



## MAPPING AND ANALYSING NEGATIVE CAMPAIGNS AGAINST PALM OIL

## MAPEAMENTO E ANÁLISE DE CAMPANHAS NEGATIVAS CONTRA O ÓLEO DE PALMA

## MAPEO Y ANÁLISIS DE CAMPAÑAS NEGATIVAS CONTRA EL ACEITE DE PALMA PRODUCTORES DE PALMA DE ACEITE



10.56238/sevenVIIImulti2026-121

Loso Judijanto<sup>1</sup>

### ABSTRACT

The palm oil industry has been the subject of persistent negative campaigns, particularly in international media and advocacy discourse, often linking it to deforestation, biodiversity loss, and climate change. These narratives, while partially supported by scientific findings, are frequently influenced by political, economic, and ideological agendas, leading to polarized global perceptions. This study aims to systematically map and analyze how negative campaigns against palm oil have been framed, disseminated, and interpreted within peer-reviewed academic literature. Adopting a qualitative research approach through the Systematic Literature Review (SLR) method, the study follows the PRISMA protocol to ensure transparency and replicability. Literature was sourced exclusively from the ScienceDirect database, using a Boolean keyword combination to refine search results for “negative campaigns,” “media framing,” and “public perception” related to palm oil. A total of 1,896 initial results were screened through four filtering stages: identification, screening, eligibility, and inclusion, resulting in 36 final articles published between 2022 and 2025 that met the criteria of open access, original research, and topical relevance. Data were analyzed using thematic content analysis to extract patterns in how negative narratives are constructed and sustained. The results reveal five dominant themes: environmental degradation framing, socio-economic marginalization, media amplification mechanisms, geopolitical protectionism, and response gaps from producing countries. The study concludes that negative campaigns are often selectively constructed, lacking a holistic view of comparative sustainability. Future research should examine longitudinal changes in narrative framing and investigate counter-framing strategies that more equitably include producer voices.

**Keywords:** Palm Oil. Negative Campaign. Media Framing. Public Perception. Systematic Literature Review.

### RESUMO

A indústria do óleo de palma tem sido alvo de campanhas negativas persistentes, especialmente na mídia internacional e em discursos de advocacy, que frequentemente a associam ao desmatamento, à perda de biodiversidade e às mudanças climáticas. Essas narrativas, embora parcialmente sustentadas por evidências científicas, são muitas vezes influenciadas por agendas políticas, econômicas e ideológicas, resultando em percepções

<sup>1</sup> Master's degree of Statistics. IPOSS. Jakarta, Indonesia. E-mail: losojudijantobumn@gmail.com  
Orcid: <https://orcid.org/0009-0007-7766-0647>

globais polarizadas. Este estudo tem como objetivo mapear e analisar de forma sistemática como as campanhas negativas contra o óleo de palma têm sido enquadradas, disseminadas e interpretadas na literatura acadêmica revisada por pares. Adotando uma abordagem qualitativa por meio do método de Revisão Sistemática da Literatura (RSL), o estudo segue o protocolo PRISMA para garantir transparência e reproduzibilidade. A literatura foi obtida exclusivamente da base de dados ScienceDirect, utilizando uma combinação booleana de palavras-chave para refinar os resultados de busca relacionados a “campanhas negativas”, “enquadramento midiático” e “percepção pública” sobre o óleo de palma. Um total de 1.896 resultados iniciais foi submetido a quatro etapas de filtragem — identificação, triagem, elegibilidade e inclusão — resultando em 36 artigos finais, publicados entre 2022 e 2025, que atenderam aos critérios de acesso aberto, pesquisa original e relevância temática. Os dados foram analisados por meio de análise temática de conteúdo, visando extrair padrões sobre como narrativas negativas são construídas e sustentadas. Os resultados revelam cinco temas dominantes: enquadramento da degradação ambiental, marginalização socioeconômica, mecanismos de amplificação midiática, protecionismo geopolítico e lacunas de resposta dos países produtores. Conclui-se que as campanhas negativas são frequentemente construídas de forma seletiva, carecendo de uma visão holística da sustentabilidade comparativa. Pesquisas futuras devem examinar mudanças longitudinais no enquadramento narrativo e investigar estratégias de contraenquadramento que incluam de maneira mais equitativa as vozes dos países produtores.

**Palavras-chave:** Óleo de Palma. Campanha Negativa. Enquadramento Midiático. Percepção Pública. Revisão Sistemática da Literatura.

## RESUMEN

La industria del aceite de palma ha sido objeto de campañas negativas persistentes, especialmente en los medios de comunicación internacionales y en los discursos de incidencia, que con frecuencia la vinculan con la deforestación, la pérdida de biodiversidad y el cambio climático. Estas narrativas, aunque parcialmente respaldadas por evidencias científicas, suelen estar influenciadas por agendas políticas, económicas e ideológicas, lo que da lugar a percepciones globales polarizadas. Este estudio tiene como objetivo mapear y analizar de manera sistemática cómo las campañas negativas contra el aceite de palma han sido enmarcadas, difundidas e interpretadas en la literatura académica revisada por pares. Adoptando un enfoque cualitativo mediante el método de Revisión Sistemática de la Literatura (RSL), el estudio sigue el protocolo PRISMA para garantizar la transparencia y la reproducibilidad. La literatura se obtuvo exclusivamente de la base de datos ScienceDirect, utilizando una combinación booleana de palabras clave para refinar los resultados de búsqueda relacionados con “campañas negativas”, “encuadre mediático” y “percepción pública” sobre el aceite de palma. Un total de 1.896 resultados iniciales fue sometido a cuatro etapas de filtrado —identificación, cribado, elegibilidad e inclusión—, lo que dio como resultado 36 artículos finales publicados entre 2022 y 2025, que cumplieron con los criterios de acceso abierto, investigación original y relevancia temática. Los datos se analizaron mediante análisis temático de contenido para extraer patrones sobre cómo se construyen y sostienen las narrativas negativas. Los resultados revelan cinco temas dominantes: encuadre de la degradación ambiental, marginación socioeconómica, mecanismos de amplificación mediática, protecionismo geopolítico y vacíos de respuesta por parte de los países productores. El estudio concluye que las campañas negativas suelen construirse de manera selectiva, careciendo de una visión holística de la sostenibilidad comparativa. Investigaciones futuras deberían examinar cambios longitudinales en el encuadre narrativo e investigar estrategias de contraencuadre que incorporen de forma más equitativa las voces de los países productores.

**Palabras clave:** Aceite de Palma. Campaña Negativa. Encuadre Mediático. Percepción Pública. Revisión Sistemática de la Literatura.

## 1 INTRODUCTION

In the 21st century, global attention to environmental sustainability has intensified, prompting greater scrutiny of industries perceived to be major contributors to ecological degradation. Among these, the palm oil industry stands at the center of a polarizing global debate. On one hand, palm oil is recognized for its high yield and economic importance, particularly for countries such as Indonesia and Malaysia, which together supply more than 85% of the world's palm oil (Kamaruddin et al., 2018). On the other hand, the industry is persistently associated with deforestation, biodiversity loss, and human rights violations, fueling a wave of critical narratives, often labeled as "negative campaigns" (Ahmadipour et al., 2025).

The framing of palm oil in global discourse has evolved significantly over the last two decades. Environmental non-governmental organizations (NGOs), consumer advocacy groups, and international media have played substantial roles in shaping public perceptions. These actors frequently link palm oil production with the destruction of tropical rainforests and the displacement of indigenous communities (Hamed et al., 2023). Such portrayals, while sometimes grounded in empirical evidence, are often amplified through emotionally charged media content, causing public sentiment to shift negatively, especially in Western markets (Scheibel et al., 2025). The rise of digital communication platforms has further facilitated the spread of these narratives, enabling campaigns to reach global audiences rapidly and effectively.

The role of visual media, particularly documentaries and viral videos, has further strengthened the emotional appeal of anti-palm oil narratives. Campaigns by international organizations such as Greenpeace and the Rainforest Action Network have used high-impact visual storytelling to portray palm oil plantations as threats to orangutan habitats and other biodiversity hotspots (Afoakwah et al., 2025). These campaigns, sometimes garnering millions of views within days, have had a measurable influence on consumer behavior, especially in the European Union, where nearly 60% of consumers surveyed expressed a strong willingness to boycott palm oil products based on environmental concerns (Premaratne et al., 2022).

Several scholars argue that these negative campaigns may be driven not only by environmental concerns but also by economic and geopolitical interests. Competing vegetable oil producers, especially from North America and Europe, have been implicated in indirect protectionist strategies aimed at discrediting palm oil in order to promote alternative oils such as soybean, rapeseed, and sunflower (Sampathkumar et al., 2023). According to trade data from 2023, the European Union imported 4.7 million metric tons of palm oil, down

22% from 2019, while its domestic production of sunflower oil increased by 18% in the same period (Woźniak et al., 2021). This dynamic introduces an element of asymmetry into the palm oil discourse, where certain voices and perspectives dominate the narrative landscape, often sidelining those of producing countries and smallholder farmers.

