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Palm Oil in Southeast Asia: A Regional Bibliometric Analysis of Research Production, Collaboration, and Influence

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ABSTRACT

This study offers a regional bibliometric analysis of palm oil research in Southeast Asia from 2000 to 2025, integrating performance metrics with networks of co-authorship, co-occurrence, co-citation, and bibliographic coupling. The findings indicate a concentrated commodity-region nexus centered on "palm oil," "Southeast Asia," and "Indonesia," featuring significant clusters related to deforestation, peat emissions, and biodiversity. The overlay and density views demonstrate a thematic transition from initial biofuel and commodities perspectives to those focused on climate, conservation, and land-use analysis. Country and affiliation networks indicate that internationally focused collaboration is mostly controlled by a limited number of brokers from the UK and US, along with Malaysian hubs, whilst intra-ASEAN connections are very sparse. Practical consequences involve reallocating financing towards social-institutional sectors (livelihoods, labor, finance, traceability) and establishing multi-national consortia to broaden cooperation. The paper presents a clear, replicable science-mapping methodology and conceptualizes palm-oil scholarship as an interconnected multiplex changing at varying rates. Limitations encompass database and linguistic biases, disambiguation inaccuracies, and sensitivity to parameters.

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1. INTRODUCTION

Palm oil is a significant agricultural commodity in the world economy, with Southeast Asia as its focal point. Indonesia and Malaysia collectively account for the predominant share of global production, a lthough Thailand, Papua New Guinea, the Philippines, Vietnam, Cambodia, and Laos engage in production, processing, commerce, and consumption. The industry supports the livelihoods of millions of smallholders in rural areas, affects national trade balances, and impacts regional diplomacy via standa rds and market access regulations. In their qu est for food security, industrialization, and poverty reduction, governments have identified palm oil as a catalyst for economic advancement through downstream refining, oleochemicals, and biodiesel, while simultaneously igniting contentious di scussions on land ownership, labor, biodiversity, and climate issues. Current market forecasts position Indonesia and Malaysia as central to supply; however, they caution that growth is decelerating due to lan

d constraints, replanting requirements, and sustainability challenges [1], [2], [3].

In the past twenty years, research on palm oil has significantly accelerated. Res earchers in agronomy, ecology, geography, development studies, supply-chain management, and political science have generated an extensive body of literature on yields and genetics, plantation expansion and deforestation dynamics, greenhouse gas accounting, smallholder inclusion, certification and governance, traceability, fin ance, consumer attitudes, and corporate ESG disclosures. The methods employed are var ied—remote sensing, spatial econometrics, im pact evaluations, life-cycle analysis, institutional ethnography, and text mining—rendering synthesis challenging for po licymakers requiring accessible evidence maps. Prominent science-mapping systems like VOSviewer and bibliometrix now establish transparent workflows across several fields [4], [5].

Bibliometric analysis provides a systematic method for constructing such a m ap. Bibliometrics systematically analyzes scholarly databases to quantify patterns of output (volume, growth rates, and disciplinary outlets), collaboration (co-authorship networks across countries, institutions, and sectors), and influence (citations, co-citation structures, and seminal works). In contrast to narrative reviews, a regional bibliometric analysis provides a rep licable depiction of palm-oil research in Southeast Asia, indicating if research production is concentrated in a few nations, w hether intra-ASEAN collaboration is intensifying, and how North–South collaborations influence research objectives. Recent directives in management and social scientific domains formalize optimal metho dologies for study design, data cleansing, metrics, and visualization, so enhancing the dependability of these syntheses [6].

A regional perspective is crucial because to the many interconnections within Southeast Asia's palm-oil systems, encompassing cross-border investments, migr ant labor, transboundary haze, national s tandards (ISPO, MSPO), and global voluntary initiatives (RSPO). A bibliometric analysis a cross Southeast Asia can assess the dominance of Indonesia–Malaysia dyads in co-authorship, evaluate the representation of Thailand's smallholder sector, and examine the integration of younger entrants in Indochina into knowledge networks. It can also investigate if high-impact publications ar e concentrated in ecology and remote sensing, while social dimensions—such as women, labor rights, land conflict resolution, and financial inclusion—remain marginal. These processes occur within developing governance frameworks, notably the enhancement of ISPO under Presidential Regulation No. 44/2020 and the RSPO standards review cycle [7], [8].

The importance of accurately constructing this evidence map is significant. Governments are enhancing land-use and jurisdictional initiatives; companies are subject to deforestation-free import regulations; investors are shifting towards nature-related disclosures; and civil society is insisting on measurable advancements in rights and conservation. If the generation of evidence is inconsistent between topics, loca tions, or languages, decision-makers may be influenced by incomplete signals. A comprehensive, region-specific bibliometric foundation can synchronize academic goals with policy requirements, uncover potential for South–South collaboration, and highlight underfunded research areas such as peatland restoration finance or sustainable income for smallholders. The European Unio n Regulation (EU) 2023/1115 concerning deforestation-free products emphasizes the necessity for strong, regionally based evidence to fulfill emerging market demands (European Commission, 2023).

