

A Systematic Literature Review: Green Supply Chain Management Performance of Palm Oil Products

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ABSTRACT

Indonesia is one of the greatest producer and exporter of palm oil. The statement is evidenced by data from the Central Bureau of Statistics for 2021 stating that Indonesian's palm oil export reached US\$ 18.44 billion or IDR 258 trillion in 2020 and grew 18.43 percent compared to the previous year. In addition to improving export quantities, the palm oil and kernel oil's domestic market is still quite large. The potential markets absorbing palm oil (CPO) and palm kernel oil (PKO) are the refinement and fractionation industry (especially the industry of cooking oil), specialty fats (substitute for cocoa butter), shortening, margarine, bath soaps, and oleochemicals. In previous findings, the industry is integrated from upstream to downstream, consisting of four sub-sectors those which are growers, millers, refiners, and oleochemicals. Environmental sustainability is currently encouraging companies to not only gain internal green activities, but also expand to green supply chain management (GSCM). Wide application of external GSCM by companies is partly justified from a transaction cost perspective. GSCM practices are often appraised economical because the research shows a positive impact of them on firm performance from resource view. There are diverse green management applications currently applied in the industry of palm oil. This study aims to point out current green management applications in the supply chain of palm oil and advance instruments to produce excellent quality palm oil in the upstream to downstream sector. This paper proposes a review of green management applications in the upstream to downstream sector, then the final selection results, including 29 papers that were chosen and investigated comprehensively to evaluate green management applications in the green supply chain process of palm oil. The method utilized in the research was A systematic review. A systematic review is a method requiring studying literatures on the topic, finding the research trend and issues in order to reveal the research gap, and then developing research question in order to gain knowledge contribution. This study enumerates value to common knowledge by expanding the theory of organizational readiness in preparing palm oil products that can be globally competitive. This research is suitable, practical, and beneficial for practitioner and academics by contributing a holistic realization roadmap in the upstream to downstream chain to guide managers in implementing green management applications at organizational level.

Keywords: *Palm Oil, Systematic Review, Firm Performance, and Green Supply Chain Management*

1. INTRODUCTION

In 2019, the growth of the palm oil industry reached 48.42 percent, but in 2020/2021 the total production is predicted to increase from 48.42 to 54.5 million tons. Total production from exports and stocks are expected to increase rapidly until 2050 which is dominated by plantations on the islands of Sumatra, Kalimantan and Papua. Figure 1 is a graph of the contribution of palm oil industry to Indonesian GDP.

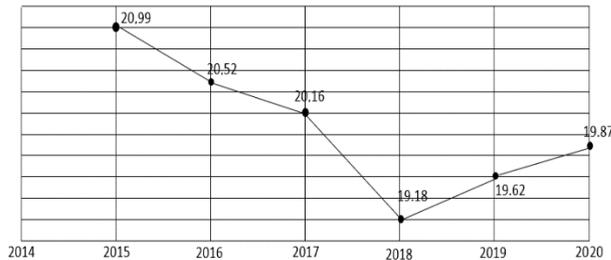


Figure 1. Contribution of Palm Oil Industry to Indonesian GDP 2015-2020

Source: Central Bureau of Statistics, Ministry of Industry, 2021

Figure 2 shows that despite the contraction in the national economy at the beginning of 2020, the palm oil industry sector still had a positive performance. The palm oil sector plays a role includes the chemical, pharmaceutical and traditional medicine industries. The growth of the chemical, pharmaceutical and traditional medicine industrial sectors is supported by the increase in domestic demand for medicines or supplements in an effort to deal with the Covid-19 outbreak [1]. However, the current condition considers that Indonesia is still facing the Covid-19 outbreak threatening the Indonesian palm oil industry. This can have a negative impact on the Indonesian economy. Because the palm oil industry has a significant contribution to the economic sector of each country [2]. The palm oil industry sector also has a contribution to gross domestic product (GDP). Because it has a significance on providing various opportunities related to employment. It is generally considered as added value which also includes income from labour and government revenue contributions.

Therefore, Indonesia has to adopt numerous strategies to ensure the renewal and improvement of palm oil sector to gain its economic contribution. Palm oil, as one of the essential needs of many countries, has to get more notice. This study is the effort to address Indonesian palm oil's problems and emphasize sustainability performance with environmentally friendly supply chain integration. Green supply chain integration can improve continuous performance by levelling up economic and environmental performance [3], [4].

