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PAPER

Entrepreneurial Intention in Engineering and Business Students: A Bibliometric Meta-Analysis (2009–2023)

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ABSTRACT

The purpose of this study is to identify the main determinants of entrepreneurial intention among engineering and business students. A bibliometric meta-analysis was performed with 1215 articles published in Scopus between 2009 and 2023, which spans 15 years of scientific production on entrepreneurial intention. Sources, authors, affiliations, countries, most cited papers, keywords, trending topics, co-occurrence network, thematic evolution, and collaborative networks were analyzed. Results showed that key related themes include entrepreneurial education, contextual factors, and personality traits. An average annual growth of 30.26% in annual scientific publications was observed. 2023 was the year with the highest scientific production, and 2009 had the highest average number of citations. It was shown that students from developing countries tend to have a higher entrepreneurial intention. Only 1% of all studies were conducted in Central America. The most used theory was that of planned behavior. The main determinants include entrepreneurial self-efficacy, attitude toward entrepreneurship, personality traits, contextual conditions, and entrepreneurial education. The practical implication of the present study suggests that higher education institutions can foster an environment that promotes the development of entrepreneurial intention among students.

KEYWORDS

entrepreneurial intention, entrepreneurial education, theory of planned behavior, entrepreneurship, bibliometric meta-analysis

1 INTRODUCTION

Entrepreneurship contributes to the economic growth of countries [1]. In this context, encouraging the creation of new businesses becomes a fundamental strategy for the development of national competitiveness [2]. For this reason, it is essential to understand the factors that influence entrepreneurial intention for the design of educational and support programs [3]. Fostering entrepreneurial intention is an important objective, especially for developing countries, where new entrepreneurial activities become a strategy for economic and social development [4], as well

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as for promoting technological development and enhancing sustainable national economic growth [5]. Entrepreneurship education is one of the main means of promoting and fostering entrepreneurial intention in university students [6].

Studies on entrepreneurial intention have increased in recent years, mainly in the context of higher education [7], which is evidence of the international interest in this topic. In particular, the relevance of research on engineering students has increased as several studies have explored the factors that influence their entrepreneurial intentions [5], [8], [9], [10] and entrepreneurial mindset [11], [12]. Entrepreneurial intention is understood as the state of mind directed towards creating a new business [13] and is one of the main predictors of entrepreneurial behavior [14]. Among the proposed theories to study entrepreneurial intention, the most widely used is the theory of planned behavior [15]. This theory proposes that entrepreneurial intention is determined by the control of perceived behavior, subjective norms, and attitude towards entrepreneurship [16]. Other theories such as the entrepreneurial event theory [17] and the psychological attribute theory [18] have also been used to analyze the factors that significantly influence the development of entrepreneurial intention.

Entrepreneurial education is one of the key factors that has been studied and analyzed for its influence on the development of entrepreneurial intention [19]. For this reason, entrepreneurship education has attracted significant attention from policymakers and educational institutions [10]. Several studies have shown that entrepreneurship programs have positively influenced attitudes toward entrepreneurship and entrepreneurial self-efficacy [20]. In particular, activities involving real-world experiences and self-directed learning, such as practical assignments or hands-on projects [9], as well as other innovative pedagogical approaches [11], [12], have proven to be effective strategies for fostering entrepreneurial competencies, intentions, and mindset among students [8]. However, studies also explain that the effectiveness of these programs may vary across contexts, this presents an opportunity for improvement in the design of programs customized to the needs of students.

This study aims to identify the main determinants of entrepreneurial intention among engineering and business students. A bibliometric meta-analysis of the literature published in Scopus was used, following the defined search protocol. The role of contextual factors in the intention of students to become entrepreneurs was analyzed. Through this study, we seek to understand the elements that motivate and develop entrepreneurial intention and to reach conclusions that allow us to identify opportunities for improvement in entrepreneurship educational programs, as well as in policies to support entrepreneurship in the university context.

The PICOC framework [21] was used to define the scope of the research. Each of the elements of the framework is detailed below:

- Population: Engineering and business students
- Intervention: Exposure to entrepreneurship-related university education
- Comparison: Determinants of entrepreneurial intention
- Outcome: Assessment models of entrepreneurial intention and motivations for entrepreneurship
- Context: Educational and socioeconomic

The timeframe was defined to include publications from 2009 to 2023. This 15-year span ensures a long-term perspective on the evolution of research related to entrepreneurial intention, allowing the identification of significant patterns and emerging topics over time. The study was conducted by identifying the key topics related to entrepreneurial intention, the most relevant authors who study

the subject, the years with the greatest scientific production, the context in which entrepreneurial intention has been studied, and the studies of entrepreneurial intention conducted in Central America. Specifically, this study will focus on answering the following research questions:

1. What are the main determinants of entrepreneurial intention?
2. What predominant models have been used to study entrepreneurial intention?
3. What have been the main findings in studies of entrepreneurial intention in engineering and business students?
4. How does entrepreneurial education relate to entrepreneurial intention?

It will be important to delve deeper into these research questions to identify research trends, state of knowledge, and research findings in the context of entrepreneurial intention in engineering and business students.

2 MATERIALS AND METHODS

The present research was developed using the methodology of bibliometric studies for the search and collection of relevant studies. Also the PRISMA statement (version 2020) [22] was used to report the process and findings identified in the bibliometric meta-analysis [23], [24]. The following are the steps that were followed for the search and collection of data:

2.1 Determine the scope of the meta-analysis

The scope of the meta-analysis was defined by the main study questions. The bibliometric meta-analysis focused on identifying the topics associated with the entrepreneurial intention of engineering and business students. The main sources, authors, and countries publishing on the topic were analyzed. Factors influencing students' entrepreneurial intention were identified.

2.2 Meta-analysis protocol definition

The first element of the protocol [25] was the declaration of the time frame, which was defined as: all publications on the subject that are available in the database until 2023. The second element of the protocol was the definition of the inclusion and exclusion criteria (refer to Table 1).

Table 1. Inclusion and exclusion criteria of publications

Element	Inclusion Criteria	Exclusion Criteria
Context	Engineering or business	Studies conducted in different contexts
Language	English and Spanish	Different from English and Spanish
Period of publication	15 years (2009–2023)	Before 2009 or after 2023
Type of article	Academic journals or conferences	Conference proceedings (individual papers only)
		Duplicates
Thematic	Related to entrepreneurial intent	Not related to entrepreneurial intent

The third element of the protocol was the selection of data sources; for this study, it was defined that the primary sources for the bibliometric meta-analysis would be obtained from the Scopus database. The fourth element of the protocol was the definition of the search terms and the canonical search equation. For the present bibliometric meta-analysis, the search term was defined as the keywords: entrepreneurial intention and the canonical search equation was defined using the logical operator AND, so the equation was "entrepreneurial AND intention" to combine the terms appropriately.

2.3 Conduct the search for papers for meta-analysis

The third step was to search for documents to perform the bibliometric meta-analysis. This was done in three stages: identification, screening, and inclusion of primary sources, as proposed in the PRISMA flowchart [22]. In the identification stage, the search strategy defined in the protocol was implemented. To this end, the Scopus database was searched using the canonical equation defined. The search was performed on the title, abstract, and keywords. From this search, conducted in May 2024, a total of 4941 articles were obtained, after which the database was downloaded in CSV format. With these results, the articles were loaded into the Rayyan software [26], with which 40 data points were identified that were automatically excluded because they did not fit the order of the database, and 21 duplicate data points were identified, leaving a total of 4880 articles to continue with the next stage, as shown in Figure 1.

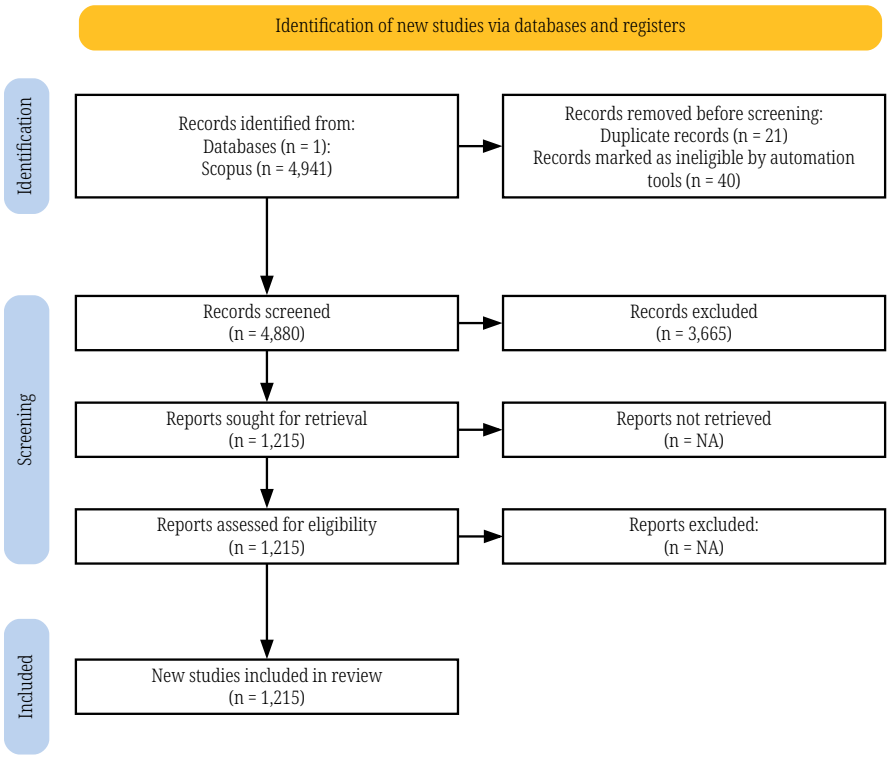

Fig. 1. PRISMA flowchart for bibliometric meta-analysis

During the screening stage, the Rayyan software [26] was used to review the titles and abstracts of the 4880 articles identified. Based on the defined criteria, 3665 articles were excluded for the following reasons: 1623 studies were conducted in different contexts, 48 were written in languages other than English and Spanish, 398 were published before 2009 or after 2023, 534 did not correspond to journal

articles or academic conferences, and 1062 were not directly related to the specific topic of entrepreneurial intention (see Figure 1). Finally, after applying the exclusion criteria, 1215 articles remained to be considered in the inclusion stage (see Figure 1). This allowed a comprehensive review of the literature.

