

Supply Chain Disruptions and Business Challenges During Palm Oil Crisis in Indonesia

Muhamad Singgih Pamungkas

International Open University - Gambia

singgih.pamungkas@bahasa.iou.edu

Abstract

The global commodities market has faced significant turbulence in recent years, with the palm oil crisis in Indonesia standing as a critical example of how supply chain disruptions can impact businesses and economies. This paper explores the multifaceted challenges faced by businesses during the palm oil crisis, focusing on the interplay between supply chain inefficiencies, regulatory interventions, and market dynamics. By examining key issues such as raw material shortages, export bans, and price volatility, the study highlights how these factors disrupted business operations, constrained profitability, and intensified economic vulnerabilities across various sectors. Using a qualitative methodology, the research synthesises industry reports, policy analyses, and case studies to assess the ripple effects of the crisis on local and global supply chains. It also investigates how businesses adapted through alternative sourcing, operational adjustments, and strategic collaborations. Critical questions addressed include: How did policy decisions during the crisis affect supply chain stability? What strategies proved effective for businesses navigating these disruptions? Findings reveal that while regulatory measures sought to stabilise domestic markets, they often exacerbated challenges for exporters and global supply chains. The study underscores the importance of fostering supply chain resilience, promoting transparent policies, and leveraging technology to enhance operational agility. Recommendations include strengthening public-private partnerships, adopting digital supply chain tools, and improving regulatory frameworks to mitigate the impact of future disruptions. By offering actionable insights, this research contributes to the discourse on supply chain sustainability, providing valuable lessons for policymakers, businesses, and stakeholders in navigating crises effectively.

Keywords

Palm Oil, Supply Chain, Crisis, Business, Resilience

Introduction

Palm oil is a critical commodity in Indonesia, serving as a significant contributor to the country's economy and playing a crucial role in global supply chains (Kaniapan *et al.*, 2021). However, the palm oil industry in Indonesia has recently faced a crisis, marked by raw material shortages, government-imposed export bans, and price instability (Sabila and Aditama, 2023).

The palm oil crisis in Indonesia can be attributed to a combination of factors. Firstly, the COVID-19 pandemic disrupted supply chains, leading to a decrease in palm oil production and a surge in global demand (Choiruzzad, 2019). This imbalance between supply and demand resulted in a shortage of raw materials, causing prices to soar. In response, the Indonesian government imposed export bans on palm oil to ensure domestic food security and stabilise prices (Sabila and Aditama, 2023).

Furthermore, the ongoing Russia-Ukraine conflict has exacerbated the crisis, as the disruption of global energy and agricultural markets has had a ripple effect on the palm oil industry (Khalid *et al.*, 2023). The conflict has led to a surge in energy prices, which has increased the cost of production and transportation for palm oil companies, further contributing to price instability (Kadarusman & Pramudya, 2019).

The palm oil crisis in Indonesia has had widespread implications, both domestically and internationally. Domestically, the export bans have led to a surplus of palm oil within Indonesia, causing a significant drop in prices for local producers (Sabila & Aditama, 2023). This has had a detrimental impact on the livelihoods of smallholder farmers and plantation workers, who rely on the palm oil industry for their income (Choiruzzad, 2019).

Internationally, the crisis has disrupted global supply chains, as Indonesia is the world's largest producer and exporter of palm oil (Kaniapan *et al.*, 2021). The shortage of palm oil has led to price increases and supply chain disruptions in countries that rely on Indonesian palm oil, such as India and China (Kadarusman and Pramudya, 2019). This has had a ripple effect on various industries, from food manufacturing to biofuel production, as palm oil is a widely used commodity (Kaniapan *et al.*, 2021).

The interdependence between Indonesia's palm oil industry and global supply chains has become increasingly apparent during the crisis (Choiruzzad, 2019). Indonesia's policy decisions, such as the export bans, have had a significant impact on the global market, highlighting the need for greater collaboration and coordination between producing and consuming countries to ensure the sustainability and stability of the palm oil industry (Kadarusman and Pramudya, 2019).