The environmental damage caused by economic activities has prompted some policy makers and researchers, such as [5], to join in the call for a change in their views on the palm oil industry. This will affect supply chain management. The supply chain management concept focuses on improving operational efficiency and minimizing waste not for environmental reasons, but for economic reasons [6]. Basically, the goals of supply chain management are about cost reduction, transportation and storage efficiency, while service improvement comes from better delivery performance and less inventory for retailers [7]. Supply chain is a network facility and distribution option functioning as the acquisition of materials, transportation of these materials to intermediaries, finishing products to customers, and involving the extraction and exploitation of natural resources.

The main principle of SCM is to coordinate raw materials and components flows from various suppliers to palm oil companies for the purpose of converting raw materials into finished products and meeting customer value expectations efficiently. The supplier's ability is directly related to company's capability to produce higher quality products and lower costs while fulfilling delivery promises. To reach organizational continuity, companies must take notice supply-side applications. GSCM must emanate collaboration with suppliers in creating environmental friendly products, implementing awareness, and aiding suppliers to build their environmental programs [8]. Further evidence that more companies are applying collaborative environmental applications into theirs [9].

As an awareness of the application of GSCM in business, accredited GSCM has been carried out by leading SCM communities or organizations, which tend to be trending and hot topics of discussion by researchers and practitioners. Most of the research on GSCM that has been done previously has focused on the involvement of environmental aspects and social sustainability in the implementation of management operations and supply chains [10].

Throughout the last decade, researchers have carried out large-scale research on GSCM. One of the main streams is testing the performance of GSCM empirically which should support firms with constructive guidance for the adoption of certain applications [11], [12].

However, the findings of empirical studies do not always agree with each other which can confuse practitioners when they initiate GSCM and prevent progress of GSCM studies. In this case, firms adopting GSCM in Southeast Asia are witnessing marked improvements in economic competitiveness and performance. On the other hand, a slight improvement is found in economic performance of firms adopting GSCM in China. Therefore, it can be a strong motivation to make a more comprehensive

qualitative analysis on the literature of the prolific GSCM in order to explain such inconsistencies in previous empirical results.

Based on this background, this study aims to identify current green supply chain management performance in the supply chain of palm oil and develop instruments to yield high quality palm oil in Indonesian.

2. MATERIALS AND METHODS

This review is based on the A systematic review. The steps contained in the method consisted of five stages report as shown in Figure 2. to briefly introduce the process of developing the final data set of our study.

