

Technology Adoption In The Sustainability Ecosystem Of The Palm Oil Industry

Labansing¹, Idris², Sulong³

¹Faculty of Business, Economic and Accountancy, Universiti Malaysia Sabah, Malaysia

²Faculty of International Finance, Universiti Malaysia Sabah, Malaysia

³Faculty of International finance, Universiti Malaysia Sabah, Malaysia

Abstract

The study explored how technology adoption influenced stakeholder commitment and contributions to Certified Sustainable Palm Oil within the palm oil industry. Using qualitative methods like qualitative content analysis and interviews, it investigated the challenges stakeholders faced in integrating technology into the Certified Sustainable Palm Oil ecosystem, such as initial investment costs and data security concerns. Despite these hurdles, stakeholders recognized technology's potential to enhance supply chain management and sustainability efforts. Stakeholders deemed collaborative efforts necessary to address challenges like the digital divide and ensure inclusive access to technology, particularly for smallholders. The study also examined the impacts of external disruptions, highlighting the importance of technology adoption by the stakeholders. Overall, the research provided insights into leveraging technology for sustainability practices in the palm oil industry, contributing to the discourse on corporate responsibility and environmental stewardship in the digital age.

Keyword: certified sustainable palm oil; technology; stakeholder theory; sustainable development; business ecosystem.

1. Introduction

In the context of the palm oil industry, the adoption of long-term values and sustainable practices has had a profound impact on various aspects of the industry. This addressed concerns about the sustainability of palm oil production and improved the industry's reputation among consumers, investors, and other stakeholders. Throughout history, the palm oil industry has undergone significant transformations, driven by technological advancements, globalization, and shifts in consumer demand (Corley & Tinker, 2016). One of the key milestones in the industry's history was its expansion into global markets during the colonial era, as European powers established plantations in tropical colonies to meet the growing demand for palm oil in their home countries (Chandran, 2021).

While adopting technology for sustainability, the palm oil industry struggled to balance economic gains with environmental and social responsibilities. Despite initiatives like Certified Sustainable Palm Oil (CSPO), changes hinder progress. Stakeholders' commitment to CSPO amid technology adoption was crucial but complex. Factors like production costs and market demand heavily influenced stakeholders' decisions regarding technology integration.

Regulatory frameworks shaped sustainable palm oil production, while technological advancements influenced stakeholders' engagement with CSPO.

Translating consumer demand for sustainably sourced products into incentives for CSPO remained challenging. Conflicting interests and external disruptions complicate sustainability efforts. Understanding barriers to stakeholders' commitment was vital. Research aimed to reveal how technology adoption influenced CSPO commitment and addressed challenges for a more sustainable palm oil industry ecosystem.

2. Literature Review

2.1 Stakeholder Theory

The stakeholder theory provided a fundamental framework for understanding the dynamics of sustainable palm oil research within the industry. Scholars used this theory to identify and classify the diverse stakeholders involved, including producers, traders, consumers, environmental NGOs, government agencies, and local communities. This structured approach facilitated a comprehensive understanding of stakeholders' interests, concerns, and relationships, enabling scholars to uncover areas of alignment and divergence among stakeholders regarding sustainable palm oil production.

Moreover, stakeholder theory allowed for the evaluation of stakeholder commitment strategies and the effectiveness of engagement initiatives undertaken by firms, industry associations, certification schemes, and other stakeholders (Moore, 1993). Scholars assessed the impacts and outcomes of CSPO initiatives, such as reduced deforestation and biodiversity conservation, informing future decision-making for more sustainable practices. Recognizing the importance of relationships and stakeholder management further enhanced the effectiveness and sustainability of CSPO, contributing to advancing sustainability efforts and promoting responsible palm oil production practices within the industry.

2.2 Sustainable Development Theory

In the context of sustainable palm oil research, integrating sustainable development theory was essential as it promoted holistic approaches to sustainability, addressing economic, environmental, and social dimensions. This integration ensured that sustainability initiatives considered intergenerational equity, safeguarding natural resources for future generations. Researchers could develop comprehensive strategies for achieving sustainability goals by recognizing the interconnectedness of global systems and considering social, economic, and environmental concerns. Sustainable development theory also facilitated the examination of the root causes of unsustainability in the palm oil industry, as well as the proposal of solutions promoting environmental conservation and social justice. Furthermore, it allowed for the identification of trade-offs and synergies between different sustainability objectives, fostering resilience and promoting sustainable palm oil production practices in the face of external disruptions and global challenges. Adding sustainable development theory to stakeholder theory makes it more complete by giving us a bigger picture of how to deal with sustainability issues besides just asking stakeholders to be committed. This lets us see the roles and contributions of all stakeholders in sustainability projects in a more complete way.

