A Systematic Literature Review on the Role of Entrepreneurship Education in Fostering a Sustainable Entrepreneurial Ecosystem in Higher Education Institutions

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Abstract. Entrepreneurship is one of the important indicators of a developed country's economy. Consequently, entrepreneurship education in higher education institutions is considered essential for shaping a sustainable entrepreneurial ecosystem. Through pedagogical approaches such as Project-Based Learning, Problem-Based Learning, and Action Learning, students are equipped with practical skills and an adaptive entrepreneurial mindset. This study employs a Systematic Literature Review (SLR) approach, examining scientific articles from various reputable databases and utilizing VOS viewer software to map the bibliometric relationships among key concepts in the entrepreneurship literature. Entrepreneurship education not only teaches business management but also fosters creativity, innovation, and collaboration. The findings indicate the importance of the role of educational institutions in building synergy among academia, government, and industry. With the support of a strong entrepreneurial ecosystem, university graduates are better prepared to create sustainable businesses and contribute to national economic growth.

Keywords: Entrepreneurial Ecosystem, Entrepreneurship Education, Higher Education.

1 Introduction

Entrepreneurship education has become a primary focus in efforts to promote economic growth and innovation across countries. Higher education institutions play an important role in producing competent entrepreneurs through the implementation of effective pedagogical approaches. Cross-country evidence indicates that entrepreneurship education built around successful entrepreneurial role models and experiential case teaching significantly strengthens students' entrepreneurial competencies and their intention to start a business [5], while other scholars argue that entrepreneurship education itself should be understood and designed as an ecosystem of interconnected actors and resources rather than as an isolated course [6]. However, the challenge of integrating entrepreneurship theory and practice remains an issue that needs to be addressed. This paper

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aims to explore various pedagogical approaches in entrepreneurship education and their impact on the development of a sustainable entrepreneurial ecosystem. Entrepreneurship education has a strategic role in shaping innovative and independent individuals, who are expected to drive economic growth. In the current era of globalization and digitalization, the need for adaptive and creative entrepreneurs continues to grow. Therefore, integrating entrepreneurship education into the formal education system is crucial for creating a sustainable entrepreneurial ecosystem. This paper discusses the role of entrepreneurship education in fostering a sustainable entrepreneurial ecosystem, drawing on accredited journal sources from both domestic and international literature.

Entrepreneurship education does not focus solely on transferring knowledge about how to start and manage a business, but also emphasizes the development of entrepreneurial attitudes, skills, and mindsets. This includes the ability to recognize opportunities, take calculated risks, and innovate in the face of challenges. Entrepreneurship education thus plays a role in fostering the motivation, competence, and interest of individuals in pursuing entrepreneurship. Research shows that entrepreneurship education can enhance students' skills and motivation toward entrepreneurship, which in turn strengthens the entrepreneurial ecosystem. Empirical studies in the Indonesian higher education context corroborate this pattern, showing that university-based enterprise development programs significantly strengthen students' entrepreneurial self-efficacy and their readiness to start a business [9], and that a supportive campus entrepreneurial atmosphere positively shapes students' innovation and entrepreneurship ability [15]. In addition, higher education institutions play an important role in integrating entrepreneurship education into the curriculum. By providing entrepreneurship programs and training, universities can equip students with the skills needed to succeed in the business world. Collaboration among universities, businesses, and government in creating a successful entrepreneurship education ecosystem is also of great importance, as conceptualized in the Triple Helix model of university-industry-government interaction [12] and as demonstrated empirically in studies on research commercialization within higher education institutions [14] and on Triple Helix synergy mechanisms in developing economies such as Indonesia [13]. This paper discusses the significance of such collaboration in creating a successful entrepreneurship education ecosystem.

The implementation of entrepreneurship education in higher education can serve as an alternative means of reducing unemployment. Practice- and experience-based entrepreneurship courses, known as entrepreneurship concepts and skills, can form the backbone of the skills that university graduates need to achieve success [1]. Entrepreneurial learning methods within entrepreneurship education are important as a means of changing a person's mindset and behavior so that they develop an interest in entrepreneurship. Business Planning, as one of the compulsory courses in Entrepreneurship Education, equips students with an understanding of and experience in self-development and business building. According to Solomon and Fernald, as cited in Yuniasanti and Esterlita [2], traditional entrepreneurship education focuses on business plan preparation, providing an understanding of how to obtain financing, the business development process, and small business management. Chang and Rieple as cited in Warnardi et al. [3] identified four dimensions of entrepreneurial skills: 1) technical skills, 2) management

