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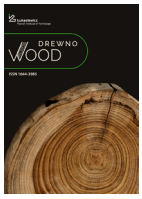

Entrepreneurship, Technology, Sustainable Practices in The Bioeconomic Transition of Southeast Asia: A Systematic Literature Review of Empirical Studies for Furniture Producer

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This research investigates the prospects of furniture producers in the context of the bioeconomic transition, focusing on Southeast Asia (Vietnam, Malaysia, and Indonesia). As the global economy increasingly shifts towards sustainable practices and technological advances, furniture producers must be resilient in facing these increasingly rapid and diverse changes. This paper presented a combination of a bibliometric analysis approach and a systematic literature review of empirical studies utilising the PRISMA analysis framework to synthesise existing knowledge on the dimensions encountered by furniture industries and their strategic responses during the bioeconomic transition. This bibliometric study analyses the evolving landscape of entrepreneurship, technology, and sustainable practices by furniture producers in the evolving global bioeconomic transition. A systematic literature review was conducted using the PRISMA analysis framework to examine the challenges encountered by Southeast Asian furniture industries, emphasising the importance of entrepreneurial aspects in the bioeconomic transition and the necessity for further research on political strategies. There is a knowledge gap in technology, particularly in the innovation of new materials from biological sources and technologies for commercialisation to enhance efficiency in the bioeconomic shift, with an emphasis on sustainable practices to promote sustainable consumption habits among manufacturers. The analysis points out the changing connection among entrepreneurship, technology, and sustainable practices in the furniture domain, emphasising the critical role of collaboration for ecological and economic resilience.

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Introduction

The furniture industry is one of the sectors that refers to bioeconomy activities that affect economic growth (Nicolas et. al., 2020). Capturing the furniture industry in ASEAN is one of understanding the bioeconomic transition in the regional context (Ratnasingam, 2003). This transition can be advanced by integrating circular bioeconomy principles with advanced industrial engineering and digital transformation, supported by collaborative and standardised policy frameworks (Yuniati et al., 2025; Qureshi et al., 2020). Examining the ASEAN furniture industry, particularly wood furniture, provides a useful lens for understanding the

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region's transition toward a forest-based and circular bioeconomy, because furniture production is embedded in forest-based value chains and is directly affected by bioeconomy and circularity strategies (Klitkou et al., 2023; Rinn et. al., 2024; Wang et al., 2022). For example, the timber-based industry in Indonesia has the potential to be a mainstay of the country's non-oil exports in the future, but it faces constraints such as inefficiencies, decreasing raw material supply, and changes in international demand (Rio and Stefan, 2019). However, the industry's contribution to the country's future development is limited due to weak linkages with local economies (Tommy, 1999). On the other hand, wood-based products in Indonesia have the potential to contribute to climate change mitigation by prolonging the storage of carbon in the anthroposphere (Yanto et. al., 2017). However, many wood-based products in Indonesia come from unsustainable sources due to widespread land-use changes (Rio and Stefan, 2022). The Malaysian wood-based industry, particularly the wooden furniture sector, has the potential to contribute significantly to national income (Zakaria et. al., 2014), and its socio-economic importance is non-negligible (Ratnasingam et. al., 2018). The furniture manufacturing sector in Malaysia has shown impressive growth, with organised industrial clusters and small and medium enterprises playing a crucial role in maintaining cost competitiveness and product diversity (Ratnasingam, 2011). The high turnover rate in the furniture retailing industry raises the question of whether employer branding can lead to employee engagement and retention (Raemah et. al., 2018). The efficiency of the wooden furniture industry in Malaysia varies, with many firms operating below the optimal level (Alias et. al., 2010). The Vietnamese government has released policies to stimulate the domestic industry, especially furniture production, and the development of timber value chains La et. al., 2021). The financial and economic performance of different timber value chains, including woodchip, non-FSC (Forest Stewardship Council certification system) furniture, and FSC-certified furniture, has been compared, with FSC-certified furniture contributing fundamentally to economic development (Blackburn et. al., 2020). Additionally, the barriers to implementing green innovation in the Vietnamese manufacturing sector have been identified, with financial capability constraints and lack of government support being the most decisive challenges (Yung-Fu et. al., 2022).

The bioeconomy emerges as a prospective remedy to confront the prevailing environmental crisis and realise sustainable development goals (Lilian, 2023). Positioned as a pivotal facet in this transformative journey is the shift towards a sustainable bioeconomy, marked by the substitution of fossil resources with renewable biogenic counterparts (Hinderer et al., 2021). This transition from one paradigm to another is not just a shift in technology but rather involves the restructuring of socio-technical systems, leading societies towards more sustainable paths (Losacker et al., 2023). A crucial determinant of economic development, the bioeconomic transition assumes particular significance in sectors engrossed in the production and processing of biological wealth (Wang et al., 2022). Navigating the evolutionary processes inherent in the bioeconomy necessitates an emphasis on knowledge dissemination, collaboration, and co-existence (Pyka et al., 2022). The key lessons gleaned for the design of bioeconomy underscore the importance of context specificity in crafting transformation pathways to address unique sustainability challenges and opportunities (Stark et al., 2022). Additionally, the social dimensions of bioeconomy promotion highlight the need for a just transition towards a bioeconomy (Coral, 2022). The imperative for the bioeconomy lies in its capacity to be sustainable, circular, and economically viable, all while remaining adaptable to the dynamic needs and circumstances of the global landscape (Aguilar and Twardowski, 2022).