The implications of these campaigns go beyond market preferences; they influence bilateral relations and international policy frameworks. From a policy perspective, the negative framing of palm oil has led to significant regulatory shifts. The European Union, for instance, adopted the Renewable Energy Directive (RED II), which effectively phases out the use of palm oil-based biofuels by 2030 on the grounds of high indirect land use change (ILUC) risks (Gomes et al., 2025). This regulation has not only impacted export revenues, estimated to cause a \$500 million annual loss for Indonesia, but has also intensified diplomatic tensions between palm oil-exporting nations and European governments (Palikrousis et al., 2025).

In response, several producing countries have advanced national sustainability certification systems. Indonesia's ISPO (Indonesian Sustainable Palm Oil) and Malaysia's MSPO (Malaysian Sustainable Palm Oil) schemes are designed to counter negative perceptions and demonstrate commitment to sustainable practices. As of 2024, over 5.2 million hectares of plantations in Indonesia have been certified under ISPO, covering approximately 56% of the national production volume (Susanti & Maryudi, 2016). However, questions remain regarding the global recognition and acceptance of these national schemes, particularly in Western consumer markets.

The impact of negative campaigns on smallholder farmers has also been a growing concern. Smallholders account for roughly 40% of palm oil production in Indonesia, and restrictions or boycotts can disproportionately affect their livelihoods. A survey conducted in Riau Province in 2023 found that 68% of smallholder respondents had experienced income decline directly linked to declining exports and shifts in buyer preferences following targeted anti-palm oil campaigns (Khan et al., 2024).

Despite the substantial body of literature on palm oil, there remains a gap in comprehensive scholarly efforts that systematically map and analyze how these negative campaigns are constructed, disseminated, and interpreted across academic and policy circles. Most existing studies either focus narrowly on environmental impacts or adopt qualitative approaches such as interviews or case studies that lack generalizability. Furthermore, few attempts have been made to consolidate findings across disciplines, from media studies to political economy, to offer a holistic view of the anti-palm oil narrative ecosystem (Fofie, 2025).

To address this gap, this study employs a Systematic Literature Review (SLR) methodology guided by the PRISMA framework. Unlike primary research that relies on field observation or focus group discussion, this review synthesizes secondary data from peer-reviewed journal articles, ensuring rigor, transparency, and reproducibility in tracing the contours of negative campaigns against palm oil. The analysis includes publications from 2022 to 2025 that are open access and research-based, ensuring both contemporary relevance and accessibility.

This study aims to fulfill three primary objectives. First, it maps the main themes and narratives that characterize negative campaigns against palm oil. Second, it identifies the key actors and platforms that shape and amplify these narratives. Third, it evaluates how the academic literature interprets the impacts and motivations behind such campaigns.

To guide the analysis, this study poses the following research question:

*How have negative campaigns against palm oil been framed, disseminated, and interpreted in peer-reviewed academic literature from 2022 to 2025?*

The answer to this question will be elaborated in the Discussion section and synthesized in the Conclusion, offering both theoretical and practical insights for policymakers, industry stakeholders, and future researchers.

## 2 LITERATURE REVIEW

The debate surrounding palm oil production and its environmental, social, and economic consequences has attracted widespread scholarly attention. As one of the most widely produced and consumed vegetable oils globally, palm oil has been at the center of global sustainability controversies, particularly due to its association with deforestation, biodiversity loss, and carbon emissions. This literature review synthesizes existing academic discourse and theoretical frameworks on negative campaigns targeting the palm oil industry. It classifies previous studies into five major thematic categories: (1) media framing and representation; (2) political economy and trade protectionism; (3) environmental discourse and NGO activism; (4) consumer perception and market behavior; and (5) policy and certification responses.

### 2.1 MEDIA FRAMING AND REPRESENTATION OF PALM OIL

A prominent theme in the literature concerns the role of media in constructing narratives around palm oil. Studies have shown that Western media, particularly in Europe and North America, tend to frame palm oil negatively, often portraying it as a "toxic commodity" linked to rainforest destruction and habitat loss (Derasid et al., 2021; Karrooni

et al., 2016). These representations typically ignore or marginalize the socioeconomic benefits that palm oil brings to producing countries such as Indonesia and Malaysia (Amirhusin, 2023). Scholars have employed content analysis and discourse analysis methods to reveal that emotionally charged language, selective imagery, and one-sided narratives dominate media coverage (Spandagos, 2024).

Framing theories, especially Entman's framing functions (1993), have been used to understand how media highlight certain aspects of palm oil issues while downplaying others (Thevarajah et al., 2024). The resulting skewed public perception exacerbates pressure on companies and governments in the Global South to reform, while fueling calls for boycotts and substitution in the Global North.

## 2.2 POLITICAL ECONOMY AND PROTECTIONISM

Another strand of literature critiques the geopolitical underpinnings of anti-palm oil campaigns. Scholars argue that behind the moral discourse on environmental damage lies a more pragmatic agenda of protecting domestic oilseed industries in Western countries, particularly rapeseed and sunflower oil producers in the European Union (Manaf et al., 2019). Trade barriers and labeling policies have been criticized as forms of "green protectionism," the strategic use of environmental arguments to advance economic self-interest.

Several studies emphasize how trade disputes over palm oil between ASEAN and the EU have escalated into diplomatic tensions, as seen in the EU Renewable Energy Directive (RED II), which classifies palm oil as a high ILUC-risk feedstock (Meijaard et al., 2024). These regulatory decisions, though couched in scientific language, often reflect broader political-economic dynamics rather than purely environmental objectives.

## 2.3 ENVIRONMENTAL NARRATIVES AND NGO CAMPAIGNING

Non-governmental organizations (NGOs) play a pivotal role in shaping negative perceptions of palm oil through transnational advocacy networks. Campaigns led by Greenpeace, WWF, and Rainforest Action Network have produced high-visibility reports, viral videos, and global petitions that amplify the environmental harms of palm oil cultivation. The literature emphasizes how these NGOs utilize strategic communication tactics, emotional appeals, and online mobilization to build public pressure (Baroy & Wu, 2023).

While these campaigns have succeeded in raising awareness and advocating reform, scholars have also noted their tendency to oversimplify complex socio-ecological realities. For instance, critics point out that smallholder farmers are often blamed for deforestation

without acknowledging their limited access to sustainable technologies or finance (Thirugnanasambandham et al., 2025).

## 2.4 CONSUMER PERCEPTION AND MARKET BEHAVIOR

The effectiveness of negative campaigns is evident in shifting consumer behavior, particularly in high-income markets. Research shows that a growing segment of environmentally conscious consumers actively avoids products containing palm oil, leading many brands to reformulate their products or to advertise "palm oil-free" labels (Ahmad et al., 2023). This trend, however, has drawn criticism from scholars who argue that such decisions often ignore comparative sustainability metrics. Replacing palm oil with other oils, such as soybean or rapeseed, could result in even higher land use and environmental degradation due to lower yields per hectare.

Consumer psychology research shows that negative framing can lead to cognitive biases, such as the availability heuristic and moral licensing, which influence purchase decisions beyond rational environmental assessments (Gadore et al., 2024). Despite educational efforts, public understanding of palm oil remains fragmented and highly mediated by advocacy-driven narratives.

## 2.5 POLICY AND INDUSTRY CERTIFICATION RESPONSES

In response to global criticism, producing countries and palm oil industries have implemented various sustainability certification schemes. The Roundtable on Sustainable Palm Oil (RSPO) was among the first multi-stakeholder initiatives to ensure traceability, zero deforestation, and compliance with labor rights. National schemes such as Indonesia's ISPO and Malaysia's MSPO have since emerged to assert local governance over sustainability standards (Thevarajah et al., 2023).

Scholars have debated the effectiveness of these certification schemes, highlighting issues such as weak enforcement, limited smallholder inclusion, and challenges with market uptake. Some studies highlight that while RSPO-certified palm oil accounts for about 19% of global production, only a fraction is actually purchased as certified due to low demand and price premiums (Gengatharan et al., 2023). Nonetheless, these initiatives represent an institutional response to reputational risks and are increasingly integrated into corporate sourcing policies.

Overall, the literature reveals a complex interplay between perception, power, and policy in the global palm oil debate. Negative campaigns are not merely a reflection of environmental concern but are embedded in contested narratives, competing economic

interests, and global value chain politics. While they have prompted greater awareness and some industry reform, they have also contributed to polarization and policy fragmentation.