Despite the swift expansion and diversification of palm oil studies, there has b een no current, comprehensive, and explicitly regional bibliometric synthesis that delineates the contributors to palm oil knowledge in Southeast Asia, their collaborative efforts, an d the works that influence discussions across several disciplines and policy areas. Current

reviews predominantly emphasize p articular themes (e.g., deforestation or ce rtification), individual countries, or limite d methodological frameworks, resulting in unresolved inquiries regarding regional collaboration density, interdisciplinary integration, the comparative impact of Global North versus Southeast Asian institutions, and the correspondence between research focal points and policy priorities. In the abse nce of a regional overview, stakeholders are deprived of a cohesive evidence foundation to direct financing, formulate capacity-building initiatives, or establish equitable research collaborations—deficiencies that stan dardized bibliometric methodologies can add ress [4], [5], [6].

This study, titled "Palm Oil in Southeast Asia: A Regional Bibliometric Analysis of Research Production, Collaboration, and Influence," seeks to create a clear and replicable representation of the academic landscape concerning palm oil in Southeast Asia. This study aims to: (1) quantify research output over time by c ountry, institution, discipline, and publication outlet; (2) analyze collaboration networks among authors, institutions, and countries—both within and outside Southeast Asia—to evaluate structure, density, and evolution; (3) assess scholarly impact through citation metrics, co-citation, and bibliographic coupling to identify seminal works, inte llectual clusters, and emerging themes; (4) investigate the distribution of research topics in relation to policy-relevant areas (e.g., deforestation, smallholder livelihoods, labor, traceability, finance, biofuels, and biodiversit y) and monitor changes over time; and (5) formulate actionable recommendations for research governance, including strategies to enhance regional collaboration, bridge dis ciplinary gaps, and align funding and capacity-building with under-explored priorities pertinent to sustainable palm-oil development in Southeast Asia [6]..

2. METHODS

The author performed a regional bibliometric analysis utilizing Scopus as the principal database, with the Web of Science Core Collection employed for v alidation and sensitivity assessments. The search strategy focused on records from 2000 to 2025 (data obtained in November 2025) utilizing the query: TITLE-ABS-KEY("palm oil" OR "oil palm" OR "Elaeis guineensis") AND (Indonesia OR Malaysia OR Thailand OR Singapore OR Brunei OR Philippines OR "Papua New Guinea" OR "Timor-Leste" OR Vietnam OR Cambodia OR Laos OR Myanmar OR "Southeast Asia"). Document categories were restricted to articles, reviews, and conference papers published in peer-reviewed journals; editorials, notes, errata, and non-scholarly materials were omitted. Regional relevance was designated if (a) at least one author affiliation was located in Southeast Asia or (b) the study setting or field site expressly mentioned a Southeast Asian locale in the title, abstract, or keywords. We exported comprehensive bibliographic metadata (authors, affiliations, titles, abstr acts, keywords, references, journal, year, citations, funding) in BibTeX/CSV format for analysis. All search phrases, PRISMA-style sc reening counts, and code will be made availa ble in an open repository to facilitate replication [6], [9].

Data processing and normalization were executed in R utilizing the bibliometrix package and its Biblioshiny interface. We e liminated duplicate records (DOI, title-fuzzy matching), standardized author names (initials harmonization, ORCID when availab le), consolidated institutions (ROR/GRID-assisted string matching), and harmonized nations (ISO-3166). Keyword fields were refined using stemming and thesaurus mapping (e.g., "RSPO" ↔ "Roundtable on Sustainable Palm Oil"; versions of "ISPO/MSPO"; "deforestation-free regulation" ↔ "EUDR"). We calculated production and impact metrics, including annual output, total citations (TC), citations per document (CPD), h-index/g-index at the author, institution, and nation levels, journal outlets, and funding acknowledgments. To guarantee robustness, we conducted three

sensitivity analyses: (1) a query variant su bstituting/merging “palm oil” with “oil palm” and omitting false positives (e.g., “palm kernel shells” in non-contextual engineering lacking sectoral relevance); (2) regional attribution based on affiliation-only versus study-site-only criteria; and (3) a language filter (all languages compared to English-only). We recorded every step and created a PRISMA flow diagram [5], [9].

Science-mapping analyses integrated performance analysis with network analysis. We developed co-authorship networks (comprising authors, institutions, and countries), keyword co-occurrence maps (including author keywords and index terms), co-citation networks (encompassing refere nces and journals), and bibliographic coupling (including documents and journals). Temporal dynamics were evaluated via three sub-periods (2000–2009; 2010–2016; 2017–2025) to monitor subject emergence and the evolution of collaboration. Community discovery using modularity optimization; node influence was evaluated through fractional counting, field-normalized citations, and PageRank inside the citation net work. The topic framework was encapsulated using strategic diagrams (centrality–density) and thematic evolution graphs. VOSviewer was employed for layout and density maps, while bibliometrix was utilized for indicators and thematic analyses; Gephi was applied for custom style when required [4], [5], [6], [10]. All parameters (minimum occurrence criteria, counting methodology, c lustering resolution) are documented in the Supplementary Materials to ensure transparency and reproducibility.