Entrepreneurship in the bioeconomy encompasses a vast array of participation at various levels (Kuckertz et. al., 2020). At the micro level, it focuses on the individual endeavours of entrepreneurs within the bio-based sector, where they engage in various innovative initiatives to contribute to the growth and development of this sector (Hietala et al., 2019; Kokkonen and Ojanen, 2018). These endeavours at the micro level are vital as they create a foundation for the larger landscape of the bioeconomy (Viaggi, 2015). Transitioning to the meso level, the emphasis shifts towards a broader perspective that encompasses not only individual initiatives but also the overall entrepreneurial ecosystem, clusters, and innovation systems that collectively shape and support entrepreneurship in the bioeconomy (Pigford et al., 2018; Viaggi, 2015; Ylimartimo, 2018). At the meso level, the role of different stakeholders, including government agencies, research institutions, and industry associations, becomes crucial (Borge and Broring, 2020). These bodies cooperate to generate a facilitating context that stimulates start-ups, creativity, and partnership (Van Lancker et al., 2016; Ylimartimo, 2018). In addition, they contribute to the formation of clusters, which provide a platform for businesses, research organisations, and other relevant actors to engage in knowledge exchange, resource sharing, and market access (Kuckertz et. al., 2020). This collaborative approach and focus on ecosystem-building contribute to the growth and sustainability of the bio-based sector (Hayrinen et al., 2017). Moving to the macro level, the discussion expands to the critical role played by government vision and support in propelling the transition

towards a bio-based economy (Mukhtarov et al., 2017; Osmakova et al., 2018). Governments play a crucial role in setting the agenda, providing policy frameworks, and offering financial incentives to discourage entrepreneurship and innovation in the bioeconomy (Scordato et al., 2018). They also facilitate the establishment of research and development centres, innovation hubs, and technology transfer offices to support the commercialization of bio-based technologies (Johnson and Silveira, 2014).

Concurrently, technology plays a pivotal role in enabling and driving the transformation towards a bio-based economy (Hlangwani et al., 2023). The role and challenges of technology and innovation management within the process of moving towards bioeconomy (Golembiewski et. al., 2015). The shift towards bio-based materials is supported by a new and intricate knowledge base that has been developed because of advancements in technology (Christensen & Rosenbloom, 1995; Dosi et al., 2008). This wisdom base contains various fields, including biotechnology (Birch, 2009), materials science (Schnettler et al., 2013), and renewable energy (Coleman & Stanturf, 2006). Moreover, efforts are being directed towards facilitating cross-chain technology development (Golembiewski et. al., 2015). This involves integrating different technologies and value chains to ensure the efficient utilisation of biomass and maximise the potential for innovation and value creation (Mac Clay, 2022). The collaboration and knowledge exchange between different sectors, such as agriculture, forestry, and biotechnology, and cross-chain technology development aims to impede the commercialisation of bio-based products and services (Hassegawa et al., 2022a).

The bioeconomy must be guided by sustainable practices in the pursuit of entrepreneurship and technology development (D'Amico et. al., 2022). Responsible consumption entails making conscious choices to preserve physical health and minimise waste generation (Schutter et. al., 2019). The role of wood-based products in the circular bioeconomy suggests that initiatives promoting the use of wood-based products as alternatives to non-renewable materials can contribute to responsible consumption (Hassegawa et al., 2022b; Sikkema et al., 2017). Sustainable practices should be able to minimise Irresponsible production, which involves rejecting socio-environmentally unfriendly manufacturing processes (Jarosch et. al., 2020) and maximising the use of non-renewable resources (Kircher, 2022). Lastly, the promotion of autonomy and self-organisation ensures the regenerative capacity of social-ecological systems for supporting sustainable practices, allowing them to adapt and thrive in the face of changing circumstances. (Daniel et al., 2022; Schutter et al., 2019; Kaufmann et al. 2004).

