

The Importance of Adopting Life Cycle Sustainability Assessment (LCSA) in the Oil Palm Industry

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ABSTRACT

The oil palm industry has played a vital role in contributing to the economies of numerous countries worldwide. However, concerns regarding environmental impact and climate change have raised questions about its sustainability. It is thus crucial for the industry to adopt a proactive approach to educate the public about its significance for the decade-long sustainability practices. Life cycle sustainability assessment (LCSA) plays a key role in improving the industry's image by addressing environmental, social, and economic impacts throughout its lifecycle. By aligning LCSA with Sustainable Development Goals and embracing Environmental, Social, and Governance principles, the industry can enhance its sustainability performance, promote transparency, and contribute to a more sustainable future.

INTRODUCTION

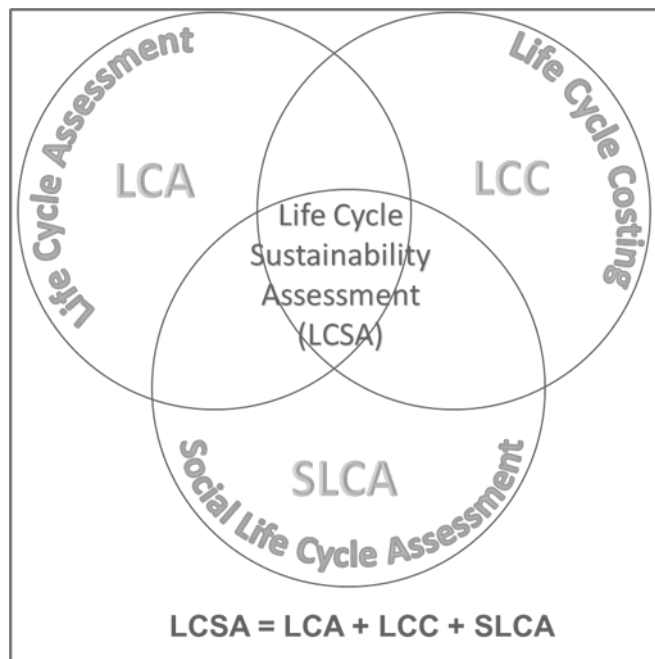
Various aspects of discussions regarding the means of achieving sustainable development and identifying suitable performance measures are ongoing. Many studies utilised the existing life cycle assessment (LCA) framework to evaluate the social and economic aspect along the supply chain of the process or product (Udo de Haes *et al.*, 2002). LCA has been used in a variety of industries to evaluate the environmental impacts of the respective supply chain. In addition, LCA is used to assist decision makers in enhancing policies and regulations (Guinée, 2016). Since the 1990s, UNEP has utilised the LCA, and in 2002, the UNEP/SETAC Life Cycle Initiative contributed to among other things, the Marrakech Process on Sustainable Consumption and Production (SCP), the development of a 10-Year Framework of Programmes on SCP, and

UNEP's Green Economy Initiative. The UNEP/SETAC's goal for SCP is to incorporate LCA methodologies into a sustainable development perspective (UNEP/SETAC, 2011).

The idea, which is frequently referred to as the 'triple bottom line' is widely accepted by the business community. It is the 'three-pillar' interpretation of sustainability (Finkbeiner *et al.*, 2010). In essence, it says that in order to achieve (or evaluate) sustainability, the environmental, economic, and social aspects must be weighed against one another. The term 'life cycle sustainability assessment' (LCSA) refers to the examination of all environmental, social, and economic implications (positive and negative) in decision-making processes towards more sustainable goods throughout their life cycles. Given the model's widespread acceptance, as per *Figure 1*, it incorporates LCA based on ISO 14040-44 standards (ISO, 2006), life cycle costing (LCC) for assessment of economic factors (Swarr *et al.*, 2011), and social LCA (S-LCA) for evaluation of social impacts (UNEP/SETAC, 2009).

LCC is the most traditional of these three life cycle techniques. LCC dates back to 1933, when the General Accounting Office of the United States of America requested tendering for an evaluation of the costs of tractors from a life cycle perspective (UNEP/SETAC, 2011). LCC is typically employed as a decision-making tool to help with the purchase of expensive and long-lasting capital equipment and goods (Hunkeler, 2006; Hunkeler and Rebitzer, 2003).

The discussion on addressing social and socioeconomic criteria in LCA began roughly 15 years ago (Fava, 1994) even before the publication of the SETAC



Source: UNEP/SETAC, 2011c.

Figure 1. Life cycle sustainability assessment concept.