The palm oil industry faced significant disruptions during the COVID-19 pandemic, with policy decisions playing a key role in shaping supply chain stability. Go and Lau (2020) observed that the global financial crisis led to increased volatility and reduced informational efficiency in the crude palm oil futures market, indicating the far-reaching impact of macroeconomic shocks. Voora *et*

al. (2023) further highlighted how government interventions, such as export restrictions and price controls, contributed to supply chain instability and price fluctuations in the palm oil market.

Hafiz *et al.* (2022) provided an Indonesian perspective, noting that the pandemic prompted the government to implement lockdowns and mobility restrictions, which disrupted the flow of goods and labour within the palm oil supply chain. This, in turn, led to delays in harvesting, processing, and transportation, ultimately affecting the availability and pricing of palm oil products (Hafiz *et al.*, 2022). Ahmad *et al.* (2022) emphasised that the lack of harmonised policies across producing and consuming countries further exacerbated the challenges, as inconsistent regulations and trade barriers hindered the industry's ability to respond effectively to the crisis.

This study aims to address two key research questions: How did policy decisions during the crisis affect supply chain stability in the palm oil industry? What strategies proved effective for businesses navigating these disruptions?

The central aim of this research is to assess the challenges businesses in the palm oil industry faced during the COVID-19 crisis and the strategies they adopted to build resilience. The findings will have broader implications for enhancing supply chain sustainability and economic stability within this critical sector.

Overall, the palm oil crisis in Indonesia is a complex issue that has far-reaching implications. The crisis has been driven by a combination of factors, including the COVID-19 pandemic, the Russia-Ukraine conflict, and government interventions. The crisis has had a significant impact on both the domestic and global markets, underscoring the need for a comprehensive and collaborative approach to addressing the challenges facing the palm oil industry.

Literature review

Existing studies have highlighted the vulnerabilities inherent in supply chains, particularly in commodity-driven economies. Garnett *et al.* (2020) examined the UK's food supply chains during the COVID-19 pandemic, revealing the fragility of these systems and their susceptibility to external shocks. Similarly, Ferreira Jr *et al.* (2022) explored the impacts of the pandemic on supply chain sustainability, emphasising the need for increased resilience and adaptability.

While these studies provide valuable insights into general supply chain disruptions, there is a gap in the literature regarding sector-specific impacts, such as those on the palm oil industry in Indonesia. Adwiyah *et al.* (2023) have begun to address this gap by examining sustainable supply chain management (SSCM) performance in the Indonesian palm oil industry, but more research is needed to fully understand the unique challenges faced by this critical sector.

The palm oil industry is a significant contributor to the Indonesian economy, accounting for approximately 11% of the country's total exports in 2021 (Adwiyah *et al.*, 2023). However, the industry has faced numerous challenges, including environmental concerns, social conflicts, and supply chain disruptions. Varkkey *et al.* (2018) have explored the environmental and socio-political

factors influencing palm oil policy in Indonesia and Malaysia, providing valuable context for understanding the broader context in which the industry operates.

Furthermore, Delle Chiaie *et al.* (2022) have examined the common factors influencing commodity prices, which can have significant implications for the palm oil industry. Fluctuations in global commodity prices can disrupt supply chains, leading to challenges for businesses and consumers alike.

The role of policy interventions, such as export bans and price controls, in shaping market dynamics during crises is a crucial aspect to explore. Prokopczuk *et al.* (2019) highlight the significant impact of economic factors, including policy measures, on commodity market volatility. The authors found that changes in monetary policy, exchange rates, and global economic conditions can significantly influence the volatility of commodity prices. In the context of the palm oil crisis in Indonesia, the interplay between domestic policy measures and global market stability is of particular importance.

Weiss and Wallace (2021) discuss how domestic political considerations can shape a country's approach to international economic policies, including trade and commodity regulations. The authors argue that the rise of China and the changing dynamics of the global order have led to increased use of economic tools, such as export restrictions, to pursue domestic political objectives. This is particularly relevant in the case of Indonesia's palm oil industry, where the government has implemented export bans and price controls in response to the crisis (Espitia *et al.*, 2020).