Given all these changes impacting the global economic challenges, particularly international trade for furniture products. This research strives to accomplish a complete and thorough understanding of the bioeconomic transition that is unfolding in Southeast Asia. To accomplish this objective, the research employs a dual-focused approach that includes two primary goals. Firstly, the inquiry aspires to explore the scholarly contributions rendered by Furniture Manufacturers in the locale to the expansive bioeconomic transformation. These scholarly contributions, the examination also seeks to emphasise the considerable function they fulfil in advancing a sustainable bioeconomy. Secondly, the research seeks to analyse the pivotal role of Entrepreneurship, Technology, and Sustainable Practices in driving the bioeconomic transition within Southeast Asia. This analysis involves delving into the interplay between these Dimensions and examining how they collectively contribute to bioeconomic principles. Prisma Analysis and bibliometrics, including theme analysis, were carried out to scrutinise the scientific literature. The findings and discussion originating from the study offer valuable insights into potential areas that merit further scrutiny. It is crucial to note that this study endeavours to establish more comprehensive and universally applicable conclusions about the outcomes of this research endeavour. Furthermore, the forthcoming comparative review aims to offer a meticulous and thorough analysis, thereby facilitating an in-depth comparison that has the potential to engender novel theoretical perspectives and insights.

Research Methodology

1. Data Collection

Data was gathered through a comprehensive analysis to elucidate the determinants influencing the responses of furniture manufacturers to the transition towards bioeconomy. Our research underscores the significance of entrepreneurship, technological advancement, and sustainable methodologies within Southeast Asian nations (ASEAN). Although prior investigations have explored the obstacles encountered by furniture manufacturers amid the bioeconomic transition, there exists a deficiency of a conceptual framework that cohesively integrates entrepreneurship, technology, and sustainable practices. The objective of our manuscript is to synthesise the current literature, concentrating on the strategic challenges presented in the scholarly articles that are pertinent during the bioeconomic transition by furniture manufacturers.

The study conducted an advanced search in the Scopus and Web of Science databases, using keywords related to Furniture producers, entrepreneurship,

technology, and sustainable practices (see Fig. 1 for details). These papers were categorised based on the reviewed journal article type and affiliation from Indonesia, Vietnam, and Malaysia. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure the proper conduct and reporting of our research articles (Moher et al., 2009). The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure the proper conduct and reporting (Moher et al., 2009) of our research articles on entrepreneurship, technology, and sustainable practices in the bioeconomic transition of Southeast Asia. While PRISMA provides the core standard applied in this study, additional step-by-step methodological guidance for systematic reviews has been proposed in the literature, for example, for management research in general (e.g., Sauer and Seuring, 2023), and separate review paradigms have also been developed specifically for supply chain management research (e.g., Durach et al., 2017).

To create an illustrative map of the scientific domain of entrepreneurship, technology, and sustainable practices of furniture. The initial topic search string was composed of two parts. The first in the Scopus database focuses on Furniture producers using TITLE-ABS-KEY ((furniture) AND (enterpris* OR industr* OR producers) AND (entrepre* OR technology OR ((sustainable OR green) AND (practices OR practice)))). The total number of returned papers in all years from the query was 735 articles. Second, the topic search string was composed in the Web of Science Core Collection database: ((TS=(furniture) AND TS=(enterpris* OR industr* OR producers) AND (TS=(entrepre*) OR TS=(technology) OR TS=((sustainable OR green) AND (practices OR practice))))). The second result was 456. After isolating based on study aims and duplication screening, the total was 70 journal articles. The final number of records after the filtering process leaves only articles and reviews. After this step, a more detailed manual control of titles, keywords, and abstracts was performed independently by each author. After fine-tuning, 63 articles were analysed.

2. Bibliometric Maps

The present investigation employed a sophisticated software application known as VosViewer, which has been meticulously engineered to enhance the construction and graphical depiction of the research network on each literary work through bibliometric mapping (Van Eck and Waltman, 2017). Employing bibliometric analysis allows researchers to delve into extensive scientific publications with accuracy and depth, which assists in their orderly classification and arrangement. The examination of two distinct elements, specifically the affiliations associated with the countries of authors and the keywords attributed to these authors. To guarantee the highest level of precision in the analysis, we engage in the careful process of manually identifying and removing any instances of co-occurring author keywords. These identified keywords are subsequently