Workshop Report, A Conceptual Framework for Life Cycle Impact Assessment. The report proposes a social welfare impact category by stating, among other things, “... the primary emphasis should be on environmental impacts that are resulted directly or indirectly from other social impacts ...”. The suggested social impact category has enabled LCA methodology developers to initiate a more comprehensive discussion. As a result of these efforts, the S-LCA guidelines were established in 2009 (UNEP/SETAC, 2009). With the growing interest in S-LCA among the scientific communities, as was evidenced by the increasing number of scientific journals publishing, UNEP/SETAC published the second edition of the S-LCA (UNEP/SETAC, 2020), which is more comprehensive; focusing mainly on capacity building and methodological developments.

THE IMPORTANCE OF LIFE CYCLE SUSTAINABILITY ASSESSMENT (LCSA) TO THE INDUSTRY

The oil palm industry has contributed significantly to the economies of many countries around the world. It grew steadily over the years since its first commercial planting in 1917 in Malaysia. With growing concerns on sustainable

development and climate change, the industry has come under close scrutiny. As a result, the industry must take a proactive approach to showcase sustainability and educate the public about its significance to the world economy.

When applied to the oil palm industry, LCSA can play a pivotal role in enhancing its reputation and addressing sustainability issues. Here are how LCSA contributes to improving the perception of the oil palm industry and its relationship with the Sustainable Development Goals (SDGs) and Environmental Social Governance (ESG):

- 1. Identifying and mitigating environmental impacts:** LCSA evaluates the environmental impacts of the oil palm industry at various stages, such as cultivation, processing, transportation, and waste management. It aids in the identification of environmental hotspots such as deforestation, habitat loss, water pollution, and greenhouse gas (GHG) emissions. By quantifying these impacts, stakeholders can prioritise and implement measures to reduce and mitigate negative effects, thereby improving the environmental performance of the industry.

2. **Evaluating social and economic aspects:** LCSA considers the social and economic dimensions of the oil palm industry in addition to the environmental aspects. It evaluates labour conditions, human rights, community livelihoods, land rights, and economic viability. The oil palm industry can positively contribute to local communities, ensure fair working conditions, and support long-term economic development by addressing social and economic challenges.
3. **Enhancing transparency and accountability:** LCSA provides a systematic framework for assessing and reporting on sustainability performance throughout the supply chain of the oil palm industry. The industry can gain trust and credibility from stakeholders such as consumers, investors, and regulators by embracing transparency and sharing data on environmental and social impacts. The increased transparency aids in the identification of areas for improvement and promotes industry accountability.
4. **Alignment with SDGs:** A set of global goals has been adopted by the United Nations to address diverse social, economic, and environmental issues. LCSA permits the oil palm industry to assess its

contributions to these goals and identify areas where current practices and strategies can be aligned with the SDGs. For example, the industry can contribute to SDG 15 (Life on Land) by promoting responsible land use and conserving the surrounding ecosystems.

5. **Relation to ESG:** ESG is a framework to assess company's or industry's environmental, social, and governance practices. The oil palm industry demonstrates its commitment to ESG principles by adopting LCSA. It enables businesses to evaluate their environmental and social impacts, implement responsible practices, and meet the expectations of investors and stakeholders who value long-term investments.

LCSA contributes to the enhancement of the image of the oil palm industry by identifying and addressing environmental, social, and economic impacts throughout its life cycle. By aligning with SDGs and embracing ESG principles, the industry can improve its sustainability performance, increase transparency, and contribute to a more sustainable future. *Figure 2* illustrates the connection between LCSA and the SDGs.