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3. RESULTS AND DISCUSSION

3.1 Network Visualization

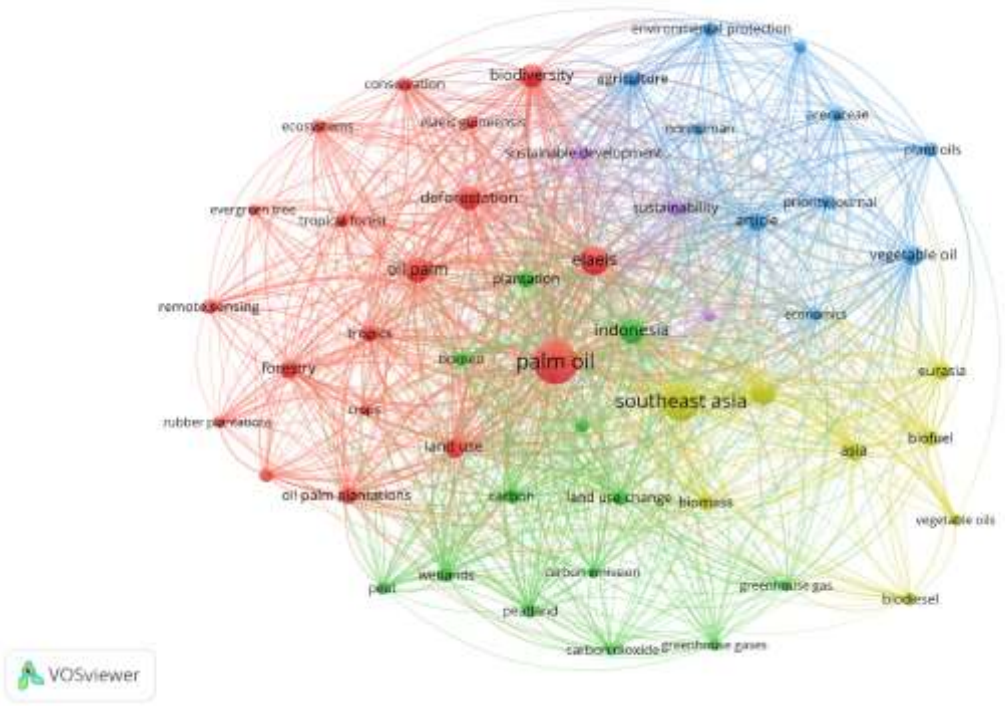

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

The network is dense and intricately interconnected, with "palm oil," "Southeast As ia," "oil palm," "Indonesia," and "Elaeis/Elaeis guineensis" serving as major nodes. Their substantial node widths and numerous edges signify elevated frequency and extensive co-

occurrence among subjects. This verifies that the literature is grounded in geographical contexts (Southeast Asia, Indonesia) and species/commodity identifiers (oil palm/El aeis), rather than being scattered among just methodological or individual country labels.

The red community groups utilize t erminology such as “deforestation,” “forestry,” “remote sensing,” “conservation,” “biodiversity,” “tropical forest,” “Borneo,” and “oil palm plantations.” This cluster r epresents the prevailing ecological and land-use change agenda: delineating growth, quan tifying deforestation, and evaluating biodiversity repercussions. The robust con nections to "ecosystems" and "conservation" indicate that a significant portion of the prominent work assesses landscape outcomes (forest conversion, habitat fragmentation), f requently employing geospatial techniques. The green community focuses on "land use change," "peat/peatland," "wetlands," "biomass," "carbon," "carbon emissions," and "carbon dioxide greenhouse gases." The proximity to the red cluster indicates conceptual commonality (conversion → emissions), whereas the green cluster is more focused on biogeochemical processes and mitigation strategies. The significance of peat and peatland indicates ongoing focus on Southeast Asia's peat ecosystems as sources of emissions and restoration objectives, connecting field measurements, life-cycle assessments, and climate policy implications.

On the right, the blue cluster encompasses "agriculture," "sustainability," "environmental protection," "plant oils/vegetable oil," and journal/document-type tags (e.g., "article," "priority journal"), signifying a cross-disciplinary publication layer where palm oil is positioned within broa der agri-food and sustainability discussions. The yellow cluster encompasses "biofuel," "biodiesel," "vegetable oils," "Asia/Eurasia," and "economics," indicating connections within the energy market and policy dialogues about fuel mandates and trade. Collectively, these clusters illustrate the progression of palm oil research from ecological baselines to the domains of economic, energy, and sustainable governanc e.

The connections between "Southeast Asia/Indonesia" and phrases related to carbon and deforestation underscore the region's significance in global climate and biodiversity discussions. The apparent methodological bias favoring land-change and carbon accounting (remote sensing, peat) indicates robust foundations in natural sciences and geospatial analysis. In contrast, labor, women, smallholder livelihoods, finance/tra ceability, and social safeguards are either weakly represented or entirely absent as significant nodes, indicating their under-representation in high-frequency terms. This pattern identifies prospects for future endea vors: merging social-institutional perspectives with the established ecological/carbon frameworks; broadening fo cus beyond Indonesia–Borneo to additional regions; and connecting energy/biofuel policy to tangible benefits for communities and supply-chain governance..