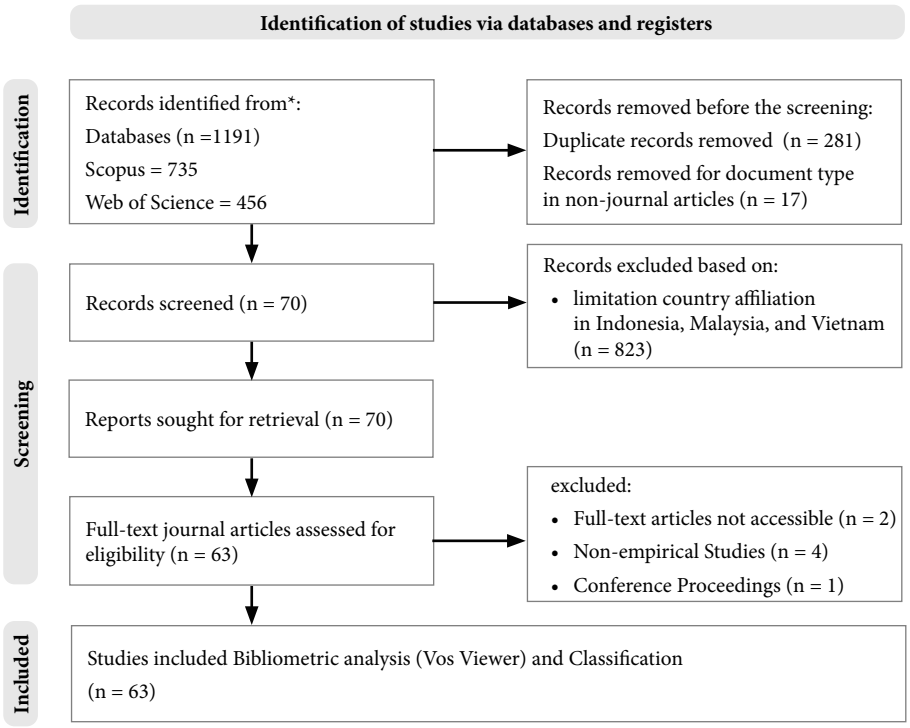


Fig. 1. PRISMA Diagram for Inclusion Articles

organised, categorised, and appropriately designated within the same classification, thereby effectively eliminating any occurrences of synonymous terms or related phrases. To achieve this, the study imposes a minimum threshold of 5 occurrences for each keyword. In overlay visualisation mode, the study attains a holistic perspective of the average publication year, the frequency of occurrences, and the strength of the interconnections among these keywords. Employing bibliometric analysis not only promotes the methodical arrangement of numerous scientific documents but also provides for more prudent and exhaustive scrutiny of the matter being examined.

3. The Classification Approach

The work of Abu et al. (2019) indicates that such assessments boost thorough examinations of elevated research and amalgamate insights on targeted themes. Moreover, they furnish a thorough examination of key state-of-the-art works. Lage Junior and Godinho Filho (2010) suggest that literature reviews should employ classification systems to elucidate and structure existing knowledge. This study modifies the classification and coding framework established by Jabbour (2013). This classification entailed a hybrid of numerical and alphabetical coding (Table 1). Each article could be assigned multiple codes per item. Classification 1 involved determining the national context within the studies, coded on a scale from A–C. Classification 2 pertained to the research methodology, coded on a scale from A–F. Classification 3 focused on the entrepreneurship factor (Kuckertz et al., 2020), coded from A–C. Classification 4 addressed the technology factor (Golembiewski et al., 2015) and was also coded on a scale from A–C. Classification 5 related to sustainable practices (Schutter et al., 2019) and was similarly coded from A–C. Classification 6 concerned the bioeconomy perspective (Pülzl et al., 2017) and was coded on a scale from A–C.

Results by issues

1. Bibliometrics Results

The trend of publication, which commenced in the year 2002 and has persistently escalated to the present day, demonstrates a mounting significance across diverse research domains (Fig. 2). The initial article, being the focus of our attention, sheds light on the burgeoning prominence accorded to the advancement of innovation and entrepreneurial ecosystems within the realm of furniture. Within this context, the inaugural article assumes the form of an in-depth case study that explores an entrepreneurial development program tailored specifically for furniture makers. It is worth noting that the surge in publications that present contrasting viewpoints and perspectives is most pronounced in the year 2018, reaching its pinnacle in 2023. Several influential journals play an important role in academic research; "Bioresources", which has published as many as 10 articles; "International Journal of Civil Engineering and Technology" with three articles, and "Economic Annals XXI", "Entrepreneurial Business and Economics Review", "International Journal of Scientific and Technology Research", "Management and Production Engineering Review", and "Quality Access to Success",

Table 1. The framework for classifying and coding the studies analysed

Code	Classification	A	B	C	D	E
1	Country	Indonesia	Malaysia	Vietnam		
2	Research Method	Quantitative	Qualitative	Mix Method	**Survey**	**Cases Study**
3	Entrepreneurship Factor	Entrepreneur Capability	Entrepreneurial Ecosystem	Political Vision		
4	Technological Factor	Developing a new or/ and complex knowledge for raw material	Facilitating cross-chain technology development	Commercializing		
5	Sustainable Practices Factor	Responsible consumption	Responsible production	Autonomy and self-organisation to safeguard		
6	Bioeconomy Visions	Biotechnology	Bioresources	Bioecology		

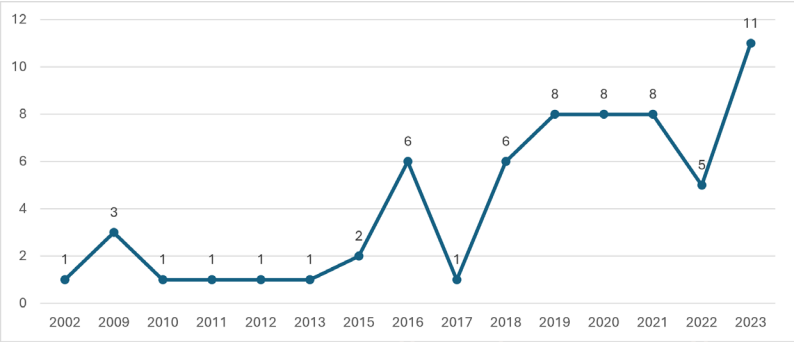


Fig. 2. Number of publications per year

each has two articles. This diverse range of journals demonstrates the importance of their contributions to different fields of study and highlights their impact on scientific discourse.

