "Sustainability in the Malaysian palm oil industry", *Journal of Cleaner Production*, vol. 85, pp. 258-264, 2014.
- [9] S.A. Muyibi, A.R. Ambali, and G.S. Eissa, "The impact of economic development on water pollution: trends and policy actions in Malaysia", *Water Resources Management*, vol. 22, no. 4, pp. 485-508, 2008.

- [10] K.M. McPhaul, M. London, K. Murrett, K. Flannery, J. Rosen, and J. Lipscomb, "Environmental evaluation for workplace violence in healthcare and social services", *Journal of Safety Research*, vol. 39, no. 2, pp. 237–50, 2008.
- [11] E. Amrina, and S.M. Yusof, "Key performance indicators for sustainable manufacturing evaluation in automotive companies", in *IEEE International Conference on Industrial Engineering and Engineering Management*, Singapore, 2011, pp. 1093-1097.
- [12] H.H. Millar, and S.N. Russell, "The adoption of sustainable manufacturing practices in the Caribbean", *Business Strategy and the Environment*, vol. 20, no. 8, pp. 512-526, 2011.
- [13] Y. Basiron and F.-K. Yew, "The burden of RSPO certification costs on Malaysian palm oil industry and national economy", *Journal of Oil Palm, Environment & Health*, vol. 7, no. 2, pp. 19–27, 2016.
- [14] I. Mukherjee and B.K. Sovacool, "Palm oil-based biofuels and sustainability in Southeast Asia: A review of Indonesia, Malaysia, and Thailand", *Renewable and Sustainable Energy Reviews*, vol. 37, pp. 1-12, 2014.
- [15] E.L.Y. Man, and A. Baharum, "A qualitative approach of identifying major cost influencing factors in palm oil mills and the relations towards production cost of crude palm oil", *American Journal of Applied Sciences*, vol. 8, no. 5, pp. 441-446, 2011.
- [16] G.D. Paoli, B. Yaap, P.L. Wells, and A. Sileuw, "CSR, oil palm and the RSPO: Translating boardroom philosophy into conservation action on the ground", *Tropical Conservation Science*, vol. 3, no. 4, pp. 438-446, 2010.
- [17] C. Brandi, T. Cabani, C. Hosang, S. Schirmbeck, L. Watermann, and H. Wiese, "Sustainability standards for palm oil: Challenges for smallholder certification under the RSPO", *The Journal of Environment and Development*, vol. 24, no. 3, pp. 292-314, 2015.
- [18] L. Ocampo, and E. Clark, "A proposed framework in developing sustainable manufacturing initiatives using Analytic Hierarchy Process (AHP)", *Industrial and Systems Engineering Review*, vol. 3 no. 1, pp. 7-16, 2015.
- [19] A. Matuszak-Flejszman, "Benefits of environmental management system in Polish companies compliant with ISO 14001", *Polish Journal of Environmental Studies*, vol. 18, no. 3, pp. 411–419, 2009.
- [20] G. Theyel, and K.H. Hofmann, "Stakeholder relations and sustainability practices of US small and medium-sized manufacturers", *Management Research Review*, vol. 35, no. 12, pp. 1110-1133, 2012.