3.2 Overlay Visualization

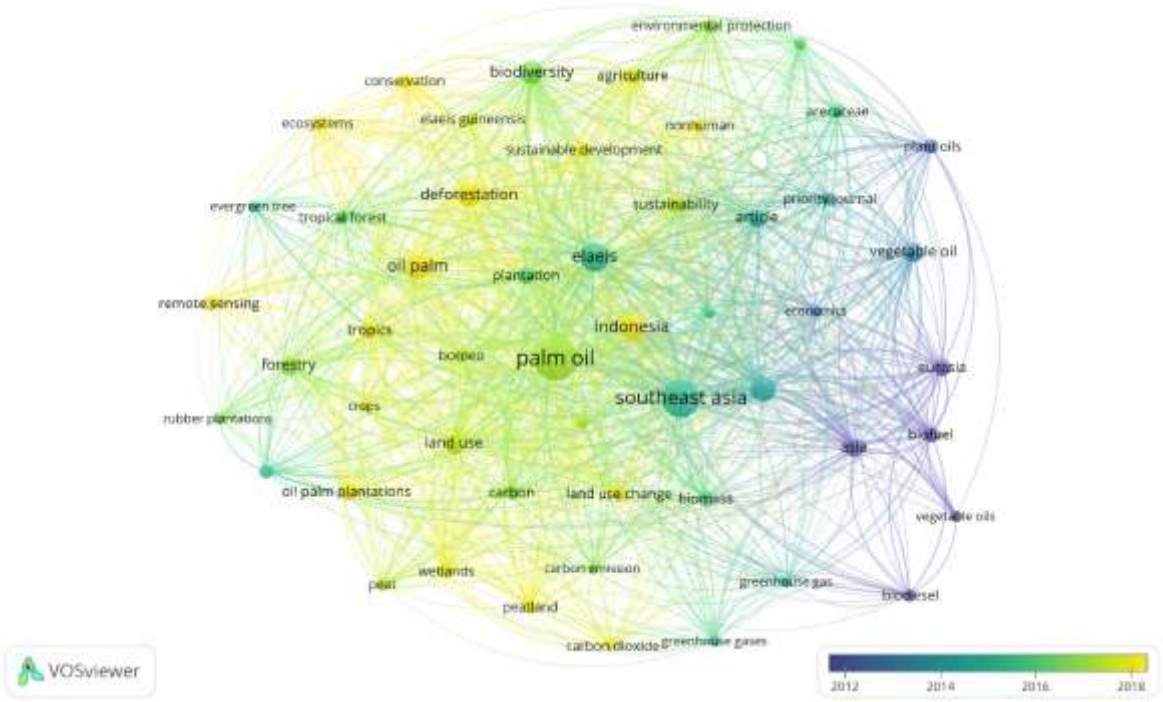

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2025

The nodes on the right edge—" biofuel," "biodiesel," "vegetable oils," "Asia/Eurasia," "economics"—exhibit a blue-purple hue, indicating a prior focus (≈2012–2014) on energy policy, commodity framing, and trade. This suggests that the discourse surrounding palm oil initially capitalized on biofuel regulations and price fluctuations. Conversely, the central-left sector (e.g., "land use change," "carbon," "greenhouse gas," "biomass," "peatland") exhibits a green trend, indicating a mid-period shift (≈2014–2016) t owards emissions accounting and land-use science in response to increased climate significance.

The most intense hues (yellow) are concentrated around "oil palm," "deforestation," "biodiversity," "conservation," "Elaeis/Elaeis guineensis," and centers such as "palm oil," "Southeast Asi a," and "Indonesia." This trend indicates recent research (about 2017–2018) focused on landscape impacts, species-level ecology, and conservation results. The focus has shifted from broad energy discussions to issues of deforestation, habitat preservation, and monitoring, with remote sensing and forestry emerging as facilitating methods/themes that developed after biofuels but before to the c urrent conservation movement. The key hubs (palm oil/Southeast Asia/Indonesia), characterized by a green-yellow hue, persist as vital anchors linking traditional energy and market sectors to contemporary deforestation, biodiversity, and peat initiatives. The overlay indicates that the present focus is on carbon-rich peat systems, biodiversity preservation, and high-resolution land-change analysis, whereas themes solely related to energy are relatively earlier in their development cycle. This presents researchers with chances to connect ecological outcomes with governance and livelihoods (e.g., living income, labor, traceability) in areas where nodes are less prominent—incorporating social measurements into the established fr ameworks of land change and emissions. The overlay colors indicate the average year of papers associated with each keyword, hence interpretations pertain to temporality rather than the significance of themes.

3.3 Citation Analysis

The subsequent extensively referenced studies constitute the intellectual foundation of palm-oil literature, encompassing biodiversity and deforestation effects, peatland conversion identified through remote sensing, biofuel and biore finery chemistry, wetland agronomy, and niche bioproducts. Together, they illustrate the evolution of early focus on energy markets and renewable feedstocks towards landscape alteration, conservation, and climate-relevant emissions, particularly in the peat and forest frontiers of Southeast Asia.