2.4 Data analysis

The 1215 articles were exported in CSV format. This file contained information on authors, article title, year of publication, source, DOI, affiliation, keywords, abstract, references, language, and type of document, among other bibliographic information. To perform the meta-analysis, the R programming language [27], the RStudio platform [28], and the Bibliometrix application [29] were used. These tools allow the development of a comprehensive bibliometric analysis with large volumes of data through citation analysis, collaborative networks, thematic, descriptive, and trend analysis.

2.5 Use of AI tools

To support the writing process of this manuscript, the authors used two AI-based tools. OpenAI's ChatGPT was employed to assist with language refinement and to improve the clarity and coherence of the text. Additionally, DeepL Translator was used to support the translation of the manuscript into English. All content suggested by these tools was carefully reviewed, edited, and approved by the authors to ensure its accuracy, consistency, and alignment with the research objectives.

3 RESULTS OF THE BIBLIOMETRIC META-ANALYSIS

3.1 Description of the information

In this study, a bibliometric meta-analysis approach was used to analyze the evolution of entrepreneurial intention from 2009 to 2023. The study is based on data obtained from academic journals and conference publications. To conduct this meta-analysis, 1215 articles from a wide variety of sources, including 445 journals and conferences, were included. An average annual growth of 30.26% can be seen in Figure 2, reflecting the growing interest in the subject.

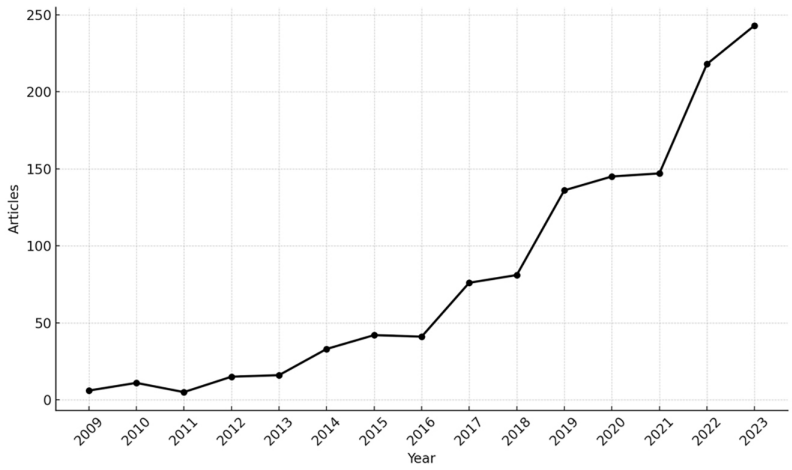

Fig. 2. Annual scientific production

On average, publications have been in circulation for approximately 4.2 years. The highest average number of citations per year, 9.4, citations was reached in 2009, followed by 2014, with an average of 8.5 citations. The publications used a total of 57,452 references. This highlights the importance of the literature on the subject under study. A total of 2067 keywords were identified in the topic of entrepreneurial intention, reflecting the diversity of subtopics and approaches in this field. The total number of articles was written by 3089 authors, of which 117 wrote single-authored articles, representing diverse individual and collaborative perspectives. The average number of collaborations is 3.23 authors per paper, and 25.1% of these collaborations are international, which highlights the collaboration between countries on the subject. Finally, of the total number of publications, 1118 are journal articles and 97 are conference papers.

3.2 Description of sources

Bradford's law is a concept used in bibliometrics and information science. It describes how publications on a specific topic are distributed among sources. The law defines that a small number of sources contain most of the publications that are relevant [30]. Bradford's law classifies articles into three zones; Zone 1 contains the most relevant articles. In this study, Bradford's law places 19 of the 445 sources in Zone 1.

In Figure 3, Zone 1 is highlighted, showing the most relevant sources. In Table 2 the 3 sources that are most relevant according to Bradford's law are presented. The cumulative frequency shows that this group of sources represents 13% of the published articles. The 19 sources in Zone 1 represent 33% of the total of published articles. The journal Frontiers in Psychology stands out with 74 publications, becoming the most relevant source in this database, followed by Sustainability with 49 publications and Education and Training with 36 publications.

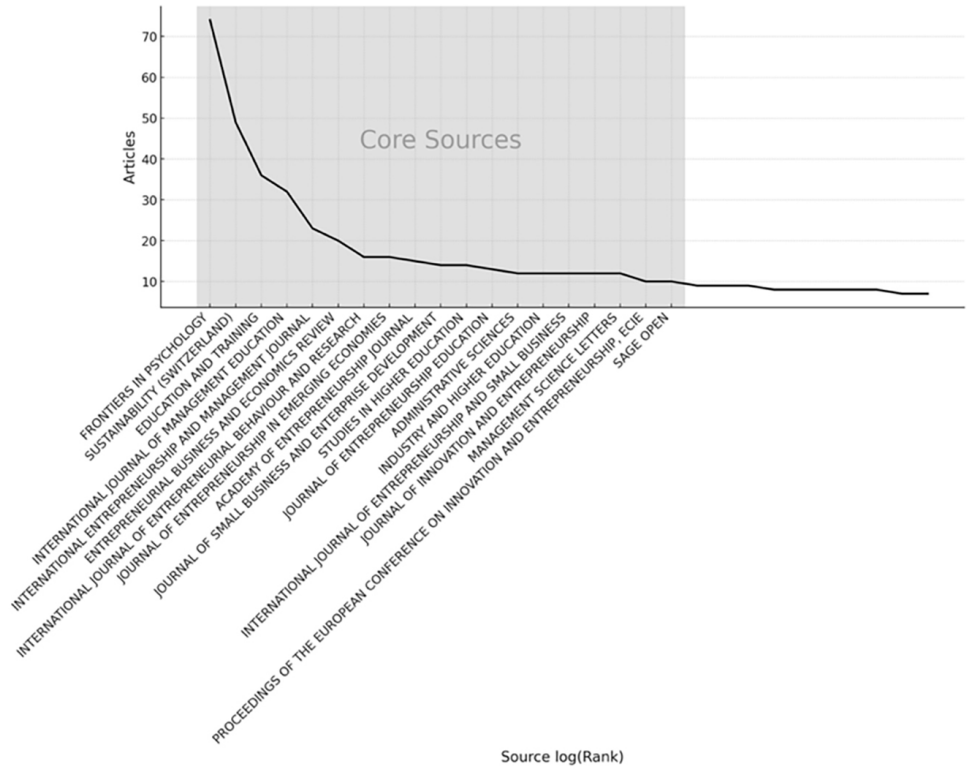

Fig. 3. Major sources according to Bradford's law

The number of publications accumulated from the 19 sources in Zone 1 suggests a strong consolidation of the literature relevant to the study. This makes it possible to focus the search efforts for information about entrepreneurial intention in these journals.

Table 2. The three most relevant sources according to Bradford's Law

Source	Position	Frequency	Cumulative Frequency	Zone
Frontiers in Psychology	1	74	74	Zone 1
Sustainability (Switzerland)	2	49	123	Zone 1
Education and Training	3	36	159	Zone 1

The level of impact and productivity of scientific journals can be measured by various bibliometric indicators. In Table 3 the h, g, and m indexes are shown. These metrics show the level of citations of the publications, which would reflect the influence they have in the academic community.

The h-index is a measure that combines productivity and impact [31]. The journal with the highest h-index (24) is *Education And Training*, meaning that it has 24 publications that have been cited at least 24 times each since 2011. The g-index considers the cumulative impact of citations [32], the journal with the highest g-index (37) is *Frontiers In Psychology*, which means that the 37 most relevant publications have been cited frequently with a total of 1539 citations since 2015. The m-index provides a measure of consistency in impact over time [33], the journal with the highest m-index is *Frontiers In Psychology*, meaning that on average, the journal has added 2.2 h-index articles per year since 2015, indicating recent but rapidly growing scholarly influence. The top three journals in the various indexes are: *Education and Training*, *Frontiers in Psychology*, and *International Journal of Management Education*, which are the same as those highlighted in Figure 3 and Table 2.

