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University Business Incubators as Catalysts for SBMC Readiness: A Bibliometric and Multi-Stakeholder Survey Analysis

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ABSTRACT

The convergence of entrepreneurship, innovation, and sustainability is becoming increasingly important in the development of startup ecosystems within higher education institutions. University business incubators play a strategic role in encouraging the development of startups that are not solely profit-oriented but also sustainability-oriented through the integration of sustainable business models and their contribution to the Sustainable Development Goals (SDGs). However, the conceptual link between university business incubators, sustainable business models, and the SDGs remains underexplored comprehensively in the literature. This research aims to address three main focuses: identifying trends and patterns in conceptual linkages in the literature, analyzing the level of interest and readiness for sustainability-based startup development, and classifying potential business sectors. To achieve these objectives, this research uses a quantitative approach combining bibliometric analysis and a descriptive survey. Bibliometric analysis was used to map the research landscape through visualization of keyword co-occurrence, while the survey was used to describe empirical conditions related to respondent interest and readiness, as well as trends in proposed business sectors. The results indicate a growing link between business incubators, university-based entrepreneurship, and sustainability, but the implementation of sustainable business models remains suboptimal. Thus, this study offers a state of the art in the form of an integration of bibliometric analysis and empirical data in examining the role of university business incubators, thereby providing a new contribution in developing a more adaptive incubation strategy oriented towards achieving the SDGs.

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INTRODUCTION

Universities have a strategic role in encouraging knowledge-based innovation and entrepreneurship, particularly through the development of a sustainable startup ecosystem, in line with the transformation towards entrepreneurial universities that contribute to economic and social development (Karahan, 2024). In this context, the existence of business incubators within universities is an important instrument for bridging academic research results with the needs of industry and society, especially in supporting the commercialization of innovation and the creation of social value (Mate et al., 2025). Incubators such as startup incubators, business incubators, and technology business incubators function not only as facilitators for the development of start-up businesses, but also as an integral part of the entrepreneurial ecosystem that provides mentoring services, networking, and support sustainable business model canvas development for startups (Breu & Kanbach, 2025).

Furthermore, the existence of the business incubator center at the university also has an important educational dimension in building a knowledge-based entrepreneurial culture (Albort-Morant & Ribeiro-Soriano, 2016; Hassan, 2020; Mian et al., 2016). business incubator serves as a learning and coaching

platform for students, lecturers, alumni, and Micro, Small, and Medium Enterprises (MSMEs) in the community who own or are pioneering startup-based businesses. Through a structured incubation process, participants not only gain access to business facilities but also receive education, training, mentoring, business monitoring, and assistance in developing business models to increase business capacity, expand markets, and develop into independent and sustainable startups (Bruneel et al., 2012). Thus, business incubator plays a role not only as a business development center but also as a means of entrepreneurship education that encourages increased innovation competency, creativity, and sustainable business literacy within the university and community.

Studies show that university-based incubators contribute significantly to increasing entrepreneurial capacity and encouraging sustainable innovation among students and fostered startups (Surana et al., 2020; Daub et al., 2020). As attention to sustainability issues increases, conventional business approaches are shifting toward more socially and environmentally responsible models. The concept of a sustainable business model has evolved in response to the need to integrate economic, social, and environmental aspects into modern business strategies. Business model innovation has proven to play a crucial role in driving organizational sustainability and enhancing competitiveness in the global era (Kajtazi et al., 2023). In this context, the development of the Sustainable Business Model Canvas (SBMC) is a necessary tool for designing sustainability-oriented business models. Innovation spaces and incubators, both at the city and university levels, play a crucial role in encouraging the adoption of sustainable business innovations by providing resources, networks, and policy support (Williamsson & Sandoff, 2023).

Business incubators act as catalysts in developing business models that adapt to global challenges, particularly in integrating sustainability aspects into business strategies through the support of resources, knowledge, and innovation networks (Lamperti et al., 2025). However, the implementation of this approach still faces various challenges, such as limited tenant understanding of the concept of sustainability, the lack of integration between incubation programs and Sustainable Development Goals (SDGs) principles, and the suboptimal use of the SBMC framework in the startup mentoring process (Fitri et al., 2024). Furthermore, although research related to business incubators and sustainability continues to grow, studies specifically linking the role of university business incubators to the development of the Sustainable Business Model Canvas and its contribution to the SDGs are still relatively limited and scattered across various research approaches.

Therefore, this research is relevant and strategic in providing a comprehensive overview of the role of university business incubators in supporting the development of sustainable business models and their contribution to achieving the SDGs, through bibliometric analysis and a multi-stakeholder survey. Specifically, this research aims to:

1. Identify publication trends, collaboration maps, and conceptual linkage patterns in the scientific literature related to university business incubators, sustainable business models, and the SDGs through bibliometric analysis.
2. Analyze the level of readiness and interest in startup development within the university and community, including lecturers, students, alumni, and MSMEs, based on survey results.
3. Classify the business sectors proposed by respondents, such as food and beverage, fashion, education, and digital services, as a basis for formulating a more adaptive and sustainability-oriented incubator development strategy.