skills, 3) entrepreneurship skills, and 4) personal maturity skills. According to Rusdiana, as cited in Warnardi et al. [3], the indicators of entrepreneurial skills consist of 1) creative thinking skills, 2) decision-making skills, 3) leadership skills, 4) managerial skills, and 5) interpersonal skills. Based on this discussion, there are three complementary aspects of competence: knowledge, skills, and attitude/character. Project-based learning has been shown to be particularly effective in cultivating these entrepreneurial competencies in practice: a blended project-based entrepreneurial learning model implemented at an Indonesian university successfully guided students from prototype development through to marketable business products [7], while a comparable collaborative project-based learning management model applied in a teacher-education program in Thailand significantly improved students' career skills and entrepreneurial readiness [8].

2 Methods

The research uses a Systematic Literature Review (SLR) approach to identify, analyze, and synthesize relevant literature on entrepreneurship education and the development of entrepreneurial ecosystems in higher education institutions. The SLR was conducted following systematic stages, as described below.

1. Formulation of the research questions;
2. Literature search through scientific databases such as Scopus, Web of Science, and Google Scholar, using the keywords “entrepreneurship education,” “university entrepreneurship,” and “entrepreneurial ecosystem”;
3. Article selection based on inclusion and exclusion criteria;
4. Thematic analysis of the findings. To map the relationships among topics and identify dominant research trends, VOSviewer software was used, enabling bibliometric network visualization, including relationships among keywords, co-authorship, and co-citation.

This analysis aims to reveal knowledge patterns and identify research gaps in the study of entrepreneurship education within the higher education context. The results of this process serve as the basis for developing a more comprehensive and contextual conceptual framework. Data were obtained from various accredited scientific sources addressing the role of entrepreneurship education in developing the entrepreneurial ecosystem, drawn from both national and international journals. Emphasis was placed on pedagogical approaches, the role of universities, and the challenges of implementation in Indonesia.

3 Result and Discussion

3.1 Bibliometric Mapping Procedure

To complement the thematic literature synthesis presented in the preceding chapters, a bibliometric keyword co-occurrence analysis was conducted using VOSviewer software. Keyword data were extracted from the bibliographic records collected through the literature search strategy described in the Methodology section. VOSviewer generated three complementary visualizations: (1) a network visualization, in which node size reflects the relative frequency of keyword occurrence and the proximity between nodes reflects the strength of co-occurrence, with color denoting cluster membership; (2) an overlay visualization, in which color instead denotes the average publication year associated with each keyword, allowing the identification of thematic evolution over time; and (3) a density visualization, in which color intensity reflects the concentration of items in a given area of the map, with brighter (yellow) zones indicating a higher density of closely related, frequently occurring terms and darker (blue/purple) zones indicating sparser, less-developed areas of the literature.

It should be noted that the interpretation presented in this section is based on visual inspection of node size, color, and spatial clustering, since the exact numerical occurrence and total link-strength values generated by VOSviewer were not exported into a separate data table. This limitation is consistent with the scope of the present review, which relies primarily on Google Scholar as the literature source, and the findings below should therefore be read as an indicative rather than an exhaustive quantitative bibliometric account.

3.2 Keyword Co-Occurrence Network Analysis

Figure 1 presents the network visualization of keyword co-occurrence generated from the collected literature. Five distinct clusters can be identified, differentiated by color, each representing a coherent thematic grouping within the body of literature on entrepreneurship education and entrepreneurial ecosystems.

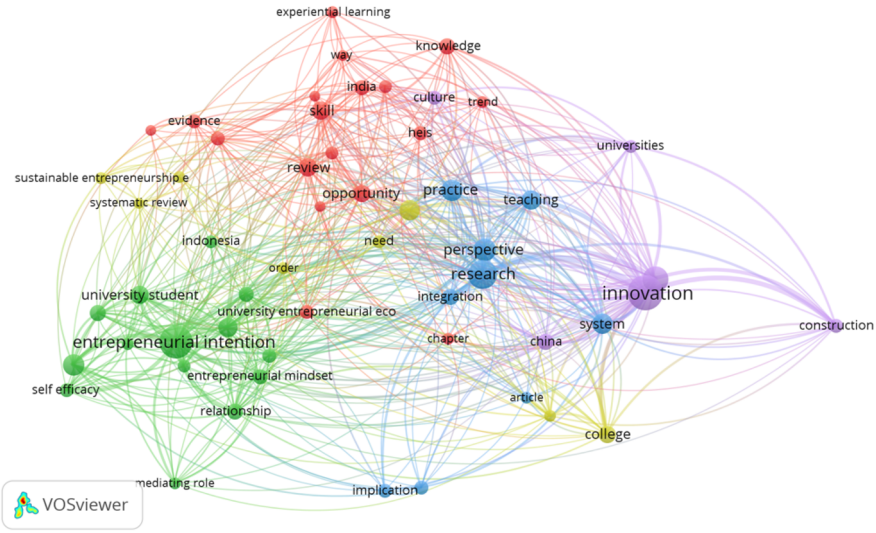

Fig. 1. Keyword Co-occurrence Network Visualization (VOSviewer)

A summary of the five clusters, their representative keywords, and the proposed thematic labels is presented in Table 1 below.