Table 3. Impact of the three main sources

Magazine	Index h	Index g	Index m	Total Quotes	Number of Publications	Year of Start of Publication
Education and Training	24	36	1.714	1771	36	2011
Frontiers in Psychology	22	37	2.2	1539	74	2015
International Journal of Management Education	18	32	2	1164	32	2016

3.3 Description of the authors

The relevance of authors in research processes can be determined by the number of publications as well as the quality of their collaborations [34]. The number of articles and the fractional count can show the impact of the authors and their tendency to collaborate. The fractional count is obtained by dividing the publications by the number of co-authors, a lower number suggests greater collaboration, and a higher number suggests more individual contribution [35].

Table 4 presents the four most relevant authors in the study of entrepreneurial intention, each with at least eight published articles. Authors such as Narmaditya, Bagus Shandy (12 articles and 2.57 fractional), and Valencia-Arias (8 articles and

2.50 fractional) tend to collaborate more with other researchers. Unlike authors such as Wibowo, Agus (16 articles and 3.44 fractional); Duong, Cong Doanh (12 articles and 4.63 fractional) who have relatively higher individual participation in each article.

Table 4. The four most relevant authors

Authors	Number of Articles	Fractional Articles
Wibowo, Agus	16	3.44
Duong, Cong Doanh	12	4.63
Narmaditya, Bagus Shandy	12	2.57
Valencia-Arias, Alejandro	8	2.50

The relevance of the authors is not only measured by the number of publications but also by the impact of their publications over time, measured by indicators such as frequency of publication, total citations, and average citations per year. Figure 4 shows the four authors ordered by the number of articles published. Each line represents the timeline of each author, the first to publish was Valencia-Arias, Alejandro, in 2018. The size of each circle is proportional to the number of articles published, it is observed that the authors who published the most per year were Duong, Cong Doanh (6 articles), and Wibowo, Agus (5 articles), both in 2023. The color intensity is proportional to the total citations received; it is observed that the most cited authors were Wibowo, Agus, and Narmaditya, Bagus Shandy (97 citations in 2021).

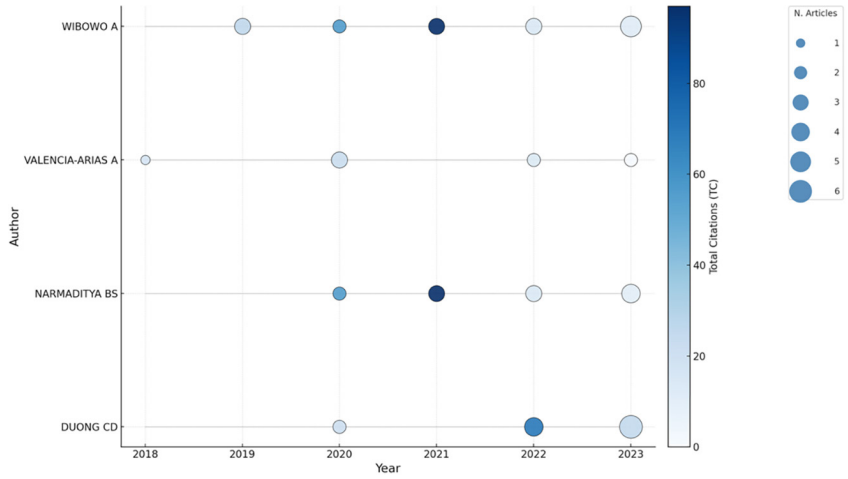

Fig. 4. Authors' production over time

3.4 Description of affiliations and countries of origin

Affiliations refer to the institutions that make the necessary infrastructure and resources available to carry out scientific research. Figure 5 shows the 10 most relevant affiliations in entrepreneurial intent. The most important is the National Economics University with 69 articles, followed by King Faisal University with 37 articles, which positions them as reference institutions in research on entrepreneurial intention. In total, there are 1163 affiliations, however, 607 of them have published only one article, 213 have published two articles, and 141 have published three articles. The ten

affiliations in Figure 5 have published between 19 and 69 articles demonstrating an exceptional dedication and contribution to the study of entrepreneurial intention.

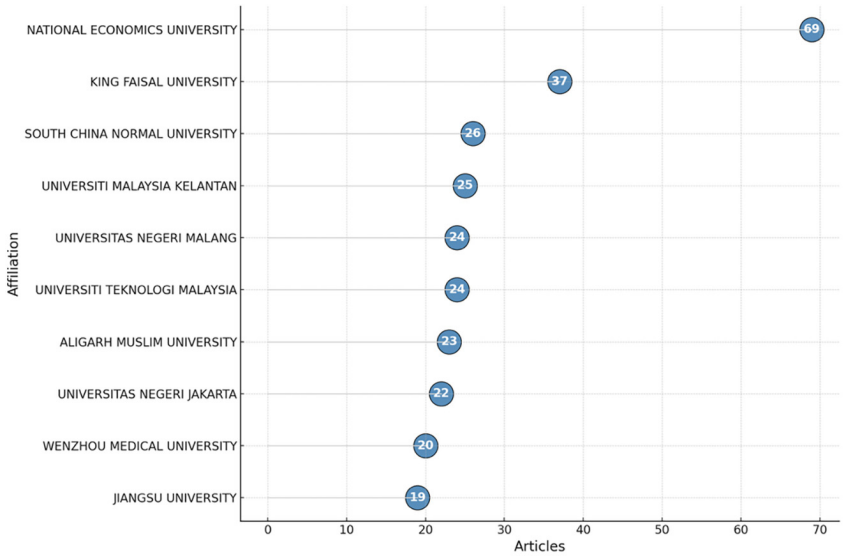

Fig. 5. The most relevant affiliations

The presence of affiliations from various countries such as Vietnam (National Economics University), Saudi Arabia (King Faisal University), China (South China Normal University, Wenzhou Medical University, and Jiangsu University), Malaysia (Universiti Malaysia Kelantan and Universiti Teknologi Malaysia), Indonesia (Universitas Negeri Malang and Universitas Negeri Jakarta), and India (Aligarh Muslim University) demonstrates the global interest and relevance of the study of entrepreneurial intention. Figure 6 shows that there is a global interest in publishing on the topic of entrepreneurial intention. The intensity of the color shows the number of articles published per country in 2023. The ten countries with the highest scientific production in 2023 on entrepreneurial intention were China, leading with 459 publications, followed by Malaysia with 352, Spain with 290, Indonesia with 270, India with 176, the United States with 125, Pakistan with 124, Colombia with 120, Saudi Arabia with 107 and Portugal with 103 publications.

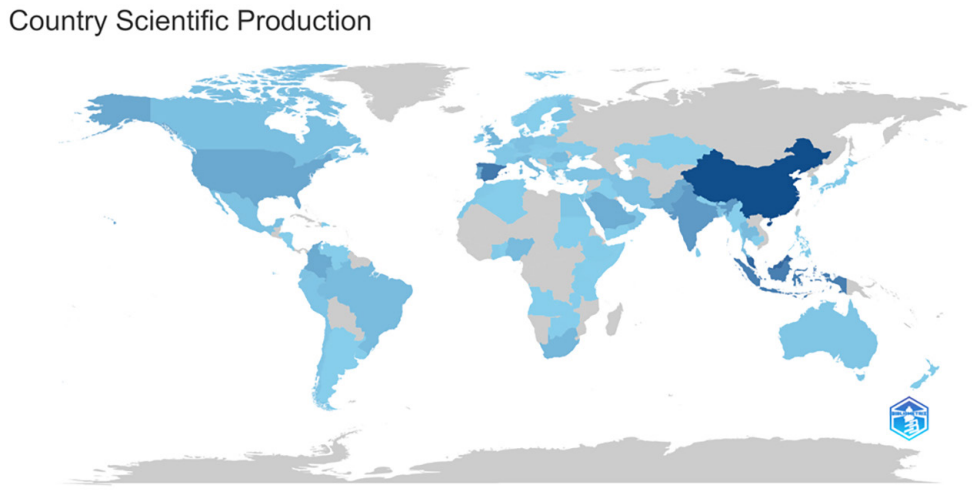

Fig. 6. Scientific production by country in 2023

3.5 Co-occurrence network analysis

It is a graphical interpretation used in bibliometric studies to show how terms and concepts are related in the same context [36]. Figure 7 shows the co-occurrence network of the analyzed articles; it is a network in which the nodes represent the keywords, and the links between them represent the frequency with which these co-occur in the same set of publications [37]. The size of the nodes is related to the frequency of co-occurrence; a larger node suggests that the keywords co-occur more frequently. The node with the top term is entrepreneurial intention.

In the co-occurrence network, there are six main clusters, identified by colors. The blue represents the first cluster and contains the main node on entrepreneurial intention; it is related to terms such as theory of planned behavior and entrepreneurial education. Red represents the second group; the largest node is entrepreneurship, related to terms such as attitude and education. Green represents the third cluster and includes terms such as need for achievement and innovativeness. Purple represents the fourth cluster and only has the term social entrepreneurial intention. Orange represents the fifth group and only has the social capital node. Finally, Brown represents the sixth group that only has the term social entrepreneurship.