RESEARCH METHOD

This study uses a mixed-methods approach that integrates bibliometric analysis and surveys to obtain a comprehensive overview of the development of sustainable business incubators in university environments. Bibliometric analysis was conducted to map research developments, theme trends, and conceptual linkages related to business incubators, entrepreneurship, innovation, and sustainability based on Scopus-indexed scientific publications (Damarsha et al., 2026; Nasution et al., 2026). The process of collecting and filtering bibliographic data was carried out systematically using Biblioshiny, thus enabling the visualization of relationships between publication metadata such as author country, title keywords, and research abstract focus. In addition, this study also used a survey method with students, lecturers, alumni, and MSMEs to identify the level of readiness, interest, and mentoring needs in developing startups and sustainable business models (Nasution et al., 2024). The research method in this study was implemented through systematic stages, including five stages to achieve the research objectives, as shown in Figure 1.

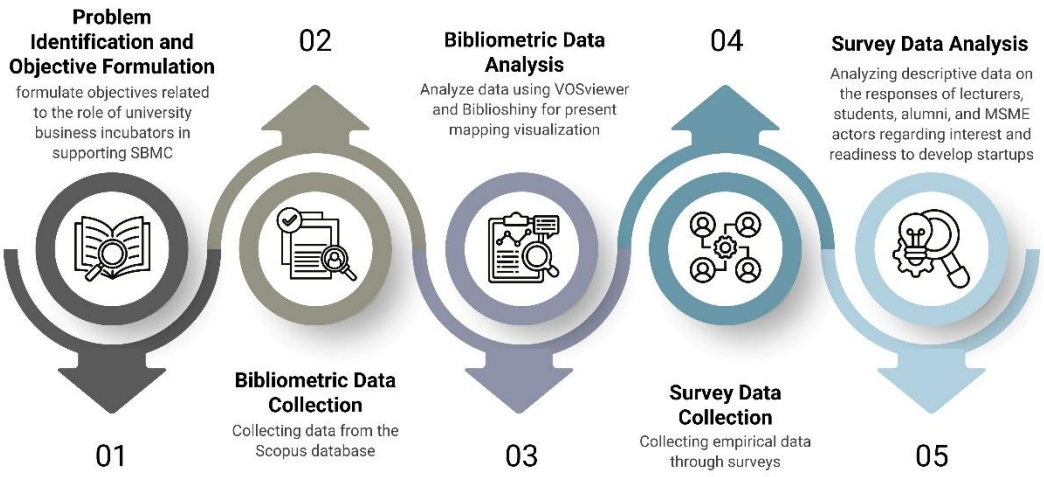


Figure 1. Research flowchart

Figure 1 shows the research stages, which begin with problem identification and the formulation of research objectives related to the role of university business incubators in supporting the development of sustainable business models and their contribution to the SDGs. The next stage is bibliometric data collection (in Figure 2), conducted through a search of the Scopus database using relevant keywords and applying inclusion and exclusion criteria (Lintangesukmanjaya et al., 2026; Assagung et al., 2026; Suprapto et al., 2026). The obtained data then undergoes a filtering and cleaning process to ensure document quality and relevance, with the selection process adhering to the PRISMA procedure. Next, the data is analyzed using VOSviewer software and Biblioshiny to identify publication trends, keyword relationships, and thematic clusters within the literature (Habibi, 2026; Nasution, 2026). The results of the bibliometric analysis are then visualized and interpreted to illustrate the research's conceptual patterns and structure.

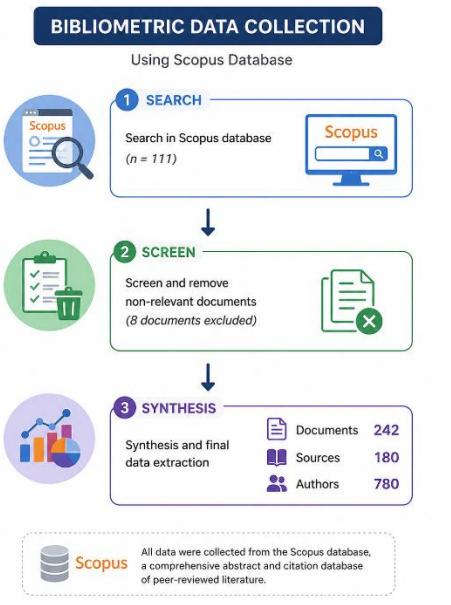


Figure 2. Research stages of data collection

Figure 2 shows the bibliometric data in this study was obtained from Scopus, a reputable database providing internationally indexed scientific publications. The search was conducted using pre-defined keywords, namely ("University") AND ("Startup Incubator" OR "Business Incubator" OR "Technology Business Incubator" OR "University Business Incubators") AND ("Sustainable Business Model Canvas" OR "SBMC" OR "SDGs"). The obtained data were then analyzed using VOSviewer software to identify publication trends, analyze keyword co-occurrence, map author and institutional collaboration networks,

and identify research theme clusters. The results of this analysis were used to answer the first research objective, which was to identify trends and patterns of conceptual linkages in the literature.