Espitia *et al.* (2020) provide empirical evidence on the impact of export restrictions on global food markets during the COVID-19 pandemic. The authors found that these policy measures led to significant disruptions in international trade and price volatility, with disproportionate effects on developing countries. This highlights the importance of understanding the broader implications of domestic policy interventions in commodity markets, particularly during times of crisis.

Existing frameworks and models for business adaptation during supply chain disruptions offer valuable insights for understanding the challenges faced by businesses during the palm oil crisis in Indonesia. Bode and Macdonald (2017) propose a comprehensive model of supply chain disruption response, which identifies direct, constraining, and mediating factors that influence a firm's ability to mitigate the impact of disruptions.

The authors emphasize the importance of factors such as supply chain visibility, flexibility, and collaboration in enabling effective response strategies. In the context of the palm oil crisis, businesses in Indonesia would need to consider these factors to enhance their resilience and adaptability.

Azadegan *et al.* (2020) provide a complementary perspective, examining the empirical relationship between supply chain disruptions and business continuity. The authors found that

factors such as supply chain complexity, supplier dependency, and organizational agility play a significant role in determining a firm's ability to maintain business operations during times of crisis.

These insights can inform the strategies and practices adopted by Indonesian palm oil businesses to navigate the challenges posed by the current crisis. By understanding the key drivers of business resilience, companies can develop more robust and adaptable supply chain management practices to mitigate the impact of disruptions.

Additionally, examining case studies from other commodity-driven crises can provide valuable comparative insights for the palm oil industry in Indonesia. Drawing lessons from how businesses in other sectors have responded to similar challenges can help inform the development of effective crisis management strategies.

Overall, the existing literature provides a solid foundation for understanding supply chain disruptions, but more research is needed to specifically address the unique challenges faced by the palm oil industry in Indonesia during times of crisis. By highlighting the gaps in the literature and the need for sector-specific analysis, this review sets the stage for a more in-depth exploration of the topic.

Methods

The methodology employed in this study is rooted in a qualitative approach, which is particularly effective for analysing the complex and multi-dimensional challenges presented by the palm oil crisis in Indonesia. The research draws on secondary data sources, including industry reports, policy analyses, and detailed case studies, to provide a comprehensive understanding of the crisis's impact on both local and global supply chains. This approach allows for an in-depth exploration of how supply chain inefficiencies, regulatory interventions, and market dynamics collectively influenced business operations and economic stability. The study places significant emphasis on synthesising diverse perspectives to identify patterns and draw actionable insights.

To evaluate the ripple effects of the crisis, the research integrates thematic analysis and comparative case study methods. By examining key variables such as raw material shortages, export bans, and price volatility, the study reveals the nuanced interplay between policy decisions and market outcomes. Case studies of businesses affected by the crisis are analysed to uncover adaptive strategies, such as alternative sourcing and operational adjustments, that proved effective in navigating disruptions. This methodological framework also incorporates an evaluation of collaborative efforts, highlighting the role of public-private partnerships and cross-sector coordination in mitigating supply chain vulnerabilities.

Furthermore, the research employs a targeted focus on technological adoption, particularly the integration of digital supply chain tools, as a means to enhance operational agility and transparency. The qualitative nature of the study allows for the examination of both micro-level business strategies and macro-level policy implications. By triangulating data from multiple sources, the research ensures a robust analysis that captures the broader implications of the palm

oil crisis, offering valuable lessons for building supply chain resilience and fostering sustainable economic practices.

Analysis/Discussion

Business Stability and Resilience During Pandemic

Faced with these disruptions, businesses in the palm oil industry had to adopt various strategies to maintain operations and ensure supply chain resilience. Adwiyah *et al.* (2023) highlighted the importance of implementing sustainable supply chain management practices, such as enhancing traceability, improving supplier collaboration, and investing in digital technologies. These measures enabled companies to better anticipate and respond to disruptions, minimising the impact on their operations.