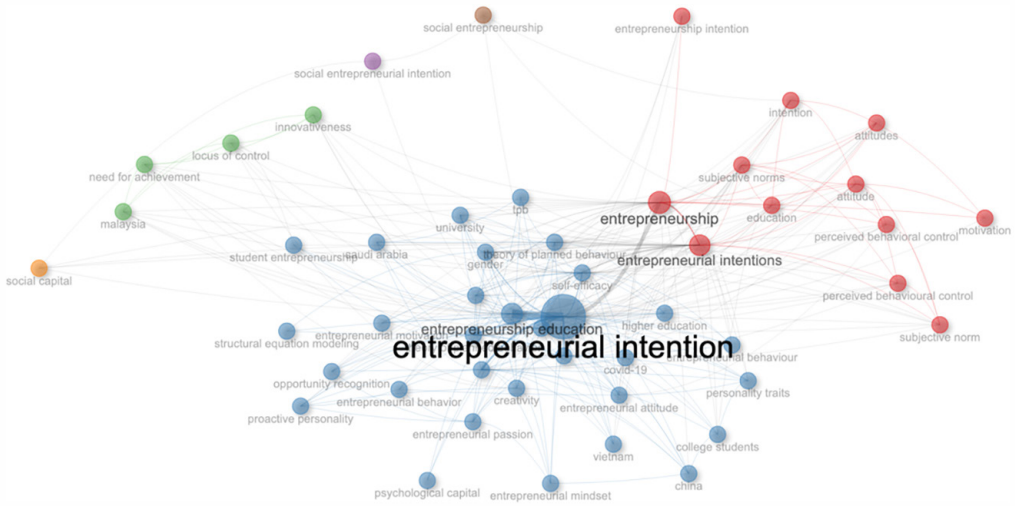

Fig. 7. Keyword co-occurrence network

3.6 Thematic map analysis

It is a technique used in bibliometric analysis to visualize and understand the evolution of a field of study, as well as to identify trends and emerging areas [38]. It involves creating thematic maps that represent the relationship between various topics in the field of study and that allow the development of a field of study to be evaluated [39]. In the thematic map, topics are grouped based on the frequency and co-occurrence of keywords. The X-axis represents the relevance degree (centrality) of a topic, and the Y-axis represents the development degree (density) of a topic. Four quadrants are also presented motor themes, niche themes, emerging themes, and basic themes [40].

The thematic map of entrepreneurial intention is shown in Figure 8. Four main clusters are observed. In the quadrant of motor themes, there is the theme of need for achievement, this quadrant represents themes with high centrality and high density, they are central themes in the field of study. In the niche themes quadrant, there are the themes of green entrepreneurial intention [41], social entrepreneurial intention, and innovativeness, these are themes that are not well connected with the other ones but are important within their niche. In the emerging themes quadrant is the theme of entrepreneurial intention, representing topics of interest for study. Finally, in the basic themes box are the themes of entrepreneurial intention and COVID-19, these are important themes but are not fully developed.

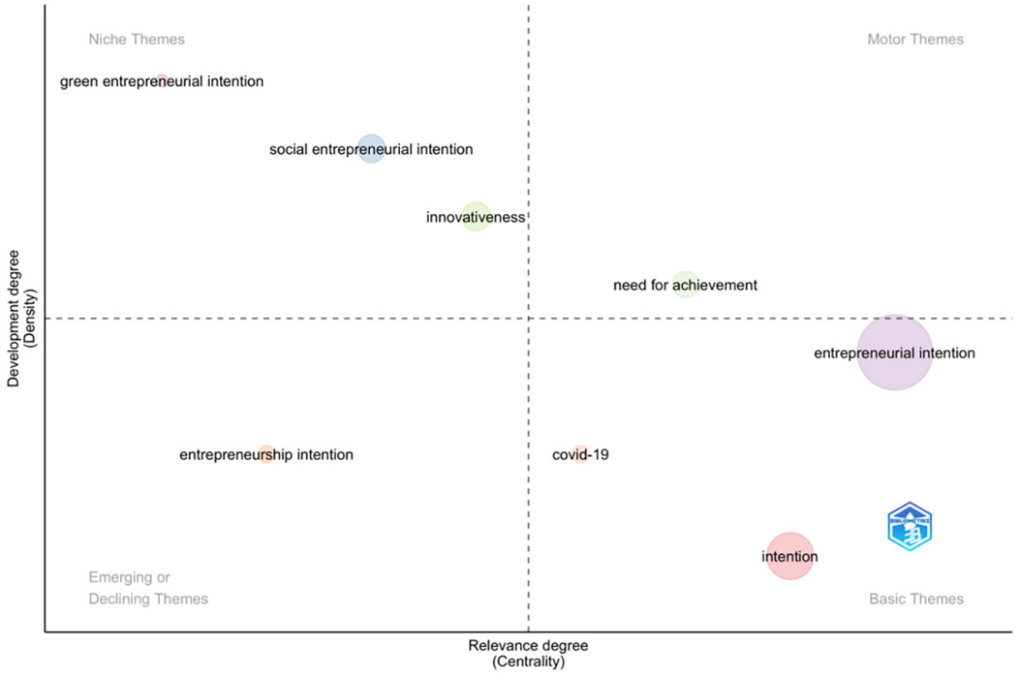

Fig. 8. Thematic map

3.7 Analysis of the thematic evolution

Figure 9 presents the thematic evolution over time, considering the keywords of the published articles. It provides an understanding of the changes and continuous evolution of the themes around entrepreneurial intention, as well as the discovery of emerging themes over time. In the 2009–2013 period, the main themes were entrepreneurial self-efficacy, entrepreneurial intention, and attitude toward entrepreneurship (theory of planned behavior). This period shows a strong emphasis on entrepreneurial self-efficacy, as well as the relationship between entrepreneurial intentions and the attitude towards entrepreneurship (theory of planned behavior). In the 2014–2018 period the main themes were entrepreneurial intention, entrepreneurial education, personality traits, and contextual conditions. Entrepreneurial intention remains an important and central theme. In 2019–2023 entrepreneurial intention remains the central theme.

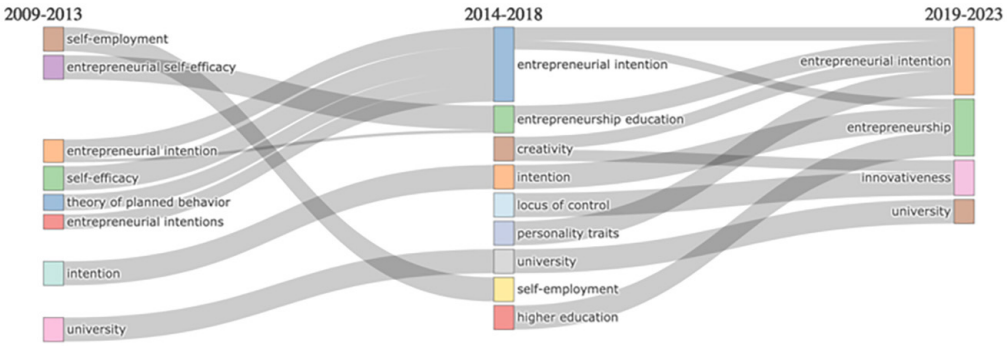

Fig. 9. Evolution of the subject matter over time

Entrepreneurial intention was a constant and central theme throughout the three periods, reflecting its importance in the research. Entrepreneurial self-efficacy and attitude toward entrepreneurship appear as a relevant theme in 2009–2013. Entrepreneurial education, personality traits, and contextual conditions appear as relevant themes in 2014–2018 and evolve in the following period, 2019–2023, indicating interest in its study. Throughout the time of analysis, entrepreneurial intention has presented a thematic evolution, resulting in academic enrichment, deep understanding, and study of emerging elements.

4 DISCUSSION

This study focused on identifying the factors that influence the entrepreneurial intention of engineering and business students according to educational and socio-economic context through a bibliometric meta-analysis. In this section, a discussion will be made based on the most cited publications from the main sources, considered relevant by their frequency, by Bradford's law [30], index h [31], index g [32], index m [33]; also, the main authors are considered relevant by the number of published articles, and likewise, the main affiliations by country are considered relevant by the number of published articles.

4.1 Main determinants of entrepreneurial intention

Entrepreneurial self-efficacy. Entrepreneurial self-efficacy among students has a significant positive effect on entrepreneurial attitude and entrepreneurial intention [6], [42], [43], [44]. Likewise, it has been shown that entrepreneurial self-efficacy has a significant effect on perceived behavioral control [45] and plays an important role in explaining how entrepreneurial education is related to entrepreneurial intention [46]. Moreover, self-efficacy mediates the relationship between entrepreneurial personality traits and entrepreneurial intention [47]. The most commonly used factors to assess entrepreneurial intention in engineering and business students were: self-efficacy, entrepreneurial attitude, motivation, and subjective norms [48]. Another article shows that entrepreneurial attitude plays a partial intermediary role in the relationship between entrepreneurial self-efficacy and entrepreneurial intention [6]. The results also indicated that educational support, conceptual support, and national support for entrepreneurship exerted a positive influence on entrepreneurial self-efficacy, which in turn positively affected entrepreneurial intention [49].

Attitude toward entrepreneurship. The results showed that entrepreneurial attitude has a significant role in mediating the relationship between culture, education, and entrepreneurial intention [50]. It was evidenced that entrepreneurs are characterized by having a positive attitude and aptitude toward entrepreneurship [51]. Findings suggest that a positive attitude toward entrepreneurship significantly influences entrepreneurial intention [47] and also that attitudes, subjective norms, and perceived behavioral control mediate the relationship between perceived motivation and entrepreneurship [15], [45], [52], [53], [54], [55], [56], [57], [58], [59], [60]. One study even showed that attitude toward entrepreneurship played a more important role than entrepreneurial intention in shaping entrepreneurial start-up behavior [61]. The results revealed that the need for achievement and risk-taking propensity significantly affect attitudes toward entrepreneurship [60], [62]. Another study showed that engineering and business students who perceive higher risk tend to show lower entrepreneurial intentions [63].