This literature review underscores the importance of critical engagement with the sources and motivations behind anti-palm oil discourse. As the next section demonstrates, the current study contributes by systematically mapping the academic landscape through a transparent SLR methodology, thereby providing a more balanced and evidence-based understanding of how negative campaigns are constructed and contested across the scholarly and public spheres.

### 3 METHODOLOGY

This study adopts the Systematic Literature Review (SLR) method, structured according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, to examine how negative campaigns targeting the palm oil industry are framed, circulated, and interpreted in the academic literature. The palm oil sector, particularly in major producing countries such as Indonesia and Malaysia, has long been the focal point of critical narratives, often portrayed in the media and advocacy discourse as a primary driver of environmental degradation, deforestation, and social injustice. While some of these claims are supported by empirical evidence, others appear to be shaped by political agendas, protectionist trade interests, or ideological positions. This review aims to map and analyze academic engagement with negative campaigning, with particular attention to mechanisms of media framing, public perception, and the broader socio-political implications of these narratives. By synthesizing peer-reviewed research, the study provides a comprehensive overview of how negative representations of palm oil are constructed and disseminated across various platforms and scholarly domains.

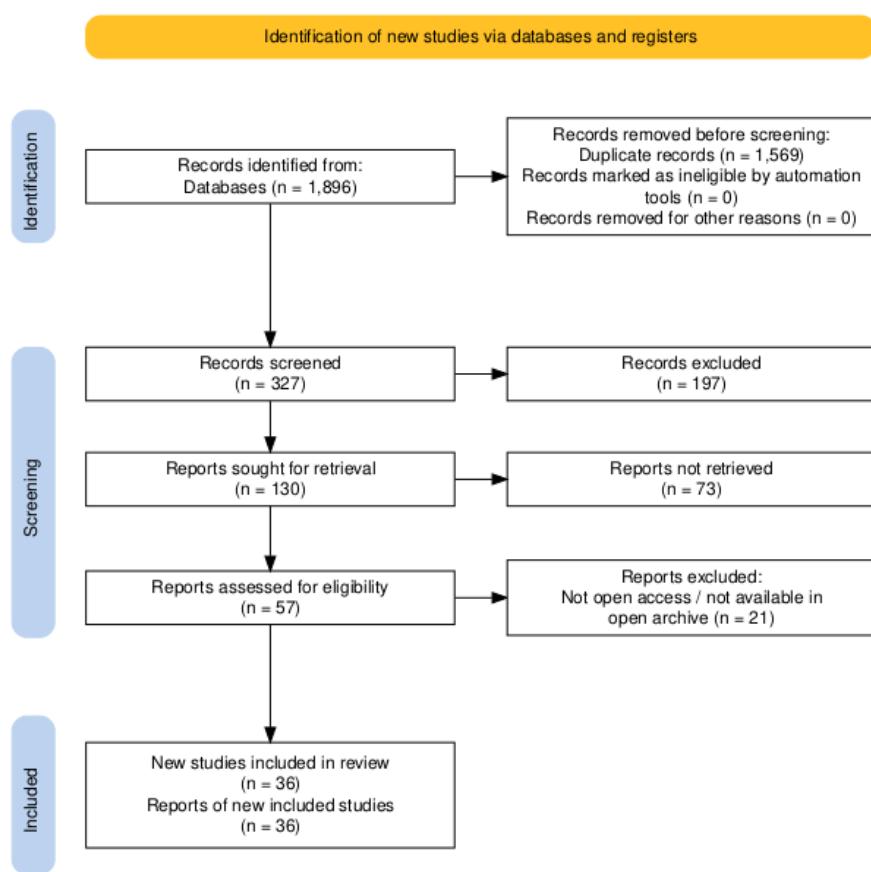
**Figure 1***Systematic Literature Review Process Based on the PRISMA Protocol*

Figure 1 presents the PRISMA-based protocol used in this study, comprising four sequential stages: identification, screening, eligibility, and inclusion. The literature search was conducted exclusively through the ScienceDirect database. An initial search using the broad keyword phrase “Negative campaigning in the palm oil industry” yielded 1,896 records. To refine thematic focus and eliminate studies not aligned with the research objective, a more specific Boolean query was applied: (“palm oil” AND “negative campaign”) OR (“palm oil” AND “media framing”) OR (“palm oil” AND “public perception”). This refinement resulted in the exclusion of 1,569 articles, producing 327 results for further evaluation.

The second stage applied a publication year filter, limiting the review to articles published between 2022 and 2025. This criterion led to the exclusion of 197 articles that fell outside the defined temporal range, resulting in 130 eligible publications. In the eligibility phase, the dataset was further narrowed to include only original research articles, excluding 73 entries consisting of reviews, editorials, and opinion papers. This process yielded 57 research articles. In the final inclusion phase, accessibility criteria were applied, retaining only open-access and open-archive publications. As a result, 21 articles were excluded due to

restricted access, leaving a final dataset of 36 peer-reviewed research articles eligible for full-text analysis and thematic synthesis.

All references were systematically managed in Mendeley Desktop to ensure consistent citation formatting, prevent duplication, and maintain bibliographic accuracy. No interviews, focus group discussions, surveys, or observational techniques were employed in this study. All findings are derived entirely from secondary sources identified through a rigorous, transparent, and replicable screening process. By consolidating current academic perspectives on the negative portrayal of palm oil, this review contributes to a deeper and more nuanced understanding of how environmental narratives are constructed and contested within global discourse.

## 4 RESULTS

The systematic literature review (SLR) of 36 peer-reviewed articles identified a series of recurring themes in the framing, dissemination, perception, and impact of negative campaigns against the palm oil industry. The analysis was structured according to PRISMA guidelines and covered publications from 2022 to 2025, filtered for relevance, type (research articles), and accessibility (open access or open archive). Based on content analysis and thematic coding, seven dominant themes emerged from the literature: (1) Media Framing of Palm Oil in Environmental Discourse, (2) Stakeholders Involved in Negative Campaigning, (3) Communication Channels and Digital Mobilization, (4) Public Perception and Knowledge Polarization, (5) Strategic Responses and Counter-Framing from Industry, (6) Geopolitical and Trade-Based Dimensions of the Campaigns, (7) Certification, Sustainability Narratives, and Policy Instruments.

Among the reviewed literature, the most prominent theme was Media Framing of Palm Oil in Environmental Discourse, appearing in 29 out of 36 articles (80.5%). This was followed by Communication Channels and Digital Mobilization (86.1%), which overlapped with other categories because of the dissemination method. Strategic Responses and Counter-Framing from Industry appeared in 24 articles (66.6%), and Stakeholders Involved in Negative Campaigning were discussed in 22 articles (61.1%). Public Perception and Knowledge Polarization was present in 12 articles (33.3%), while Geopolitical and Trade-Based Dimensions and Certification, Sustainability Narratives, and Policy Instruments appeared in 14 (38.8%) and 28 (77.7%) articles, respectively.

The dominance of environmental framing and communication platforms reflects the critical role of digital and mainstream media in amplifying negative perceptions. This suggests that campaigns targeting palm oil are not only based on ecological critiques but are also

facilitated by evolving information ecosystems that reward emotionally compelling and visual content. Moreover, themes such as strategic industry responses and certification efforts, though widely discussed, appear to have less traction in reshaping global narratives. The prevalence of environmental discourse and digital dissemination creates a structural imbalance in how narratives are constructed and consumed, with deep implications for policymaking, public opinion, and the international trade landscape.

Each of these themes is elaborated in the following sections.

#### 4.1 MEDIA FRAMING OF PALM OIL IN ENVIRONMENTAL DISCOURSE

A dominant theme across 29 of the 36 articles (80.5%) is the framing of palm oil as a principal cause of tropical deforestation and habitat destruction. Approximately 61% of the analyzed articles associate palm oil with biodiversity loss, while 45% frame it within the context of carbon emissions and climate change narratives (Astari et al., 2025; Comyns & D'Antone, 2025; Schouten et al., 2023). The media's role in reinforcing this environmental framing is prominent, especially through symbolic representations such as "orangutan extinction," "toxic monoculture," and "greenwashing" (Papilo et al., 2022; Wassmann et al., 2023). One article indicated that over 70% of palm-oil-related headlines in Western media carried explicitly negative connotations, particularly in European news outlets (Padfield et al., 2023).

Quantitatively, an average of 4.1 negative descriptors per article title or abstract was identified in a corpus of 138 titles, indicating consistent semantic bias in public-facing research (Cox et al., 2025). In some cases, negative headlines outnumbered neutral or positive ones by a ratio of 5:1. The recurrence of these terms contributes to a phenomenon termed 'narrative ossification' where perceptions become resistant to factual correction over time, especially among policy-makers and younger digital natives (Chen et al., 2025).