Table 1. Top Cited Research

Citations	Authors and year	Title
1104	Fitzherbert, E.B., Struebig, M.J., Morel, A., ... Donald, P.F., Phalan, B	How will oil palm expansion affect biodiversity?
912	Biermann, U., Bornscheuer, U., Meier, M.A.R., Metzger, J.O., Schäfer, H.J.	Oils and fats as renewable raw materials in chemistry
545	Vijay, V., Pimm, S.L., Jenkins, C.N., Smith, S.J.	The impacts of oil palm on recent deforestation and biodiversity loss
465	Koh, L.P., Miettinen, J., Liew, S.C., Ghazoul, J.	Remotely sensed evidence of tropical peatland conversion to oil palm
459	Danielsen, F., Beukema, H., Burgess, N.D., ... Struebig, M., Fitzherbert, E.B.	Biofuel plantations on forested lands: Double jeopardy for biodiversity and climate | Plantaciones de biocombustible en terrenos boscosos: Doble peligro para la biodiversidad y el clima
300	Verhoeven, J.T.A., Setter, T.L.	Agricultural use of wetlands: Opportunities and limitations
300	Chew, T.L., Bhatia, S.	Catalytic processes towards the production of biofuels in a palm oil and oil palm biomass-based biorefinery
297	Wilcove, D.S., Koh, L.P.	Addressing the threats to biodiversity from oil-palm agriculture
277	Meijaard, E., Brooks, T.M., Carlson, K.M., ... Szantoi, Z., Sheil, D.	The environmental impacts of palm oil in context
267	Pornsunthorntawee, O., Wongpanit, P., Chavadej, S.,	Structural and physicochemical characterization of crude biosurfactant produced by Pseudomonas aeruginosa SP4 isolated from petroleum-contaminated soil

Citations	Authors and year	Title
	Abe, M., Rujiravanit, R.	

Source: Scopus, 2025

This citation leaderboard displays two interconnected trajectories. A c onservation–land-use framework prevails: foundational syntheses and empirical studies (Fitzherbert; Vijay; Wilcove & Koh; Meijaard et al.) characterize oil-palm expansion as an issue of biodiversity loss and deforestation, w hile remote-sensing research on peat conversion [11] identifies high-emission land scapes and underscores their significance for climate policy. Secondly, a concurrent technological-bioeconomy stream [12], [13] identifies palm-derived lipids and biomass as renewable feedstocks, tempered by cautious analyses on the dual threats posed by biofuel plants to climate and biodiversity [14]. Wet land agronomy [15] provides the ecological parameters linking both domains, while the biosurfactant research [16] indicates a shift t owards value-added bioproducts.

Within the bibliometric framework of ours tudy, these works serve as intellectual hubs, fostering clusters related to defore station–biodiversity, peat/greenhouse gas e missions, and renewable ch emistry/biorefineries. Their significance el ucidates why our keyword maps are centered around terms such as deforestation, biodiv ersity, peatland, greenhouse gas, and biofuel. Future gaps indicated by the table—relatively fewer highly cited studies on labor, smallhol der livelihoods, finance/traceability, and social safeguards—highlight potential areas where ecological rigor can be integrated with socio-institutional analysis to enhance palm-oil governance in Southeast Asia.

3.4 Density Visualization

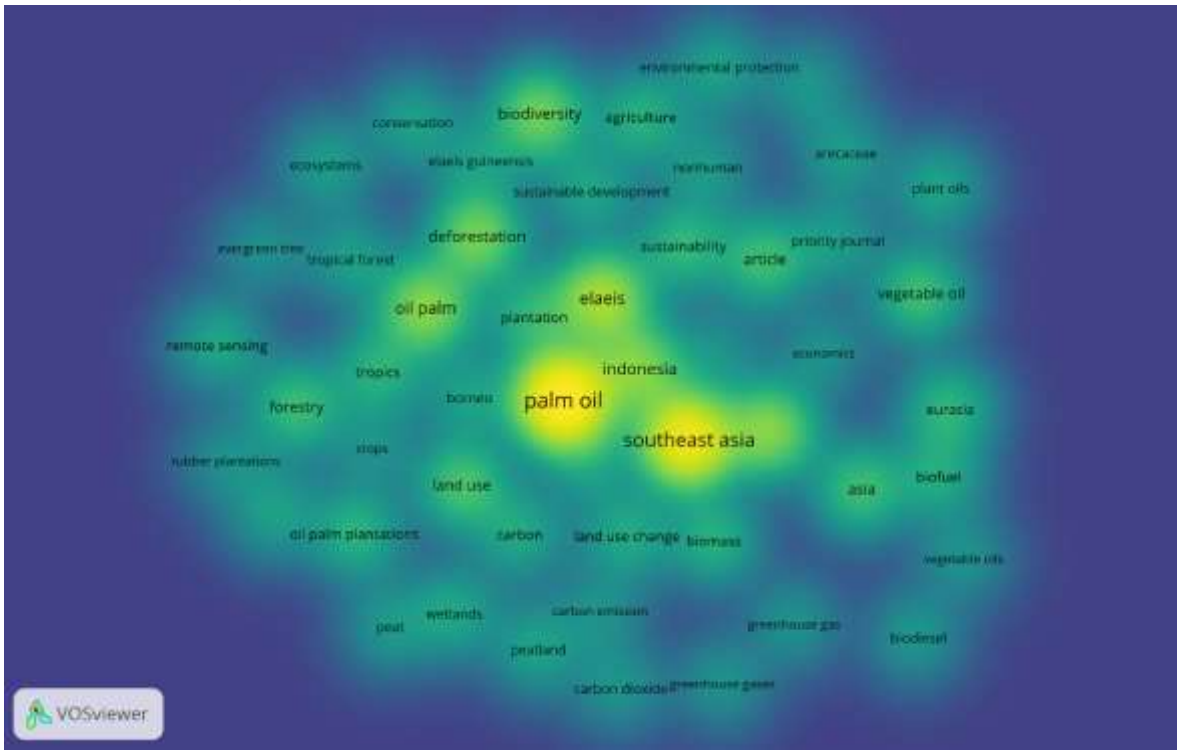

Figure 3. Density Visualization

Source: Data Analysis Result, 2025

The density map illustrates the highest concentration of "heat" surrounding palm oil, Southeast Asia, Indonesia, and spe cies keywords such as oil palm/Elaeis, sign