Table 1. Summary of Keyword Clusters Identified through VOSviewer Ne work Visualization

Cluster (Colour)	Representative Keywords	Proposed Thematic Label	Dominant Node(s)
1 (Red)	Experiential learning; skill; knowledge; review; opportunity; evidence; HEIs; India; need	Pedagogical Approaches and Skill Development	Skill; review
2 (Green)	Entrepreneurial intention; entrepreneurial mindset; self-efficacy; university student; university entrepreneurial ecosystem; mediating role; relationship; Indonesia	Entrepreneurial Intention and Psychological Antecedents	Entrepreneurial intention
3 (Blue)	Research; perspective; practice; teaching; integration; implication; system; China	Institutional Research Practice and Teaching Perspectives	Research; perspective
4(Yelow/Olive)	College; article; order; sustainable entrepreneurship education	Publication Context and Educational Setting	College
5 (Purple)	Innovation; culture; universities; construction; trend	Innovation and Ecosystem Construction	Innovation

The network map shows that the node "innovation" (purple cluster) and the node "entrepreneurial intention" (green cluster) are the two largest and most centrally positioned items in the map, indicating that these two constructs represent the most frequently discussed and most densely interconnected themes within the reviewed literature. The centrality of "innovation" suggests that the ecosystem-level discourse—linking universities, industry, and government, consistent with Isenberg's seven-pillar framework [4] discussed in above remains a dominant lens through which entrepreneurship in higher education is studied. Conversely, the prominence of "entrepreneurial intention", together with closely associated nodes such as "entrepreneurial mindset", "self-efficacy", and "university student", indicates that a substantial portion of the literature approaches entrepreneurship education from an individual, psychological, and behavioral perspective, rather than from an institutional or systemic one. This pattern is consistent with survey-based studies among Indonesian university students, which report that entrepreneurial self-efficacy significantly shapes both entrepreneurial attitude and entrepreneurial intention [10], and that perceived university support together with a proactive personality strengthens self-efficacy and, through it, entrepreneurial intention [11]. It also echoes recent work arguing that a deliberately built campus-level entrepreneurial ecosystem is a precondition for cultivating strong entrepreneurial intention among students [16].

The red cluster, comprising terms such as "skill", "experiential learning", "knowledge", and "review", corresponds closely to the pedagogical approaches discussed in previous part of this study, namely Experiential Learning, Problem-Based Learning, and Action Learning. Notably, this cluster occupies a peripheral position relative to the "innovation" and "entrepreneurial intention" clusters, and its nodes are comparatively smaller in size. This positioning suggests that, although pedagogical methods are recognized as important in entrepreneurship education, they are discussed somewhat separately from—and are less frequently and less strongly connected to—the literature that addresses ecosystem-building and institutional outcomes. The blue cluster ("research", "perspective", "practice", "teaching") functions as a structural bridge between the pedagogical cluster and the innovation cluster, indicating that research and teaching practice serve as the conceptual link between classroom-level pedagogy and ecosystem-level outcomes. The smaller yellow cluster ("college", "article", "order") appears to reflect bibliographic or contextual descriptors rather than a substantive theoretical theme.

3.3 Temporal Trend (Overlay) Analysis

Figure 2 presents the overlay visualization, in which the color gradient represents the average publication year of each keyword, ranging from approximately 2021.5 (purple/blue) to 2023.0 (yellow/green).