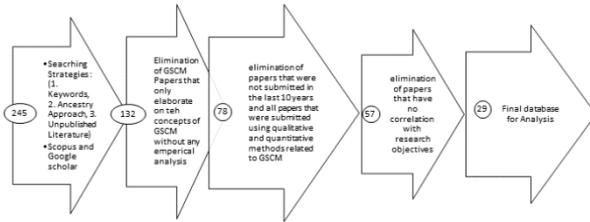


Figure 2. Process of literature selection

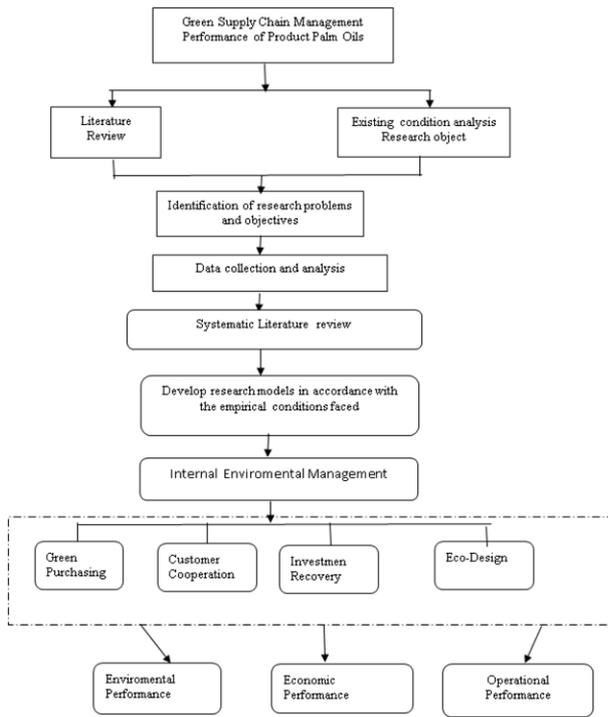


Figure 3. Research framework

3. RESULTS AND DISCUSSION

3.1. Descriptive analysis

The authors analyzed trends in the year of publication to obtain information on the evolution of SCM research in GSCM over time. All articles were published between 2010 and 2021. The increasing scientific interest in sustainability at GSCM is reflected by 61% of articles published after 2010. Fig. 3 describes the distribution of articles over the time period under review. The authors analyzed the outlets for articles in the dataset to understand the extent to which SCM in GSCM has been considered by researchers in operations management as well as researchers in other management fields.

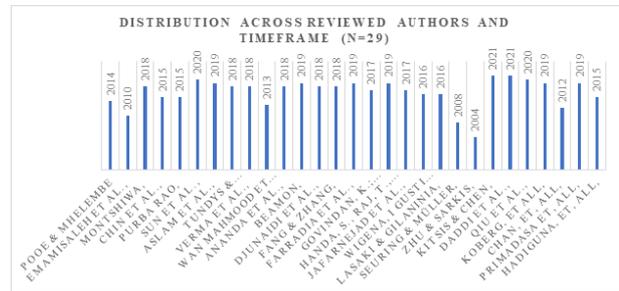


Figure 4. Distribution Across Reviewed Authors And Timeframe, 2021

The articles mentioned for consideration for this review are distributed in 29 journals in several research domains. The presence of SCM research in journals outside the operations management domain may reflect the growing importance of supply chains in relation to competitive advantage as well as increasing recognition by scholars in various fields of the possibilities supply chain management presents to address sustainability issues. Figure 5 presents the journals considered in this research data set.

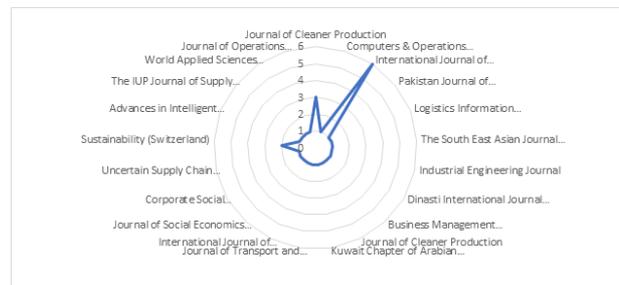


Figure 5. Reviewed Paper Distribution Across Journals.

Table 1. Research Method

Research Methods	Number of Articles (n=29)
Conceptual	5
Qualitative	7
Quantitative	10
Mixed Method	7

3.2. Research Trend and Issues

A random effects meta-analysis was used to synthesize empirical results from 29 selected literature with 245 effect sizes. In addition, subgroup and meta-regression analysis were applied to examine potential moderators that could affect the strength of the practice-performance relationship. The researcher found that, internal and external GSCM practices were positively related, and both were positively related to company’s performance. In particular, the relationship between GRSCM practices and environmental performance ($r = 0.518$) was the largest, followed by operational ($r = 0.481$) and economic ($r = 0.464$) performance. In addition, the moderator test found that industry type, ISO certification, export orientation, and cultural dimensions of uncertainty avoidance had a moderating effect on the practice-performance relationship. Based on the results of previous research on state of the art, an overview of the position of GSCM research in Supply Chain Management was obtained as follows:

3.3. Research Gap

Given the rich empirical results in extant GSCM literature, many efforts have already been made to integrate them systematically as mentioned in section 1 [9], [13] synthesized the past researches by developing a viable green supply chain strategy. A comprehensive bibliometric analysis that graphically illustrates the theoretical development of GSCM, identifies focus of current studies and gives hints for future directions.