Personality traits. Personality traits have a significant impact on entrepreneurial attitude, especially self-efficacy [52]. The results revealed that a proactive personality has a significant moderating effect between entrepreneurial intention and entrepreneurial behavior [14]. Personality traits such as the need for achievement and locus of control are positively correlated with self-efficacy and entrepreneurial intention [52], [64], especially locus of control strengthens the relationship between entrepreneurial intention and action [65]. Psychological attributes such as ability retention, innovativeness, self-confidence, and tolerance for ambiguity positively influence entrepreneurial intention [66]. Other personality traits such as emotional stability, interpersonal relationships, and extroversion were positively linked to entrepreneurial intention. The role of personality as a predictor of entrepreneurial intention is highlighted [67]. The results also showed that the dark triad (narcissism, psychopathy, and Machiavellianism) positively predicts entrepreneurial intention and that entrepreneurial self-efficacy has a mediating effect on the relationship between the dark triad and entrepreneurial intention [68].

Contextual conditions. As a contextual factor, it was revealed that perceived support from the university had a significant effect on students' attitudes towards entrepreneurship, as well as on behavioral control [69]. Country norms are considered the most influential factor in entrepreneurial intention, followed by social capital, attitude, and self-efficacy [70]. Government policies and programs supporting entrepreneurship reinforce the connections between: attitude, intention, and entrepreneurial behavior [61]. Family economic education and peer groups are positively correlated with entrepreneurial intention [71], and saving behavior influences entrepreneurial intention [72]. National context has a significant effect on the relationship between education and entrepreneurial intention [73]. Family support was also shown to moderate the relationship between entrepreneurial intention and entrepreneurial behavior [74]. It was also shown that the regulatory dimension negatively affected entrepreneurial intention, but the normative dimension positively motivated it [75].

Entrepreneurial education. The findings indicate that entrepreneurial education has a significant positive effect on students' entrepreneurial intention [6], [42], [46], [76], [77], [78]. It was revealed that students who participate in entrepreneurship programs tend to have higher motivation toward entrepreneurship and are more likely to become entrepreneurs [53]. Another study also showed that participation in entrepreneurial education in general is associated with higher entrepreneurial intention [79]. Other studies have demonstrated that both entrepreneurial education and entrepreneurial culture are positively related to students' entrepreneurial

mindset, which accelerates their entrepreneurial intention [80]. Furthermore, the results showed that entrepreneurial education has a direct effect on entrepreneurial attitude and behavior [61].

4.2 Predominant models used to study entrepreneurial intention

The predominant models used to study entrepreneurial intention were the theory of planned behavior [6], [81], [45], [69], [82], [53], [83], [77], [54], [84], [44], [47], entrepreneurial event theory [83], [77], [79], psychological attributes theory [85], [79], human capital theory [85], [79], self-determination theory [85], [54] and entrepreneurial cognition theory [77].

4.3 Main findings in engineering and business students

The results showed that students from developing countries have stronger entrepreneurial intentions than students from developed countries [82]. It was evidenced that access to resources had a strong effect on entrepreneurial intention by increasing perceived norms, which increases positive attitudes and perceived control [86]. It was revealed that students who participate in entrepreneurship programs tend to have a higher motivation towards entrepreneurship and are more likely to be entrepreneurs [53]. It was also shown that entrepreneurship education programs should be differentiated for business students and students from other fields, as it impacts them differently [85]. Study results showed that students' perception of the entrepreneurial ecosystem affects entrepreneurial intention [87]. Entrepreneurial self-efficacy and opportunity recognition showed a significant impact on students' entrepreneurial intentions [43]. It was also revealed that there are significant positive effects of gender, type of university where students study, and major of study on the relationship between entrepreneurial education and entrepreneurial intention [77].

4.4 Relationship between entrepreneurial education and entrepreneurial intention

The results of the studies show that college education [15], [88] and entrepreneurial education [73], [89], [90], [91], [92], [93] have a positive and significant effect on students' entrepreneurial intention [6], [42], [46], [76], [77], [78]. They also show that entrepreneurial education increased entrepreneurial intention through attitude toward entrepreneurship and perceived behavioral control [55], [75], [94]. On the other hand, entrepreneurial education has a moderating role between personality traits and entrepreneurial intention [3], another study points out that it also moderates the relationship between self-efficacy and entrepreneurial intention [43]. The results suggest that entrepreneurial education should focus on fostering creativity and entrepreneurial self-efficacy, as well as encouraging entrepreneurial intention and developing an entrepreneurial mindset [45]. It was found that there are three components of entrepreneurship education programs that influence entrepreneurial intention: learning, inspiration, and resources [86]. Another study highlights the importance of entrepreneurship education being based on successful entrepreneurial role models to positively influence entrepreneurial attitudes and intentions [85]. It was shown that entrepreneurial training programs based on active learning

had an important role in significantly improving entrepreneurial intention [66]. Finally, another finding is related to faculty competencies. A moderate and positive correlation between teachers' competencies and students' entrepreneurial intention was shown [95].

5 LIMITATIONS

Despite the extensive bibliometric meta-analysis conducted, this study has some limitations. First, the review was limited to articles indexed in the Scopus database; therefore, articles from other databases were not included. Second, the focus of this study was restricted to articles on engineering and business students. Although these groups are of special interest in the study of entrepreneurial intention, the exclusion of students from other disciplines limits the generalizability of the results. These limitations, therefore, represent an opportunity for future research.

6 FUTURE RESEARCH DIRECTIONS

Based on the scope and findings of this study, future research could address several areas that remain open for exploration. Firstly, it would be useful to include articles from other databases to broaden the perspective and include studies that may provide additional insights. This would contribute to a more comprehensive understanding of entrepreneurial intentions at a global level. Secondly, future studies should also include students from other academic disciplines. Identifying the specific determinants of entrepreneurial intention in each field and assessing whether there are significant differences between groups would provide a deeper and more nuanced understanding of how academic background influences entrepreneurial intention. Thirdly, research on emerging topics such as sustainability, digital entrepreneurship, and virtual learning environments could provide new insights into the factors influencing entrepreneurial intention in contemporary contexts. Lastly, it is important to expand studies in regions with low scientific production, especially Central America, to strengthen the global perspective on entrepreneurial intentions and include perspectives from underrepresented contexts.

7 CONCLUSION

Key topics related to entrepreneurial intention include entrepreneurial education, entrepreneurial self-efficacy, entrepreneurial culture, attitude towards entrepreneurship, contextual factors, cultural factors, psychological factors, and personality traits. The most relevant authors by the number of articles published, number of citations received to their work, h, g, and m indexes, were: Wibowo, Agus (Indonesia); Valencia-Arias, Alejandro (Colombia); Duong, Cong Doanh (Vietnam); Anwar, Imran (India); and Alshebami, Ali Saleh (Saudi Arabia). Scientific production on entrepreneurial intention has been constant in recent years. The topic is of international interest since an average annual growth of 30.26% in annual scientific publications has been observed. The year 2023 was the year of the highest scientific production with 243 articles published, and 2009 was the year with the highest average number of citations. The main determinants of entrepreneurial intention were entrepreneurial self-efficacy, attitude toward entrepreneurship, personality

traits, contextual conditions, and entrepreneurial education. The predominant models used to study entrepreneurial intention were the theory of planned behavior, entrepreneurial event theory, psychological attributes theory, human capital theory, self-determination theory, and entrepreneurial cognition theory. The main findings in engineering and business students were that students from developing countries tend to have higher entrepreneurial intentions than students from developed countries. Research on the subject in Central America is limited, only 1% of studies have been conducted in the region. However, there is a growing interest in understanding the socioeconomic and educational conditions that influence entrepreneurial intention, which represents an important opportunity to study the subject in the region and contribute to the growth of international literature. The relationship between entrepreneurial education and entrepreneurial intention reveals that entrepreneurial education has a positive, direct, and significant effect on students' entrepreneurial intentions, students who participate in entrepreneurship programs tend to have higher entrepreneurial intentions. These findings show the diversity and complexity of the factors that influence entrepreneurial intention in engineering and business students, highlighting the need for studies that identify best practices to promote entrepreneurial intention, from the role of educational programs to the role of students' economic, social, cultural, and family contexts.

