



# Social Sustainability of Palm Oil Industry: A Review

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Climate change, resource scarcity, and an aging population are the most concerning global issues in recent decades. One of the best methods to manage and mitigate these problems while continuing to boost the economies and offer opportunities for the growing world population is sustainable development. As Malaysia is one of the major oil consumers in the world, the sustainability of palm oil has been controversial. Several sustainability standards are introduced to ensure the balance performance in terms of economic, environmental, and social performance of the industry. Nonetheless, the social aspect of the sustainability of palm oil has received relatively less emphasis as compared with the economic and environmental aspects. Literature, experts, and anecdotal evidence often claim that it is due to the complication in assessing and evaluating social factors and impacts. Thus, this work aims to fill the gap in the literature on social sustainability for the palm oil industry both in terms of methods and facets. Suggested facets and their implication can enrich the theoretical contribution of this field while providing a comprehensive profile of the social sustainability of the palm oil industry. The outcomes can also be adopted by policymakers and industry stakeholders to assess, manage, and enhance the social sustainability of the industry.

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## INTRODUCTION

The need for sustainable development has been elevated across the globe over the past two decades as one of the key efforts to address and mitigate global challenges such as climate change, resource scarcities (i.e., energy, food, water), and social issues (i.e., aging, poverty, human right). As sustainable development is promoted as the most prominent direction for future development, institutions, governments, as well as non-governmental organizations have initiated to integrate sustainability practices or elements into their respective arenas. The 2030 Agenda for Sustainable Development is thus far the most well-recognized movement across the world, enlisting and formulating the world's issues into 17 Sustainable Development Goals (SDGs) as a shared blueprint for peace and prosperity for people and the planet, now and into the future.

The agenda was first introduced in the year 2015, with a 15-year plan to achieve the goals. Many countries are taking concrete actions for sustainable development, such as increasing marine protected areas for environmental protection, ratifying the Paris Agreement on climate change, developing national policies in response to rapid urbanization and sustainable consumption and production. Despite the efforts in the past 5 years, more actions need to be taken in the next decades to ensure the achievement of the SDGs. In view that the natural environment is deteriorating at an alarming rate and the COVID-19 pandemic, a faster and more ambitious response is needed to unleash the social and economic transformation to achieve 2030 goals (United Nations, 2020).

The introduction and implementation of new avenues such as circular economy, bioeconomy, green economy in recent years have offered pragmatic approaches for sustainable development. Nonetheless, it is observed that such efforts are highly skewed toward economic development with cleaner production and environmental preservation and conservation, with minimal attention devoted to the social dimension (Klassen and Vereecke, 2012; Valenzuela-Venegas et al., 2016). A similar trend can be observed in the research arena as well, whereas the publications related to sustainability have been increasing rapidly in the past 20 years, but the intensity of publications related to social sustainability is relatively low. Even though there is a constant growth in the number of publications on sustainable development topics, inclusive of economic sustainability, environmental sustainability, and social sustainability, a vast gap is observed between the number of publications related to sustainable development, environmental sustainability, and economic sustainability than those related to social sustainability. The gaps in the number of publications for environmental sustainability, economic sustainability, and social sustainability are shown in **Figure 1**.

Literature, experts, and anecdotal evidence often claim that social sustainability remains a very niche scope as it is harder to quantify as compared to other components of sustainable development (i.e., environmental and economic aspect). The assessment of social impacts, the selection of social indicators, and the measurement of the effectiveness of efforts to improve social well-being are all associated with high uncertainties and

complications. One of the reasons is that the measurement of social indicators such as living conditions, equality, health, and safety are often subjected to the cultures and values, education level of the social group. Furthermore, the assessment of social impacts would only be considered meaningful if the process was devised, interpreted, and translated based on context-specific indicators (Magee et al., 2012).

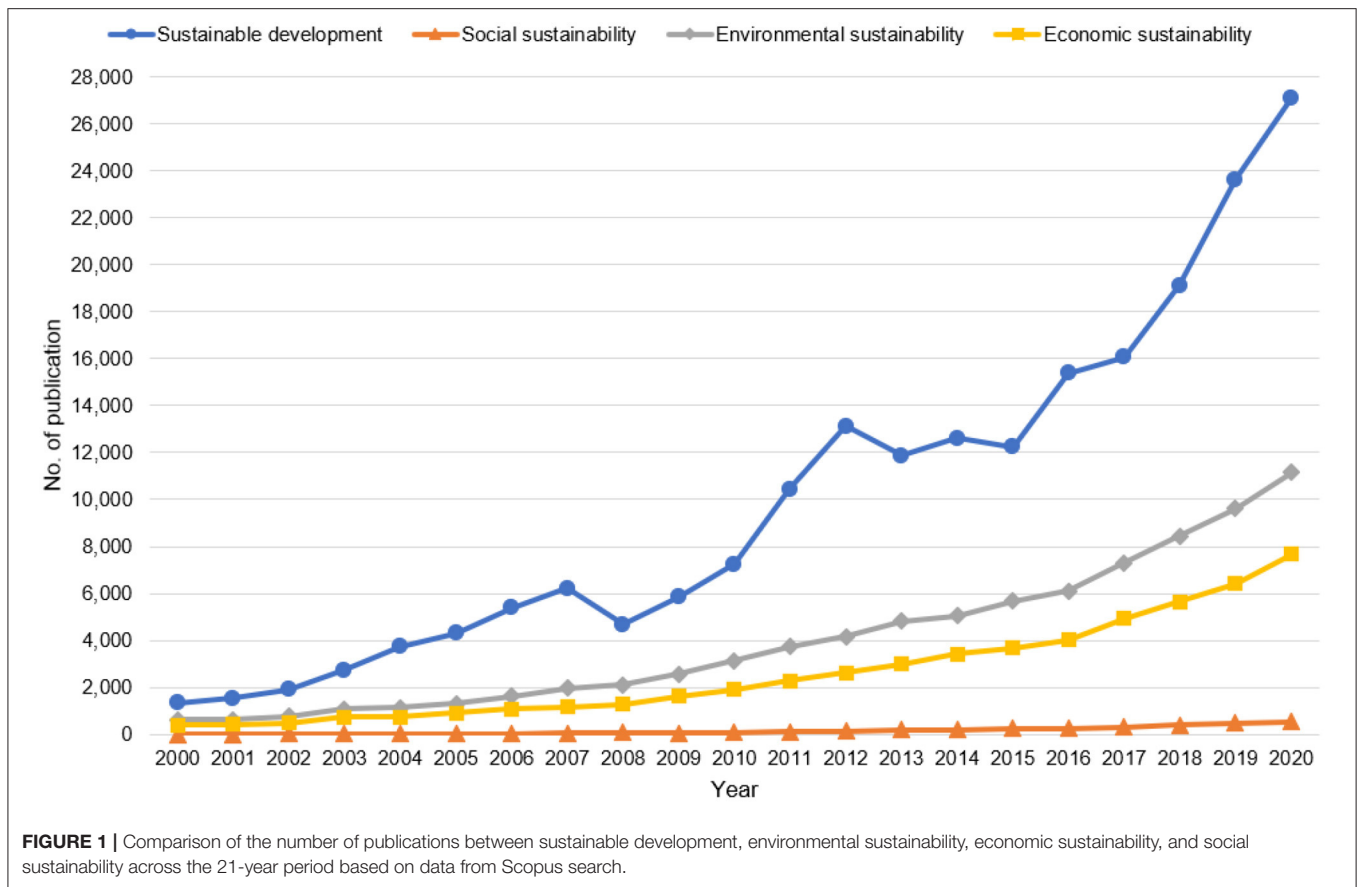
As one of the major palm oil producers and exporters, the palm oil industry in Malaysia contributes about 37.9% of the country's gross national income (GDP) through the agricultural sector (DOSM, 2019). However, in recent years, there has been increasing concern about sustainability issues related to palm oil production. Advocates argue that the palm oil industry has caused deforestation, which leads to biodiversity loss, increased soil erosion, and loss of wildlife habitat (Sayer et al., 2012). Oil palm production, especially large-scale estates, has frequently been associated with negative social impacts on rural communities, indigenous people, and estate laborers. The employment of undocumented labor and children exposes them to exploitation and violates human rights (Ferdous Alam et al., 2015; Pye, 2018). Lack of access to school education and training in the workplace and poor working conditions are also asserted as neglecting the welfare and well-being of plantation workers. Consequently, many non-governmental organizations (NGOs) have launched a series of anti-palm oil campaigns in order to increase the awareness of the social sustainability issues associated with palm oil production (Goh, 2016). These global anti-palm oil campaigns have created a strong impact on the demand for crude palm oil, particularly in developed nations such as European Union nations. The Malaysian government has been actively defending the sustainability of the industry through the enforcement of sustainability certification across the whole palm oil production chain, organizing awareness campaigns and branding activities. The impact of these initiatives, however, has not been significant, particularly in terms of the social aspect. This is due to the complexity and complication in assessing social sustainability. Thus, the main objectives of this paper are to (1). contribute to the theoretical foundation on the definition and importance of social sustainability in terms of sustainable development; (2). generalize and identify the key facets for social assessment and evaluation for the palm oil industry. The following paper is structured as follows: Section 2—Background review on the definition and scope for social sustainability and the current state of the sustainability of palm oil industry; Section 3—Review method and process; Section 4—Methods for social sustainability assessment and evaluation; Section 5—Key facets for the social sustainability assessment in the palm oil industry; and last but not least, Section 6—Conclusion.