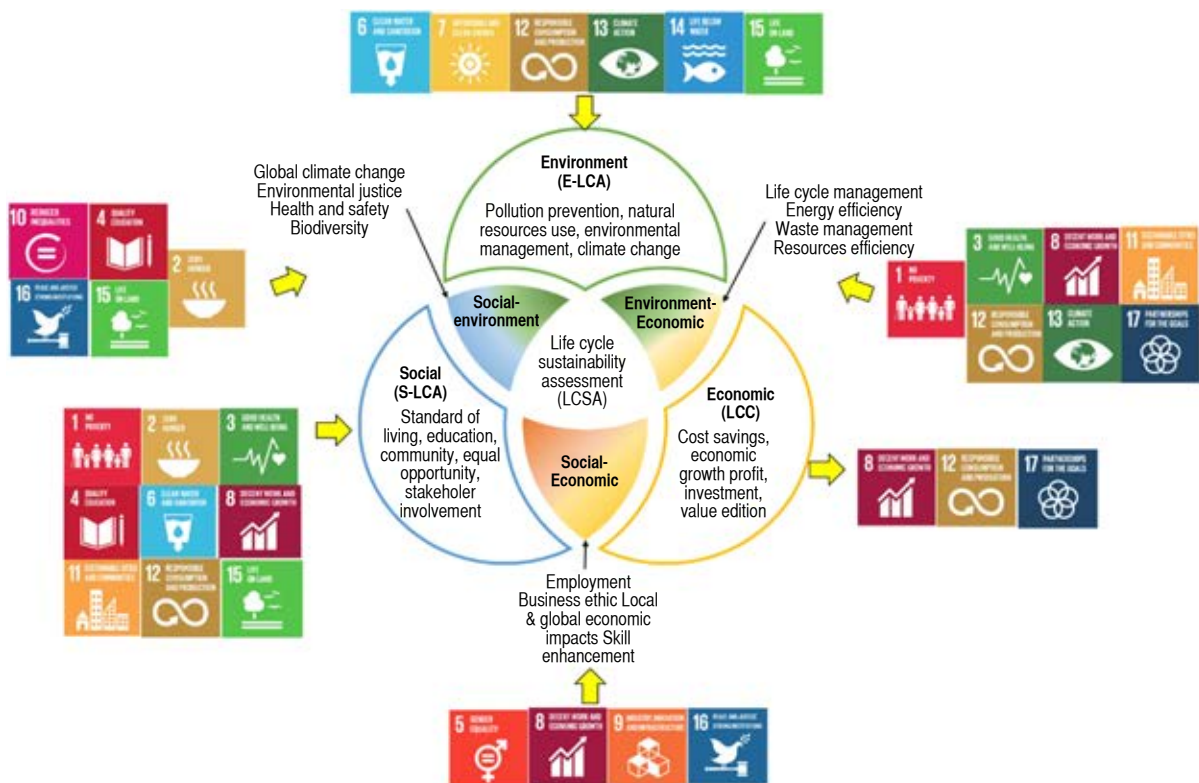


Figure 2. Life cycle sustainability assessment concept linked to the 17 SDGs.

RESEARCH IN THIS AREA

In 2010, the LCA for the Malaysian palm oil industry from nursery stage to palm biodiesel production, demonstrated no detrimental impact in oil palm cultivation to the environment (Choo *et al.*, 2011). The findings of the full LCA conducted serves as part of the industry's commitment towards sustainable development and environmental compliance for uses of palm biodiesel as a renewable transportation fuel. This first national LCA study was endorsed by an external panel of experts in 2009. Moving on, various other LCA studies on environmental aspects are ongoing and progressing to ensure a continuous assessment process in line with current developments by the industry.

Recent LCA study by Subramaniam *et al.* (2021) analysing the GHG associated with land use change (LUC) and pathways without LUC, plus industry practices (biogas capture, and biomass utilisation as fuels) demonstrated several options in achieving the best environmental performance with the least GHG emissions and greatest savings for the production of crude palm oil (CPO). Besides, Yung *et al.* (2020) performed the gate-to-gate assessment of the production of palm biodiesel. Findings reveal that replacing fossil-based methanol with biomethanol (from biogas) is the most favourable option, with 63% reduction of fossil resources and 22% that of global warming impacts. On the other hand, Subramaniam *et al.* (2020) focused on analysing the water footprint (WFP) of the palm oil supply chain via the LCA approach for water depletion index, or local blue water scarcity assessment. The milling stage has been found to contribute the most significant impact to the WFP, and thus the oil palm players are required to avoid dilution (adding water) during the process, including boiler and process water.

Other studies by Haryati *et al.* (2021; 2022) were on the S-LCA of CPO production. These studies focus on identifying the social hotspots of the workers working in nursery, plantation, and mill. The study (Haryati *et al.*, 2021) assessed the social impact and established a connection with relevant SDGs, while Haryati *et al.* (2022) adopted subcategory assessment method (SAM) to evaluate the social performance of several oil palm companies in Malaysia, identify the social hotspots, and test the applicability of the SAM method. The findings show that all participating companies follow the set of law and regulations governing the industry.

The social hotspot, *i.e.*, the working hour subcategory requires further improvement for the well-being of the workers.

CONCLUSION

Through LCSA adoption by the oil palm industry, potential life cycle environmental, social, and economic impacts and hotspots can be identified. The negative environmental impacts can be mitigated while others can be improvised in ensuring social and economic sustainability. This kind of comprehensive evaluation is essential to safeguard the oil palm industry in facing various sustainability changes ahead. By considering the entire life cycle, LCSA helps to identify areas for improvement, informs decision-making, supports policy development, and promotes sustainable industry practices.

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