8 REFERENCES

[1] E. Fiore, G. Sansone, and E. Paolucci, "Entrepreneurship education in a multidisciplinary environment: Evidence from an entrepreneurship programme held in Turin," *Adm. Sci.*, vol. 9, no. 1, p. 28, 2019. https://doi.org/10.3390/admsci9010028

[2] Y. H. Al-Mamary and M. Alshallaqi, "Impact of autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness on students' intention to start a new venture," *J. Innov. Knowl.*, vol. 7, no. 4, p. 100239, 2022. https://doi.org/10.1016/j.jik.2022.100239

[3] S. F. F. B. Shamsudin, A. A. Mamun, N. B. C. Nawi, N. A. B. M. Nasir, and M. N. B. Zakaria, "Factors influencing entrepreneurial intention and the moderating role of entrepreneurship education: A conceptual model," *Adv. Sci. Lett.*, vol. 23, no. 4, pp. 3006–3008, 2017. https://doi.org/10.1166/asl.2017.7635

[4] A. I. Vodă and N. Florea, "Impact of personality traits and entrepreneurship education on entrepreneurial intentions of business and engineering students," *Sustainability*, vol. 11, no. 4, p. 1192, 2019. https://doi.org/10.3390/su11041192

[5] M. O. Idris, B. S. Adeboye, O. A. Adeyemi, M. O. Abanikannda, N. A. Lawal, and M. O. Lawal, "Assessment of engineering entrepreneurship intentions among engineering students of osun state university, Nigeria," *Int. J. Eng. Pedagogy IJEP*, vol. 12, no. 4, pp. 85–97, 2022. https://doi.org/10.3991/ijep.v12i4.30111

[6] X. Liu, C. Lin, G. Zhao, and D. Zhao, "Research on the effects of entrepreneurial education and entrepreneurial self-efficacy on college students' entrepreneurial intention," *Front. Psychol.*, vol. 10, p. 869, 2019. https://doi.org/10.3389/fpsyg.2019.00869

[7] M. Villanueva-Flores, D. Hernández-Roque, M. Díaz-Fernández, and M. Bornay-Barrachina, "Exploring the mediation role of perceived behavioural control and subjective norms in the relationship between psychological capital and entrepreneurial intention of university students," *Int. J. Manag. Educ.*, vol. 21, no. 3, p. 100865, 2023. https://doi.org/10.1016/j.ijme.2023.100865

[8] M. Arias and M. Flad, "Exploring the factors influencing entrepreneurial intentions of engineering students: A comparative study," *Int. J. Eng. Pedagogy IJEP*, vol. 15, no. 1, pp. 109–124, 2025. https://doi.org/10.3991/ijep.v15i1.48543

[9] M. Fallast and S. Vorbach, "The entrepreneurial student's experience journey through engineering education," *Int. J. Eng. Pedagogy IJEP*, vol. 9, no. 4, p. 121, 2019. https://doi.org/10.3991/ijep.v9i4.10216

[10] P. Holzmann, E. Hartlieb, and M. Roth, "From engineer to entrepreneur – entrepreneurship education for engineering students: The case of the entrepreneurial campus villach," *Int. J. Eng. Pedagogy IJEP*, vol. 8, no. 3, pp. 28–39, 2018. https://doi.org/10.3991/ijep.v8i3.7942

[11] J. DeWaters and B. Kotla, "Growing the entrepreneurial mindset in first year engineering students using sociotechnical design challenges," *Int. J. Eng. Pedagogy IJEP*, vol. 13, no. 7, pp. 24–49, 2023. https://doi.org/10.3991/ijep.v13i7.41667

[12] L. Bosman, N. Duval-Couetil, B. Mayer, and P. McNamara, "Using online discussions to develop the entrepreneurial mindset in environmental engineering undergraduates: A case study," *Int. J. Eng. Pedagogy IJEP*, vol. 9, no. 3, p. 4, 2019. https://doi.org/10.3991/ijep.v9i3.9491

[13] P. Zhang, D. D. Wang, and C. L. Owen, "A study of entrepreneurial intention of university students," *Entrep. Res. J.*, vol. 5, no. 1, 2015. https://doi.org/10.1515/erj-2014-0004

[14] C. Li, M. Murad, F. Shahzad, M. A. S. Khan, S. F. Ashraf, and C. S. K. Dogbe, "Entrepreneurial passion to entrepreneurial behavior: Role of entrepreneurial alertness, entrepreneurial self-efficacy and proactive personality," *Front. Psychol.*, vol. 11, p. 1611, 2020. https://doi.org/10.3389/fpsyg.2020.01611

[15] M. M. Aliedan, I. A. Elshaer, M. A. Alyahya, and A. E. E. Sobaih, "Influences of university education support on entrepreneurship orientation and entrepreneurship intention: Application of theory of planned behavior," *Sustainability*, vol. 14, no. 20, p. 13097, 2022. https://doi.org/10.3390/su142013097

[16] A. Mishra and P. Singh, "Attitude, subjective norms, and perceived behavioural control as predictors of entrepreneurial intentions among engineering students," *Prabandhan Indian J. Manag.*, vol. 15, no. 5, p. 43, 2022. https://doi.org/10.17010/pijom/2022/v15i5/169580

[17] B. A. Soomro, G. R. Lakhan, S. Mangi, and N. Shah, "Predicting entrepreneurial intention among business students of public sector universities of Pakistan: An application of the entrepreneurial event model," *World J. Entrep. Manag. Sustain. Dev.*, vol. 16, no. 3, pp. 219–230, 2020. https://doi.org/10.1108/WJEMSD-11-2019-0092

[18] A. Garcez and M. Franco, "Effects of psychological and cognitive factors on the relation between entrepreneurial intention and academic hazing: Case of the new students in the faculty of social and human sciences at the university of Beira – Portugal," *Entrep. Res. J.*, vol. 13, no. 2, pp. 409–437, 2023. https://doi.org/10.1515/erj-2020-0351

[19] D. Atmono *et al.*, "The effect of entrepreneurial education on university student's entrepreneurial self-efficacy and entrepreneurial intention," *Int. J. Eval. Res. Educ. IJERE*, vol. 12, no. 1, p. 495, 2023. https://doi.org/10.11591/ijere.v12i1.23262

[20] S. Vivekananth, L. Indiran, and U. H. Abdul Kohar, "The influence of entrepreneurship education on university students' entrepreneurship self-efficacy and entrepreneurial intention," *J. Tech. Educ. Train.*, vol. 15, no. 4, pp. 129–142, 2023. https://doi.org/10.30880/jtet.2023.15.04.011

[21] M. Petticrew and H. Roberts, *Systematic Reviews in the Social Sciences: A Practical Guide*, 1st ed. London: Wiley, 2006. https://doi.org/10.1002/9780470754887

[22] M. J. Page *et al.*, "Declaración PRISMA 2020: una guía actualizada para la publicación de revisiones sistemáticas," *Rev. Esp. Cardiol.*, vol. 74, no. 9, pp. 790–799, 2021. https://doi.org/10.1016/j.recesp.2021.06.016

[23] F. J. García-Peñalvo, "Desarrollo de estados de la cuestión robustos: Revisiones Sistemáticas de Literatura," *Educ. Knowl. Soc. EKS*, vol. 23, p. e28600, 2022. https://doi.org/10.14201/eks.28600

[24] A. Vazquez-Ingelmo, F. J. Garcia-Penalvo, and R. Theron, "Information dashboards and tailoring capabilities – A systematic literature review," *IEEE Access*, vol. 7, pp. 109673–109688, 2019. https://doi.org/10.1109/ACCESS.2019.2933472

[25] L. Shamseer *et al.*, "Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: Elaboration and explanation," *BMJ*, vol. 349, no. 1, p. g7647, 2015. https://doi.org/10.1136/bmj.g7647

[26] M. Ouzzani, H. Hammady, Z. Fedorowicz, and A. Elmagarmid, "Rayyan—a web and mobile app for systematic reviews," *Syst. Rev.*, vol. 5, no. 1, p. 210, 2016. https://doi.org/10.1186/s13643-016-0384-4

[27] R Core Team, *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. [Online], 2024. Available at: https://www.R-project.org/

[28] Posit team, *RStudio: Integrated Development Environment for R*. Posit Software, PBC, Boston, MA. [Online], 2024. Available at: http://www.posit.co/

[29] M. Aria and C. Cuccurullo, "bibliometrix: An R-tool for comprehensive science mapping analysis," *J. Informetr.*, vol. 11, no. 4, pp. 959–975, 2017. https://doi.org/10.1016/j.joi.2017.08.007

[30] R. U. Alvarado, "El crecimiento de la literatura sobre la ley de Bradford," *Investig. Bibl. Arch. Bibliotecol. E Inf.*, vol. 30, no. 68, pp. 51–72, 2016. https://doi.org/10.1016/j.ibbai.2016.02.003

[31] L. Egghe and R. Rousseau, "An h-index weighted by citation impact," *Inf. Process. Manag.*, vol. 44, no. 2, pp. 770–780, 2008. https://doi.org/10.1016/j.ipm.2007.05.003

[32] L. Egghe, "Theory and practise of the g-index," *Scientometrics*, vol. 69, no. 1, pp. 131–152, 2006. https://doi.org/10.1007/s11192-006-0144-7

[33] M. Ndwandwe, D. G. Bishop, R. Wise, and R. Rodseth, "Bibliometrics to assess the productivity and impact of medical research," *South Afr. J. High. Educ.*, vol. 35, no. 4, 2021. https://doi.org/10.20853/35-4-4341

[34] T. Breuer, P. Schaer, and D. Tunger, "Relevance assessments, bibliometrics, and altmetrics: A quantitative study on PubMed and arXiv," *Scientometrics*, vol. 127, no. 5, pp. 2455–2478, 2022. https://doi.org/10.1007/s11192-022-04319-4

[35] A. Perianes-Rodriguez, L. Waltman, and N. J. Van Eck, "Constructing bibliometric networks: A comparison between full and fractional counting," *J. Informetr.*, vol. 10, no. 4, pp. 1178–1195, 2016. https://doi.org/10.1016/j.joi.2016.10.006