## LITERATURE REVIEW

### Social Sustainability—Definition and Coverage

By definition, sustainable development is a form of development to meet the needs of the present without compromising the ability of future generations to meet their own needs

**Abbreviations:** ADB, Asian Development Bank; AHP, Analytic Hierarchy Process; ANOVA, Analysis of Variance; CPI, Consumer Price Index; CSPO, Certified Sustainable Palm Oil; DOSM, Department of Statistics Malaysia; EIA, Environmental Impact Assessment; ESIA, Environmental and Social Impact Assessment; ELCA, Environmental Life Cycle Analysis; FFB, fresh fruit bunches; GDP, Gross Domestic Product; GNI, Gross National Income; GPGLI, Global Person Generated Index; GRI, Global Reporting Initiative; ILCD, International Reference Life Cycle Data System; IR 4.0, Industrial Revolution 4.0; ISO, International Organization for Standardization; ISPO, Malaysian Sustainable Palm Oil; LCA, Life Cycle Analysis; MPOC, Malaysian Palm Oil Council; MPOCC, Malaysian Palm Oil Certification Council; MSPO, Malaysian Sustainable Palm Oil; NGO, Non-Governmental Organization; OLCA, Organizational Life Cycle Analysis; PANAS, Positive and Negative Affect Scale; PCA, Principal Component Analysis; POSA, Palm Oil Sustainability Assessment; RSPO, Roundtable Sustainable Palm Oil; SDG, Sustainable Development Goal; SEM, Structural Equation Modeling; SETAC, Society of Environmental Toxicology and Chemistry; SIA, Social Impact Assessment; SLCA, Social Life Cycle Analysis; SOLCA, Social Organizational Life Cycle Analysis; UNEP, United Nations Environment Programme; UNESCO, United Nations Educational Scientific and Cultural Organization.



(United Nations General Assembly, 1987). The generalized idea of sustainable development has been achieved and well-accepted across different industries, despite there being still some provocations and doubts insisting that “sustainability” remains as a normative concept with no definitive meaning (Demeritt et al., 2011). Sustainable development focuses on achieving a state of balance between economic, environmental, and social aspects. Nonetheless, the priorities of these three main pillars of sustainable development have always been controversial. Literature on the concentric model suggests that the environmental dimension predominates over social and economic dimensions (Colantonio, 2007; Severson and Vos, 2018), while mainstream idea emphasizes the equal weights amongst all these three aspects (Kleindorfer et al., 2009). However, neither of these models highlights the importance of the social dimension, relative to economic and environmental dimensions (Vallance et al., 2011; Ghahramanpouri et al., 2013). The significance of social sustainability is evident with 10 (out of 17) SDGs which are directly or indirectly associated with social issues. They are SDG 1—No poverty, SDG 2—Zero hunger, SDG 3—Good health and well-being, SDG 4—Quality education, SDG 5—Gender equality, SDG 6—Clean water and sanitation, SDG 8—Decent work and economic growth, SDG 10—Reduced inequalities, SDG 11—Sustainable cities and communities, and

SDG 16—peace, justice, and strong institutions. Nonetheless, the lack of interest and theoretical foundations for social sustainability is one of the reasons that the definition of social sustainability has remained vague and ambiguous to date (Vifell and Soneryd, 2012). **Table 1** highlights some of the definitions and perceptions of social sustainability in backward chronological order.

The common descriptions of social sustainability across the literature encompass the development of civil society, fostering an environment conducive for human well being and social engagement. It includes physical, social, and emotional needs as well as health or the subjective perception of happiness. Thus, in this work, social sustainability is delineated as the design of social world infrastructure which creates physical, cultural, and social places that support people’s well being and encourage a sense of community. Based on the classification done by the Global Reporting Initiative (GRI), the first and most recognized sustainability reporting system, social sustainability can be divided into four sub-categories, namely labor practices, decent work, human rights, and society and product responsibility (Global Reporting Initiative, 2020). Cuthill (2010) in view that the four different aspects of social sustainability (i.e., social capital, social justice and equity, social infrastructure, and engaged governance) are interdependent on one another with a self-reinforcing relationship. In recent years, some

**TABLE 1** | Highlights of the definitions of social sustainability.

References	Description
Balaman (2019)	The management of the positive and negative impacts of systems, processes, organizations, and activities on people and social life.
Staniškiene and Stankevičiute (2018)	The fulfillment of the basic needs and equity which are required for survival of human beings in terms of both physical and psychological.
Missimer et al. (2017a,b)	A solution for structural obstacles to health, influence, competence, impartiality, and meaning making.
Rajak and Vinodh (2015)	The interaction between individual, societies, and communities in meeting basic needs and equity
Anisul Huq et al. (2014)	The representation of the human side of the sustainability, mainly revolving around the impacts on the relationship of various stakeholders.
Dempsey et al. (2011)	The development that supports the well-being of people, regardless of individual, in group or as in communities with the environment.
Bramley et al. (2009)	The development of communities and social equity
McKenzie (2004)	The development and revolution surrounded with humans' value and living criteria, with emphasis on the positive condition within communities, and a process within communities that can achieve that condition.
Chiu (2003)	The conservation and development of the quality of life for present and forthcoming generations.
Caulfield et al. (2001)	The development that is compatible with harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population.

work has been done to categorize social sustainability into three orientations—namely instrumentalist bridge sustainability (i.e., behavior change to achieve bio-physical environmental goals), maintenance sustainability (i.e., preservation of socio-cultural patterns and practices by social-economic change) and development sustainability (i.e., poverty, inequity, and issues of injustice) (Vallance et al., 2011). Bai and Sarkis (2010) categorized the social criteria into internal social criteria (criteria concerning or having impacts on the individual only such as health and safety, employment practices) and external social criteria (criteria that influences others such as infrastructure, stakeholders' relationship). The concept of social sustainability has been employed by the housing and property management industry, which can be categorized into four dimensions, namely social and cultural life, voice and influence, amenities and infrastructure, and changes in the neighborhood.