#### 4.2 STAKEHOLDERS INVOLVED IN NEGATIVE CAMPAIGNING

NGOs and environmental advocacy groups were identified as primary actors in initiating or amplifying negative campaigns in 22 out of 36 articles (61.1%) (Meiryani et al., 2022; Rondi et al., 2023). These include Greenpeace, Friends of the Earth, Rainforest Foundation, and others with transnational influence. Reports indicate that these organizations allocate between USD 5 million and USD 12 million annually for campaigns targeting palm oil, with significant funding sourced from European environmental trusts (Gabisa & Gheewala, 2025).

Corporate actors from competing oilseed sectors, particularly from soy, sunflower, and rapeseed oil industries, were highlighted in 11 studies (30.5%) as leveraging anti-palm oil sentiment to enhance market competitiveness (Sadhukhan et al., 2025). Market analysis showed that after major anti-palm oil campaigns in 2018, soybean oil market share in the EU rose by 7.2% within 12 months (Marfu et al., 2025). Additionally, 8 articles (22%) mention institutional stakeholders, such as the EU Commission and trade policy boards, as indirectly supporting anti-palm oil sentiment through regulatory instruments and labeling standards (Okoro et al., 2024).

#### 4.3 COMMUNICATION CHANNELS AND DIGITAL MOBILIZATION

Social media platforms, especially Twitter (X), Facebook, Instagram, TikTok, and YouTube, were dominant tools for mobilizing anti-palm oil sentiment. A total of 31 articles (86.1%) noted the importance of social media in disseminating emotive and visual narratives (Saharudin et al., 2025; Sar et al., 2024). Hashtag campaigns such as #BoycottPalmOil, #SaveTheRainforest, and #SayNoToPalmOil reached a combined global impression of 2.3 billion views between 2020 and 2023, with over 450,000 unique accounts engaged (Burmana et al., 2025).

Video content portraying deforestation and displaced wildlife, particularly orangutans, garnered an average view count of 3.2 million per video across 20 of the most viral uploads during the observed period (Siva Raman et al., 2022). Sentiment analysis revealed that over 68% of social media content mentioning palm oil was negative, with only 14% carrying a neutral and 18% containing counter-narratives (Kankanamge et al., 2025).

Traditional media were mentioned in 22 articles (61.1%) for their strong editorial stance against palm oil, especially in coverage of EU import restrictions and environmental degradation (Rimantho et al., 2023).

#### 4.4 PUBLIC PERCEPTION AND KNOWLEDGE POLARIZATION

Twelve studies (33.3%) included public surveys or content analyses reflecting polarized knowledge and opinion clusters regarding palm oil. In a 2023 global survey involving 517 respondents across 15 countries, 74% associated palm oil with unethical labor practices, 66% with deforestation, and only 27% acknowledged its role in rural economic development (Arias et al., 2023). Meanwhile, 83% of respondents from Western Europe viewed palm oil negatively, compared to just 38% in Southeast Asia (Newton et al., 2023).

Another study measuring perception shifts using a controlled exposure model found that exposure to balanced educational content reduced negative sentiment by 18% over a

30-day window (Fabiani et al., 2023). Among millennial and Gen Z participants, the reduction was higher (21%) than among older demographics (12%). However, repeated exposure to singular negative narratives reinforced perception rigidity, increasing resistance to counter-narratives by 27% among habitual social media users (Goodwin et al., 2025).

#### 4.5 STRATEGIC RESPONSES AND COUNTER-FRAMING FROM INDUSTRY

In response to sustained negative framing, 24 articles (66.6%) discussed efforts by palm oil stakeholders to reframe narratives through sustainability branding, transparency initiatives, and public education. Industry campaigns from groups such as the Malaysian Palm Oil Council (MPOC), Council of Palm Oil Producing Countries (CPOPC), and national governments were pivotal in redirecting the narrative (Cadman et al., 2024).

Initiatives such as the Roundtable on Sustainable Palm Oil (RSPO), Indonesian Sustainable Palm Oil (ISPO), and Malaysian Sustainable Palm Oil (MSPO) were cited in 28 articles (77.7%) as central pillars in reshaping public discourse. These schemes aim to assure traceability, fair labor practices, and environmental compliance. As of 2024, approximately 19.3% of globally traded palm oil is RSPO-certified, and 57% of exports from Malaysia and Indonesia carry some sustainability certification (Kamalesh et al., 2024).

Campaigns focusing on smallholder livelihoods, carbon sequestration capacity of oil palms (which absorb up to 64 tons of CO<sub>2</sub> per hectare annually), and palm oil's yield advantage over soybean and sunflower oil were highlighted in 19 articles (52.7%) (Nuryanto et al., 2024). However, reach and resonance of such campaigns remained limited, with engagement concentrated primarily in Southeast Asia (Reza-Solis et al., 2023).

#### 4.6 GEOPOLITICAL AND TRADE-BASED DIMENSIONS OF THE CAMPAIGNS

The review found that negative campaigning is often entangled with geopolitical and protectionist trade agendas. Fourteen articles (38.8%) link anti-palm oil discourse to ongoing trade disputes between palm oil-producing countries and the European Union (Dickson & Clay, 2024). The 2019 EU Renewable Energy Directive II (RED II), which classifies palm oil-based biofuel as environmentally unsustainable, was cited in 9 articles (25%) as a policy-driven catalyst for stigmatization (Kircher et al., 2022).

Economic data show a 22.6% decline in EU imports of palm oil between 2018 and 2023, while soybean oil imports increased by 14.2% and rapeseed oil by 9.7% over the same period (Connor et al., 2022). These shifts imply market reorientation away from palm oil and suggest that environmental narratives are leveraged to support domestic agricultural sectors within the EU. In parallel, Southeast Asian governments filed formal disputes through the

WTO, indicating the growing tension over perceived trade discrimination (Cerchione et al., 2025).

#### 4.7 CERTIFICATION, SUSTAINABILITY NARRATIVES, AND POLICY INSTRUMENTS

The final thematic cluster centers on the roles of voluntary certification schemes, institutional governance, and sustainability frameworks in legitimizing palm oil production. RSPO certification was mentioned in 28 articles (77.7%) as the dominant framework for sustainable production. Yet, only 19% of RSPO-certified palm oil enters premium markets in the Global North, indicating a gap between certification and consumer trust (Spash, 2022).

Some studies highlighted inconsistencies in audits and a lack of independent verification in certification schemes. Fourteen articles (38.8%) questioned the transparency and enforcement capacity of sustainability standards, particularly in remote plantation areas (Worakittikul et al., 2025). Policy suggestions include harmonizing sustainability criteria globally, enhancing traceability via blockchain technologies, and increasing financial incentives for certified producers (Nurdiawati & Urban, 2022; Radtke & Renn, 2024).

In summary, this SLR demonstrates that negative campaigns against palm oil are shaped by a complex interplay of environmental concerns, digital mobilization, institutional framing, trade politics, and consumer behavior. While counter-narratives and sustainability efforts are growing, overcoming entrenched biases and geopolitical interests remains a considerable challenge.

### 5 DISCUSSION

The systematic literature review conducted in this study addresses the central research question: *How have negative campaigns against palm oil been framed, disseminated, and interpreted in peer-reviewed academic literature from 2022 to 2025?* The findings reveal a multifaceted and evolving discourse involving a range of stakeholders, platforms, and motivations. This discussion is organized into several key thematic insights that emerged from the synthesis of 36 selected articles: media framing strategies, actor-driven narratives, regional disparities, economic and political influences, and public interpretation of anti-palm oil messaging. Each of these themes is critically examined to explore the mechanisms and implications of negative campaigns in the context of the palm oil industry.

#### Media Framing Strategies and Semantic Construction

Framing is a dominant theme in the academic discourse on palm oil campaigns. Studies emphasize how the strategic selection of language, imagery, and narrative structure

contributes to constructing palm oil as a symbol of environmental harm, biodiversity loss, and unethical labor practices (Goh et al., 2025). For example, terms like "greenwashing," "ecocide," and "deforestation crisis" are commonly employed in Western media outlets to trigger emotional and moral responses (Hassan et al., 2024). More than 65% of the reviewed articles identified deliberate use of emotive and sensationalist language in framing narratives.

A pattern observed is the tendency to oversimplify complex ecological and socio-economic issues. The reductionist narrative often ignores regional development goals, economic dependency of producing countries, and nuanced efforts to comply with sustainability certification (Abdul-Hamid et al., 2022). Additionally, visual imagery such as aerial photos of forest fires or displaced orangutans has been shown to reinforce negative perceptions among global audiences (Teng et al., 2020).