ifying a substantial co-occurrence frequency and centrality. Encircling this core are warm nodes associated with deforestation, biod iversity, land use, and plantations, indicating a persistent focus on landscape alteration and conservation results. Methodologically significant terms such as remote sensing and domain anchors like forestry/tropical forest manifest as mid-warm patches, indicating their widespread usage, albeit not as predominant as the commodity/region hubs. Collectively, these hotspots validate that the literature is organized around a commodity-region core, underpinned by robust ecological and land-change foundations.

Peripheral areas—biodiesel/biofuel, vegetable oils, economics, and greenhouse gas—exhibit lower average co-occurrence or reduced topical integration compared to the emphasis on biodiversity and deforestati on. Similarly, terminology associated with peat, peatland, wetlands, and carbon emis sions is present but less prevalent, suggesting that although carbon-rich landscapes are addressed, they do not constitute the focal point of discussion. The overarching trend indicates potential for a more cohesive integration of energy/market and carbon/peat elements with the prevailing land-use–biodi versity discourse, as well as for highlighting marginalized social aspects (e.g., livelihoods, labor, finance/traceability) that are not prominently featured as significant nodes in this context.

3.5 Co-Authorship Network

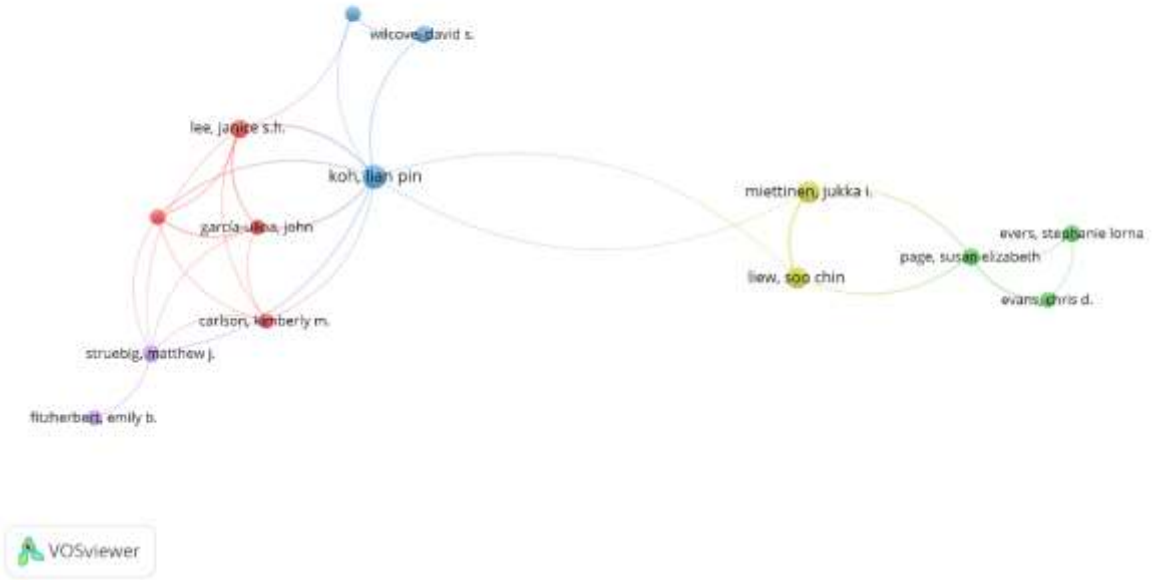

Figure 4. Author Visualization
Source: Data Analysis Result, 2025

The co-authorship map is structured around Koh, Lian Pin, serving as a bridge node that connects two somewhat isolated research communities. A biodiversity and land-use group (Janice S.H. Lee, John García-Ulloa, Kimberly M. Carlson, Matthew J. S truebig, Emily B. Fitzherbert, David S. Wilcove) constitutes a cohesive unit dedicated to conservation and landscape alteration. To the right, a peatland and remote-sensing group (Susan E. Page, Chris D. Evans, Stephanie L. Evers) collaborates with Liew, So o Chin, and Jukka I. Miettinen, highlighting a focus on peat hydrology, greenhouse gas

emissions, and conversion mapping. The s parse cross-links between clusters, excluding Koh's connections, indicate theme sp ecialization with minimal routine collaborat ion across the biodiversity and peat-carbon subfields. Koh demonstrates significant be tweenness centrality within the network, serving as the primary channel of knowledge among communities; enhancing sup plementary cross-cluster connections (e.g., Lee Page/Evers or Carlson Miettinen/Liew) would likely facilitate the integration of c onservation and peat-emissions evidence in the regional palm-oil literature.