## Sustainability of Palm Oil Industry

The sustainability of the palm oil industry has been under the spotlight in recent years. At one end, palm oil is the most versatile oil which serves as a key ingredient for a variety of products, ranging from food, to cosmetic, natural preservatives, cooking oil, as well as biofuel. Palm oil remains a dominant player in the total oils and fats market, contributing to about 36.43% of the global consumption, followed by soybean oil (27.75%) and rapeseed (canola) oil (13.56%) (Shahbandeh, 2020). On the other end, the palm oil industry is claimed to be one of the major drivers of deforestation and loss of biodiversity. A huge track of virgin tropical forests is cleared to be converted to oil palm plantations, leading to natural habitat loss for many endangered species such as orangutans, elephants, tigers, and rhinos (Comte et al., 2012). Furthermore, the agricultural practices in oil palm plantations are also believed to contribute to soil erosion, water pollution, as well as haze issues associated with the burning

of peatlands (Bissonnette, 2016). Lack of standard procedure and documentation on the employment in oil palm plantations, particularly those involving native and indigenous groups are often associated with labor and human rights issues. Despite studies in major palm oil-producing countries (i.e., Indonesia, Malaysia, Brazil) have shown that the palm oil industry is positively correlated to income and financial security of the smallholders, particularly on job creation, economic activities and infrastructure development to improve the overall quality of life, the negative impacts of the industry are still significant and shall be mitigated (Bissonnette, 2016; Azima et al., 2018; Córdoba et al., 2019).

With the increasing awareness of sustainable development, the industry has been put under severe pressure in an attempt to provide continuous support to the increased fat and oil demands due to the growing population, while accommodating sustainable practices in its operation. Different sustainability standards have been introduced by institutions (i.e., local authorities) and NGOs to govern the operation of the palm oil supply chain, from oil palm plantation to the generation of end-products. Amongst the sustainability certifications, Roundtable Sustainable Palm Oil (RSPO) is the most recognized standard that is well-accepted throughout the globe. Malaysia and Indonesia, which account for about 90% of the world's palm oil production, also mandate the compliance of the national sustainability certification, namely Malaysian Sustainable Palm Oil (MSPO) and Indonesian Sustainable Palm Oil Standard (ISPO), respectively.

The basic components of these major sustainability certifications are similar, which cover the three main pillars of sustainable development, i.e., economic, social and environmental, in different terms. In RSPO, seven (7) impact goals are targeted under three principles, namely (i) prosperity (i.e., economic aspect)—to enhance the economic performance for the industry through higher productivity, efficiency, and



**TABLE 2** | The principles for MSPO and ISPO.

MSPO (MPOCC, n.d.)	ISPO (Hutabarat, 2017; Hidayat et al., 2018)
Management commitment and responsibility	Licensing system and plantation management
Transparency	Technical guidelines for palm oil cultivation and processing
Compliance to legal requirements	Environmental management and monitoring
Social responsibility, health, safety, and employment conditions	Responsibilities for workers
Environment, natural resources, biodiversity, and ecosystem services	Social and community responsibility
Best practices	Strengthening community economic activities
Development of new plantings (for oil palm plantations only)	Sustainable business development

resilience; (ii) people (i.e., social aspect)—to improve social sustainability through a commitment of human and community rights, and to provide support for human development; and (iii) planet (i.e., environmental aspect)—to conserve and preserve the environment (Roundtable on Sustainable Palm Oil, 2018). MSPO contains a more detailed grouping in terms of the stakeholders' groups (i.e., independent smallholders, oil palm plantations and organized smallholders, palm oil mill) and the stages in the palm oil production chain (i.e., oil palm management and supply chain) (Malaysian Palm Oil Certification Council, 2019). The details of the principles for both MSPO and ISPO are summarized in **Table 2**. Similarities can be observed in the main principles of MSPO and ISPO, with both standards emphasizing the implementation and documentation of the sustainable practices associated with the planning of new plantations, palm oil cultivation, environmental impact, and social development. It is worth noting that when ISPO was first introduced in 2011, it was only compulsory for big plantations. Small farmers with <25 hectares can adopt the ISPO voluntarily. However, in 2020, the Indonesian government has announced the mandatory compliance for small stakeholders, with a total of 5 years grace period (Jong, 2020). The implementation of the MSPO in Malaysia was started in early 2015 voluntarily for all stakeholders and was later enforced as mandatory in 2019.

Despite certifications have been introduced at the national as well as at the international level, the effectiveness of the certification has been controversial. Several studies have shown that the RSPO was unable to assure the traceability of the whole palm oil supply chain, hence resulting in a lower confidence level of the certification and less premium for Certified Sustainable Palm Oil (CSPO) (Ruysschaert and Salles, 2014; Cazzolla Gatti et al., 2019). The high cost to accredited with RSPO compared to the premium of CSPO is also deemed unworthy to go through the lengthy process to be certified (Ruysschaert et al., 2019). Similarly, the effectiveness of the domestic's certifications remains vague as there is very limited information that shows the improvement in terms of sustainability practices after attaining the respective certification.

Nonetheless, with the fourth industrial revolution (IR 4.0) technologies have accelerated in recent years, efforts have been made to integrate IR 4.0 elements in evaluating the sustainability of the palm oil industry. For instance, Malaysian Palm Oil Council (MPOC), the main agency responsible for governing the sustainability of the palm oil industry has collaborated with a blockchain startup (i.e., BloomBloc) to utilize the blockchain feature to trace the whole production of palm oil and to ensure sustainable practices in the industry (Alexandre Ana, 2020). Despite its implementation is still at early stage, this initiative potentially helps in stopping illegal deforestation. Data collected from this collaboration could also further enhance economic performance through higher accuracy in predicting the quantity and price of supply and demand as well as prevent losses.