The next stage is empirical data collection through a survey involving lecturers, students, alumni, and MSMEs to identify the level of interest and readiness in developing sustainability-based startups. Survey data is analyzed descriptively to illustrate the empirical conditions and trends in the proposed business sectors, such as food and beverage, fashion, education, and digital services. The final stage of the research is synthesis and drawing conclusions by integrating the results of bibliometric analysis and surveys to answer the research objectives and formulate implications and recommendations for the development of more effective and sustainable university business incubators

Furthermore, this study also involved a multi-stakeholder survey consisting of lecturers, students, alumni, and MSMEs. Respondents were selected using a purposive sampling technique, with the criteria being interest or involvement in entrepreneurship or startup development. The research instrument consisted of a questionnaire designed based on indicators of interest in startup development, level of entrepreneurial readiness, understanding of sustainable business models, and understanding of the principles of the SDGs. The questionnaire used a Likert scale to measure respondents' perceptions and readiness and was distributed online through digital platforms to reach respondents from various backgrounds. Survey data was analyzed quantitatively and descriptively to identify respondents' levels of interest and readiness, illustrate the distribution of responses based on background, and draw conclusions regarding readiness for sustainability-based startup development. The results of this analysis were used to address the second research objective.

Furthermore, data related to respondents' startup ideas or proposals were analyzed using categorization analysis techniques. The proposed businesses were classified into several main sectors: food and beverage, fashion, education, and digital services. This analysis aimed to identify trends in the business sectors of interest and their potential for developing sustainable business models. The results of this classification were used to address the third research objective.

RESULTS AND DISCUSSION

Result

The results to obtain an overview of the development and direction of research related to sustainable business incubators, a bibliometric analysis of relevant scientific publications was conducted. This analysis aims to identify patterns of relationships between publication metadata elements, such as the author's country of origin, the dominant research theme in the article title, and the focus of discussion emerging in the abstract. Through this approach, we can understand the distribution of global research attention on issues of entrepreneurship, innovation, sustainability, and the development of university-based business models. The results of this bibliometric visualization are presented in Figure 1 as a Three-Field Plot to demonstrate the relationships between research components more systematically and informatively.