[36] M. Feicheng and L. Yating, "Utilising social network analysis to study the characteristics and functions of the co-occurrence network of online tags," *Online Inf. Rev.*, vol. 38, no. 2, pp. 232–247, 2014. https://doi.org/10.1108/OIR-11-2012-0124

[37] S. Radhakrishnan, S. Erbis, J. A. Isaacs, and S. Kamarthi, "Novel keyword co-occurrence network-based methods to foster systematic reviews of scientific literature," *PLoS ONE*, vol. 12, no. 3, p. e0172778, 2017. https://doi.org/10.1371/journal.pone.0172778

[38] R. Farooq, "Mapping the field of knowledge management: A bibliometric analysis using R," *VINE J. Inf. Knowl. Manag. Syst.*, vol. 53, no. 6, pp. 1178–1206, 2023. https://doi.org/10.1108/VJIKMS-06-2021-0089

[39] A. Parlina, K. Ramli, and H. Murfi, "Theme mapping and bibliometrics analysis of one decade of big data research in the scopus database," *Information*, vol. 11, no. 2, p. 69, 2020. https://doi.org/10.3390/info11020069

[40] M. J. Cobo, A. G. López-Herrera, E. Herrera-Viedma, and F. Herrera, "Science mapping software tools: Review, analysis, and cooperative study among tools," *J. Am. Soc. Inf. Sci. Technol.*, vol. 62, no. 7, pp. 1382–1402, 2011. https://doi.org/10.1002/asi.21525

[41] A. S. Alshebami, M. S. Alholiby, I. A. Elshaer, A. E. E. Sobaih, and S. H. Al Marri, "Examining the relationship between green mindfulness, spiritual intelligence, and environmental self identity: Unveiling the path to green entrepreneurial intention," *Adm. Sci.*, vol. 13, no. 10, p. 226, 2023. https://doi.org/10.3390/admsci13100226

[42] G. Asimakopoulos, V. Hernández, and J. Peña Miguel, "Entrepreneurial intention of engineering students: The role of social norms and entrepreneurial self-efficacy," *Sustainability*, vol. 11, no. 16, p. 4314, 2019. https://doi.org/10.3390/su11164314

[43] A. Hassan, I. Saleem, I. Anwar, and S. A. Hussain, "Entrepreneurial intention of Indian university students: The role of opportunity recognition and entrepreneurship education," *Educ. Train.*, vol. 62, nos. 7/8, pp. 843–861, 2020. https://doi.org/10.1108/ET-02-2020-0033

[44] C. L. Shook and C. Bratianu, "Entrepreneurial intent in a transitional economy: An application of the theory of planned behavior to Romanian students," *Int. Entrep. Manag. J.*, vol. 6, no. 3, pp. 231–247, 2010. https://doi.org/10.1007/s11365-008-0091-2

[45] Y. Shi, T. Yuan, R. Bell, and J. Wang, "Investigating the relationship between creativity and entrepreneurial intention: The moderating role of creativity in the theory of planned behavior," *Front. Psychol.*, vol. 11, p. 1209, 2020. https://doi.org/10.3389/fpsyg.2020.01209

[46] G. Hoang, T. T. T. Le, A. K. T. Tran, and T. Du, "Entrepreneurship education and entrepreneurial intentions of university students in Vietnam: The mediating roles of self-efficacy and learning orientation," *Educ. Train.*, vol. 63, no. 1, pp. 115–133, 2020. https://doi.org/10.1108/ET-05-2020-0142

[47] R. Roy, F. Akhtar, and N. Das, "Entrepreneurial intention among science & technology students in India: Extending the theory of planned behavior," *Int. Entrep. Manag. J.*, vol. 13, no. 4, pp. 1013–1041, 2017. https://doi.org/10.1007/s11365-017-0434-y

[48] A. Valencia Arias, I. Montoya Restrepo, and A. Montoya Restrepo, "Intención emprendedora en estudiantes universitarios: Un estudio bibliométrico," *Intang. Cap.*, vol. 12, no. 4, p. 881, 2016. https://doi.org/10.3926/ic.730

[49] A. Alvarez-Risco, S. Mlodzianowska, V. García-Ibarra, M. A. Rosen, and S. Del-Aguila-Arcentales, "Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of ecuador," *Sustainability*, vol. 13, no. 11, p. 6447, 2021. https://doi.org/10.3390/su13116447

[50] L. W. Wardana, B. S. Narmaditya, A. Wibowo, Fitriana, T. T. Saraswati, and R. Indriani, "Drivers of entrepreneurial intention among economics students in Indonesia," *Entrep. Bus. Econ. Rev.*, vol. 9, no. 1, pp. 61–74, 2021. https://doi.org/10.15678/EBER.2021.090104

[51] J. A. Torres Velásquez *et al.*, "Characterization of entrepreneurial intention in university students as from systemic entrepreneurship intention model: A case study," *Cuad. Gest.*, vol. 18, no. 2, pp. 95–114, 2018. https://doi.org/10.5295/cdg.160670jt

[52] I. Anwar, M. T. Jamal, I. Saleem, and P. Thoudam, "Traits and entrepreneurial intention: Testing the mediating role of entrepreneurial attitude and self-efficacy," *J Int. Bus. Entrep. Dev.*, vol. 13, no. 1, p. 40, 2021. https://doi.org/10.1504/JIBED.2021.112276

[53] M. Z. Solesvik, "Entrepreneurial motivations and intentions: Investigating the role of education major," *Educ. Train.*, vol. 55, no. 3, pp. 253–271, 2013. https://doi.org/10.1108/00400911311309314

[54] I. Al-Jubari, A. Hassan, and F. Liñán, "Entrepreneurial intention among University students in Malaysia: Integrating self-determination theory and the theory of planned behavior," *Int. Entrep. Manag. J.*, vol. 15, no. 4, pp. 1323–1342, 2019. https://doi.org/10.1007/s11365-018-0529-0

[55] C. D. Duong, "Exploring the link between entrepreneurship education and entrepreneurial intentions: The moderating role of educational fields," *Educ. Train.*, vol. 64, no. 7, pp. 869–891, 2022. https://doi.org/10.1108/ET-05-2021-0173

[56] A. S. Alshebami, A. H. A. Seraj, and E. Alzain, "Lecturers' creativity and students' entrepreneurial intention in Saudi Arabia," *Vis. J. Bus. Perspect.*, 2022. https://doi.org/10.1177/09722629221099596

[57] S. Joensuu-Salo, A. Viljamaa, and E. Varamäki, "Sustainable entrepreneurs of the future: The interplay between educational context, sustainable entrepreneurship competence, and entrepreneurial intentions," *Adm. Sci.*, vol. 12, no. 1, p. 23, 2022. https://doi.org/10.3390/admsci12010023

[58] S. Joensuu-Salo, A. Viljamaa, and E. Varamäki, "Understanding business takeover intentions—The role of theory of planned behavior and entrepreneurship competence," *Adm. Sci.*, vol. 11, no. 3, p. 61, 2021. https://doi.org/10.3390/admsci11030061

[59] H. Mei, Z. Zhan, P. S. W. Fong, T. Liang, and Z. Ma, "Planned behaviour of tourism students' entrepreneurial intentions in China," *Appl. Econ.*, vol. 48, no. 13, pp. 1240–1254, 2016. https://doi.org/10.1080/00036846.2015.1096006

[60] H. A. Bazkiaei, N. U. Khan, A.-R. Irshad, and A. Ahmed, "Pathways toward entrepreneurial intention among Malaysian universities' students," *Bus. Process Manag. J.*, vol. 27, no. 4, pp. 1009–1032, 2021. https://doi.org/10.1108/BPMJ-01-2021-0021

[61] C. D. Duong, K. Wach, N. X. Vu, S. T. Ha, and B. N. Nguyen, "Entrepreneurial education, government policies and programmes, and entrepreneurial behaviour: A serial moderated mediation model," *Entrep. Bus. Econ. Rev.*, vol. 10, no. 4, pp. 37–54, 2022. https://doi.org/10.15678/EBER.2022.100403

[62] K. Wiramihardja *et al.*, "Sustainable economic development through entrepreneurship: A study on attitude, opportunity recognition, and entrepreneurial intention among university students in Malaysia," *Front. Psychol.*, vol. 13, p. 866753, 2022. https://doi.org/10.3389/fpsyg.2022.866753

[63] Z. Li *et al.*, "College students' entrepreneurial intention and alertness in the context of the COVID-19 pandemic," *Sustainability*, vol. 14, no. 13, p. 7713, 2022. https://doi.org/10.3390/su14137713

[64] N. Al-Qadasi, G. Zhang, M. A. Al-Awlaqi, A. S. Alshebami, and A. Aamer, "Factors influencing entrepreneurial intention of university students in Yemen: The mediating role of entrepreneurial self-efficacy," *Front. Psychol.*, vol. 14, p. 1111934, 2023. https://doi.org/10.3389/fpsyg.2023.1111934

[65] D. Bernardus *et al.*, "Which psychological characteristics strengthen 'The entrepreneurial intention-action relationship'?: An extension of the theory of planned behavior," *Cogent Bus. Manag.*, vol. 7, no. 1, p. 1823579, 2020. https://doi.org/10.1080/23311975.2020.1823579