## REVIEW METHOD

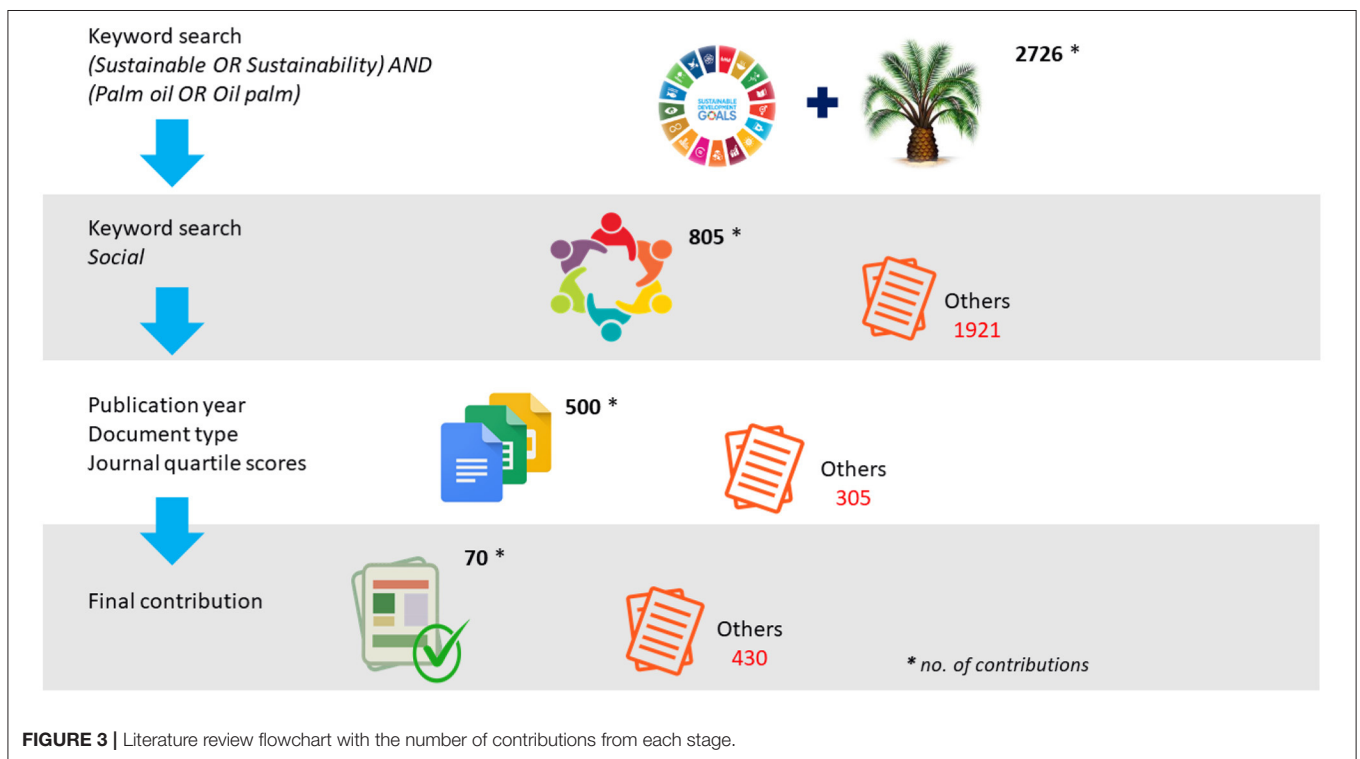
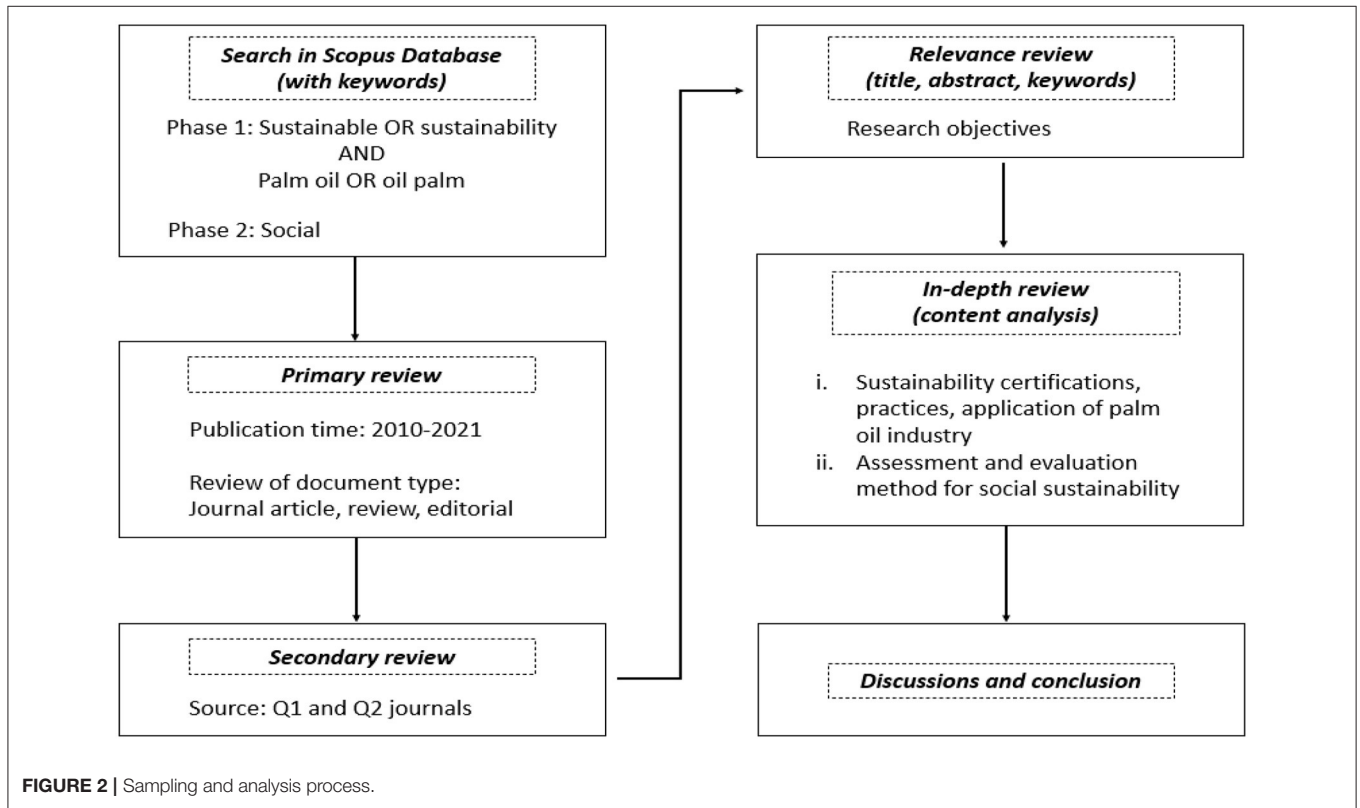
In this work, a four-stage sampling and analysis method is adopted to identify the relevant research on social sustainability, with a focus on the context of the palm oil industry. The overall flow of this work is illustrated in **Figure 2**. **Figure 3** indicates the literature review flowchart with the number of contributions determined from each stage leading to the selection of the final contribution.

Step 1: A generic search was performed in the Scopus database based on the keywords input. Scopus database is one of the largest abstract and citation databases of literature, which includes scientific journals, books, and conference proceedings. It also captured most of the well-recognized publishers such as Elsevier, Springer, Wiley, Taylor and Francis, open access, etc. The first stage is performed with two keywords: “sustainable or sustainability” and “palm oil or oil palm,” returning a total of 2,726 documents. The second phase of the keyword search is conducted with the keyword “social” to narrow down the scope to social-related studies, which is the main objective of the paper. A significantly refined search result is obtained, with only 805 documents remaining after this stage.