2.3 Business Ecosystem Theory

At its core, business ecosystem theory, conceptualized by Moore (1993), provided a comprehensive framework for understanding the complex interactions within the palm oil industry. It illuminated the intricate relationships among stakeholders and external forces, including market trends, technological innovations, and regulatory policies, shaping industry dynamics. Embracing this theory enhanced insights into the interconnectedness of actors and resources, enabling a deeper exploration of sustainability initiatives and outcomes. Integrating business ecosystem theory with stakeholder theory enriched understanding by broadening the scope to encompass the holistic network of influences shaping sustainability efforts. By considering the interplay of individual relationships and ecosystem dynamics, scholars unearthed novel insights and developed more nuanced strategies for advancing sustainability agendas in the palm oil industry.

3. Material and Method

This study employed qualitative content analysis (QCA) and interviews conducted during two international palm oil conferences to investigate stakeholders' commitment to CSPO within the context of technology adoption in the palm oil industry. Rooted in a constructivist perspective, it acknowledged the subjective nature of knowledge and underscored the significance of social interaction and interpretation in knowledge development. QCA involved the analysis of numerous documents and literature, as well as in-depth interviews with key industry stakeholders, totaling 20 participants recruited via snowball sampling.

3.1 Design Study

The study employed a qualitative research approach (Longman, 2013) to delve into stakeholders' commitments to CSPO within the palm oil industry, particularly in the context of technology adoption. Through methods such as interviews and content analysis, the aim was to uncover the factors influencing stakeholders' commitments and understand how these were reflected in their actions amidst technological advancements. This approach facilitated a deep exploration of stakeholders' perspectives (Kothari, 2009), allowing for the identification of emergent themes and the generation of new insights into how technology adoption influenced their commitment to CSPO. By drawing from theoretical frameworks like stakeholder theory, sustainable development theory, and business ecosystem theory, the study aimed to provide a holistic understanding of CSPO commitments within the evolving landscape of technology adoption (Freeman & McVea, 2001; Keeble, 1988; Pesqueux, 2013). Overall, the research contributed valuable insights to the literature on sustainable palm oil practices, informing future research and policy initiatives in this area.

3.2 Data Analysis

The data analysis for this study employed QCA, supported by the use of MAXQDA software. This approach was chosen for its effectiveness in systematically analyzing textual data, particularly sustainability reports and communication progress reports submitted by stakeholders in the palm oil industry. The reports provided valuable insights into their commitments to CSPO and their sustainability efforts within the industry. The MAXQDA

approach, as introduced by Kuckkartz and Radiker (2023), was adopted. Once collected, the documents were meticulously coded using MAXQDA, a qualitative data analysis tool. This coding process involved breaking down the text into meaningful units and assigning descriptive codes based on their content.