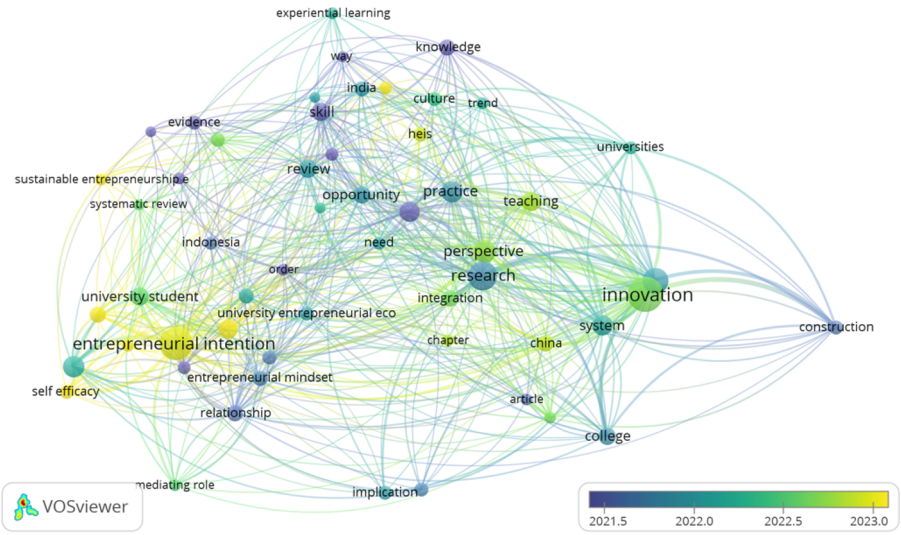

Fig. 2. Overlay Visualization of Keyword Co-occurrence by Average Publication Year (VOSviewer)

A comparison of keyword coloring across the three periods identified in the overlay map is presented in Table 2.

Table 2. Temporal Evolution of Dominant Themes Based on Overlay Visualization

Period (Average Publication Year)	Representative Keywords	Interpretation
Earlier period (≈ 2021.5–2022.0) — purple/blue tone	Knowledge; way; skill; review; opportunity; HEIs; heis; culture	Foundational and conceptual themes; establishing definitions and pedagogical frameworks
Transitional period (≈ 2022.0–2022.5) — teal/green tone	Innovation; research; teaching; practice; perspective; system	Consolidation of research practice and institutional teaching perspectives
Recent period (≈ 2022.5–2023.0) — yellow/green tone	Entrepreneurial intention; self-efficacy; university student; university entrepreneurial ecosystem	Emerging emphasis on individual-level psychological antecedents and ecosystem-level constructs

This temporal pattern suggests a discernible shift in scholarly attention. Earlier contributions in the reviewed period tended to focus on establishing conceptual and pedagogical foundations—defining relevant skills, reviewing existing knowledge, and examining higher education institutions (HEIs) as a general setting. More recent contributions, by contrast, place greater emphasis on individual-level constructs such as entrepreneurial intention and self-efficacy among university students, as well as on the notion of the

university entrepreneurial ecosystem as a distinct unit of analysis. This trend indicates that the field is gradually moving from broad, descriptive accounts of entrepreneurship education toward more specific, measurable, and construct-driven investigations of student-level entrepreneurial behavior and ecosystem-level dynamics.

3.4 Density Visualization Analysis

Figure 3 presents the density visualization, in which brighter areas indicate a higher concentration of frequently occurring and closely related items, while darker areas indicate comparatively sparse or underexplored regions of the co-occurrence map.

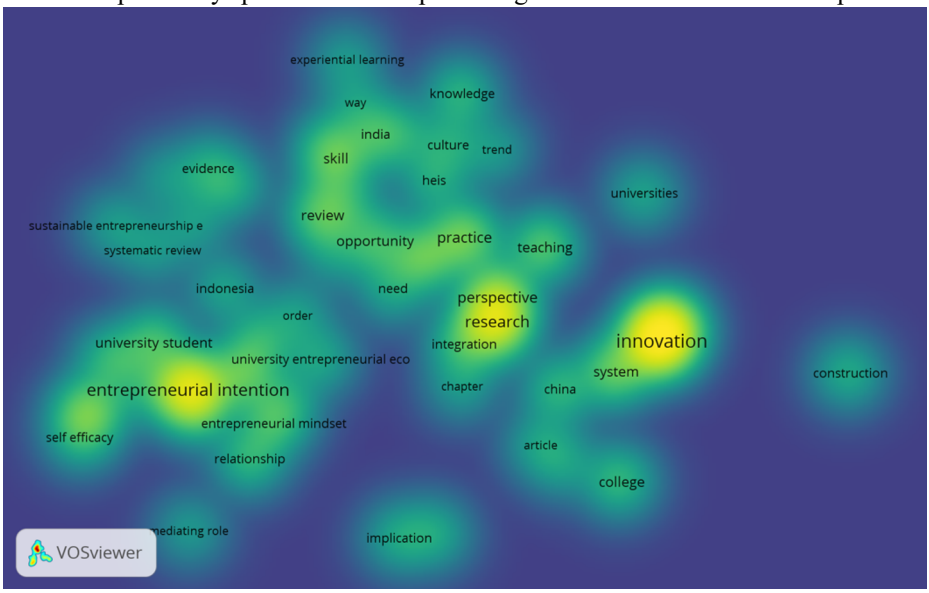

Fig. 3. Density Visualization of Keyword Co-occurrence (VOSviewer)