Step 2: The primary review is performed based on the publication year and the document type. The publication year considered is within the last 11 years (2010–2021), and the document types are limited to journal articles, conference proceedings, book chapters, and editorials.

Step 3: The sampling stage is followed by the categorization based on Journal Quartile Scores. In this work, only Q1 and Q2 journals were considered. The source titles of the Q1 and Q2 journals along with the number of works reviewed in this study are summarized in **Appendix A**. This screening stage has resulted in a total of 500 documents.

Step 4: An initial review was performed through scrutinization of the papers' titles, abstract, and keywords to identify the research studies that addressed the research questions mentioned in Section 1. A total of 70 documents were selected at this stage which served as the final contributions for this work. The research questions served as the foundation and rationale for this work, i.e., to understand and propose a list of social facets



that is most applicable and appropriate to enhance the social sustainability of the palm oil industry.

Step 5: In-depth review and content analysis are conducted on the selected final contributions categorized into two groups: 1. Sustainability certifications, sustainable practices, and application on oil palm plantation, palm oil mill, palm oil biorefinery, palm oil supply chain, and oil palm biomass; 2. Assessment and evaluation method of social sustainability and social impacts.

## Social Sustainability Assessment and Evaluation

The flourished attention toward sustainable development has increased the attempts to quantify and qualify different aspects associated with sustainability. A wide range of methods and indices is introduced to assess and evaluate sustainability, both on standalone measures (i.e., economic performance, environmental impacts, social impacts) as well as the integrated measures to access the overall sustainability performance. As described in section Social sustainability—Definition and Coverage, the nature of the elements associated with social sustainability is mainly qualitative and varies significantly with demographic and geographic characteristics. Thus, most of the currently available assessment and evaluation tools for social sustainability are still eclectic and flexible. Before the upsurge of interest in the concept of sustainable development, the measurement of the social aspect largely revolves around the quality of life. A wide range of methods and models is used to measure the quality of life, including but not limited to indexing, multiple-decision criteria analysis tools, predictive models, statistical models, etc. For instance, Diener (2006) provided a guideline with the inclusion of subjective variables for the assessment of well-being to enhance the effectiveness of policymaking in the social aspect. McCrea et al. (2006) adopted Geographical Information Systems to combine both subjective and objective indicators and used Structural Equation Modeling (SEM) to understand the influence and dependence of the indicators on the overall quality of life. Martin et al. (2010) adopted Global Person Generated Index (GPGI) with the Positive and Negative Affect Scale (PANAS) to investigate the correlation of different demographic, geographic, and cultural factors on quality of life. Besides, statistical methods such as goodness of fit ( $R^2$ ), are also employed to address the correlation of income, happiness level, and life satisfaction level (Rojas, 2011).

The elevated attention toward social sustainability increases the development and application of the social assessment as well. The need for assessing and evaluating social sustainability is also emphasized by Engelman (2014), as quantifying the concept of sustainability is the first stage prior to managing it. The complication associated with the social impacts based on the action plan and policy from global to the household level, macro-economic model to regional disaggregation (Brinkman et al., 2019) thus increases the challenges of the social assessment. Amongst various methods introduced and employed throughout the past decades, Social Life Cycle Analysis (SLCA) and Social Impact Assessment (SIA) appeared to be the most dominant

**TABLE 3 |** Definition of social group with example of social issues, modified from UNEP-SETAC (2013).

	Definition	Example of social issues
Individual	A person directly involved in the activity/process/event in a specific location	Labor rights, child labor
Community	A group of people living in the same area or territory which utilizes the same local resources (material and immaterial)	Local infrastructure, risk of unemployment, clean water, and education
Society	Persons directly and indirectly affected by quality of the environment and economic development in a broad sense and wider coverage area	Governance, corruption

tools in comprehensively assessing the social aspects of different industries or fields. The details of the description of these two methods are further elaborated in the following subsections.

## Social Life Cycle Assessment

Life cycle assessment (LCA), a “cradle-to-grave” assessment method that takes into account all input and output flows occurring along the production chain, is one of the established methods to assess sustainability (Geng et al., 2017). It is known for its extensiveness in accessing the costs and effects of economic, environmental, and social parameters. LCA allows transparent comparison when the decision or problem is associated with multiple alternatives. Courses, handbooks, and software are well-established to provide detailed guidance on how to perform LCA to assure the reliability and transparency of the results (International Organization for Standardization (ISO), 2006a; International Reference Life Cycle Data System (ILCD) Handbook, 2010; Guinée et al., 2011) also provided the standards in ISO 14040 and 14044 to ensure LCA is conducted systematically and consistently (International Organization for Standardization (ISO), 2006a,b; Scientific Applications International Corporation (SAIC), 2006). LCA consists of 4 major stages, starting with defining the goal and scope, followed by inventory analysis of extractions and emissions (input-output analysis), impact assessment (enhance decision making), and interpretation (to conclude). The LCA framework can be categorized into environmental life cycle assessment (ELCA) and social life cycle assessment (SLCA).

SLCA is defined as a systematic process of using the best available science to collect the best available data and report on social impacts (which can be positive or negative) in a products’ life cycle from extraction to final disposal (UNEP-SETAC, 2009). SLCA mainly relies on local data collection and publicly available secondary data. Unlike environmental impact indicators, which often contain process-level databases for input, social impacts are highly cultural-based and contextually specific to data sources

(Myllyviita et al., 2013; De Luca et al., 2015). Depending on the goal and scope (i.e., impact categories) of the study, the outcome of SLCA is usually a performance that can either be based on the cause-effect model or characterization model. The cause-effect model that utilizes performance reference points is more effective for assessing task-force indicators, while the characterization model is more capable of quantifying general societal impacts that are associated with a chain, pathway, or process. As the goal of SLCA might vary across industries and stakeholders, the interpretation needs to be done in a modest manner and approach to avoid biases and confusion (Macombe et al., 2013). SLCA is known for its capability to measure social issues associated with individuals, society, and communities. The clear definitions of these 3 main stakeholders are summarized in **Table 3**.

Pizzol et al. (2015) advocated that the application of SLCA is associated with a high level of abstraction, particularly related to the type (i.e., potential or actual cost/impact) and time (initial stage, mid-stage, or end-stage) of data acquisition. The results of SLCA could differ significantly depending on the evaluation of the social impact at a point in time or consequences due to a change in the value chain across the whole period. Hutchins et al. (2013) further elucidated that the analysis of social impacts at product-level and corporate-level often serves different purposes, which may conflict with one another. Thus, it is necessary to measure SLCA at both levels to ensure meaningful outcomes based on the predetermined goal.

Concerning the limitations of SLCA, an “enhanced” version of SLCA is introduced to overcome its constraints. Tsalis et al. (2017) integrated SLCA with GRI guidelines to overcome the constraints of lack of standard non-financial accounting methodology. In this context, GRI indicators serve as performance indicators to standardize the required data between companies/firms in different regions or industries. De Luca et al. (2015) integrated SLCA with the amalgamated priorities of stakeholders through the Analytic Hierarchy Process (AHP) to form a multicriteria SLCA. Martínez-Blanco et al. (2015) proposed a new framework, namely the social organizational LCA (SOLCA) to focus on the social assessment at a product level with the integration of organization-data (OLCA) to increase the relevancy of the proposed recommendation. Participatory modeling technique, one of the core aspects of system thinking, is coupled with SLCA methodology to produce a dynamic framework with a feedback loop in inventory analysis and impact assessment for an interpretation which includes conceptualized output and potential/predictive impacts (McCabe and Halog, 2018).