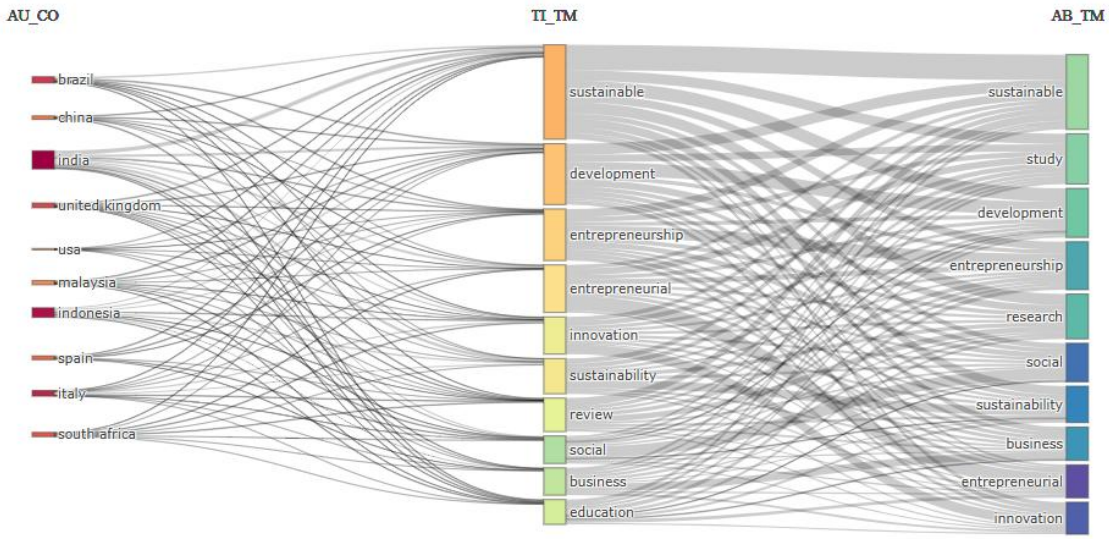


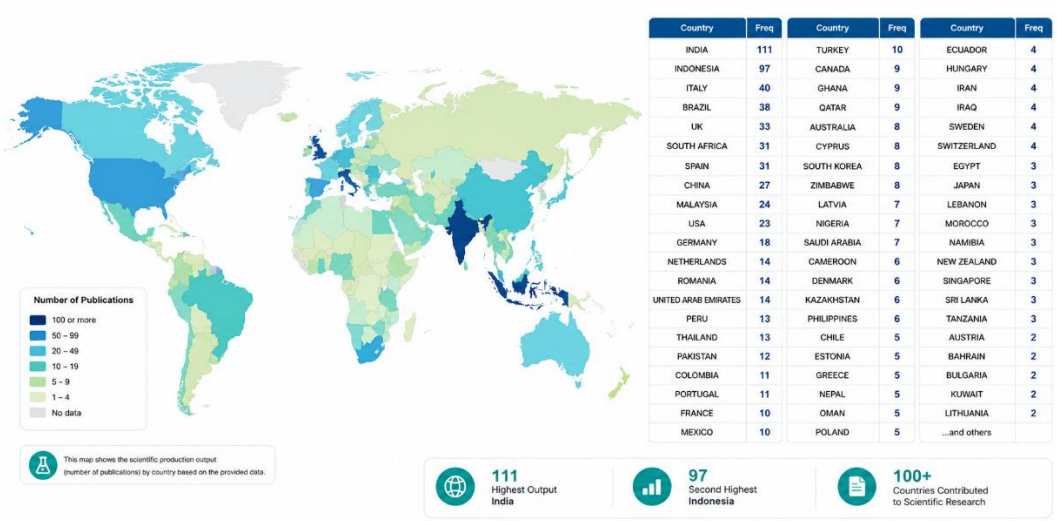
Figure 3. Three-Field Plot Bibliometric Analysis of Business Incubator Research

Figure 1 shows bibliometric mapping assisted by Biblioshiny software, focusing on visualizing the relationship between authors' country of origin (AU_CO), dominant keywords in article titles (TI_TM), and dominant keywords in article abstracts (AB_TM) in research related to business incubators, entrepreneurship, and sustainability. Biblioshiny's bibliometric analysis helps systematically visualize and explore relationships between scientific publication metadata, thus facilitating the identification of patterns of interconnectedness between research themes, collaborations, and research developments within a specific field. This visualization reveals patterns of conceptual linkages and the distribution of global research focus in the field of university-based business incubators and sustainable business models.

Based on authors' country of origin, countries such as India, Indonesia, Brazil, China, the United Kingdom, and Malaysia are significantly contributing to research publications related to entrepreneurship and sustainability. The dominance of developing countries indicates that startup development, business innovation, and sustainable entrepreneurship are important areas of focus in efforts to increase the competitiveness of a knowledge- and innovation-based economy. Indonesia also appears to have strong connections to various research themes, indicating increasing attention to the development of startup ecosystems and business incubators within universities. On the other hand, the dominant keywords in the titles indicate the most frequently occurring words in article titles, such as "sustainable," "development," "entrepreneurship," "entrepreneurial," "innovation," "sustainability," "social," "business," and "education." The dominance of the terms "sustainable" and "entrepreneurship" indicates that current global research is no longer solely focused on new business creation but is shifting toward entrepreneurship development that takes into account economic, social, and environmental sustainability. The presence of the term "education" also indicates that entrepreneurship education is beginning to be positioned as a crucial component in building innovation capacity and developing university-based startups. This is evidenced by the results of the dominant keywords in the abstracts. The dominant words in the article abstracts, such as "sustainable," "development," "entrepreneurship," "research," "social," "business," "entrepreneurship," and "innovation," demonstrate that research addresses more than just business aspects but also links business incubators to social development, innovation, and sustainability. This reinforces the view that university business incubators have a multidimensional function, serving as startup development centers, innovation centers, and sustainability-based entrepreneurship education facilities.

The interdisciplinary flow in the figure shows that the theme of "sustainable entrepreneurship" is strongly connected to the concepts of "development," "innovation," and "education." This finding suggests that startup development within universities is increasingly geared toward sustainable and knowledge-based business models. Thus, university business incubators serve not only as business support facilities but also as educational spaces that guide students, lecturers, alumni, and MSMEs in understanding innovative business development that is oriented towards social and environmental impact. This visualization result is relevant to the existence of the Business Incubator at universities which acts as a learning platform, coaching, and mentoring for startups. Through a structured incubation process, tenants receive entrepreneurship education, business model development training, mentoring, business monitoring, and business networking support to increase business capacity and startup competitiveness. Therefore, business incubator can be understood not only as a business development center, but also as part of an entrepreneurial education ecosystem that supports the development of the SBMC and contributes to the achievement SDGs.

On the other hand, Biblioshiny's data results show that the Country Scientific Production analysis is used to observe the distribution of scientific publication contributions based on the countries involved in the research. Through Biblioshiny's visualization, this data provides an overview of the level of international collaboration and also shows the countries with the highest publication contributions in the analyzed research topics. The higher the frequency of a country's publications, the greater its role in the development and dissemination of scientific knowledge in the related field. The world map visualization in Biblioshiny's results shows that research has involved various countries from Asia, Europe, America, Africa, and Australia. The dominance of darker colors indicates countries with a higher number of publications, while lighter colors indicate lower publication contributions. Thus, this analysis not only shows scientific productivity but also reflects the breadth of the global research collaboration network. The results of the visualization of research publication data related to business incubators in higher education are shown in Figure 4.



