

Bibliometric analysis of entrepreneurial competencies using Scopus data and VOSviewer



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ABSTRACT

The positive impact of entrepreneurial competencies has sparked the attention of researchers from various industries and disciplines. Since academic scholars are becoming more interested in the practice of entrepreneurial competencies, thus it is required to gain a better grasp of the themes of interest and to expand collaboration networks in order to advance research toward interdisciplinary approaches. Therefore, an analysis using the bibliometric technique was conducted to find major trends and themes by analyzing significant papers, countries, authors, and keywords. This research used the Scopus database and expanded to scientific mapping using VOSviewer to provide a complete view of research trends. According to the statistics, the overall number of articles has climbed consistently from 2017 to 2021. Researchers from India, Malaysia, and the United Kingdom greatly contributed to the entrepreneurial competencies research. However, entrepreneurial competencies have received limited attention in the computer science and engineering field. The statistical research shows conclusively that there is a strong relationship between entrepreneurial competencies and intention, entrepreneurship education, and learning. The following analyses were accomplished in this study namely co-citation, bibliographical coupling, authors' keywords, and co-occurrence of all keywords. Future researchers investigating entrepreneurial competencies will be able to accurately target their research using the findings presented in this paper.

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1. Introduction

Numerous studies have focused on entrepreneurship over the past few decades and identified it as a critical factor in economic growth, job creation, and also improving the quality of human capital (Fagadar et al., 2021; Ahmad et al., 2010; Tehseen et al., 2019). It is obvious that an individual who effectively performs entrepreneurial competencies will be more successful than those who lack entrepreneurial ability or skills (Kruger and Steyn, 2021; Mitchelmore and Rowley, 2010). Entrepreneurial competencies are considered the root of the entrepreneurship process (Chiles et al., 2007; EU, 2018; Wong et al., 2005) given that entrepreneurial competencies inspire the creation of

useful ideas, new products as well as new ventures (RezaeiZadeh et al., 2017).

Several pieces of evidence have discovered that the attributes of entrepreneurial competencies have been associated with firm entrepreneurial success and growth (Devetag et al., 2020; Hashim et al., 2018; Vidal et al., 2021) and the outcome of performing these competencies measured from financial elements such as cash flow, market share, sales growth, revenues, and net worth (Chandler and Hanks, 1993; Yani et al., 2020). On the other hand, non-financial success, namely customer satisfaction, customer retention, corporate image, and reputation are also considered as the successful implication of entrepreneurial competencies (Al Mamun and Fazal, 2018; Ahmad et al., 2011).

Entrepreneurial competencies serve as a foundation for business innovativeness, and the implications have been related to economic success and firm survival (Lans et al., 2014) and it is also considered a powerful motivator for the entrepreneurial spirit, aiding in the discovery of new business prospects and new invention (Schelfhout et al., 2016). Recently, academic interest in

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entrepreneurial competencies has risen steadily. Therefore, credible analytical approaches must be used to analyze the associated articles. Given the growing interest, there is a scarcity of bibliometric analyses on this subject.

Bibliometric analyses of the bibliographic information of publications statistically using a variety of tools and approaches. In general, bibliometric techniques are using technology tools to assess and interpret both qualitative and quantitative data depending on bibliographic records, as well as to prepare relevant visualizations (Donthu et al., 2021). Academicians have become more engaged in this method and its popularity has contributed to the advancement of bibliometric tools namely VOSviewer, Leximancer, Gephi, and scholarly databases including Scopus and Web of Science. Scholars utilize bibliometric assessment for a wide variety of purposes, namely to identify trends in the research publication and analyze publication productivity, authors' collaborative patterns, and research aspects, as well as study the basic anatomy of a particular area in the current research works (Donthu et al., 2021). Therefore, the current work aims to give a graphical mapping of bibliometric data related to entrepreneurial competencies by utilizing the Scopus database and VOSviewer application. The following is an overview of the organization of this article. A brief literature review of entrepreneurial competencies is presented in Section 2. Section 3 outlines the strategy, which combines data collection and a search method. The data analysis and visual presentation are reported in Section 4. To conclude, Section 5 is presenting conclusions, challenges, and recommendations for future research.