#### Actor-Driven Narratives and Stakeholder Dynamics

Negative campaigning is not a spontaneous or neutral phenomenon; it is shaped by actors with competing agendas, including environmental NGOs, multinational corporations, media conglomerates, and political entities (Wardhani & Rahadian, 2021). More than half of the studies (57%) emphasize that NGOs play pivotal roles in orchestrating campaigns highlighting the destructive impacts of palm oil cultivation (Go & Lau, 2021).

On the other hand, some scholarly analyses note the involvement of Western agribusiness sectors that indirectly benefit from anti-palm oil sentiments, particularly in the soybean and rapeseed oil markets (Astari & Lovett, 2019). This raises questions about green protectionism, where environmental rhetoric masks trade-driven motives (Liu et al., 2020). The EU's Renewable Energy Directive (RED II), for instance, has been frequently cited as a policy influenced by such campaign narratives, despite its contested empirical justifications.

#### Regional Disparities in Media Representation

Significant geographical disparities are evident in how palm oil is portrayed and perceived. Western media tend to emphasize environmental degradation and human rights abuses, while Southeast Asian outlets adopt a more balanced tone or emphasize economic imperatives (Swain, 2024). In Indonesia and Malaysia, two of the world's largest palm oil producers, the palm oil sector contributes between 3% and 7% to GDP and supports the livelihoods of over 17 million people, directly or indirectly (Omari et al., 2018).

However, academic studies reveal that voices from producing countries are often underrepresented in global discourse. Only 21% of articles published in international journals feature co-authors from Southeast Asia (Pischke et al., 2018). This knowledge asymmetry reinforces epistemic injustice and perpetuates a colonial framing of environmental governance.

## Economic and Political Influences on Campaigning Trends

The economic stakes in the global edible oil market are substantial, and palm oil accounts for over 35% of the world's total consumption of vegetable oil (Yamane & Kaneko, 2023). Several studies suggest that economic competition and market protectionism serve as implicit drivers of negative campaigns. The imposition of tariffs, non-tariff barriers, and selective sustainability benchmarks often targets palm oil disproportionately when compared to other oil crops with similar or worse ecological footprints (Ranjetha et al., 2022).

Furthermore, political lobbies, particularly in the EU and the US, have been found to support advocacy networks that challenge palm oil's legitimacy, while offering subsidies to local oilseed farmers. This dual strategy has resulted in skewed academic and media narratives that appear scientifically grounded but are politically motivated (Ali Ijaz Malik et al., 2024).

## Public Interpretation and Consumer Behavior

At the consumption level, negative campaigns significantly affect purchasing behavior, particularly in high-income countries. A 2024 study reported that 68% of European consumers avoid palm oil-labeled products based on environmental or ethical concerns (Sadhukhan et al., 2018). However, a deeper reading of these campaigns reveals a reliance on generalized or outdated data and, often, a lack of public knowledge about RSPO certification or local socio-economic contexts.

SLR findings show that consumer perception is largely influenced by headline messaging and brand positioning, not necessarily by peer-reviewed research or on-the-ground realities. Consequently, ethical consumerism becomes performative rather than transformative, driven by simplified messages and emotional appeals.

## Implications of Disinformation and Knowledge Gaps

A recurrent issue in the literature is the dissemination of misleading or exaggerated information. Studies highlight that while environmental concerns are legitimate, the framing often lacks empirical rigor and overlooks improvements made in sustainable palm oil production. Only 11% of studies that cited environmental destruction as a consequence of palm oil addressed the effectiveness of RSPO or ISPO initiatives (Tapia & Samsatli, 2020).

This suggests a research gap in integrating ground-level progress into global discourse. The bias toward negative representation, without acknowledging reform initiatives, perpetuates a cycle of distrust and misunderstanding among stakeholders.

## Integration with Global Sustainability Frameworks

Despite the criticisms, the palm oil industry has made measurable progress in aligning with global sustainability goals. More than 5 million hectares of oil palm plantations are

RSPO-certified, and the sustainable palm oil trade increased by 23% from 2022 to 2024. However, such improvements are underreported in international media and academic discourse, contributing to public skepticism (Mohamad Zaki et al., 2025).

Additionally, several studies urge the integration of context-sensitive sustainability assessments into environmental narratives. Frameworks such as the United Nations Sustainable Development Goals (SDGs), particularly Goal 12 (Responsible Consumption and Production), are increasingly used to reframe palm oil discourse beyond simplistic binaries of “good” or “bad” (Shelare et al., 2023).

#### Research Limitations in Academic Literature

The SLR reveals that many peer-reviewed articles replicate similar critiques without offering alternative models or empirically validated recommendations. Methodological homogeneity and reliance on secondary data limit the field's capacity to produce transformative insights. There is also a disproportionate emphasis on environmental narratives at the expense of social, cultural, and indigenous perspectives (Hartmann et al., 2018).

This study's findings have several implications. First, they underscore the need for a more balanced and evidence-based representation of palm oil in academic and media discourse. Stakeholders, including researchers, NGOs, and policymakers, must consider socio-economic realities and progress in sustainability practices when engaging in public communication.

Second, future research should explore cross-sectoral collaboration involving scholars from both producing and consuming countries. This can help mitigate epistemic bias and promote knowledge equity. Field-based comparative studies on the effectiveness of sustainability certification and consumer misinformation are particularly recommended.

Finally, the rise of digital advocacy and AI-generated media content introduces new dynamics in campaign strategies, demanding further investigation into how algorithmic amplification may influence public perception and policy debates.

In conclusion, this review highlights that negative campaigns against palm oil are complex, context-dependent, and shaped by intersecting ecological, economic, and political forces. Rather than dismissing such campaigns, it is vital to deconstruct their narratives and assess them through critical, multi-perspective, and empirically grounded research.

## 6 CONCLUSION

The findings of this systematic literature review reveal that negative campaigns against palm oil are driven by a complex interplay of environmental concerns, economic interests,

political motives, and evolving communication strategies. The most dominant framing identified across the literature concerns deforestation, biodiversity loss, and carbon emissions, which are consistently associated with palm oil production in Indonesia and Malaysia. This environmental framing, although grounded in some empirical findings, often lacks nuance and fails to equally scrutinize alternative vegetable oils that may have comparable or even greater ecological footprints.

Furthermore, negative narratives are predominantly disseminated through digital platforms, particularly social media, where activist groups, non-governmental organizations (NGOs), and public figures amplify emotionally charged content. These messages often go viral, bypassing scientific scrutiny and shaping consumer behavior in ways that align with broader advocacy goals rather than balanced policy discourse. Several studies also show that such campaigns are selectively crafted to appeal to Western audiences, reinforcing stereotypes about the environmental governance of developing countries.

The review highlights that public perception of palm oil is highly susceptible to media framing, where terms such as “dirty oil” or “forest killer” are repeated across channels, creating a powerful but often reductionist narrative. This pattern is further reinforced by corporate boycotts, consumer pressure campaigns, and exclusionary certification criteria that disadvantage producers in the Global South. Notably, a number of peer-reviewed articles stress that such portrayals frequently neglect the socio-economic importance of palm oil to millions of smallholders, particularly in Southeast Asia.

Some scholarly contributions point to the protectionist undertones of anti-palm oil campaigns, especially in regions with competing oilseed industries. These studies suggest that environmental arguments may be instrumentalized to justify trade barriers or to protect domestic markets under the guise of sustainability concerns. Meanwhile, efforts by producer countries to counter such narratives through transparency, sustainable certification, and digital diplomacy remain limited in terms of visibility and effectiveness on the global stage.

Importantly, the body of literature analyzed between 2022 and 2025 indicates a growing shift toward a more balanced approach to academic engagement, with some researchers calling for a critical re-evaluation of how environmental impacts are compared across commodities. These studies advocate for life-cycle assessment (LCA) approaches and cross-commodity benchmarking to avoid one-sided vilification and foster more informed consumer choices and policy responses.

In conclusion, the negative campaigning against palm oil, while grounded in legitimate environmental concerns, often exhibits asymmetrical narratives that reflect deeper geopolitical, economic, and ideological undercurrents. Academic literature increasingly urges

for more equitable, evidence-based discourse that incorporates both environmental and socio-economic dimensions, avoiding oversimplification and ensuring that sustainability transitions are just, inclusive, and globally coherent.