Co-citation analysis, a commonly employed bibliometric technique, entails investigating the co-citation patterns within publications (Ding et al., 2001). Through identifying and studying clusters of co-citation pairings, co-citation analysis offers insights into the conceptual framework, knowledge base, and collective heritage of scholarly research (Chen et al., 2010; Leung et al., 2017). At the journal level, the analysis of co-citations involves the identification of clusters based on colour. The first cluster carries great weight in the field of socio-economic studies, particularly in the areas of innovation, management, economics, and business. This cluster exhibits the highest concentration of scientific publications. Following this, the second cluster represents the dominance of bioscience, while the third cluster signifies the dominance of environmental studies. Notably, there exists a stronger relationship between the socio-economic and bioscience clusters. This association functions to clarify the objective of this inquiry, which is to proficiently administer biological assets and tackle ecological issues, thereby promoting a shift towards a more sustainable bioeconomic framework.

At the co-authorship level, it becomes apparent that certain authors play a significant role in influencing this research. The most influential author, Ratnasingam J., has amassed a total of 77 citations and a link strength of 738. It is noteworthy that this author is also associated with the first cluster, which is the most prominent one. The second most influential author, Wiklund J., has received 21 citations and a total link strength of 288. Lastly, the third cluster is associated with an influential author named Sarkis J., who has garnered 13 citations and a total link strength of 106.

The evaluation consists of six separate clusters, which are intended to shed light on the complex and varied relationships that persist among entrepreneurship, technological evolution, and sustainable approaches in the context of the three countries under consideration (Fig. 3). The first cluster, which is distinctly marked by the colour red, sheds light on the various performance factors deemed to be of utmost importance to entrepreneurs, particularly those who operate within small and medium-sized enterprises. In this regard, it becomes abundantly clear that Indonesia emerges as the country that exhibits the most profound level of involvement when considering this factor. The second cluster, which is denoted by the colour green, serves as a clear indication of the significant role that technology plays in the all-encompassing support that it provides for the development of the furniture industry. More specifically, it accomplishes this by taking into consideration a wide range of manufacturing processes. What becomes clear is that Malaysia takes centre stage as the country that exhibits the highest level of involvement when it comes to considering this technological factor. The third cluster, which is distinguished by the colour blue, serves to place a heavy emphasis on the importance of quality, both in terms of raw wood materials and the actual furniture products themselves, as an essential determining factor that ultimately leads to the improvement of overall performance. It becomes apparent that Vietnam is most closely associated with this cluster, thus indicating a clear tendency to consider the concept of quality in the conducted studies. The fourth cluster, which is denoted by the colour yellow, seeks to underscore the crucial importance that entrepreneurial orientation plays in the overall support and facilitation of innovation. It becomes clear that both Indonesia and Malaysia seem to exhibit a much higher level of consideration when it comes to this factor, as opposed to Vietnam, which tends to focus solely on innovation. Moving on to the fifth cluster, which is coloured purple, it becomes evident that this cluster serves to highlight the pivotal role that the green supply chain plays in the overall maintenance of the sustainability of raw material use. This is further backed by various regulations and policies that are put into place with the sole purpose of promoting these sustainable practices. It is evident that furniture manufacturers, regardless of their scale of operation, must

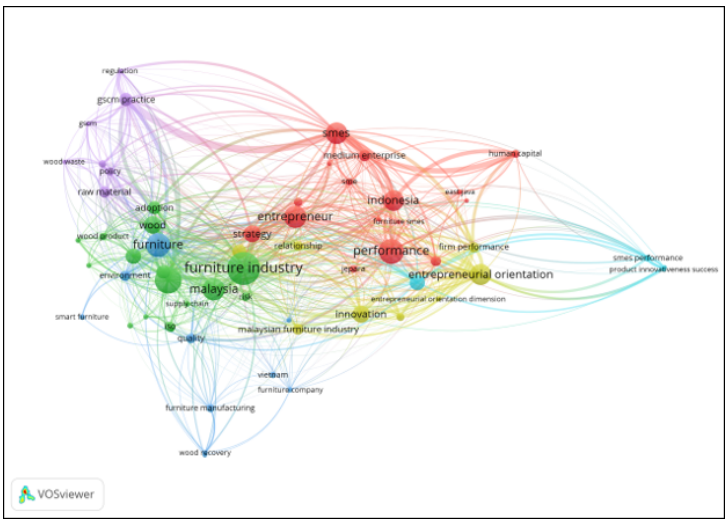


Fig. 3. Screenshot of the bibliometric map created based on terms

consider these sustainable practices in their operations, which can only be achieved through the implementation of the green supply chain. Finally, the sixth and final cluster is distinctly marked by the colour light blue. This cluster places an unwavering emphasis on the importance of considering the ever-changing dynamics of the market itself as a key factor that ultimately leads to the profitability of furniture businesses.