Country	Freq	Country	Freq	Country	Freq
INDIA	111	TURKEY	10	ECUADOR	4
INDONESIA	97	CANADA	9	HUNGARY	4
ITALY	40	GHANA	9	IRAN	4
BRAZIL	38	QATAR	9	IRAQ	4
UK	33	AUSTRALIA	8	SWEDEN	4
SOUTH AFRICA	31	CYPRUS	8	SWITZERLAND	4
SPAIN	31	SOUTH KOREA	8	EGYPT	3
CHINA	27	ZIMBABWE	8	JAPAN	3
MALAYSIA	24	LATVIA	7	LEBANON	3
USA	23	NIGERIA	7	MOROCCO	3
GERMANY	18	SAUDI ARABIA	7	NAMIBIA	3
NETHERLANDS	14	CAMEROON	6	NEW ZEALAND	3
ROMANIA	14	DENMARK	6	SINGAPORE	3
UNITED ARAB EMIRATES	14	KAZAKHSTAN	6	SRI LANKA	3
PERU	13	PHILIPPINES	6	TANZANIA	3
THAILAND	13	CHILE	5	AUSTRIA	2
PAKISTAN	12	ESTONIA	5	BAHRAIN	2
COLOMBIA	11	GREECE	5	BULGARIA	2
PORTUGAL	11	NEPAL	5	KUWAIT	2
FRANCE	10	OMAN	5	LITHUANIA	2
MEXICO	10	POLAND	5	...and others	

Figure 4. Country Scientific Production

Based on the analysis of Country Scientific Production in Biblioshiny, shown in Figure 4, it is known that research publications related to business incubators in universities have developed extensively and involve contributions from various countries worldwide. India ranks first with the highest number of publications, with 111 documents, followed by Indonesia with 97 publications. The high contribution of these two countries indicates that the study of business incubators in universities is a significant focus, particularly in supporting the development of entrepreneurship, innovation, and the downstreaming of academic research results. Meanwhile, the involvement of European and American countries indicates that research on business incubators continues to develop in the context of industry collaboration, innovation commercialization, and strengthening relations between universities and the business world.

Furthermore, the results of bibliometric analysis using network visualization co-occurrence indicate that research related to university business incubators, sustainable business models, and the SDGs forms several main thematic clusters. The first cluster is dominated by keywords such as innovation, entrepreneurship, and university, indicating that the role of universities as centers of innovation is a primary focus in the literature. The second cluster connects the concepts of business incubators, startups, and technology transfer, emphasizing the incubator's function as a facilitator for technology-based business development. Meanwhile, the third cluster demonstrates the link between sustainability, SDGs, and sustainable business models, reflecting the growing attention to integrating sustainability principles into business development. However, the position of the SBMC in the network remains relatively peripheral, indicating that this topic has not been strongly integrated into studies of university business incubators. A visualization of these results can be seen in Figure 2.

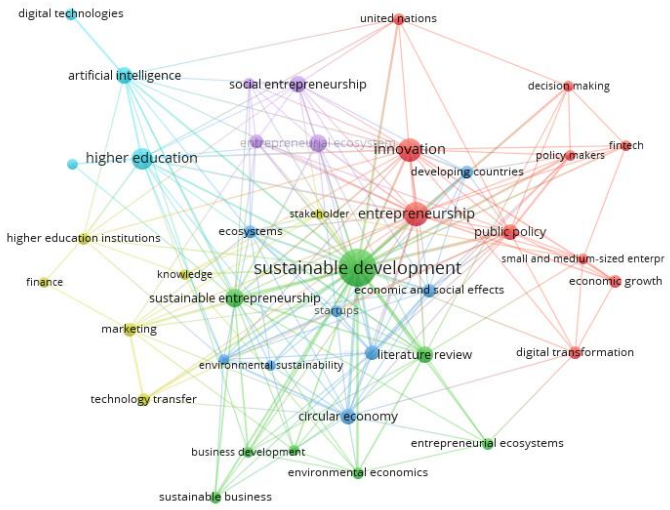


Figure 5. Network visualization co-occurance

The network co-occurrence visualization shows that the concept of sustainable development occupies a central position in the network, characterized by larger node sizes and extensive connections with various other keywords. This indicates that sustainability issues are a key focus in research related to university-based business and entrepreneurship incubators. The strong link between sustainable development and entrepreneurship and innovation demonstrates that current literature increasingly positions entrepreneurship as a strategic instrument in achieving sustainable development goals. A visualization of these results can be seen in Figure 3.