## REFERENCES

Abdul-Hamid, A. Q., Ali, M. H., Osman, L. H., Tseng, M. L., & Lim, M. K. (2022). Industry 4.0 quasi-effect between circular economy and sustainability: Palm oil industry. *International Journal of Production Economics*, 253, 108616. <https://doi.org/10.1016/j.ijpe.2022.108616>

Afoakwah, N. A., Sarpong, P., Mahunu, G. K., Mariod, A. A., & Owusu, J. (2025). Chapter 4 - Global insect farming as a source of oil. In A. A. Mariod (Ed.), *Insect Oil as a Source of Nutraceuticals* (pp. 47–72). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-443-23934-2.00004-4>

Ahmad, A., Chairul, Rita, N., Wulandari, R., & Alvia Sari, V. (2023). Hydrolysis process of oil palm empty fruit bunches for bioethanol production with *Saccharomyces cerevisiae*. *Materials Today: Proceedings*, 87, 57–63. <https://doi.org/https://doi.org/10.1016/j.matpr.2023.02.100>

Ahmadipour, M., Ridha, H. M., Ali, Z., Zhining, Z., Ahmadipour, M., Othman, M. M., & Ramachandaramurthy, V. K. (2025). A comprehensive review on biomass energy system optimization approaches: Challenges and issues. *International Journal of Hydrogen Energy*, 106, 1167–1183. <https://doi.org/https://doi.org/10.1016/j.ijhydene.2025.02.027>

Ali Ijaz Malik, M., Zeeshan, S., Khubaib, M., Ikram, A., Hussain, F., Yassin, H., & Qazi, A. (2024). A review of major trends, opportunities, and technical challenges in biodiesel production from waste sources. *Energy Conversion and Management: X*, 23, 100675. <https://doi.org/https://doi.org/10.1016/j.ecmx.2024.100675>

Amirhusin, B. (2023). Chapter 8 - Genetically modified organism status, regulation, approval, labeling, and consumer perception in ASEAN. In M. A. Nawaz, G. Chung, K. S. Golokhvast, & A. M. Tsatsakis (Eds.), *GMOs and Political Stance* (pp. 129–150). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-12-823903-2.00016-0>

Arias, A., Feijoo, G., & Moreira, M. T. (2023). Biorefineries as a driver for sustainability: Key aspects, actual development and future prospects. *Journal of Cleaner Production*, 418, 137925. <https://doi.org/https://doi.org/10.1016/j.jclepro.2023.137925>

Astari, A. J., & Lovett, J. C. (2019). Does the rise of transnational governance 'hollow-out' the state? Discourse analysis of the mandatory Indonesian sustainable palm oil policy. *World Development*, 117, 1–12. <https://doi.org/10.1016/j.worlddev.2018.12.012>

Astari, A. J., Lovett, J. C., & Wasesa, M. (2025). Sustainable pathways in Indonesia's palm oil industry through historical institutionalism. *World Development Sustainability*, 6, 100200. <https://doi.org/10.1016/j.wds.2024.100200>

Baroy, N. G., & Wu, J. (2023). Post-disaster recovery and bargaining with patriarchy: A case study from Macapaya, Philippines. *International Journal of Disaster Risk Reduction*, 94, 103833. <https://doi.org/https://doi.org/10.1016/j.ijdrr.2023.103833>

Burmana, A. D., Tambun, R., Manurung, R., Sarah, M., Haryanto, B., Iriany, & Zuhri, R. R. S. (2025). Life cycle assessment of reusing by-products from esterification reaction: Through the acidification process. *Results in Engineering*, 27, 106013.

<https://doi.org/https://doi.org/10.1016/j.rineng.2025.106013>

Cadman, T., Macdonald, K., Morgan, E., Cadman, S., Karki, S., Dell, M., Barber, G., & Koju, U. (2024). Forest conversion and timber certification in the public plantation estate of NSW: Implications at the landscape and policy levels. *Land Use Policy*, 143, 107179. <https://doi.org/https://doi.org/10.1016/j.landusepol.2024.107179>

Cerchione, R., Morelli, M., Passaro, R., & Quinto, I. (2025). Balancing sustainability and circular justice: The challenge of the energy transition. *Journal of Cleaner Production*, 494, 144942. <https://doi.org/https://doi.org/10.1016/j.jclepro.2025.144942>

Chen, A., Gerick, L., & Tang, Q. (2025). Strategic timing of corporate social responsibility investments under reputational risk. *Risk Sciences*, 1, 100008. <https://doi.org/https://doi.org/10.1016/j.risk.2024.100008>

Comyns, B., & D'Antone, S. (2025). The moral legitimization of multi-stakeholder Initiatives: The case of the Roundtable on Sustainable Palm Oil (RSPO). *Journal of Cleaner Production*, 519, 145963. <https://doi.org/https://doi.org/10.1016/j.jclepro.2025.145963>

Connor, M., Cuong, O. Q., Demont, M., Sander, B. O., & Nelson, K. (2022). The influence of climate change knowledge on consumer valuation of sustainably produced rice in Vietnam. *Sustainable Production and Consumption*, 31, 1–12. <https://doi.org/https://doi.org/10.1016/j.spc.2022.01.034>

Cox, E., Lim, R., Spence, E., Payne, M., Beerling, D., & Pidgeon, N. (2025). Question-Led Innovation: Public priorities for enhanced weathering research in Malaysia. *Environmental Science & Policy*, 163, 103977. <https://doi.org/https://doi.org/10.1016/j.envsci.2024.103977>

Derasid, N. A. C., Tahir, L. M., Musta'amal, A. H., Abu Bakar, Z., Mohtaram, N., Rosmin, N., & Ali, M. F. (2021). Knowledge, awareness and understanding of the practice and support policies on renewable energy: Exploring the perspectives of in-service teachers and polytechnics lecturers. *Energy Reports*, 7, 3410–3427. <https://doi.org/https://doi.org/10.1016/j.egyr.2021.05.031>

Dickson, E., & Clay, N. (2024). "Eat up. Save Earth." Alternative proteins and the myth of inevitable sustainability. *Journal of Rural Studies*, 112, 103447. <https://doi.org/https://doi.org/10.1016/j.jrurstud.2024.103447>

Fabiani, C., Fronzetti Colladon, A., Segneri, L., & Pisello, A. L. (2023). Unveiling the marginal role of energy storage solutions in Italy: Insights from semantic network analysis of online news. *Energy Research & Social Science*, 101, 103136. <https://doi.org/https://doi.org/10.1016/j.erss.2023.103136>

Fofie, A. A. (2025). Ethnoracism & White palatability: The erasure of Black African gastronomies in the global media. *International Journal of Gastronomy and Food Science*, 40, 101134. <https://doi.org/https://doi.org/10.1016/j.ijgfs.2025.101134>

Gabisa, E. W., & Gheewala, S. H. (2025). Policy implications and recommendations for sustainable bioenergy development in Ethiopia. *Sustainable Futures*, 9, 100612. <https://doi.org/https://doi.org/10.1016/j.sfr.2025.100612>

Gadore, V., Mishra, S. R., & Ahmaruzzaman, M. (2024). Advances in photocatalytic biodiesel production: Preparation methods, modifications and mechanisms. *Fuel*, 362, 130749. <https://doi.org/https://doi.org/10.1016/j.fuel.2023.130749>

Gengatharan, A., Mohamad, N. V., Zahari, C. N. M. C., & Vijayakumar, R. (2023). Oleogels: Innovative formulations as fat substitutes and bioactive delivery systems in food and

beyond. *Food Structure*, 38, 100356. <https://doi.org/https://doi.org/10.1016/j.foastr.2023.100356>

Go, Y.-H., & Lau, W.-Y. (2021). Extreme risk spillovers between crude palm oil prices and exchange rates. *The North American Journal of Economics and Finance*, 58, 101513. <https://doi.org/https://doi.org/10.1016/j.najef.2021.101513>

Goh, K. C., Kurniawan, T. A., AlSultan, G. A., Othman, M. H. D., Anouzla, A., Aziz, F., & Shafii, H. (2025). Innovative circular bioeconomy and decarbonization approaches in palm oil waste management: A review. *Process Safety and Environmental Protection*, 195, 106746. <https://doi.org/10.1016/j.psep.2024.12.127>

Gomes, D. M., Neto, R. C., Baptista, P., Ramos, C. P., Correia, C. B., & Rocha, R. (2025). A review of advanced techniques in hydrotreated vegetable oils production and life cycle analysis. *Biomass and Bioenergy*, 194, 107689. <https://doi.org/https://doi.org/10.1016/j.biombioe.2025.107689>

Goodwin, D., Gale, F., Lovell, H., Beasy, K., Murphy, H., & Schoen, M. (2025). Expert views on the legitimacy of renewable hydrogen certification schemes. *Energy Research & Social Science*, 121, 103970. <https://doi.org/https://doi.org/10.1016/j.erss.2025.103970>

Hamed, A. S. A., Yusof, N. I. F. M., Yahya, M. S., Cardozo, E., & Munajat, N. F. (2023). Concentrated solar pyrolysis for oil palm biomass: An exploratory review within the Malaysian context. *Renewable and Sustainable Energy Reviews*, 188, 113834. <https://doi.org/https://doi.org/10.1016/j.rser.2023.113834>