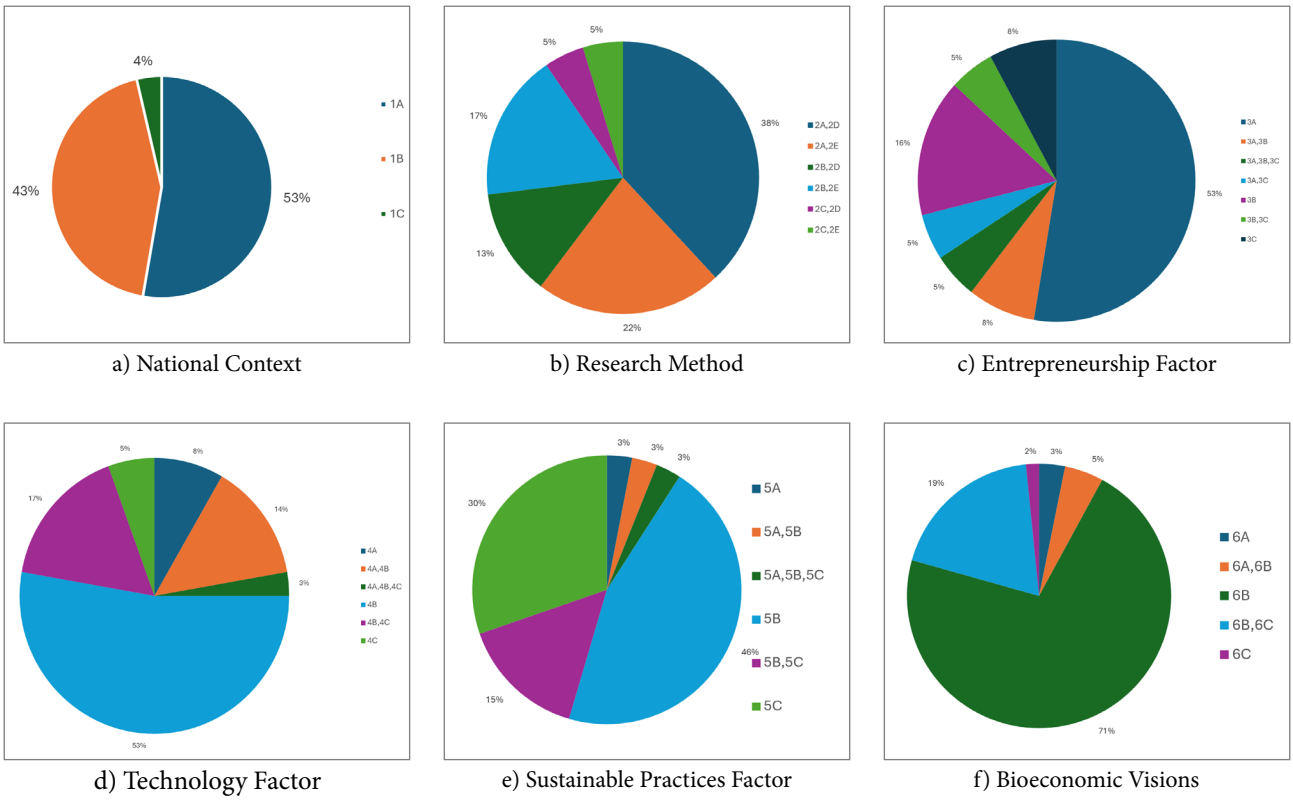
2. The Classifications Results

The considerable level of interest in research conducted on furniture manufacturers in Indonesia and Malaysia signifies a recognition of the significance of addressing sustainability within the wood industry. In Fig. 4, the truth that there have been 29 studies conducted in Indonesia and 24 studies in Malaysia suggests that both countries are undergoing a shift towards a bioeconomy, where the use of natural resources, including wood, is viewed as more sustainable. Nonetheless, there are significant variances in the focal points of these studies between the two countries. Despite the Indonesian context, these studies are not directly connected to the sustainable utilisation of natural resources but rather involve aspects like the sustainable management of forests, the environmentally friendly use of wood, and efforts to mitigate the adverse impact of the wood industry on the environment. In contrast, Malaysia only has two studies that delve into topics such as entrepreneurship, technology, and sustainable practices within the furniture industry. This discrepancy may suggest that Malaysia still has room to further advance its comprehension and implementation of sustainable practices within the industry.

The developmental trajectory of research in this area of study indicates a prevailing inclination towards the utilisation of quantitative methodologies, which make up a significant majority of 60% of the total studies conducted (Fig. 4). Following closely behind are qualitative approaches, which account for 30% of the research endeavours. Moreover, an additional 10% of the studies are allocated to the utilisation of Mixed Methods. Furthermore, when delving into the realm of empirical investigations, it becomes evident that survey methods emerge as the most widely employed, constituting a substantial 56% of the research endeavours. On the other hand, case study methodologies encompass a noteworthy 44% share, indicating their significance in the field.