The density map confirms the pattern observed in the network visualization: the brightest (most intensely researched) zones are centered on "innovation" and on the cluster of "research", "perspective", and "practice", as well as on "entrepreneurial intention" and its immediate neighbors. These bright zones represent the most mature and heavily populated areas of the literature. In contrast, terms located toward the periphery of the map—such as "construction", "universities", "sustainable entrepreneurship education", "systematic review", "mediating role", and "implication"—appear against a notably darker background, indicating that these topics are addressed less frequently and are less densely connected to the rest of the literature. This pattern points to a research gap: the intersection between sustainable entrepreneurship education, the construction of university-level entrepreneurial ecosystems, and systematic, evidence-based evaluation of pedagogical outcomes remains comparatively underexplored, despite its conceptual centrality to the topic of this review.

The bibliometric mapping results are broadly consistent with, and provide empirical support for, the qualitative literature synthesis presented in previous part. The dominance of the "innovation" cluster corroborates the discussion of Isenberg's entrepreneurial ecosystem framework [4], in which innovation functions as a cross-cutting outcome linking the culture, policy, human capital, and support pillars. Similarly, the prominence of the "entrepreneurial intention" cluster reflects the substantial body of literature, also referenced in the introduction that examines how entrepreneurship education shapes students' entrepreneurial attitudes and interest.

At the same time, the relatively peripheral and less densely populated position of the pedagogical-method cluster (experiential learning, skill development) suggests that the specific pedagogical models discussed in this review—Project-Based Learning, Problem-Based Learning, and Action Learning—have not yet been extensively or explicitly linked, in the wider literature, to ecosystem-level outcomes such as institutional collaboration, incubator performance, or regional economic development. This gap reinforces the rationale for the present review: rather than treating pedagogy and ecosystem-building as separate strands of inquiry, there is a need for research that explicitly connects classroom-level pedagogical interventions to the broader, multi-pillar entrepreneurial ecosystem in which higher education institutions are embedded.

Taken together, the network, overlay, and density visualizations indicate that the literature on entrepreneurship education is thematically mature in two areas—individual entrepreneurial intention and ecosystem-level innovation—but comparatively underdeveloped in the area that connects the two: the systematic, pedagogy-driven cultivation of a sustainable university entrepreneurial ecosystem. This observation supports the position taken in this study that further research, particularly in the Indonesian higher education context, is warranted to bridge this gap through empirical and conceptual work that integrates pedagogical design with ecosystem-building strategies.

It is important to note that these findings are constrained by the scope of the underlying literature search, which relied on Google Scholar rather than a fully curated database such as Scopus or Web of Science, and by the absence of exact numerical occurrence and link-strength data. Future studies seeking to extend this analysis are encouraged to supplement the visual bibliometric mapping presented here with the corresponding quantitative cluster and link-strength exports from VOSviewer, in order to strengthen the empirical precision of the thematic classification proposed in this chapter.

4 Conclusion

This systematic literature review, supported by bibliometric mapping using VOSviewer, shows that entrepreneurship education in higher education is a multidimensional process that shapes entrepreneurial attitudes, skills, and mindsets through pedagogical approaches such as Project-Based Learning, Problem-Based Learning, and Action Learning, rather than merely transmitting business knowledge. Grounded in Isenberg's seven-pillar framework [4], a sustainable entrepreneurial ecosystem depends

on the synergistic interaction of universities, government, and industry, with higher education institutions acting as catalysts linking pedagogy to incubation, industry collaboration, and policy support. The keyword co-occurrence analysis corroborates this, revealing innovation and entrepreneurial intention as the two most prominent themes—representing ecosystem-level and individual-level perspectives respectively—while the overlay and density visualizations show a temporal shift toward construct-driven research and expose a persistent gap between pedagogical practice and ecosystem-building, both extensively studied in isolation but rarely integrated. These findings indicate that entrepreneurship education's effectiveness cannot be fully realized without situating pedagogical innovation within the broader ecosystem, and although the study is limited by its reliance on Google Scholar rather than fully curated databases and by the absence of exact numerical link-strength data, future research—particularly in the Indonesian higher education context—should pursue more comprehensive, multi-database bibliometric analysis and empirical investigation into how specific pedagogical interventions translate into measurable ecosystem-level outcomes such as incubator performance, start-up formation, and university–industry collaboration.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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