2. Entrepreneurial competencies

The degree of entrepreneurship in a nation is significantly influenced by the practice of entrepreneurial activities (Jones et al., 2018). The application of entrepreneurial knowledge and competencies tremendously boosts the individual intention to explore new and diverse opportunities thus enhancing their entrepreneurial spirit (Schelfhout et al., 2016). This is corroborated by a recent study, that the practice of entrepreneurial competencies stimulates ideation, and enhances the commercialization of innovative products and it is ultimately required to leverage Industry 4.0 technologies (Kruger and Steyn, 2021).

Although there are various philosophies about entrepreneurial competencies, each one offers significant insights. In the early 90's, the term entrepreneurial competencies referred to the fundamental and specialized information, goals, qualities, self-image, positions, and abilities that are essential for a new venture, sustainability, and development (Bird, 1995). A recent study referred to entrepreneurial competencies as a group of knowledge and skills that lay the foundation for individuals to succeed in their entrepreneurial endeavors (Pulka et al., 2021).

There are several dimensions of entrepreneurial competencies. Man (2001) reviewed earlier empirical studies in entrepreneurial competencies and provided a brief description of behavioral focus along with seven competency categories namely strategic thinking, conceptual thinking, relationship, commitment, organizing, personal maturity, and organizing.

The European Commission designed an Entrepreneurship Competence Framework, which consists of three interconnected competence areas: the ability to come up with new concepts and opportunities, using resources effectively, and executing the concepts towards the goal (EU, 2018). According to the European Commission (EU, 2018), entrepreneurial competencies are comprehensive abilities, knowledge, and behaviors that each individual is required to practice to be entrepreneurial across all aspects of their life.

Several strategies have been found in entrepreneurship education studies as being effective in the effort to impart entrepreneurial competencies to all students by promoting the practice of these competencies in their projects (Tittel and Terzidis, 2020). In other words, developing students' entrepreneurial abilities is the primary objective of entrepreneurship education and to prepare them for the world of business. The recent finding revealed the positive outcome of implementing entrepreneurship education programs and in this sense, the participants of these programs are more likely to establish their own enterprises (Freites et al., 2022).

It is often acknowledged that individuals who have entrepreneurial competencies are more receptive to ideas and dynamics than those who are more conservative (Chiles et al., 2007; Strauti et al., 2018). According to prior studies, when every employee in an organization demonstrates entrepreneurial competencies, the entire business benefits (Ahmad et al., 2018; Pulka et al., 2021). Not surprisingly, demonstrating entrepreneurial competencies and encouraging workers to adopt entrepreneurial behaviors is critical for organizations of all sizes and types to achieve larger performance advantages (Gupta et al., 2016). Positive outcomes of practicing entrepreneurial competencies are undeniable.

3. Methodology

This paper analyzed the organization and content of entrepreneurial competencies literature using bibliometric analytic methodologies. Scholars conduct the statistical bibliometric investigation for a number of purposes, namely spotting burgeoning fields, collaboration works, and research elements, as well as exploring citations of journals, authors, or other statistics to analyze the effectiveness of published articles and the productivity of these papers and scholars that published most articles (Zhao and Strotmann, 2015). The number of citations could provide information about an

author's commitment to a particular subject, topic, approach, or joint author (Adams et al., 2016). Citation analysis is useful to organize the research focus areas to explore their conceptual frameworks, evaluate the academic significance and analyze the sources for information, continuously monitor the distribution of theories and data flows, to aid in retrieving information, organization, and data presentation, and to analyze who uses the scholarly articles and effective utilization of the papers (Zhao and Strotmann, 2015). A bibliometric analysis article differs from a review paper in that it is primarily designed to lay a solid foundation for advancing a study, identifying the most recent developments, difficulties, and future research directions of a particular field of study.

3.1. Data collection and search strategy

The Scopus data set was chosen for the current study because it contains the highest number of detailed peer-reviewed investigations on the study issue. Followed by a series of testing, the following phrases were used for the title, abstract, and keywords to find publications associated with

entrepreneurial competencies: "entrepreneurial competencies" OR "entrepreneurial skills." The data mining was carried out on 16 March 2022, using the Scopus database. Scopus has gained immense popularity and it is one of the most extensively used databases, with a coverage that is over 60% greater than WoS (Zhao and Strotmann, 2015). There is a moment of intersection in the year 2017, attention is directed more toward the relevance of developing entrepreneurial competencies. Hence, we search for literature from 2017 to 2021 to find a recent trend in entrepreneurial competencies research. Fig. 1 shows the search query strings that were used for this study.