## Social Impact Assessment

Social impact assessment (SIA) is defined as the process of analyzing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change invoked by those interventions (Esteves et al., 2012). SIA was first introduced in conjunction with Environmental Impact Assessment (EIA) in the National

Environmental Policy Act of 1969 (United States) to address the potential and actual effects of planned interventions on communities to ensure project sustainability (Momtaz and Kabir, 2013). The recognition of the act led to the first deployment of SIA by the Interorganizational Committee on Guidelines and Principles (IAIA) in 1994 as a *process to assess or estimate, in advance, the social consequences that are likely to follow from specific policy actions (including programs and the adoption of new policies), and specific government actions (including build buildings, large projects and leasing large tracts of land for resource extraction), particularly in the context of the U.S. National Environmental Policy Act of 1969* [Interorganizational Committee on Guidelines and Principles for Social Impact Assessment (IAIA), 1995]. Despite both EIA and SIA being introduced at the same time, the attention given to SIA has only increased until recently. In the past, SIA was often perceived as a subordinate component as compared to EIA or coupled together with EIA as the Environmental and Social Impact Assessment (ESIA). This is due to the perception that ecological and environmental aspects are more significant than social aspects (Bonilla-Alicea and Fu, 2019). Social impacts, on the other hand, are the consequences of any public or private actions on human populations that alter how people live, work, play, relate to one another (relationship), organize to meet their needs, and generally cope as members of the society (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment (IAIA), 1995).

SIA has a long history of application as a social planning tool, which has been widely accepted in policy making and regulatory arena. In most countries, SIA is mandated by law as a general process to identify and evaluate social impacts, and recommend suitable institutional, organizational, and project-specific mechanisms to mitigate the potential adverse effects. Besides local authorities, the majority of the international development partners such as the World Bank Group, Asian Development Bank (ADB), United Nation Environment Program (UNEP) also employed SIA as the preliminary assessment for the regulatory approval of new development projects and programs. The purpose is to highly involve social elements at the initial stage of planning and design of a project. SIA serves as a step-by-step process to assess social impact and a tool for promoting and protecting the social benefits of the communities. In general, SIA consists of seven steps as follows: (1). Analyze project context; (2). Identify stakeholders and perform stakeholder analysis; (3). Identify social factors/variable; (4). Analyze data and assess priorities; (5). Consult stakeholders and develop mitigative plans; (6). Implement mitigation plan and public participation; (7). Ensure monitoring with active stakeholder involvement and modify it (Rietbergen-McCracken and Narayan, 1998). It can be employed as a prioritization tool to aid the decision-making associated with social investments to maximize the positive outcomes and mitigate the negative impacts (Joyce and Macfarlane, 2001). It is important to note that SIA associates with great relevance. The social impacts of similar projects at different locations can vary significantly depending on





the geographic and demographic characteristics, value, culture, and other macroeconomic indicators. This remains a major challenge for the generalization of the SIA method, particularly on the selection of social indicators. Thus, it is necessary to contextualize the process to achieve meaningful outcomes.

Despite the increasing emphasis on social roles in many organizations, the commission and delivery of SIA is claimed to have little social experience and impact (Dendena and Corsi, 2015). The lack of significance and acknowledgment on social impacts and SIA being conducted only as a fulfillment to regulatory requirements have underestimated the real social impacts (Franks and Vanclay, 2013). In addition, the limited capacity of regulators and resources devoted to quality control and updated data, and lack of expertise to keep the reliability and validity of the assessment process have hindered the robustness of SIA (Esteves et al., 2012). With that, Franks et al. (2009) emphasized the need for a change to the driver and domain of SIA to implement ongoing processes of assessing, managing and monitoring potential and actual social impacts during project implementation.

## KEY FACETS FOR SOCIAL SUSTAINABILITY ASSESSMENT IN THE PALM OIL INDUSTRY

Both SLCA and SIA provide generic steps and methodology to evaluate and assess the social sustainability of a project, process and/or industry, it is prevalent that the categorization or grouping of social indicators is the most important stage in the assessment of social sustainability. This is because the selection and the categorization of the social indicators directly affect the application of different indices or tools to measure or evaluate the performance of that indicator. In the past, attempts and efforts have been made by various social scientists and institutions to develop general classifications for social impacts. Branch et al. (1984) proposed four categories of SIA, which are direct project inputs, community resources, community social organizations, and indicators of individual community well-being. Armour (1990) categorized social impacts into 3 groups, namely people's way of life in everyday living, culture (e.g., customs, values), and community (e.g., cohesion, stability, facilities). Gramling and Freudenburg (1992) divided

social impacts into seven systems, i.e., biophysical and health systems, cultural systems, social systems, political/legal systems, economic systems, and psychological systems. Vanclay (1999) further enhanced the work proposed by Armour (1990) into 8 categories: culture, community, political systems, environment, health and well-being, personal and property rights, fears, and aspirations. In more recent literature, Eizenberg and Jabareen (2017) introduced a new conceptual framework for social sustainability, breaking down the social aspect into four major categories, namely urban forms, equity (Justice), eco-presumption and safety (Eizenberg and Jabareen, 2017). Popovic et al. (2018) suggested a seven-step procedure to enlist a group of quantitative social sustainability indicators. The proposed method includes validation through content analysis, analysis of variance (ANOVA), and applicability checks of the indicators based on data acquired from 141 sustainability reports. As a result, a similar list of indicators as suggested by other researchers is concluded (i.e., democratic civil society, living environment, human development, and equity).

In the context of the palm oil industry, current literature is mainly concentrated on the overall sustainability assessment of the industry, both on developing novel methodology to assess sustainability and reporting on the results of sustainability assessment. How and Lam (2018) introduced the integration of Principal Component Analysis (PCA) in developing the sustainability index for the biomass supply chain. Ngan et al. (2018) utilized Fuzzy Analytic Network Process to develop a sustainability index for the palm oil industry, based on different stages of the palm oil production chain. Lim and Biswas (2019) conducted a sustainability assessment on crude palm oil production using a novel Palm Oil Sustainability Assessment (POSA) framework. A case study conducted in Brazil indicated that the locals were well-perceived on the environmental degradation and potential negative impacts brought by the expansion of oil palm plantation toward the ecosystem, but were willing to respond positively with socioeconomic gains (Córdoba et al., 2019). A similar result was reported by Ngan et al. (2019), in which the stakeholders in the palm oil industry in Malaysia highly prioritized the economic benefits to initiating sustainable practices in the operation. The initiative to improve the social sustainability of the palm oil industry requires joint corporation and efforts from various stakeholders, which include regulators, industry players (plantation owners, workers, palm oil mill owners, consumers), and society. Thus, policy makers need to understand the preferences of the industry makers, and subsequently design policies and provide supports that could trigger the appetite of the industry players to instill sustainability in their business operation while promoting sustainable development overall. Besides, to recommend effective measures to improve the social sustainability of the palm oil industry, it is imperative to connect the scattered information to identify the relevant social indicators. This work summarized and highlighted the seven key facets (see **Figure 4**) that play a crucial role in assessing the social sustainability of the palm oil industry in developing regions. **Table 4** illustrates the key facets of social sustainability assessment for the palm oil industry in developing regions with its references.