Table 2. Research Gaps

Research Gaps	Example	Intended Contributions
Lack of an Integrated Framework	[10] focused on corporate economic performance. [9] focused on customer cooperation. Mangla et al (2013) focused on investment recovery	A more integrated research framework is developed in our study to depict a more comprehensive picture of GSCM constructs to scholars and practitioners. Impacts
Inconsistencies of Empirical Results	[13] found the relationship between GSCM practice and economic performance to be significantly positive. [14] and [15] claimed it to be only slightly positive. [8] found the relationship between investment recovery and performance to be significantly positive, while Abdullah and Yaakub (2014) claimed it to be insignificant.	Impacts of cultural and substantive moderators on practice performance relationship are tested to account for the inconsistencies in previous empirical researches

However, important as their research findings are, they still fail to quantitatively synthesize the inconsistent results found in prior GSCM literature from a more integrated perspective, and interpret those inconsistencies, which act as two major motivations for us to apply a meta-analysis. Table 2 provides a detailed list of research gaps we try to narrow, and display how we address them in our studies.

First, as most extant empirical literature only focus on subsets of GSCM constructs, they are probably unable to offer a comprehensive view of GSCM research, thus reducing the value for practitioners and scholars to some extent. For example, Ameer and Othman (2012) centered on the relationship between GSCM practice and economic performance. Kumar et al. (2013) concentrated on the influence of customer cooperation. In our study, we intend to synthesize those empirical results based on a

more integrated GSCM research framework (Fig. 3). As shown, all five types of GSCM practices and three types of firm performance (i.e., environmental, economic and operational) are included, which may provide practitioners and scholars with an overall view of GSCM research. Second, inconsistencies of empirical results can often be found in prior literature. For instance, Choi (2014) found the relationship between investment recovery and firm performance to be significantly positive. Recently, the intensive study of green supply chains has been handled extensively by practitioners and academics. However, studies on performance evaluation are still few.

3.4. Novelty

GSCM concept is to integrate environmental thinking into supply chain management (SCM). Thus, GSCM is important in influencing the total environmental impact of any organization involved in supply chain activities. More importantly, GSCM can contribute to improving sustainability performance. In this paper, we focus on environmental collaboration, which has been seen as a key relational capability to facilitate strategic formulation and implementation of GSCM.

3.5. Research Questions

The research questions in this review are: 1) what is the relationship among GSCM, environmental collaboration and sustainability performance in the context of palm oil industry, 2) what is the most representative conceptual model to explain the relationship among these three variables in the context of palm oil industry.

3.6. Knowledge Contribution

Environmental performance [13] found that environmental performance is the integration of the evaluation of the company's profits and environmental impacts. ISO 14001 identifies environmental performance as a measurable result of an organization's management of its environmental aspects. ISO 14031 is defined as a process focusing on evaluating environmental performance, because some palm oil companies in developing countries increase their production activities dramatically, cause air pollution, and affect environmental performance. Economic performance is the first priority for producers in implementing GSCM, as the extended of company's global management, then economic performance represents the economic results to achieve profit. This includes the effects of environmental actions [14]; [15], [16].

Economic performance refers to the effective use of various inputs in the production process. Economic performance is divided into 2 categories: (1) positive economic performance and (2) negative economic performance. In order to evaluate the economics of

performance in manufacturing companies, this study defines the associated positive economy as a reduction in the costs of energy consumption, material purchasing, sewage treatment, and waste disposal. On the other hand, increased investment, operational costs and purchasing cost of environmental-friendly materials are referred to as negative economic performance [13].

The company operational performance is the basis of efficient distribution and palm oil which in turn generates financial benefits. Measuring operational performance is needed when dealing with customer satisfaction, internal processes and activities. In this research, the categories selected to evaluate operational performance were: (1) scrap/waste reduction, (2) quality improvement, (3) delivery improvement, and (4) increased capacity utilization [16]; [17].

Environmental performance has been applied very well to the palm oil industry in developed countries. The evidence happens in EU countries. The European Union requires industrial manufacturers to carry out plans to reduce the consumption of toxic materials, design and manufacture products for reuse, re-production, recovery and recycle expired products; improve recycling of materials, and ensure that the components used do not contain mercury, hexavalent chromium, cadmium or lead. This directive is seen as a factor to encourage the establishment of an environmentally conscious palm oil industry. However, developing countries tend not to do these procedures in terms of environmental performance [9]; [13].

4. CONCLUSION

The green supply chain is essential to gain sustainable economic in the palm oil industry. The integration of green supply chain management, environmental performance and sustainability performance is a great way to achieve the sustainability of palm oil industry. In this case, the comprehensive model of this integration will be useful.

AUTHORS' CONTRIBUTIONS

The authors of this review collectively collected and analyzed the literatures to gain knowledge contribution.

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