Furthermore, Hafiz *et al.* (2022) noted that successful businesses leveraged their existing relationships and networks to navigate the crisis. By collaborating with suppliers, logistics providers, and even competitors, they were able to share resources, coordinate efforts, and find alternative solutions to address supply chain challenges (Hafiz *et al.*, 2022). This collaborative approach not only helped maintain business continuity but also fostered a more resilient ecosystem within the industry.

The findings from this study have broader implications for the long-term sustainability and economic stability of the palm oil industry. Voora *et al.* (2023) emphasised the need for a balanced approach that considers both economic and environmental factors, as the industry plays a crucial role in the livelihoods of millions of smallholder farmers and the global food supply.

Ahmad *et al.* (2022) highlighted the importance of aligning policy decisions with sustainability goals, such as promoting sustainable production practices, enhancing traceability, and addressing deforestation concerns. By fostering a more sustainable and resilient palm oil supply chain, the industry can contribute to the United Nations Sustainable Development Goals and strengthen its position in the global market (Ahmad *et al.*, 2022).

Furthermore, the strategies employed by businesses during the crisis can serve as a blueprint for enhancing supply chain resilience in the face of future disruptions. Adwiyah *et al.* (2023) emphasised the need for continuous improvement and adaptation, as the palm oil industry must be prepared to navigate the evolving challenges posed by climate change, geopolitical tensions, and other emerging risks.

Overall, the stability of economic and regulatory factors, as well as the examination of business resilience frameworks during pandemic, offers a comprehensive understanding of the supply chain disruptions and business challenges faced by the palm oil industry in Indonesia during the current crisis. By leveraging these insights, policymakers and business leaders can develop more informed and effective strategies to navigate the complexities of this challenging environment.

Challenges and Regulatory Interventions of Palm Oil Business Disruptions

The palm oil crisis in Indonesia has had a significant impact on businesses across various industries. One of the primary challenges has been the shortage of raw materials due to supply chain disruptions. The export ban imposed by the Indonesian government in an effort to stabilise domestic prices has constrained the availability of palm oil, a crucial ingredient for many downstream industries (Rifin *et al.*, 2020). This raw material shortage has directly affected the production capacity and profitability of businesses reliant on palm oil.

For instance, the food processing industry in Indonesia has faced substantial difficulties in maintaining their operations. Many food manufacturers rely on palm oil as a key ingredient in their products, such as cooking oil, margarine, and baked goods. The limited supply of palm oil has forced these companies to either reduce production or seek alternative, often more expensive, substitutes (Syamni, 2021). This has resulted in increased production costs, which have been passed on to consumers, leading to higher prices for essential food items.

Similarly, the biofuel industry has been significantly impacted by the palm oil crisis. Indonesia is a major producer and exporter of palm oil-based biofuel, which is used to meet the country's renewable energy targets. The export ban has reduced the availability of palm oil for biofuel production, forcing manufacturers to scale back their operations or seek alternative feedstocks (Wang *et al.*, 2024). This disruption in the biofuel supply chain has had ripple effects on the broader energy sector, potentially undermining Indonesia's efforts to transition towards more sustainable energy sources.

The knock-on effects of the palm oil crisis have also been felt by businesses in related industries, such as logistics and transportation. The reduced availability of palm oil has led to changes in shipping patterns and increased demand for alternative transportation modes, putting strain on the overall supply chain infrastructure (Scholten *et al.*, 2020). This has resulted in higher logistics costs and delivery delays, further exacerbating the challenges faced by businesses reliant on the smooth flow of goods.

To mitigate the impact of the supply chain disruptions, businesses have had to explore various strategies, such as diversifying their supplier networks, investing in inventory management systems, and exploring alternative raw materials (Chen *et al.*, 2015). However, the unpredictable nature of the crisis and the rapidly changing regulatory environment have made it challenging for businesses to implement effective and long-term solutions.

The Indonesian government's regulatory interventions during the palm oil crisis have had a significant impact on businesses, both domestically and globally. The primary aim of these interventions was to stabilise domestic palm oil prices and ensure the availability of the commodity for the local market (Rifin *et al.*, 2020). However, the implementation of these policies has inadvertently exacerbated the challenges faced by businesses.