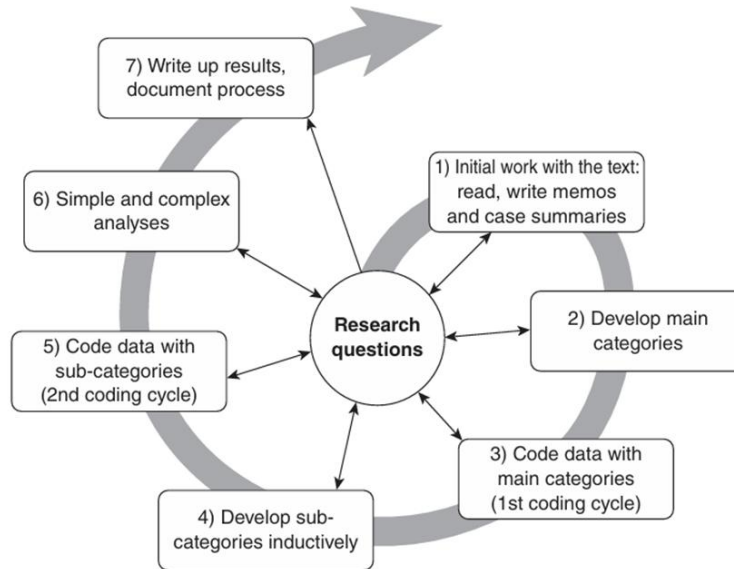


Figure 1. Qualitative Content Analysis approach

4. Result

The analysis of stakeholders' commitment to CSPO in the palm oil industry revealed significant insights across three research questions. Each research question delved into specific themes that highlight the factors influencing stakeholder engagement, commitment, and the broader impact of external disruptions on the CSPO ecosystem. The findings across these themes provide a comprehensive understanding of the dynamics influencing stakeholders' commitment to CSPO and the broader challenges faced by the palm oil industry in promoting sustainable practices. The emphasis on collaboration, transparency, and innovation underscores the need for a coordinated and proactive approach to achieve long-term sustainability goals.

Table 1. Results of themes

| Research Question One | Research Question Two | Research Question Three |
|---|--------------------------------------|--|
| Theme One: Respectful Engagement for Mutual Benefit | Theme One: Co-creation | Theme One: Impacting the Palm Oil Industry |
| Theme Two: Fostering Sustainability Commitment in the Palm Oil Supply Chain | Theme Two: Long-term Value | Theme Two: Navigating External Disruptions in the CSPO Ecosystem |
| Theme Three: | Theme Three: | Theme Three: |

| | | |
|---|--|--|
| Revitalising Certification for Sustainable Excellence | Empowering Smallholders for Sustainable Palm Oil Supply Chains | External Factors Impacting the Palm Oil Industry and CSPO Initiative |
| Theme Four: Strategic Global Planning amidst Challenges and Progress | | |

5. Discussion

Stakeholders within the palm oil industry grappled with various factors influencing their commitment to CSPO, including resource constraints, cultural barriers, transparency issues, deforestation concerns, and labor rights violations. Recognizing the importance of addressing these challenges, stakeholders engaged in collaborative efforts, transparency, and forging partnerships to advance sustainable practices, including the adoption of technology. While stakeholders played a significant role in fostering CSPO commitment through shared responsibility and inclusive decision-making, challenges persisted, such as developing investment strategies for future sustainability and ensuring smallholders' access to transparent supply chains. External disruptions, including climate change, market fluctuations, regulatory changes, and shifts in global demand, further complicated the CSPO landscape. Stakeholders acknowledged these disruptions as hindrances to supply chain resilience, transparency, and meaningful engagement, necessitating proactive response strategies to navigate them effectively.

6. Conclusion, Implication, and Recommendation

In conclusion, stakeholders within the palm oil industry faced multifaceted challenges in their commitment to CSPO, with technology adoption emerging as a pivotal aspect for overcoming these hurdles. Collaborative efforts, transparency, and the integration of technology were essential strategies for advancing sustainable practices. However, continued efforts were necessary to develop investment strategies, ensure smallholders' participation, and mitigate the impact of external disruptions driven by technology. By embracing technology and implementing proactive measures, stakeholders could navigate the CSPO landscape more effectively, fostering a more sustainable palm oil industry ecosystem.

Moving forward, fostering collaboration among stakeholders would be paramount. Partnerships between industry players, governments, NGOs, and technology providers could facilitate knowledge sharing and resource allocation, enabling more effective sustainability initiatives. Moreover, enhancing transparency throughout the palm oil supply chain was crucial. Utilizing technology, such as digital tracking systems and blockchain technology, could ensure traceability and accountability, promoting responsible production practices.

Supporting smallholders was another critical aspect of promoting technology adoption in the palm oil industry. Providing resources and assistance to smallholders could facilitate their integration of sustainable practices and access to technology. Initiatives like training programmers and financial assistance could empower smallholders to embrace technology and contribute to the sustainability of the industry.

To mitigate the impact of external disruptions, stakeholders had to develop resilience strategies. Investing in research and development to develop innovative solutions and adapt to changing environmental and economic conditions was essential. Additionally, advocating for policies that promoted sustainable palm oil production and incentivized technology adoption was crucial. Governments could play a pivotal role in providing regulatory frameworks and financial incentives to encourage sustainable practices across the industry.

By implementing these recommendations, stakeholders could harness the power of technology to drive meaningful progress towards a more sustainable palm oil industry. Collaborative efforts, transparency, and policy support were key in overcoming challenges and fostering a more resilient and sustainable industry ecosystem.

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