By restricting the papers according to the criteria, a total of 220 articles were found as shown in Fig. 1. The articles retrieved were analyzed via the VOSviewer application to visualize and create the bibliometric mapping. The application has free access to bibliometric researchers. This analysis is using VOSviewer software to analyze the data collected from Scopus, a way similar to Castillo-Vergara et al. (2018) and Guleria and Kaur (2021).

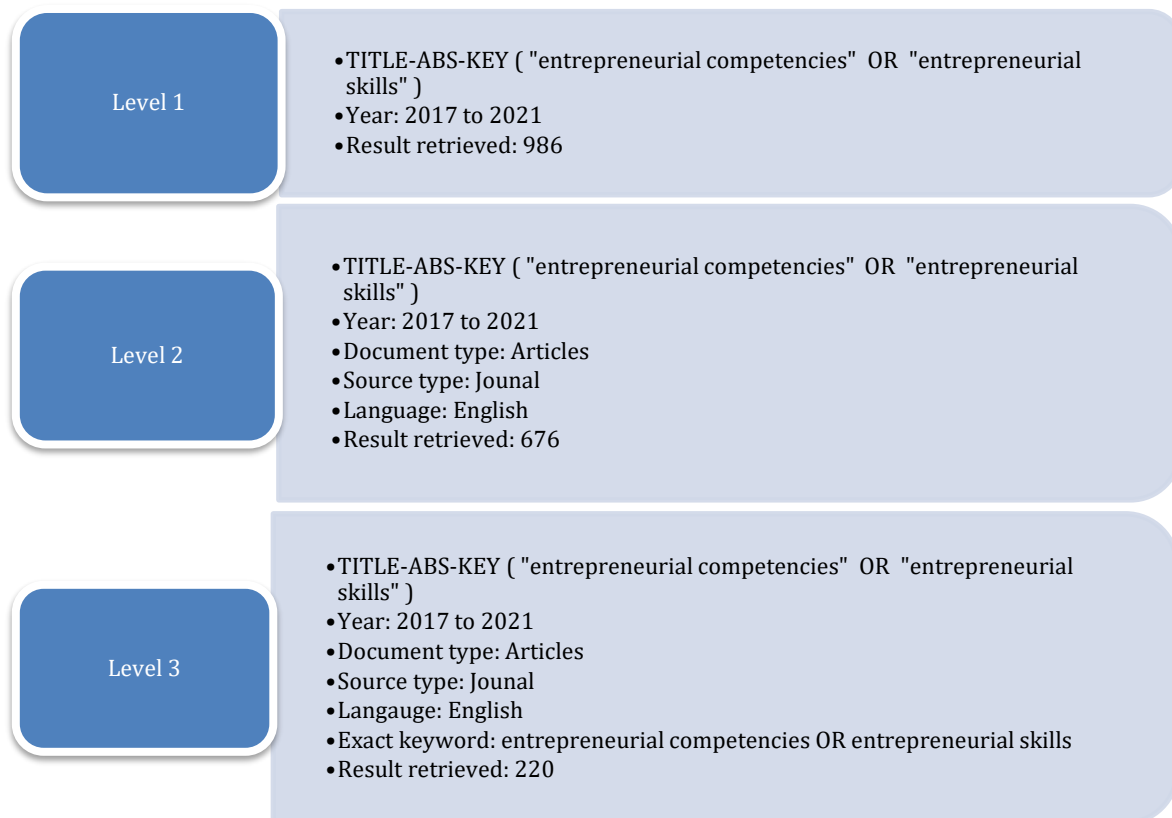


Fig. 1: Data gathering process of publications

4. Data analysis and visualization

There were 220 different studies on the defined subject in the Scopus dataset, with a total of 160 authors. Furthermore, the dataset included 26 single-authored studies related to entrepreneurial competencies, whereas 194 articles were co-authored by 134 different academics. A large

number of articles indicates that entrepreneurial competencies publications are the outcome of collaborative research attempts.

Fig. 2 depicts the total distribution of entrepreneurial competencies articles from 2017 to 2021. As indicated by Vidal et al. (2021), the ongoing Covid-19 outbreak eventually struck the world of

work and has harnessed the use of entrepreneurial competencies in digital commerce.