The entrepreneurial factor is a topic that receives more attention than the entrepreneurship ecosystem or political vision concerning the growth and development of furniture producers (Fig. 4). Through this research, it becomes evident that a majority of 53% of the studies delve into entrepreneurial capabilities, while exploring the entrepreneurship ecosystem and political vision is relatively limited, even when considered together. This finding emphasises the importance of understanding entrepreneurial capabilities' dynamics and impact in driving the furniture industry forward. The advancement and success of furniture producers are heavily influenced by the pivotal role played by entrepreneurial capabilities.

The most influential technological factor identified among furniture producers is the emergence of cross-chain technology development, which represents 53% of the classified results (Fig. 4). In contrast, factors related to the development and complexity of raw materials account for only 17% of the overall influence. These findings suggest that the linkage between raw material development and complexity and furniture producers has not been extensively explored and established. Further investigation and establishment of the connection between the development and intricacy



a) National Context b) Research Method c) Entrepreneurship Factor

d) Technology Factor e) Sustainable Practices Factor f) Bioeconomic Visions

Fig. 4. Frequency Distribution of the classification results

of raw materials and furniture producers are deemed necessary. Despite its potential significance, this aspect remains relatively underdeveloped in the present body of research and industry practices.

Most sustainable practices factors implemented by furniture producers suggest that a considerable 46% of the studied population is dedicated to sustainable production studies (Fig. 4). The adoption of product-driven strategies aimed at fostering sustainability has become a widespread practice among furniture manufacturers. Nevertheless, there exists a necessity for additional clarification regarding the intricate connection between sustainable material sourcing, waste management, energy efficiency, and social responsibility initiatives within the furniture industry. The second most influential factor, accounting for 30%, is the influence of autonomy and self-organisation in safeguarding sustainable practices. This highlights the crucial role that effective systems and governance play in shaping sustainable practices within the furniture manufacturing sector. Moreover, it is imperative to conduct a thorough investigation into the correlation between sustainable practices and wider industry dynamics, including market demands, regulatory frameworks, and technological advancements. These elements have a substantial influence on the execution and achievement of sustainable practices in the furniture sector. To fully comprehend the magnitude to which sustainable practices are integrated into the sector, it is crucial to conduct comprehensive research to investigate the various factors and dynamics at play.

The significance of the bioeconomy vision, as indicated by this study, emphasises the crucial importance of bioresources, which account for a substantial 71% of the subjects studied, particularly relevant to furniture enterprises (Fig. 4). The sustainability of furniture production is intricately linked to biomaterials, most notably wood, which serves as a primary resource in the industry. The sustainable availability of wood necessitates a comprehensive understanding of bioresources. Consequently, the impact of bioresources extends to bioecology, representing 19% of the subjects studied in this research. This emphasizes the interconnectedness between the availability of bioresources and the broader ecological context in which furniture production operates.

However, there is a compelling need for further research to delve deeper into avenues that can enhance the biotechnology vision, an aspect that has received relatively limited attention thus far, making up a mere 2% of the subjects studied under the 6C category. More specifically, this involves the examination of innovative biotechnological approaches that can potentially revolutionise material sourcing, processing, and product development within the furniture sector. Moreover, synergistic investigations that integrate biotechnology with the broader bioresources vision, accounting for 8% of the discussion, have significant potential for generating new insights and transformative solutions.

Future Research Agenda

Guided by Ketchen and Craighead's argument that a strong review should go beyond the obvious and actively shape what comes next in the field (Ketchen and Craighead, 2023), a forward-looking research agenda is outlined based on the conceptualisations developed in prior studies. The transition of bioeconomy within the context of furniture manufacturers has been a significant research focus in Indonesia, Malaysia, and Vietnam (Fig. 4). This figure reflects the main issues related to the transition of bioeconomy and areas requiring further clarification for subsequent research.

The conceptualisation of the bioeconomic transition for furniture manufacturers, particularly in Indonesia, has been the focus of research through quantitative and survey approaches. Research dominance indicates that entrepreneurial and technological factors play a dominant role in influencing the bioeconomic transition, compared to sustainable practices. Furthermore, entrepreneurship is seen as key in driving the bioeconomic transition, while technology is considered a tool to strengthen connections across production chains during the bioeconomic transition. Thus, the bioeconomic transition emphasises a sustainable vision towards the utilisation of biological resources.