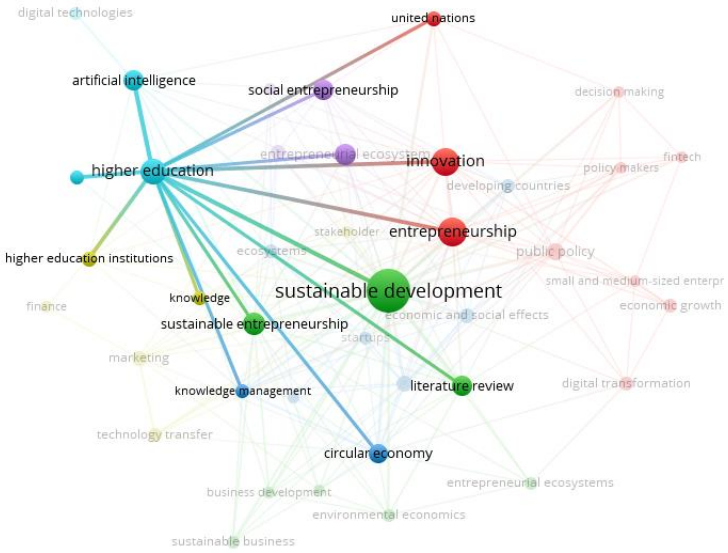


Figure 6. Network visualization of higher education support SBMC

Based on figure 3 shows cluster focused on higher education is observed, closely linked to the concepts of artificial intelligence, knowledge, and sustainable entrepreneurship. This indicates that the role of universities is not only as providers of education, but also as centers for the development of technology-based knowledge and innovation that support sustainability. This connection also demonstrates that digital transformation is beginning to become a crucial part of the entrepreneurial ecosystem within the academic environment. Conversely, the cluster centered on innovation and entrepreneurship demonstrates links to public policy issues, economic growth, and the context of developing countries. This indicates that research is not only focused on micro-scale aspects (startups and incubators) but has also expanded to macro-scale aspects, such as the impact on the economy and development policy. However, the connection between this cluster and specific concepts such as the sustainable business model canvas does not appear to be dominant, indicating as operational approaches to sustainable business models are not a primary focus in the literature.

To illustrate the direction of research developments related to business incubators and edupreneur ecosystems, a keyword network visualization analysis was conducted using network visualization. This allows us to identify the central research themes and the interconnections between the concepts of entrepreneurship, innovation, higher education, and sustainable development. The visualization results in Figures 7 and 8 show the relationship patterns between keywords that form specific research clusters. The size of the nodes indicates the frequency of keyword occurrence, while the connecting lines indicate the degree of interconnection between topics in the analyzed publications. The more connections a keyword has, the greater its role in building the structure of the research theme. Thus, this visualization provides a more comprehensive understanding of the focus, trends, and development of business incubator and edupreneur ecosystem studies in the context of higher education and sustainable entrepreneurship.

Based on the keyword network visualization in Figure 7, it can be understood that the existence of business incubators in universities plays a strategic role in building a focused and sustainable entrepreneurial ecosystem. Universities are not only venues for education but also environments with significant potential through the presence of students, lecturers, alumni, and the surrounding community, many of whom are active in the MSME sector. All of these elements possess various creative ideas, innovations, and research outputs that have the potential to be developed into products or startups with

economic value. Therefore, business incubators exist as a platform to support the development of these innovations so that they do not stop at the research stage but can be expanded into marketable products that provide tangible benefits to the community.