One of the key regulatory measures was the export ban on palm oil, which was intended to increase the domestic supply and lower prices. While this policy achieved its immediate goal of reducing prices for Indonesian consumers, it had unintended consequences for exporters and global supply chains (Ivanov, 2023). The sudden reduction in palm oil exports from Indonesia, a major global supplier, disrupted the flow of the commodity to international markets, leading to shortages and price spikes in other countries.

The impact of the export ban was particularly severe for businesses in the downstream industries, such as food processing and biofuel production, that relied on a steady supply of palm oil from Indonesia. These companies were forced to seek alternative suppliers, often at higher prices, or adjust their production processes to accommodate the limited availability of the raw material (Syamni, 2021). This, in turn, led to increased costs and reduced profitability, undermining the competitiveness of these businesses in the global market.

Moreover, the regulatory interventions were not limited to the export ban. The Indonesian government also implemented other measures, such as price controls and production quotas, in an attempt to balance the interests of domestic consumers and producers (Rifin *et al.*, 2020). While these policies may have provided short-term relief for some segments of the market, they created additional challenges for businesses, particularly those engaged in international trade.

For instance, the price controls on palm oil effectively capped the revenue that producers could earn, discouraging investment and innovation in the industry (Wang *et al.*, 2024). Similarly, the production quotas limited the ability of businesses to respond to fluctuations in global demand, further exacerbating the supply chain disruptions.

The regulatory interventions during the palm oil crisis have highlighted the delicate balance that governments must strike between domestic stabilisation efforts and the preservation of a well-functioning global supply chain. While the Indonesian government's actions were intended to protect the interests of local consumers and producers, the unintended consequences have posed significant challenges for businesses both within and outside the country (Scholten *et al.*, 2020). As the crisis continues to evolve, it will be crucial for policymakers to carefully consider the broader implications of their decisions and work collaboratively with the private sector to develop more resilient and adaptable supply chain strategies.

Cross-Border Comparative Strategies in Managing the Business Disruptions

Businesses in the Indonesian palm oil industry have had to adapt their sourcing strategies to mitigate the impact of supply chain disruptions during the crisis. One key approach has been to diversify their supplier base, reducing reliance on a single source of supply (Npueng *et al.*, 2022). This has involved identifying and establishing relationships with alternative suppliers, both domestically and internationally, to ensure a more reliable and resilient supply of raw materials. For example, some companies have expanded their procurement networks to include smaller-scale producers and cooperatives, in addition to the major plantations (Npueng *et al.*, 2022).

Effective inventory management has been crucial for businesses navigating the palm oil crisis. Companies have sought to maintain higher safety stock levels to cushion against supply disruptions and price fluctuations (Shekarian and Mellat Parast, 2021). This has involved carefully monitoring demand patterns and adjusting inventory levels accordingly, as well as implementing advanced forecasting techniques to anticipate and prepare for potential supply chain disruptions.

The adoption of digital technologies and supply chain management tools has been a key strategy for businesses during the palm oil crisis. Companies have leveraged platforms and applications that provide real-time visibility into their supply chains, enabling them to better identify and respond to disruptions (Ivanov and Dolgui, 2021). This includes the use of digital tracking systems, predictive analytics, and collaborative planning tools to enhance supply chain coordination and decision-making.

In addition to supply chain adaptations, some businesses have sought to diversify their product portfolios to mitigate the impact of the palm oil crisis. This has involved exploring alternative product lines or expanding into related markets, reducing their reliance on a single commodity (Norizam and Ahmad, n.d.). By diversifying their offerings, companies can better manage the risks associated with supply chain disruptions and market volatility.

Businesses have also focused on improving their overall operational efficiency to navigate the challenges posed by the palm oil crisis. This has included optimising production processes, streamlined logistics, and implemented lean manufacturing principles to reduce waste and enhance productivity (Ramezani & Camarinha-Matos, 2020). By improving their operational agility, companies can better respond to changing market conditions and supply chain disruptions.