In efforts to accomplish a sustainable bioeconomy, fortifying scientific inquiry is necessary, notably in domains that are still unexplored. Firstly, it is important to enrich comprehension of the national context, specifically in Vietnam, which has surfaced as a prominent country in the furniture industry in Southeast Asia. Second, complete methodological approaches, such as mixed methods involving surveys and case studies, are indispensable to elevate the soundness of empirical research. Thirdly, in the context of entrepreneurial factors, further in-depth studies are needed at the macro level, referring to political visions related to the transition of the bioeconomy. Furthermore, in the technology factor, there is a knowledge gap regarding the development of new materials from biological resources and commercialisation technologies that can enhance effectiveness during the bioeconomic transition. Sustainable practice factors also need attention, especially regarding manufacturers' initiatives to promote responsible consumption patterns among consumers. Integration of various issues in each factor is also important for future research. Lastly, there is a need to strive for balance among various bioeconomic visions in transition research. Additionally, there is a significant gap between biotechnology and bio-ecology visions compared to the bio-resource vision that still dominates research direction.

Conclusions

In conclusion, the bibliometric analysis of entrepreneurship, technology, and sustainable practices in furniture producers yields significant insights. The year 2023 marks a notable increase in awareness and discourse within this field. The rising publication rates signify an expanding knowledge base and underscore the importance of this research area. Additionally, influential journals indicate that contributions are inherently interdisciplinary. Journals such as "Bioresources and the International Journal of Civil Engineering and Technology" are vital for promoting interdisciplinary collaborations and diverse perspectives. These journals foster a comprehensive research approach, encouraging the exploration of various dimensions of this intricate

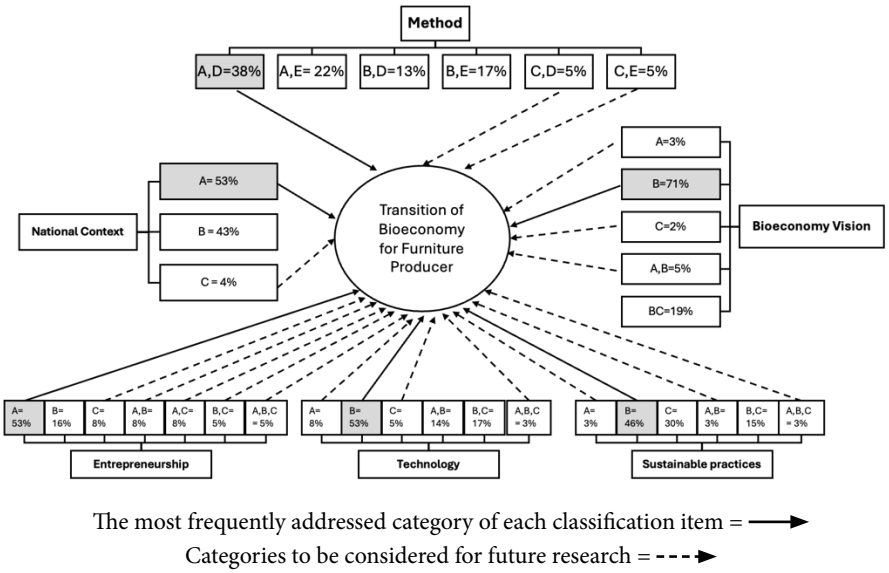


Fig. 5. Distribution of the analysis classification and categories in percentage

topic. Furthermore, the investigation of co-citation discloses unique clusters that correspond to entrepreneurship, technology, and sustainability. These clusters illustrate the interconnectivity of these themes and their crucial roles in the bioeconomic transition of countries like Indonesia, Vietnam, and Malaysia. The involvement of prominent authors such as Ratnasingam J., Wiklund J., and Sarkis J. underscores their significant contributions to the discourse and their impact on the research landscape.

In the future, this investigation's literary examination will elucidate the national context, methodologies, and critical factors affecting the furniture industry's bioeconomic transition. The review highlights the necessity for extensive studies on entrepreneurship and technology and their relationship with sustainable practices and bioeconomic goals. Researchers may elucidate the complexities of the bioeconomic shift and pinpoint areas for enhancement and innovation. Future research must address knowledge gaps related to political visions, technological innovations, and the promotion of responsible consumption. A deep comprehension of the diverse conditions of countries will help academics adjust their studies and proposals to the unique issues and possibilities found in each nation. Furthermore, adopting holistic methodological frameworks will equip researchers to comprehend the complex interrelations among the various components of the bioeconomic transition. Ultimately, addressing the knowledge gaps regarding political visions, technological progress, and fostering responsible consumption will ensure that research outcomes resonate with the overarching bioeconomic transition agenda and facilitate its effective realisation.

The findings underscore the changing relationships among entrepreneurship, technology, and sustainability in furniture enterprises, stressing the importance of unified efforts towards sustainable practices and bioeconomic resilience. Through the analysis of the acquired information, involved entities can skilfully address the challenges of the bioeconomic transition, thereby encouraging an ecologically sustainable and economically sound future for the furniture industry and beyond. Through cooperative research and innovative initiatives, stakeholders can collaboratively tackle challenges and capitalize on opportunities arising from the bioeconomic shift, thereby enhancing the sustainability and resilience of furniture production.

Conflict of interest

The author(s) declare(s) that there is no conflict of interest concerning the publication of this article.

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