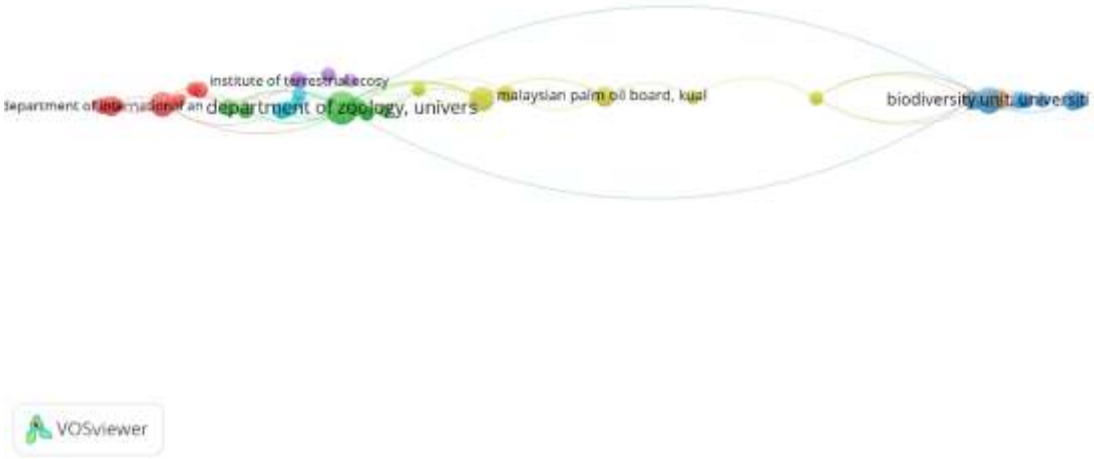

Figure 5. Affiliation Visualization
Source: Data Analysis Result, 2025

The affiliation network is a slender, chain-like structure anchored by a prominent node representing a high-output, international department of zoology on the left. This node connects through a limited number of intermediary research units, such as an institute of terrestrial ecology, to the Malaysian Palm Oil Board (MPOB) cluster at the center, and subsequently extends to a cluster of biodiversity units at a Malaysian uni versity on the right. The robust bidirectional connections surrounding MPOB signify its role as the primary conduit between internati onal conservation and ecology departments and Malaysian universities, whereas the limited interconnections among peripheral institutions imply specialized, project-ori ented relationships rather than a cohesive consortium. The pattern indicates a collaborative framework primarily centered around a few key hubs (one principal inte rnational department, MPOB, and a Mal aysian biodiversity unit), robust UK/Europe–Malaysia linkages, and minimal di versification among other ASEAN institution s. This suggests potential for expanding participation (e.g., involving Indonesian, Thai, and PNG research agencies) and establishing additional connections to reduce reliance on a singular institutional route.

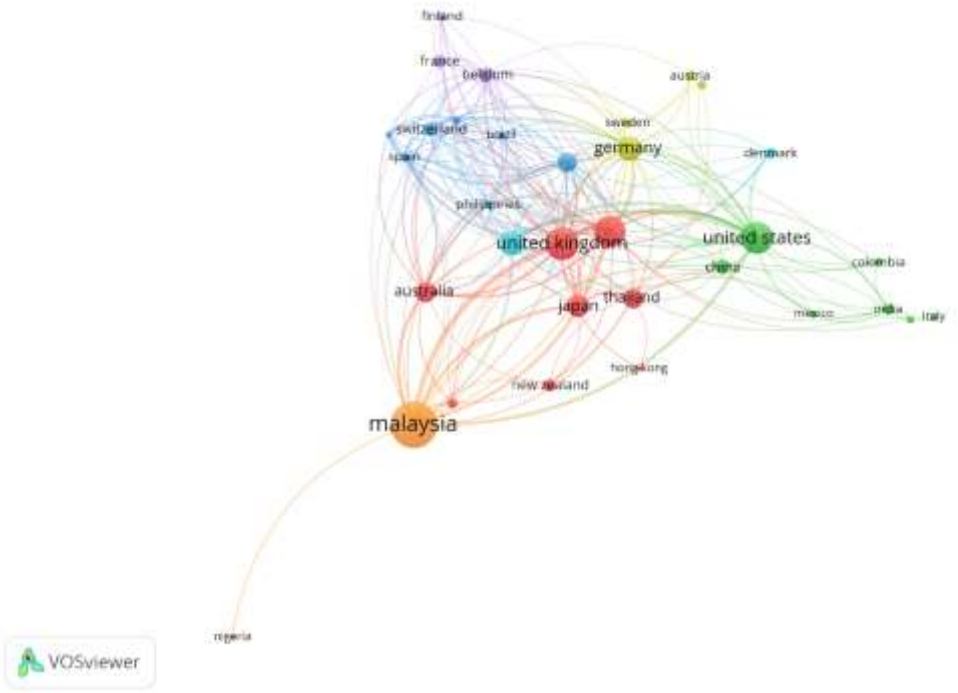

Figure 6. Country Visualization
Source: Data Analysis Result, 2025

The country co-authorship map i llustrates a hub-and-spoke framework centered on Malaysia (the largest node), closely connected to broker hubs in the United Kingdom and the United States, alongside se condary European hubs (Germany, Switze rland, France, Belgium) and Asia-Pacific pa rtners (Australia, Japan, Thailand, New Zealand, China). The dense, multi-hued bord ers surrounding Malaysia signify many cross-cluster initiatives with Anglosphere and European teams, whilst the elongated sing ular arc to Nigeria implies a concentrated bilateral connection based on common oil-palm legacies rather than extensive network integration. The UK/US nodes demonstrate significant brokerage, connecting otherwise distinct European and Asia-Pacific groups, while intra-ASEAN connections (e.g., Malaysia ↔ Thailand/Philippines) exist but are much weaker, and Indonesia is conspicuously underrepresented in this context despite its production supremacy. Collaboration is globalized yet externally fo cused, suggesting opportunities to (i) enhance intra-regional ASEAN co-authorships, (ii) develop South–South connections with India, China, Brazil, and Nigeria beyond singular channels, and (iii) diminish reliance on UK/US intermediaries by establishing direct Malaysi a–EU and Malaysia–East Asia research corridors.