Furthermore, in 2017, 27 of the 220 articles were published, followed by 37 in 2018, in 2019 41

articles, 55 articles in the year 2020, and 60 in 2021. The findings revealed that academics' interest in this topic is growing every year. Fig. 3 shows the number of citations of these articles.

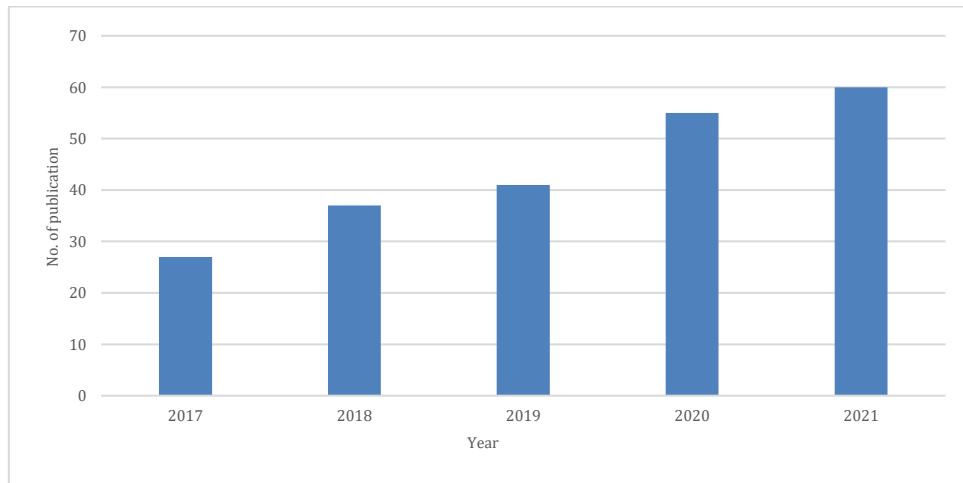


Fig. 2: Number of publications on entrepreneurial competencies from 2017 to 2021

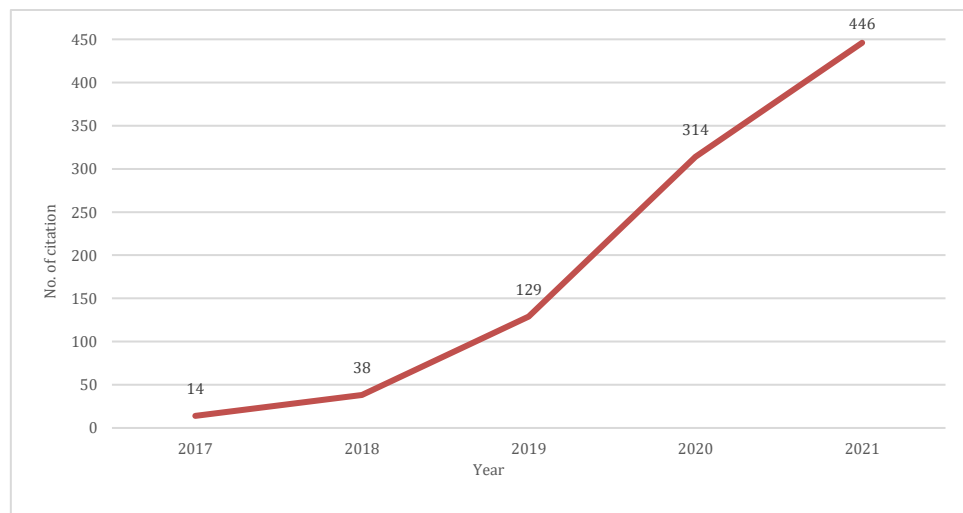


Fig. 3: Number of citations

The outcome shows the trend of entrepreneurial competencies research works and it provides an assessment of the quality of previously published papers. The year 2021 was the most active with the highest citations, the 220 articles were cited 446 times in the year 2021. These results indicate that entrepreneurial competencies research has only recently begun receiving greater attention among scholars.

The country with the highest output is measured in proportion to the overall publications gathered by finding where the author is from. It is depicted in Fig. 4. Asia countries, India and Malaysia top the list, trailed by the United Kingdom with the most articles published on entrepreneurial competencies. Although practicing entrepreneurial competencies is considered a significant element of business success in developed countries namely Norway and Japan,

according to the finding, developing countries are producing the highest number of publications on entrepreneurial competencies. India, Malaysia, and South Africa have put greater efforts to conduct research on this subject. The citation analysis was used in this bibliometric study to investigate the degree of connectivity between adjacent nodes (articles) within the 220 articles. Table 1 lists the top ten articles based on the number of citations.