The palm oil crisis in Indonesia has highlighted the importance of cross-sector collaboration in mitigating supply chain disruptions. Businesses, industry associations, and government agencies have worked together to coordinate their responses and share information, enabling a more cohesive and effective approach to addressing the challenges (Npueng *et al.*, 2022). These collaborative efforts have involved joint planning, resource-sharing, and the development of industry-wide contingency plans to enhance market resilience.

One notable example of a successful public-private partnership during the palm oil crisis is the collaboration between the Indonesian government and major palm oil producers. The government has worked closely with industry players to implement policies and initiatives that support the sustainability and resilience of the palm oil supply chain (Npueng *et al.*, 2022). This has included the development of traceability systems, the promotion of sustainable farming practices, and the facilitation of alternative market channels for palm oil products.

Through these cross-sector collaborations, businesses and stakeholders have been able to enhance market transparency and coordination within the palm oil industry. By sharing data, insights, and best practices, they have improved their collective understanding of supply and demand dynamics, as well as the factors driving disruptions (Npueng *et al.*, 2022). This has

enabled more informed decision-making and the implementation of coordinated strategies to mitigate the impact of the crisis.

The Indonesian government has also played a crucial role in supporting businesses during the palm oil crisis through various policy interventions and incentive programs. These include financial assistance, tax relief, and the facilitation of access to alternative markets and supply sources (Npueng *et al.*, 2022). By leveraging government support, businesses have been better equipped to navigate the challenges and maintain their operations during the crisis.

The collaborative efforts and public-private partnerships established during the palm oil crisis have the potential to foster long-term resilience within the industry. By strengthening supply chain relationships, improving information-sharing, and investing in sustainable practices, businesses and stakeholders can build a more robust and adaptable palm oil sector that is better prepared to withstand future disruptions (Ramezani and Camarinha-Matos, 2020). This collaborative approach can serve as a model for other industries facing similar challenges.

Conclusion

The palm oil crisis in Indonesia serves as a stark reminder of the vulnerabilities embedded within global supply chains and the cascading impact of disruptions on businesses and economies. Driven by a confluence of challenges, including the COVID-19 pandemic, geopolitical tensions such as the Russia-Ukraine conflict, and government interventions, the crisis has highlighted the fragility of the palm oil sector. These challenges have not only affected domestic markets but have also created ripples across international trade networks, underscoring the critical need for robust and adaptive frameworks to address such crises effectively. The lessons from this crisis offer valuable insights into the interplay between economic, political, and regulatory factors that shape supply chain dynamics.

A significant takeaway from the crisis is the crucial role of comprehensive and collaborative policies in stabilising the palm oil industry. Government interventions, such as export bans, while aimed at domestic price stabilisation, often resulted in unintended consequences, such as supply chain bottlenecks and reduced profitability for exporters. These measures emphasise the importance of striking a balance between protecting domestic interests and maintaining global competitiveness. Collaborative efforts among stakeholders, including policymakers, industry leaders, and international organisations, are vital to ensure that interventions are both equitable and sustainable. Transparent policies and regulatory harmonisation can further enhance trust and efficiency across the supply chain, mitigating the risks of future disruptions.

Future resilience in the palm oil sector depends on a multi-pronged approach that prioritises both economic and regulatory stability. By leveraging advanced technologies, such as digital supply chain tools, businesses can enhance visibility, streamline operations, and improve adaptability to sudden changes. These tools, coupled with investments in infrastructure and workforce training, can strengthen the sector's overall resilience. Additionally, fostering partnerships between the

public and private sectors can help bridge gaps in resources and expertise, enabling more effective responses to supply chain challenges. Such partnerships can also facilitate the sharing of best practices and innovative solutions tailored to the unique needs of the palm oil industry.