[66] M. A. Bhatti, M. A Al Doghan, S. A. Mat Saat, A. S. Juhari, and M. Alshagawi, "Entrepreneurial intentions among women: Does entrepreneurial training and education matters? (Pre- and post-evaluation of psychological attributes and its effects on entrepreneurial intention)," *J. Small Bus. Enterp. Dev.*, vol. 28, no. 2, pp. 167–184, 2021. https://doi.org/10.1108/JSBED-09-2019-0305

[67] H. Mei, Z. Ma, S. Jiao, X. Chen, X. Lv, and Z. Zhan, "The sustainable personality in entrepreneurship: The relationship between big six personality, entrepreneurial self-efficacy, and entrepreneurial intention in the chinese context," *Sustainability*, vol. 9, no. 9, p. 1649, 2017. https://doi.org/10.3390/su9091649

[68] W. Wu, H. Wang, C. Zheng, and Y. J. Wu, "Effect of narcissism, psychopathy, and machiavellianism on entrepreneurial intention—The mediating of entrepreneurial self-efficacy," *Front. Psychol.*, vol. 10, p. 360, 2019. https://doi.org/10.3389/fpsyg.2019.00360

[69] Y. Su *et al.*, "Factors influencing entrepreneurial intention of university students in China: Integrating the perceived university support and theory of planned behavior," *Sustainability*, vol. 13, no. 8, p. 4519, 2021. https://doi.org/10.3390/su13084519

[70] C. D. Duong, H. X. Nguyen, T. V. N. Ngo, V. H. Nguyen, and T. P. L. Nguyen, "The impact of individual and environmental characteristics on students' entrepreneurial intention," *Manag. Sci. Lett.*, pp. 599–608, 2020. https://doi.org/10.5267/j.msl.2019.9.020

[71] Suratno, B. S. Narmaditya, and A. Wibowo, "Family economic education, peer groups and students' entrepreneurial intention: The mediating role of economic literacy," *Heliyon*, vol. 7, no. 4, p. e06692, 2021. https://doi.org/10.1016/j.heliyon.2021.e06692

[72] A. S. Alshebami and S. H. Al Marri, "The impact of financial literacy on entrepreneurial intention: The mediating role of saving behavior," *Front. Psychol.*, vol. 13, p. 911605, 2022. https://doi.org/10.3389/fpsyg.2022.911605

[73] W. Zhang, Y. Li, Q. Zeng, M. Zhang, and X. Lu, "Relationship between entrepreneurship education and entrepreneurial intention among college students: A meta-analysis," *Int. J. Environ. Res. Public. Health*, vol. 19, no. 19, p. 12158, 2022. https://doi.org/10.3390/ijerph191912158

[74] H. Mei *et al.*, "University students' successive development from entrepreneurial intention to behavior: The mediating role of commitment and moderating role of family support," *Front. Psychol.*, vol. 13, p. 859210, 2022. https://doi.org/10.3389/fpsyg.2022.859210

[75] D. C. Doanh, "The role of contextual factors on predicting entrepreneurial intention among Vietnamese students," *Entrep. Bus. Econ. Rev.*, vol. 9, no. 1, pp. 169–188, 2021. https://doi.org/10.15678/EBER.2021.090111

[76] A. A. Adekiya and F. Ibrahim, "Entrepreneurship intention among students. The antecedent role of culture and entrepreneurship training and development," *Int. J. Manag. Educ.*, vol. 14, no. 2, pp. 116–132, 2016. https://doi.org/10.1016/j.ijme.2016.03.001

[77] Y. Zhang, G. Duysters, and M. Cloodt, "The role of entrepreneurship education as a predictor of university students' entrepreneurial intention," *Int. Entrep. Manag. J.*, vol. 10, no. 3, pp. 623–641, 2014. https://doi.org/10.1007/s11365-012-0246-z

[78] M. I. Fallatah and T. L. Ayed, "'Entrepreneurizing' college programs to increase entrepreneurial intentions: A mediation framework," *Adm. Sci.*, vol. 13, no. 2, p. 50, 2023. https://doi.org/10.3390/admsci13020050

[79] M. Solesvik, P. Westhead, and H. Matlay, "Cultural factors and entrepreneurial intention: The role of entrepreneurship education," *Educ. Train.*, vol. 56, nos. 8/9, pp. 680–696, 2014. https://doi.org/10.1108/ET-07-2014-0075

[80] S. Mukhtar, L. W. Wardana, A. Wibowo, and B. S. Narmaditya, "Does entrepreneurship education and culture promote students' entrepreneurial intention? The mediating role of entrepreneurial mindset," *Cogent Educ.*, vol. 8, no. 1, p. 1918849, 2021. https://doi.org/10.1080/2331186X.2021.1918849

[81] S. Karimi, H. J. A. Biemans, T. Lans, M. Chizari, and M. Mulder, "The impact of entrepreneurship education: A study of iranian students' entrepreneurial intentions and opportunity identification," *J. Small Bus. Manag.*, vol. 54, no. 1, pp. 187–209, 2016. https://doi.org/10.1111/jsbm.12137

[82] T. Iakovleva, L. Kolvereid, and U. Stephan, "Entrepreneurial intentions in developing and developed countries," *Educ. Train.*, vol. 53, no. 5, pp. 353–370, 2011. https://doi.org/10.1108/00400911111147686

[83] C. Schlaegel and M. Koenig, "Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models," *Entrepreneurship Theory and Practice*, vol. 38, no. 2, pp. 291–332, 2014. https://doi.org/10.1111/etap.12087

[84] M. Entrialgo and V. Iglesias, "The moderating role of entrepreneurship education on the antecedents of entrepreneurial intention," *Int. Entrep. Manag. J.*, vol. 12, no. 4, pp. 1209–1232, 2016. https://doi.org/10.1007/s11365-016-0389-4

[85] G. Boldureanu, A. M. Ionescu, A.-M. Bercu, M. V. Bedrule-Grigoruță, and D. Boldureanu, "Entrepreneurship education through successful entrepreneurial models in higher education institutions," *Sustainability*, vol. 12, no. 3, p. 1267, 2020. https://doi.org/10.3390/su12031267

[86] T. Ahmed, V. G. R. Chandran, J. E. Klobas, F. Liñán, and P. Kokkalis, "Entrepreneurship education programmes: How learning, inspiration and resources affect intentions for new venture creation in a developing economy," *Int. J. Manag. Educ.*, vol. 18, no. 1, p. 100327, 2020. https://doi.org/10.1016/j.ijme.2019.100327

[87] M. Elnadi and M. H. Gheith, "Entrepreneurial ecosystem, entrepreneurial self-efficacy, and entrepreneurial intention in higher education: Evidence from Saudi Arabia," *Int. J. Manag. Educ.*, vol. 19, no. 1, p. 100458, 2021. https://doi.org/10.1016/j.ijme.2021.100458

[88] Á. González Moreno, L. López Muñoz, and R. Pérez Morote, "The role of higher education in development of entrepreneurial competencies: Some insights from castilla-la mancha university in Spain," *Adm. Sci.*, vol. 9, no. 1, p. 16, 2019. https://doi.org/10.3390/admsci9010016

[89] B. R. Hernández-Sánchez, J. C. Sánchez-García, and A. W. Mayens, "Impact of entrepreneurial education programs on total entrepreneurial activity: The case of Spain," *Adm. Sci.*, vol. 9, no. 1, p. 25, 2019. https://doi.org/10.3390/admsci9010025

[90] A. A. Mamun, N. B. C. Nawi, M. Mohiuddin, S. F. F. B. Shamsudin, and S. A. Fazal, "Entrepreneurial intention and startup preparation: A study among business students in Malaysia," *J. Educ. Bus.*, vol. 92, no. 6, pp. 296–314, 2017. https://doi.org/10.1080/08832323.2017.1365682

[91] A. Saptono *et al.*, "Assessing the university students' entrepreneurial intention: Entrepreneurial education and creativity," *Humanit. Soc. Sci. Rev.*, vol. 7, no. 1, pp. 505–514, 2019. https://doi.org/10.18510/hssr.2019.7158

[92] A. Hassan, I. Anwar, I. Saleem, K. M. B. Islam, and S. A. Hussain, "Individual entrepreneurial orientation, entrepreneurship education and entrepreneurial intention: The mediating role of entrepreneurial motivations," *Ind. High. Educ.*, vol. 35, no. 4, pp. 403–418, 2021. https://doi.org/10.1177/09504222211007051

[93] I. Anwar, I. Saleem, K. M. B. Islam, P. Thoudam, and R. Khan, "Entrepreneurial intention among female university students: Examining the moderating role of entrepreneurial education," *J Int. Bus. Entrep. Dev.*, vol. 12, no. 4, p. 217, 2020. https://doi.org/10.1504/JIBED.2020.110254

[94] A. S. Alshebami, I. Al-Jubari, I. Y. Alyoussef, and M. Raza, "Entrepreneurial education as a predicator of community college of Abqaiq students' entrepreneurial intention," *Manag. Sci. Lett.*, pp. 3605–3612, 2020. https://doi.org/10.5267/j.msl.2020.6.033

[95] C. G. Iwu *et al.*, "Entrepreneurship education, curriculum and lecturer-competency as antecedents of student entrepreneurial intention," *Int. J. Manag. Educ.*, vol. 19, no. 1, p. 100295, 2021. https://doi.org/10.1016/j.ijme.2019.03.007

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