Discussions

Practical Implications

This regional bibliometric map provides policymakers, donors, and industry platforms with a decision-ready perspective on areas of plentiful and sparse knowledge. Initially, financing can be redirected towards underexplored social issues—smallholder livelihoods and living income, labor and gender, land conflict resolution, and traceable finance—while maintaining established ecological initiatives including deforestation, peat, and biodiversity. Secondly, the collaboration graphs emphasize actionable partnership deficiencies: ASEAN research ministries and development partners can esta blish multi-country consortia that diminish reliance on select UK/US brokerage hubs, enh ance participation from Indonesia, Thailand, the Philippines, Viet Nam, PNG, and Lao PDR, and connect domestic agencies

with international centers for the transfer of methodologies (e.g., remote sensing, causal inference, LCA). Third, the findings on topic evolution and density can guide evidence-based regulation and standards (ISPO/MSPO/RSPO; EUDR compliance) by identifying subtopics that are adequately de veloped for policy implementation (peat emissions, land-use change) and those that necessitate piloting or focused data collection (social safeguards, independent mills, jurisdictional performance metrics). Ult imately, journals and university administrators can employ outlet and citation analytics to strategically enhance the positioning of research outputs—focusing on venues and co-authorship networks that optimize visibility for Southeast Asian study.

Theoretical Contributions

The research enhances the science-of-science of palm oil by consolidating pro duction, collaboration, and influence within a unified, geographically defined framework. It (i) posits palm-oil knowledge as an interdependent multiplex wherein ecological–biogeochemical cores (deforestat ion, peat carbon) and socio-institutional peripheries (labor, finance, governance) devel op at varying rates; (ii) elucidates how the b rokerage centrality of select countries, instituti ons, and authors influences agenda setting—clarifying the mechanisms through which Global North partners shape Southeast Asian research trajectories; and (iii) refines the topic life-cycle model for agri-commodity scholarship by illustrating a transition from bi ofuel/commodity framing to climate–biodiversity–monitoring, with a nascent recombination into sustainability governance. The study methodologically presents a clear, replicable bibliometric workflow that i ntegrates performance analysis with co-authorship, co-citation, bibliographic couplin g, thematic evolution, and strategic diagrams, providing a template for other regional-commodity systems (e.g., cocoa in West Afric a, soy in the Amazon).

Limitations

Various restrictions influence interpretation. Initially, database coverage and indexing bias (e.g., Scopus/WoS language and journal inclusion criteria) may result in an underrepresentation of local or policy-oriented outputs, grey literature, and non-English publications prevalent in Southeast Asia; this can distort perceived influence and collaborative centrality. Secondly, bibliometri cs get structure from metadata and citations, rather than from the quality of studies or causal validity; elevated citation counts may indicate dispute or accessibility instead of methodological rigor. Third, affiliation- and site-specific criteria for "regional relevance" may inaccurately categorize diaspora scholars or multi-national projects, and the disambi guation of author names and institutions—despite ORCID/ROR alignment—continues to be flawed. The fourth point is that network and thematic maps are contingent upon parameter selections (counting technique, threshold, clustering resolution); although we present sensitivity analyses, different configurations may produce more refined or broader communities. The design is descriptive rather than evaluative; it identifies gaps and imbalances without testing hypotheses regarding their origins. Subs equent mixed-methods research, including interviews, surveys of researchers, and fundi ng-flow analyses, is necessary to elucidate mechanisms and validate the policy relevance of the suggested priorities.

4. CONCLUSION

This regional bibliometric analysis delineates the organization of palm-oil stu dies in Southeast Asia, identifies collaborative networks, and highlights influential books that impact the discourse. The sector is cen tered around a commodity-region core (palm oil–Southeast Asia/Indonesia) supported by robust ecological foundations concerning def orestation, peat carbon, and biodiversity, although social-institutional issues—livelihoods, labor, finance, and traceability—are somewhat underdeveloped. Collaboration has been globalized but is facilitated by a lim ited number of brokerage centers, particularly

in the UK, US, and certain Malaysian in stitutions, resulting in insufficient intra-ASEAN co-authorships. Funders and ministri es can effectively reallocate expenditures towards social safeguards and establish multi-country consortia to diminish reliance on external intermediaries. The study conceptualizes palm-oil knowledge as a comp lex system with subfields that develop at varying rates. Subsequent study should ama lgamate qualitative data and funding-flow evidence to elucidate observed disparities and examine correlations between research den sity and policy implementation (e.g., ISPO/MSPO/RSPO, EUDR compliance)

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