The crisis has also brought to light the importance of examining business resilience frameworks, particularly in the face of global pandemics and geopolitical uncertainties. Businesses that were able to adapt quickly through alternative sourcing, diversification, and operational flexibility demonstrated greater resilience and lessened the impact of disruptions. These strategies highlight the necessity for businesses to proactively develop contingency plans and invest in building adaptive capacities. Moreover, engaging with local communities and fostering sustainable practices can not only enhance operational stability but also contribute to long-term economic and social benefits, aligning business goals with broader societal interests.

In conclusion, the palm oil crisis in Indonesia underscores the interconnected nature of supply chains and the far-reaching implications of disruptions on both domestic and global markets. By addressing the root causes of the crisis and adopting a forward-looking approach, stakeholders can enhance the resilience and sustainability of the palm oil industry. A comprehensive understanding of economic and regulatory factors, combined with innovative business resilience frameworks, can serve as the foundation for more informed and effective strategies to navigate future challenges. By fostering collaboration, embracing technological advancements, and prioritising sustainability, policymakers and business leaders can build a more robust and adaptive supply chain that is better equipped to withstand the complexities of an increasingly volatile global environment.

References

- Adwiyah, R., Syaukat, Y., Indrawan, D., & Mulyati, H. (2023). Examining Sustainability Supply Chain Management (SSCM) Performance in The Palm Oil Industry: A Systematic Literature Review.
- Ahmad, S. N. H. N., Amran, A., Siti-Nabiha, A. K., & Rahman, R. A. (2022). Sustainable Palm Oil: What Drives it and Why Aren't We There Yet?. *Asian Journal of Business and Accounting*, 15(1).
- Azadegan, A., Mellat Parast, M., Lucianetti, L., Nishant, R., & Blackhurst, J. (2020). Supply Chain Disruptions and Business Continuity: An Empirical Assessment. *Decision Sciences*, 51(1), 38-73.
- Bode, C., & Macdonald, J. R. (2017). Stages of Supply Chain Disruption Response: Direct, Constraining, And Mediating Factors for Impact Mitigation. *Decision Sciences*, 48(5), 836-874.
- Chen, L. M., Liu, Y. E., & Yang, S. J. S. (2015). Robust Supply Chain Strategies for Recovering from Unanticipated Disasters. *Transportation Research Part E: Logistics and Transportation Review*, 77, 198-214.
- Choiruzzad, S. A. B. (2019). Save Palm Oil, Save The Nation: Palm Oil Companies and The Shaping of Indonesia's National Interest. *Asian Politics & Policy*, 11(1), 8-26.
- Delle Chiaie, S., Ferrara, L., & Giannone, D. (2022). Common Factors of Commodity Prices. *Journal of Applied Econometrics*, 37(3), 461-476.
- Espitia, A., Rocha, N., & Ruta, M. (2020). Covid-19 and Food Protectionism: The Impact of The Pandemic and Export Restrictions on World Food Markets. *World Bank Policy Research Working Paper*, (9253).
- Ferreira Jr, P. C. D., Machado, E. M. M., Meiriño, M. J., Quelhas, O. L. G., & Mexas, M. P. (2022). COVID-19 Pandemic: Impacts on Supply Chain Sustainability. In *Handbook of Research on SDGs for Economic Development, Social Development, and Environmental Protection* (pp. 113-127). IGI Global.
- Kadariusman, Y. B., & Pramudya, E. P. (2019). The Effects of India and China on The Sustainability of Palm Oil Production in Indonesia: Towards A Better Understanding of The Dynamics of Regional Sustainability Governance. *Sustainable Development*, 27(5), 898-909.
- Kaniapan, S., Hassan, S., Ya, H., Patma Nesan, K., & Azeem, M. (2021). The Utilisation of Palm Oil and Oil Palm Residues and The Related Challenges as A Sustainable Alternative in Biofuel, Bioenergy, And Transportation Sector: A Review. *Sustainability*, 13(6), 3110.
- Khalid, A., Daud, S. N. M., Arsad, Z., & Mobin, M. A. (2023). Energy Futures Price Bubbles and Asset Co-movements with Crude Palm Oil Futures: Through the Lenses of Geopolitical Events and Speculation. *Jurnal Pengurusan*, 68, 1-14.
- Garnett, P., Doherty, B., & Heron, T. (2020). Vulnerability of the United Kingdom's food supply chains exposed by COVID-19. *Nature Food*, 1(6), 315-318.
- Go, Y. H., & Lau, W. Y. (2020). The Impact of Global Financial Crisis on Informational Efficiency: Evidence from Price-Volume Relation in Crude Palm Oil Futures Market. *Journal of Commodity Markets*, 17, 100081.