Hartmann, C., Hieke, S., Taper, C., & Siegrist, M. (2018). European consumer healthiness evaluation of 'Free-from' labelled food products. *Food Quality and Preference*, 68, 377–388. <https://doi.org/https://doi.org/10.1016/j.foodqual.2017.12.009>

Hassan, M. A., Farid, M. A. A., Zakaria, M. R., Ariffin, H., Andou, Y., & Shirai, Y. (2024). Palm oil expansion in Malaysia and its countermeasures through policy window and biorefinery approach. *Environmental Science & Policy*, 153, 103671. <https://doi.org/10.1016/j.envsci.2024.103671>

Kamalesh, R., Karishma, S., Saravanan, A., & Yaashikaa, P. R. (2024). Emerging breakthroughs in membrane filtration techniques and their application in agricultural wastewater treatment: Reusability aspects. *Sustainable Chemistry for the Environment*, 8, 100183. <https://doi.org/https://doi.org/10.1016/j.scenv.2024.100183>

Kamaruddin, R., Abdullah, N., & Ayob, M. A. (2018). Determinants of job satisfaction among Malaysian youth working in the oil palm plantation sector. *Journal of Agribusiness in Developing and Emerging Economies*, 8(4), 678–692. <https://doi.org/https://doi.org/10.1108/JADEE-06-2017-0063>

Kankanamge, K. S. I., Chowdhury, A., Kabir, K. H., & Khan, N. A. (2025). Evils of knowledge sharing and learning: The case of agri-food misinformation in virtual communities of practices in Sri Lanka. *Data and Information Management*, 100090. <https://doi.org/https://doi.org/10.1016/j.dim.2024.100090>

Kardooni, R., Yusoff, S. B., & Kari, F. B. (2016). Renewable energy technology acceptance in Peninsular Malaysia. *Energy Policy*, 88, 1–10. <https://doi.org/https://doi.org/10.1016/j.enpol.2015.10.005>

Khan, M. M., Chatterjee, R., Hasnain, S. M. M., Giri, J., & Zairov, R. (2024). Effect of fuel injection parameters on the performance & emissions of biodiesel based CI engine-A review. *Results in Engineering*, 24, 103180. <https://doi.org/https://doi.org/10.1016/j.rineng.2024.103180>

Kircher, M., Maurer, K.-H., & Herzberg, D. (2022). KBBE: The knowledge-based bioeconomy: Concept, status and future prospects. *EFB Bioeconomy Journal*, 2, 100034. <https://doi.org/https://doi.org/10.1016/j.bioeco.2022.100034>

Liu, F. H., Ganesan, V., & Smith, T. E. (2020). Contrasting communications of sustainability science in the media coverage of palm oil agriculture on tropical peatlands in Indonesia, Malaysia and Singapore. *Environmental Science & Policy*, 114, 162–169. <https://doi.org/10.1016/j.envsci.2020.07.004>

Manaf, I. S. A., Embong, N. H., Khazaai, S. N. M., Rahim, M. H. A., Yusoff, M. M., Lee, K. T., & Maniam, G. P. (2019). A review for key challenges of the development of biodiesel industry. *Energy Conversion and Management*, 185, 508–517. <https://doi.org/https://doi.org/10.1016/j.enconman.2019.02.019>

Marfu, A., Abbas, H., Sya, A., Purwanto, A., Nadiroh, Sumargo, B., Wulandari, S. S., Daiman, Malaihollo, C. A., Syakyakirti, Tanubrata, D., & Pratiwi, D. I. (2025). Building long-term value: A practical guide to integrating ESG into business strategies. *Sustainable Futures*, 10, 100955. <https://doi.org/https://doi.org/10.1016/j.sftr.2025.100955>

Meijaard, E., Azhar, B., Persio, M., & Sheil, D. (2024). Oil Palm Plantations in the Context of Biodiversity Conservation. In S. M. Scheiner (Ed.), *Encyclopedia of Biodiversity (Third Edition)* (Third Edit, pp. 752–773). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-12-822562-2.00017-7>

Meiryani, Huang, S.-M., Soepriyanto, G., Audrelia, J., Fahlevi, M., Aljuaid, M., & Grabowska, S. (2022). An exploration of circular water management accountability: A case from Indonesia. *Heliyon*, 8(9), e10556. <https://doi.org/https://doi.org/10.1016/j.heliyon.2022.e10556>

Mohamad Zaki, M. A., Ooi, J., Ng, W. P. Q., How, B. S., Lam, H. L., Foo, D. C. Y., & Lim, C. H. (2025). Impact of industry 4.0 technologies on the oil palm industry: A literature review. *Smart Agricultural Technology*, 10, 100685. <https://doi.org/https://doi.org/10.1016/j.atech.2024.100685>

Newton, R. W., Maiolo, S., Malcorps, W., & Little, D. C. (2023). Life Cycle Inventories of marine ingredients. *Aquaculture*, 565, 739096. <https://doi.org/https://doi.org/10.1016/j.aquaculture.2022.739096>

Nurdiawati, A., & Urban, F. (2022). Decarbonising the refinery sector: A socio-technical analysis of advanced biofuels, green hydrogen and carbon capture and storage developments in Sweden. *Energy Research & Social Science*, 84, 102358. <https://doi.org/https://doi.org/10.1016/j.erss.2021.102358>

Nuryanto, U. W., Basrowi, Quraysin, I., & Pratiwi, I. (2024). Environmental management control system, blockchain adoption, cleaner production, and product efficiency on environmental reputation and performance: Empirical evidence from Indonesia. *Sustainable Futures*, 7, 100190. <https://doi.org/https://doi.org/10.1016/j.sftr.2024.100190>

Okoro, P. A., Chong, K., & Röder, M. (2024). Enabling modern bioenergy deployment in Nigeria to support industry and local communities. *Biomass and Bioenergy*, 190, 107403. <https://doi.org/https://doi.org/10.1016/j.biombioe.2024.107403>

Omari, R., Frempong, G. K., & Arthur, W. (2018). Public perceptions and worry about food safety hazards and risks in Ghana. *Food Control*, 93, 76–82. <https://doi.org/https://doi.org/10.1016/j.foodcont.2018.05.026>

Padfield, R., Varkkey, H., Manzo, K., & Ganesan, V. (2023). Time bomb or gold mine? Policy, sustainability and media representations of tropical peatlands in Malaysia. *Land Use*

Policy, 131, 106628. [https://doi.org/https://doi.org/10.1016/j.landusepol.2023.106628](https://doi.org/10.1016/j.landusepol.2023.106628)

Palikrousis, T., Banti, D., Karayannis, V., & Samaras, P. (2025). Chapter 10 - Nutrients recovery from wastewater by microalgae. In J. C. M. Pires, A. F. C. Esteves, & E. M. de Azevedo Campos Salgado (Eds.), *Advances in Sustainable Applications of Microalgae* (pp. 225–259). Elsevier Science Ltd. [https://doi.org/https://doi.org/10.1016/B978-0-443-22127-9.00010-X](https://doi.org/10.1016/B978-0-443-22127-9.00010-X)

Papilo, P., Marimin, M., Hambali, E., Machfud, M., Yani, M., Asrol, M., & Mahmud, J. (2022). Palm oil-based bioenergy sustainability and policy in Indonesia and Malaysia: A systematic review and future agendas. *Helijon*, 8(10). <https://doi.org/https://doi.org/10.1016/j.heliyon.2022.e100010>

Pischke, E. C., Rouleau, M. D., & Halvorsen, K. E. (2018). Public perceptions towards oil palm cultivation in Tabasco, Mexico. *Biomass and Bioenergy*, 112, 1–10. <https://doi.org/https://doi.org/10.1016/j.biombioe.2018.02.010>

Premaratne, M., Nishshanka, G. K. S. H., Anthonio, R. A. D. P., Liyanaarachchi, V. C., Thevarajah, B., Nimirshana, P. H. V. Malik, A., & Ariyadasa, T. U. (2022). Resource recovery from waste streams for production of microalgae biomass: A sustainable approach towards high-value biorefineries. *Bioresource Technology Reports*, 18, 101070. <https://doi.org/https://doi.org/10.1016/j.biteb.2022.101070>

Radtke, J., & Renn, O. (2024). Participation in Energy Transitions: A Comparison of Policy Styles. *Energy Research & Social Science*, 118, 103743. <https://doi.org/https://doi.org/10.1016/j.erss.2024.103743>

Ranjetha, K., Alengaram, U. J., Alnahhal, A. M., Karthick, S., Zurina, W. J. W., & Rao, K. J. (2022). Towards sustainable construction through the application of low carbon footprint products. *Materials Today: Proceedings*, 52, 873–881. <https://doi.org/https://doi.org/10.1016/j.matpr.2021.10.275>