**TABLE 4 |** Key facets for social sustainability assessment for palm oil industry in developing regions with its references.

Key facets	References
Governance	Paoli et al., 2010; Manik et al., 2013; Selifa et al., 2015; Brandi, 2017; DeFries et al., 2017; Jelsma et al., 2017; Shukla and Tiwari, 2017; Hidayat et al., 2018; Larsen et al., 2018; Bose, 2019; Gardner et al., 2019; Estrada et al., 2020; Lee et al., 2020
Economics	Paoli et al., 2010, 2013; Martin et al., 2015; Azhar et al., 2017; Jelsma et al., 2017; Pramudya et al., 2017; Shukla and Tiwari, 2017; Hidayat et al., 2018; Lim and Biswas, 2019; Koussihouédé et al., 2020; Pasaribu et al., 2020; Ayompe et al., 2021
Necessity, infrastructure, and facility	Manik et al., 2013; Bose, 2019; Lim and Biswas, 2019; Estrada et al., 2020; Lee et al., 2020; Pasaribu et al., 2020; Ayompe et al., 2021; Santika et al., 2021
Health and safety	Fernández-Coppel et al., 2018; Estrada et al., 2020; Lee et al., 2020; Pasaribu et al., 2020; Tang and Al Qahtani, 2020; González-Delgado et al., 2021; Pasaribu and Vanclay, 2021
Environment	Martin et al., 2015; Azhar et al., 2017; Fernández-Coppel et al., 2018; Hidayat et al., 2018; Bose, 2019; Capecchi et al., 2019; Lim and Biswas, 2019
Education and training	Radyi et al., 2019; Lee et al., 2020; Pasaribu et al., 2020; Tang and Al Qahtani, 2020; Pasaribu and Vanclay, 2021; Santika et al., 2021
Interpersonal relationship	Martin et al., 2015; Abram et al., 2017; Jelsma et al., 2017; Lim and Biswas, 2019; Radyi et al., 2019; Koussihouédé et al., 2020; Pasaribu et al., 2020

Despite the classification of social impacts that could remain the same regardless of the nation's development status, prioritization of the indicators needs to be performed to better allocate the limited resources to promote social sustainability. It is worth noting that the main players in the palm oil industry currently are revolving around developing countries (i.e., Indonesia, Malaysia, Thailand, and Colombia), producing up to 90% of the worldwide palm oil (USDA, 2021). Thus, the differences between the context of developed nations and developing nations need to be accentuated to select suitable facets to comprehensively measure the social sustainability of the palm oil industry. The first key facets that highlighted by most of the reviewed literature (25%) is governance. As the movement for sustainable development for the palm oil industry in developing regions is mainly policy-driven (Hidayat et al., 2018), the governance of the sustainable practices and certifications standards that involves different stakeholders (i.e., government, NGOs, communities, certification bodies, business companies) plays a key role in assessing the social sustainability. Governance issues such as the rule of law, compliance with sustainability certification, transparency, and clarity of rules

(Gardner et al., 2019) and the local legal frameworks help to develop a socially sustainable community in the palm oil industry and reduce the conflict between stakeholders (Pasaribu et al., 2020). Besides the authorities playing the role to educate and disseminate the information about the importance and needs of social sustainability, companies' initiatives (i.e., plantations, palm oil mill, and refinery) to improve the corporate governance to translate corporate social responsibility decisions into conservation actions on the grounds (Paoli et al., 2010) should also be included in the evaluation. A similar mechanism can also be integrated into the local communities at the village-, estate- level to keep the smallholders accountable in upholding the socially sustainable practices in the industry. Another prominent component of governance is the transparency in reporting, as emphasized by most of the worldly-recognized sustainability standards (MSPO, ISPO, RSPO) (Estrada et al., 2020). This is to assure continuous monitoring and management can be done to improve the social benefits of the individual, community, as well as society in the palm oil industry. The same principles should also be applied to authorities and regulators in asserting public management skills to practice transparency and integrity in auditing the certification process.

The overall economy and finance also play a crucial role in assessing social sustainability. Macroeconomic indicators such as per capita gross national income (GNI), GDP, Consumer Price Index (CPI), and currency strength and stability can serve as a reference for the cost of living of the people. Nonetheless, the evaluation should not stop at the national level, the financial status of stakeholders, both large scale plantation owners as well as smallholders, needs to be included in the assessment as well. For instance, Paoli et al. (2010) highlighted the availability of CSPO premium that serves as a motivation for plantation owners or palm oil millers to assure the traceability and sustainability of the palm oil, as well as access to capital as more and more financial institutions start prioritizing environmentally friendly projects and avoid investment that is detrimental to the environment. The evaluation of the financial status is also helpful in observing the poverty status, distribution of wealth, and sharing of economic power across different palm oil stakeholders. Multiple studies have reported that the palm oil industry has made a substantial contribution to poverty alleviation and economic growth in rural areas (Azhar et al., 2017; Pramudya et al., 2017; Ayompe et al., 2021). However, it is undeniable that the quantification of the poverty reduction offered by the palm oil industry is complicated due to the inconsistent productivity, profitability, cost of certifications, and other expenses associated with the industry. For example, the price of crude palm oil increased significantly over the past 2 years, from 535 USD/ton in Dec 2019 to 1300 USD/ton in Jan 2022. This directly increased the income of the palm oil stakeholders (Trading Economics, 2022). On the other hand, the soaring prices for fertilizers, which is one of the key cost components for the oil palm producers (i.e., 30–35%) to maintain the yield of fresh fruit bunches (FFB) also affect the profit and financial standing of the involved palm oil stakeholders (Tan, 2021). The finance facet proposed in the social sustainability assessment is not only performed based on the evaluation of

financial indicators such as net present value (NPV), return of investment (ROI), and others. It is meant to incorporate the information on both macro and microeconomics to supplement the current financial performance of the palm oil stakeholders (i.e., plantations, millers, palm oil-related businesses) to shed some light on the income and consumption power of the stakeholders that reflect the social well-being of the stakeholders. In relation to that, Shukla and Tiwari (2017) proposed a new big-data analytics framework that utilizes emerging technologies for data collection and analysis such as web-based solutions, Internet of Things (IoT), sensors, etc. to align the cost of certification with the incentive systems. Thus, data on financial income, loan status, and subsidies are some of the information that can be collected to portray the economic status of an individual or family to frame out the standard of living. The importance of financial information in enhancing the environmental and social impact assessment for a more well-rounded approach is also highlighted by Dendena and Corsi (2015).