- Hafiz, N., Azmi, K. M., Nimfa, D. T., Latiff, A. S. A., & Wahab, S. A. (2022). COVID-19 and its Implications to The Assessment of Sustainable Palm Oil Supply Chain Management: An Indonesian Perspective. *Frontiers in Sustainability*, 2, 738985.
- Ivanov, D., & Dolgui, A. (2021). A Digital Supply Chain Twin for Managing the Disruption Risks and Resilience in The Era of Industry 4.0. *Production Planning & Control*, 32(9), 775-788.
- Ivanov, D. (2023). Collaborative Emergency Adaptation for Ripple Effect Mitigation in Intertwined Supply Networks. *Annals of Operations Research*, 1-17.
- Norizam, N. A. A., & Ahmad, N. Wavelet Coherence Analysis on Crude Oil Prices and Stock Market Prices of Retail Companies in Malaysia.
- Npueng, S., Oosterveer, P., & Mol, A. P. (2022). Governing Sustainability in The Thai Palm Oil-Supply Chain: The Role of Private Actors. *Sustainability: Science, Practice and Policy*, 18(1), 37-54.
- Prokopczuk, M., Stancu, A., & Symeonidis, L. (2019). The Economic Drivers of Commodity Market Volatility. *Journal of International Money and Finance*, 98, 102063.
- Ramezani, J., & Camarinha-Matos, L. M. (2020). Approaches for Resilience and Antifragility in Collaborative Business Ecosystems. *Technological forecasting and social change*, 151, 119846.
- Rifin, A., Feryanto, Herawati, & Harianto. (2020). Assessing the Impact of Limiting Indonesian Palm Oil Exports to the European Union. *Journal of economic structures*, 9, 1-13.
- Sabila, A., & Aditama, H. (2023). Indonesia's Policy of Palm Oil Exports Banned in The Current World Energy Crisis. *Journal of Social and Economics Research*, 5(2), 189-199.
- Scholten, K., Stevenson, M., & van Donk, D. P. (2020). Dealing With the Unpredictable: Supply Chain Resilience. *International Journal of Operations & Production Management*, 40(1), 1-10.
- Shekarian, M., & Mellat Parast, M. (2021). An Integrative Approach to Supply Chain Disruption Risk and Resilience Management: A Literature Review. *International Journal of Logistics Research and Applications*, 24(5), 427-455.
- Syamni, G. (2021, March). The impact of the Economic Crisis on Indonesian Palm Oil Exports: A Long-Term Simulation Analysis. In *IOP Conference Series: Earth and Environmental Science* (Vol. 694, No. 1, p. 012012). IOP Publishing.
- Varkkey, H., Tyson, A., & Choiruzzad, S. A. B. (2018). Palm Oil Intensification and Expansion in Indonesia and Malaysia: Environmental and Socio-Political Factors Influencing Policy. *Forest Policy And Economics*, 92, 148-159.
- Voorra, V., Bermúdez, S., Farrell, J. J., Larrea, C., & Luna, E. (2023). Palm Oil Prices and Sustainability. *International Institute for Sustainable Development*.
- Wang, J., Ma, K., Zhang, L., Wei, J., & Wang, J. (2024). Crude Oil Price Bubble Identification and Risk Assessment from Different Spot Markets: Establishing a Sustainable Energy Policy. *Strategic Planning for Energy and the Environment*, 189-214.
- Weiss, J. C., & Wallace, J. L. (2021). Domestic Politics, China's Rise, And the Future of The Liberal International Order. *International Organization*, 75(2), 635-664.