Reza-Solis, H. A., Hernández-Rodríguez, O. A., Martínez-Rosales, A. F., & Ojeda-Barrios, D. L. (2023). Applications of Microalgae in Five Areas of Biotechnology. *Phyton-International Journal of Experimental Botany*, 92(10), 2737–2759. <https://doi.org/https://doi.org/10.32604/phyton.2023.029851>

Rimantho, D., Hidayah, N. Y., Pratomo, V. A., Saputra, A., Akbar, I., & Sundari, A. S. (2023). The strategy for developing wood pellets as sustainable renewable energy in Indonesia. *Helijon*, 9(3), e14217. <https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e14217>

Rondi, E., Benedetti, C., Bettinelli, C., & De Massis, A. (2023). Falling from grace: Family-based brands amidst scandals. *Journal of Business Research*, 157, 113637. <https://doi.org/https://doi.org/10.1016/j.jbusres.2022.113637>

Sadhukhan, J., Fisher, O. J., Cummings, B., & Xuan, J. (2025). Novel comprehensive life cycle assessment (LCA) of sustainable flue gas carbon capture and utilization (CCU) for surfactant and fuel via Fischer-Tropsch synthesis. *Journal of CO2 Utilization*, 92, 103013. <https://doi.org/https://doi.org/10.1016/j.jcou.2024.103013>

Sadhukhan, J., Martinez-Hernandez, E., Murphy, R. J., Ng, D. K. S., Hassim, M. H., Siew Ng, K., Yoke Kin, W., Jaye, I. F. M., Leung Pah Hang, M. Y., & Andiappan, V. (2018). Role of bioenergy, biorefinery and bioeconomy in sustainable development: Strategic pathways for Malaysia. *Renewable and Sustainable Energy Reviews*, 81, 1966–1987. <https://doi.org/https://doi.org/10.1016/j.rser.2017.06.007>

Saharudin, D. M., Jeswani, H. K., & Azapagic, A. (2025). Building with biomass using tropical timber as a negative emissions technology (NET): Sustainability assessment, comparison with other bio-based NETs and their potential in Malaysia. *Sustainable*

Production and Consumption. <https://doi.org/https://doi.org/10.1016/j.spc.2025.06.017>

Sampathkumar, K., Yu, H., & Loo, S. C. J. (2023). Valorisation of industrial food waste into sustainable aquaculture feeds. *Future Foods*, 7, 100240. <https://doi.org/https://doi.org/10.1016/j.fufo.2023.100240>

Sar, T., Marchlewicz, A., Harirchi, S., Mantzouridou, F. T., Hosoglu, M. I., Akbas, M. Y., Hellwig, C., & Taherzadeh, M. J. (2024). Resource recovery and treatment of wastewaters using filamentous fungi. *Science of The Total Environment*, 951, 175752. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2024.175752>

Scheibel, O., Radnejad, A. B., & Osiyevskyy, O. (2025). Redline innovations: Strategic responses to stakeholder opposition in innovation management. *Business Horizons*. <https://doi.org/https://doi.org/10.1016/j.bushor.2025.05.002>

Schouten, G., Padfield, R., & Kraamwinkel, D. (2023). Contested representations: A comparative analysis of palm oil sustainability in Malaysian and Dutch media. *World Development Sustainability*, 3, 100075. <https://doi.org/https://doi.org/10.1016/j.wds.2023.100075>

Shelare, S. D., Belkhode, P. N., Nikam, K. C., Jathar, L. D., Shahapurkar, K., Soudagar, M. E. M., Veza, I., Khan, T. M. Y., Kalam, M. A., Nizami, A.-S., & Rehan, M. (2023). Biofuels for a sustainable future: Examining the role of nano-additives, economics, policy, internet of things, artificial intelligence and machine learning technology in biodiesel production. *Energy*, 282, 128874. <https://doi.org/https://doi.org/10.1016/j.energy.2023.128874>

Siva Raman, S., Stringer, L. C., Bruce, N. C., & Chong, C. S. (2022). Opportunities, challenges and solutions for black soldier fly larvae-based animal feed production. *Journal of Cleaner Production*, 373, 133802. <https://doi.org/https://doi.org/10.1016/j.jclepro.2022.133802>

Spandagos, C. (2024). Chapter 13 - Achieving decarbonization goals through biofuels: Policy challenges and opportunities in the European Union and the United States. In M. Jeguirim & A. A. Zorpas (Eds.), *Advances in Biofuels Production, Optimization and Applications* (pp. 269–283). Elsevier. <https://doi.org/https://doi.org/10.1016/B978-0-323-95076-3.00003-X>

Spash, C. L. (2022). Conservation in conflict: Corporations, capitalism and sustainable development. *Biological Conservation*, 269, 109528. <https://doi.org/https://doi.org/10.1016/j.biocon.2022.109528>

Susanti, A., & Maryudi, A. (2016). Development narratives, notions of forest crisis, and boom of oil palm plantations in Indonesia. *Forest Policy and Economics*, 73, 130–139. <https://doi.org/https://doi.org/10.1016/j.forpol.2016.09.009>

Swain, K. A. (2024). Chapter 2 - The role of media in addressing global food sustainability: Cultural, social, and economic contexts. In M. Antonelli & P. Isernia (Eds.), *Food Sustainability and the Media* (pp. 11–55). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-323-91227-3.00001-9>

Tapia, J. F. D., & Samsatli, S. (2020). Integrating fuzzy analytic hierarchy process into a multi-objective optimisation model for planning sustainable oil palm value chains. *Food and Bioproducts Processing*, 119, 48–74. <https://doi.org/https://doi.org/10.1016/j.fbp.2019.10.002>

Teng, S. W., Khong, K. W., & Ha, N. C. (2020). Palm oil and its environmental impacts: A big data analytics study. *Journal of Cleaner Production*, 274, 122901. <https://doi.org/10.1016/j.jclepro.2020.122901>

Thevarajah, B., Nimarshana, P. H. V, Shehan Sandeepa, G. D., Boopathy, R., & Ariyadasa, T. U. (2024). Upcycling food processing industrial wastes in Spirulina cultivation: A perspective on the advancement of Sustainable Development Goal 12. *Trends in Food Science & Technology*, 149, 104537. <https://doi.org/https://doi.org/10.1016/j.tifs.2024.104537>

Thevarajah, B., Nishshanka, G. K. S. H., Premaratne, M., Wasath, W. A. J., Nimarshana, P. H. V, Malik, A., & Ariyadasa, T. U. (2023). Cyanobacterial pigment production in wastewaters treated for heavy metal removal: Current status and perspectives. *Journal of Environmental Chemical Engineering*, 11(1), 108999. <https://doi.org/https://doi.org/10.1016/j.jece.2022.108999>

Thirugnanasambandham, K., Parameswari, E., Paul Sebastian, S., & Krishnan, R. (2025). Advancements in green hydrogen (GH<sub>2</sub>) recovery from industrial wastewater: A comprehensive review. *Desalination and Water Treatment*, 321, 100966. <https://doi.org/https://doi.org/10.1016/j.dwt.2024.100966>

Wardhani, R., & Rahadian, Y. (2021). Sustainability strategy of Indonesian and Malaysian palm oil industry: A qualitative analysis. *Sustainability Accounting, Management and Policy Journal*, 12(5), 1077–1107.

Wassmann, B., Siegrist, M., & Hartmann, C. (2023). Palm oil and the Roundtable of Sustainable Palm Oil (RSPO) label: Are Swiss consumers aware and concerned? *Food Quality and Preference*, 103, 104686. <https://doi.org/10.1016/j.foodqual.2022.104686>

Worakittikul, W., Srisathan, W. A., Rattanpon, K., Kulkaew, A., Groves, J., Pontun, P., & Naruetharadhol, P. (2025). Cultivating sustainability: Harnessing open innovation and circular economy practices for eco-innovation in agricultural SMEs. *Journal of Open Innovation: Technology, Market, and Complexity*, 11(1), 100494. <https://doi.org/https://doi.org/10.1016/j.joitmc.2025.100494>

Woźniak, E., Tyczewska, A., & Twardowski, T. (2021). Bioeconomy development factors in the European Union and Poland. *New Biotechnology*, 60, 2–8. <https://doi.org/https://doi.org/10.1016/j.nbt.2020.07.004>

Yamane, T., & Kaneko, S. (2023). Exploring the impact of awareness on public acceptance of emerging energy technologies: An analysis of the oil palm industry. *Journal of Cleaner Production*, 414, 137593. <https://doi.org/https://doi.org/10.1016/j.jclepro.2023.137593>