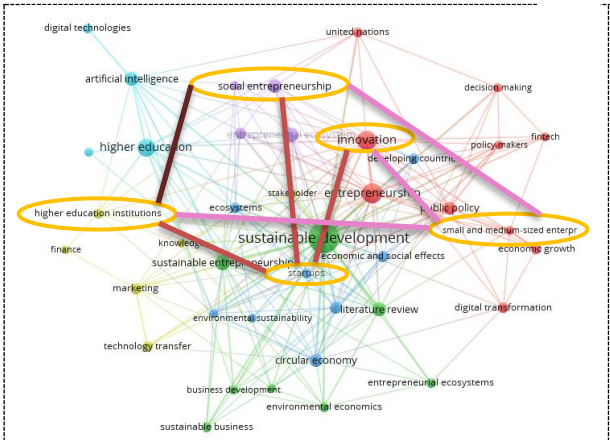


Figure 7. Visualization of business incubator

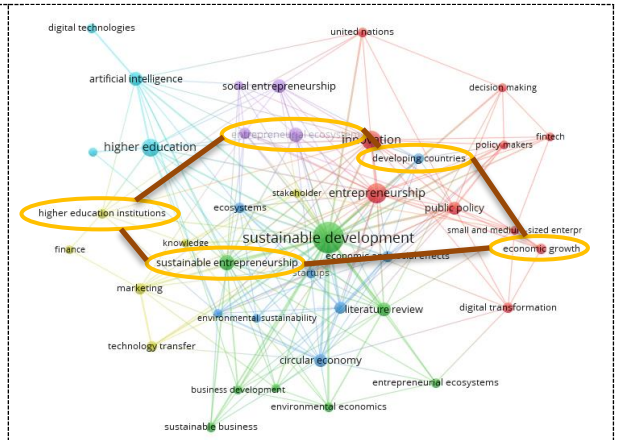


Figure 8. Visualization of edupreneur ecosystem

The relationship between the keywords innovation, entrepreneurship, higher education institutions, and small and medium-sized enterprises in Figure 7 demonstrates that universities play a role in fostering an entrepreneurial spirit through coaching, mentoring, and strengthening collaboration between the academic and business worlds. Research produced by students and lecturers serves as a valuable asset that can be developed into innovative startups, while MSMEs in the university environment can also receive business development support through knowledge and technology transfer. In this context, the emergence of the keyword "social entrepreneurship" demonstrates that entrepreneurship development in higher education is not solely oriented toward economic profit, but also directed toward creating social impact, creating job opportunities, and helping empower the broader community.

Furthermore, the relationship between the concepts in Figure 8 demonstrates how the existence of business incubators and the strengthening of the edupreneur ecosystem can create a healthy and sustainable entrepreneurial ecosystem. The interconnectedness between sustainable entrepreneurship, economic growth, developing countries, and entrepreneurial ecosystems demonstrates that higher education institutions play a vital role in supporting innovation-based economic growth, particularly in developing countries. Through the support of business incubators, innovative research findings can be continuously developed, marketed, and adapted to technological developments, thereby creating competitive and sustainable businesses. Thus, higher education institutions function not only as centers of education and research but also as driving forces for the formation of an innovative, collaborative entrepreneurial ecosystem capable of contributing to sustainable economic and social development.

Furthermore, the emergence of concepts such as the circular economy, knowledge management, and sustainable entrepreneurship indicates a research direction that is beginning to integrate environmental and managerial aspects into business development. However, the position of some of these concepts remains on the periphery of the network, indicating that their integration into university business incubator research is still developing and not yet fully established.

On the other hand, the survey results indicate a high level of interest from various stakeholder groups, including lecturers, students, alumni, and MSMEs, in developing startups (in Table 1). This finding reinforces the bibliometric analysis that places entrepreneurship as a central theme in the literature. However, when compared to the co-occurrence results, it appears that sustainability has not yet fully become a primary focus in practice, as reflected in respondents' limited understanding of the concept of sustainable business models and its relationship to the SDGs. This indicates a gap between conceptual development in the literature and implementation in the field.

Table 1. Profile of respondents by stakeholder type

Students	Lecturers	Alumni	MSMEs
10	8	6	41

Furthermore, the classification of business sectors proposed by respondents indicates that the food and beverage, fashion, education, and digital services sectors are the most dominant (in Table 2). When compared to the network visualization results, these sectors are linked to the innovation and entrepreneurship cluster, but not yet explicitly linked to the sustainability cluster. This finding indicates that opportunities for sustainability-based startup development remain wide open, particularly through strengthening the integration of business models and SDG principles within these sectors.

Table 2. Classification of proposed startup sectors

Food and Beverage	Fashion	Education	Digital Services Sectors
45	6	3	11

Overall, the integration of network visualization co-occurrence results and survey data indicates that despite significant progress in entrepreneurship studies and university business incubators, the link to the concept of sustainability, particularly in the implementation of the SBMC, still requires strengthening at both the conceptual and practical levels. Furthermore, the high level of interest from various stakeholders, including lecturers, students, alumni, and MSMEs, in developing startups indicates significant potential that has not been optimally facilitated. These findings emphasize the importance of strengthening and concentrating on developing the role of university business incubators as strategic platforms that not only support startup growth but also guide the development of sustainable business models. Therefore, business incubators need to be designed in a more integrated and adaptive manner, emphasizing sustainability-based mentoring to bridge the high level of entrepreneurial interest with the implementation of business practices aligned with the principles of the SDGs.

Discussion

Bibliometric analysis shows that research on university business incubators and sustainability has increased significantly in recent years, in line with the growing role of universities in fostering innovation-based entrepreneurship and social impact (Karahan, 2024; Millette et al., 2020). Keyword co-occurrence mapping reveals a major cluster focused on innovation, entrepreneurship, and sustainability, indicating a growing integration of these concepts in the scientific literature (Marques et al., 2022; Hakim et al., 2024). However, the specific link between university business incubators and the implementation of the SBMC remains relatively limited, indicating a research gap in implementation (Karahan, 2024).

Survey findings indicate high interest in startup development among lecturers, students, alumni, and MSMEs, reflecting significant potential for strengthening university-based entrepreneurial ecosystems (Sher et al., 2020). The dominant participation of MSMEs also indicates that the need for incubation services stems not only from the academic environment but also from the practical sector, requiring support for innovation-based business development (University Business Incubators in Indonesia). However, the level of readiness to develop sustainability-based startups still varies, particularly in terms of understanding the concept of sustainable business models and integration with the SDGs (Yassim et al., 2025; Amizuar et al., 2025). This suggests that university business incubators still face challenges in providing comprehensive, sustainability-based mentoring (Karahan, 2024).