The evaluations of infrastructure and facilities are also one of the key social facets to be assessed to understand the social sustainability of the palm oil industry in developing regions. The infrastructure and facilities that are important for the socioeconomic and socioecological well-being of the palm oil stakeholders include electricity access, sanitation and cooking energy, schools, labor, and drainage system (Santika et al., 2021). Basic needs such as food, housing, clean water, and safety must be fulfilled first to satisfy human's living conditions. Besides, urbanization services provided on top of existing basic infrastructures such as communication networks also help to enhance the quality of life of the palm oil community (Kjøllestad et al., 2014; Hollander et al., 2016). The understanding of the available infrastructure and facilities also highlighted the areas of improvement associated with the palm oil industry that served as a basis to monitor and improve the living environment for future generations. One of the negative impacts often highlighted by literature is land grabbing and conflicts over land tenure rights (Ayompe et al., 2021). Rutten et al. (2017) reported that conflicts arise from land use and land tenure rights often due to the unfulfilled promises to provide essential infrastructure to the local communities. Thus, this facet is crucial in understanding the land conflicts associated with local and indigenous people and large-scale oil palm plantations on the loss of land tenure rights.

Health and safety represent one of the key elements in the assessment of social sustainability. As reported by Myzabella et al. (2019), employees in the palm oil industry are facing high risks of exposure to musculoskeletal disorders infectious diseases, stress, mental health disorders, pesticide, and herbicide. Questions relating to the symptoms of these diseases can be included in the data collection to evaluate the severity of these risks. Mitigation measures can then be recommended and enforced by authorities to promote and manage better health and safety practices in the workplace (González-Delgado et al., 2021). Furthermore, the availability and accessibility of healthcare facilities for the oil palm plantations community should also be taken into account (Pasaribu et al., 2020). The importance of health and safety in social sustainability can also be reflected through the listing of it as a major standard

or criteria in most of the certifications (i.e., RSPO, MSPO, ISPO) and inclusion in the LCA associated with the palm oil industry (Fernández-Coppel et al., 2018; Lee et al., 2020). Even though environmental impacts are often evaluated under environmental assessment, it is worth noting that air, water and soil quality (Bose, 2019; Lim and Biswas, 2019), waste generation and management system (Hidayat et al., 2018), natural capital conservation are closely linked to the health and safety of palm oil stakeholders (Azhar et al., 2017). It is worth noting that the environmental facet for social sustainability assessment is inclusive of the social impacts arising from environmental issues. For example, instead of merely measuring the GHG emissions due to oil palm plantations expansion and land conversions in environmental impact assessment, the potential social impacts such as food security issues caused by food chain disruption and conflict between local communities and plantations owners on land rights issues should be taken into account. Thus, this facet should not be neglected in the social sustainability assessment. Human rights issues including forced labor, child labor, and unsafe working conditions in the palm oil industry have also always been a heated discussion topic in the international arena. Deforestation activities as a way for the expansion of oil palm plantations are also claimed to have adversely affected the rights of indigenous people to access to their forests, which is the source of their livelihood, food, water as well as culture (Pasaribu and Vanclay, 2021; Santika et al., 2021). On the other hand, evidence shown that the palm oil industry does offer better and solid financial security for the community. Notwithstanding either of the statements, education, and training are another key facet to be evaluated to understand the social consciousness of the industry stakeholders, particularly the workers in oil palm plantations and palm oil millers and their dependents on their understanding of their workers' rights, non-discrimination in their workplace, fair wages, gender equity, etc. (Pasaribu et al., 2020; Santika et al., 2021). The availability of the on-job briefing and training, corporate social responsibility, and sustainability certifications also help to assess the awareness levels of health and safety practices at the job to prevent accidents that could potentially be caused by ignorance or undetected dangerous conditions (Tang and Al Qahtani, 2020). As cultural differences (i.e., shared beliefs and value) play a prominent role in the overall development of an individual, education and training plays a key role to instill the concept of social sustainability (i.e., human rights, gender equality, and labor ethic) in the long run (United Nations Educational Scientific and Cultural Organisation (UNESCO), 2013). The workers need to be educated on issues pertaining to dignity and ethics in an employer-employee contractual relation to avoid the infringement of human rights and experience exploitation at the workplace. It is recommended that employee-employer relationships should not be built in a single direction. Platforms should be established to allow and encourage feedback in order to increase the overall morale and efficiency of the workers (Hamid, 2017).

Last but not least, the relationship between the palm oil industry's stakeholders, ranging from workers, plantation owners, village leaders, businesses owners, authorities, policy makers, certification bodies, NGOs should be included in

the social sustainability assessment. One of the hindrances to the development of the social sustainability of the palm oil industry is the mismatched expectations between stakeholders (How et al., 2019). Stakeholders' participation is a crucial element in the social and institutional capital approach on social aspects to enable different stakeholders to contribute information to the community and take part in decision-making. Undoubtedly, different stakeholders have different agendas and roles in the overall development of the industry. Constant communication between researchers, authorities, and industry players complemented with the reporting materials can minimize the gaps in stakeholders' expectations, reduce conflicts and avoid disruption of information across the industry chain (Abram et al., 2017). Through the evaluation, the trust level, interpersonal relationship of different stakeholders can be understood to propose an effective measure to enhance the overall social sustainability of the palm oil industry in developing regions (Martin et al., 2015). For instance, the consolidation of the comprehensive information about the industry can aid policy makers to design appropriate guidance to uphold the best practices of the industry (Radyi et al., 2019). Furthermore, a user-friendly database can also be established to aid industry players in accessing necessary information in a time-and-cost effective manner.

## CONCLUSION

Sustainable development to raise the overall quality of life while maintaining environmental and social well being does require joint efforts from all industry stakeholders, including the government, business entities, corporations, and the public. To date, social sustainability remains a very idealistic framework with less implication and actual application despite its importance as a well-recognized aspect across different industries and regions. On the other hand, the complete substitution of palm oil is impossible and the need for the industry to be sustainable is indispensable. Thus, this work employs a four-stage review to understand the current state of the social sustainability concept, with a particular focus on the palm oil industry. Social life cycle analysis and social impact assessments appeared as the two most comprehensive methods to evaluate the actual and potential social impacts associated with a specific industry or project. Nonetheless, it is important to assure that "relevancy" is taken into consideration in the analysis and interpretation of social data, particularly on the differences between developed countries and developing countries. The key facets to assess the social sustainability of the palm oil industry are also highlighted to serve as a guidance and reference for the authorities to enhance the monitoring and management of sustainable palm oil initiatives, and for industry players to initiate social sustainability practices in their respective entities. As the concept of social sustainability is still not fully embraced by the palm oil industry stakeholders, it is recommended to start the social sustainability assessment with data collection on the identified facets. The transparency of the information flow and



reporting is a must to prevent incurring extra costs and efforts due to inaccurate outcomes or mismatched results that could not reflect the actual social issues of the palm oil industry. Sustainable development will certainly continue to remain as the main agenda for development blueprint in the next decades. Given that developing countries are the major contributors to the world's GDP growth, it is vital to pave any development sustainably without compromising the benefits and welfare of future generations.

## AUTHOR CONTRIBUTIONS

SN: conceptualization, methodology, formal analysis, investigation, and writing—original draft. AE: conceptualization, methodology, validation, and funding acquisition. PY: conceptualization, validation, resources, and writing—review and editing. BH and CL: conceptualization, methodology, and writing—review and editing. WN: methodology, validation, and writing—review and editing. YC: validation and writing—review and editing. HL: conceptualization, methodology, validation,

and writing—review and editing. All authors contributed to the article and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

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