Furthermore, the results of the business sector classification indicate that the food and beverage, fashion, education, and digital services sectors are the most popular among respondents, which aligns with the development trend of market-based startups and digital technology (University Business Incubators in Indonesia). These sectors have significant potential to support sustainable development if developed through business models that integrate economic, social, and environmental aspects (Ni'mah et al., 2024). Therefore, university business incubators need to develop more adaptive and contextual strategies according to the characteristics of the business sector and the needs of startups (Millette et al., 2020).

As a simplification of the VOSviewer visualization results, Figure 9 is designed to conceptually illustrate how universities build edupreneur ecosystems through the role of business incubators. This

illustration demonstrates that universities possess enormous potential resources, ranging from students, lecturers, and alumni to the surrounding community and MSMEs, who possess creative ideas, innovations, and research findings that can be developed into products or startups. The existence of business incubators is a crucial tool for supporting the development process of these innovations so that they do not remain merely research outputs but can develop into businesses with economic value and social benefits (Klofsten et al., 2019; Nicholls-Nixon et al., 2020). Through the entrepreneurial ecosystems established within universities, various innovations can be directed to potential sectors such as food and beverage, fashion, education, and digital services. The mentoring provided focuses not only on business development but also on fostering a focused, collaborative, and sustainable entrepreneurial spirit (Theodorakopoulos et al., 2014). Therefore, the illustration in this figure demonstrates that the existence of edupreneur ecosystems in universities is expected to generate economic growth, support the development of developing countries, and foster a healthy and innovative entrepreneurial ecosystem.



Figure 9. Network visualization of higher education support SBMC

As a simplification and interpretation of the VOSviewer visualization results, Figure 8 illustrates how the edupreneur ecosystem is formed through the interconnectedness of education, innovation, and startup development actors in higher education. This concept emphasizes the strategic role universities play in building an entrepreneurial ecosystem through supporting business incubators, strengthening innovation, and mentoring research-based businesses (Schwartz, 2013; Vaz et al., 2023). Universities are not only centers of education and research, but also serve as catalysts for the emergence of new entrepreneurs capable of creating sustainable economic and social impact.

The edupreneur ecosystem certainly involves several stakeholders, including students, lecturers, alumni, and MSMEs. These four elements are the primary sources of creative ideas, innovations, and research outputs that have the potential to be developed into products or startups. The existence of business incubators in universities is a crucial tool to support the innovation development process so that it does not stop at the research stage but can be developed into businesses with economic value and competitiveness. This aligns with research showing that university business incubators are capable of building an entrepreneurial learning environment that supports students and the community to develop into real entrepreneurs (Hassan, 2020; Wonglimpiyarat, 2016; Yuping & Jianbo, 2014).

On the other hand, the role of entrepreneurs can be categorized into startup sectors, which are areas of development within the university entrepreneurship ecosystem, including food and beverage, fashion, education, and digital services. These diverse sectors demonstrate that innovations resulting from research and the creativity of academics have ample opportunities to be developed according to market needs and technological developments. The development of innovation-based startups is also a crucial part of building sustainable entrepreneurship and strengthening a healthy entrepreneurial ecosystem (Berbegal-Mirabent et al., 2015; Klofsten et al., 2019).

Meanwhile, the results of the synergy process between all elements involved in the edupreneur ecosystem. When students, lecturers, alumni, and MSMEs are able to work together through the support of

business incubators and startup development in various sectors, the expected outcome is the creation of economic growth and support for developing countries (Peters et al., 2004; Ratinho & Henriques, 2010; Wang, 2020). Thus, this illustration demonstrates that collaboration between education, innovation, entrepreneurship, and the business sector can create an innovative, sustainable entrepreneurial ecosystem that can make a real contribution to the development of a knowledge-based economy.

CONCLUSION

Based on bibliometric analysis and a multi-stakeholder survey, this study shows that studies on university business incubators, sustainable business models, and the SDGs have experienced significant growth in recent years, with a trend of increasing publications and a stronger conceptual link between entrepreneurship, innovation, and sustainability. Bibliometric mapping also indicates that research remains dominated by conceptual and policy aspects, while empirical studies related to the implementation of sustainable business models in university incubators are relatively limited.

The survey results indicate significant potential for startup development within universities and the community, as evidenced by the high level of respondents' interest in entrepreneurial activities. Survey data indicate that the majority of respondents are MSMEs, while university respondents included lecturers, students, and alumni. Furthermore, the proposed business sector classification indicates that the food and beverage, fashion, education, and digital services sectors are the most popular, with significant potential for development within a sustainable business framework.

These findings indicate that the development of university business incubators should be directed at strengthening sustainability-based entrepreneurial capacity, providing structured mentoring programs, and integrating a sustainable business model approach into the incubation process.

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