Fig. 5 shows the documents published in each subject area. Most entrepreneurial competencies documents were published in business, management, and accounting with 148 documents (31.5%).

Followed by social sciences with 123 documents (26.2%). As per the subject area, the highest number of publications is in business, management, and accounting.

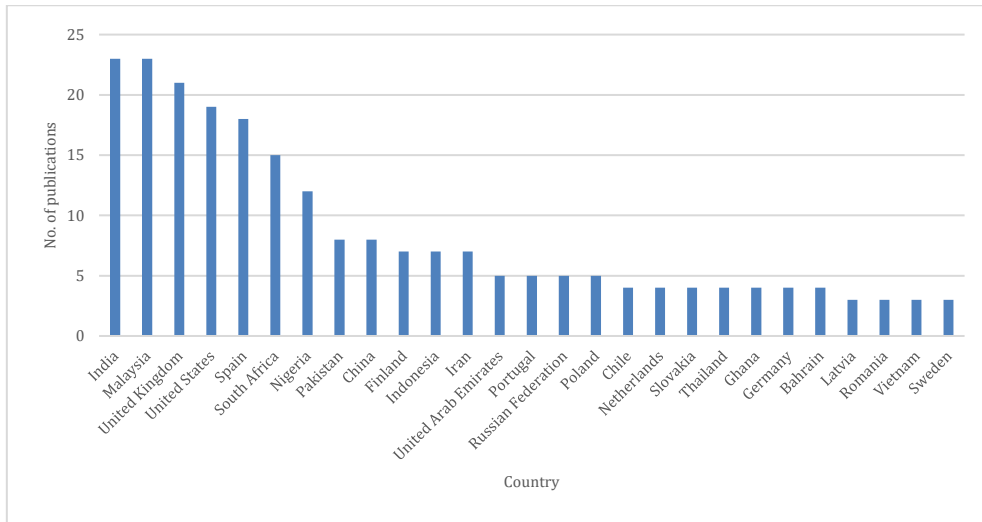
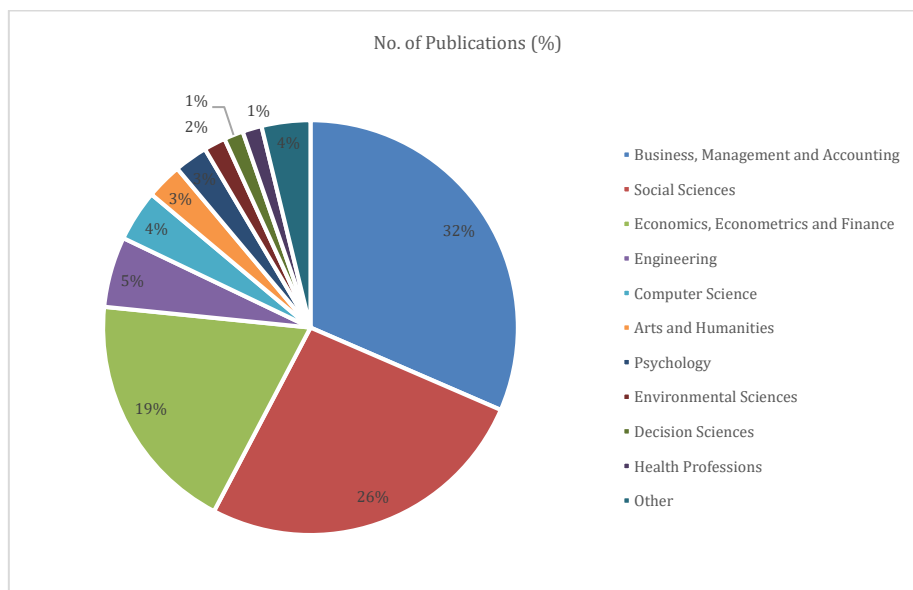


Fig. 4: Productive countries in entrepreneurial competencies

Table 1: Top 10 most cited articles

R	Paper Title	Author(s) and Year	TC	Journal
1	Multiple skills and medium enterprises' performance in Punjab Pakistan: A pilot study	(Ahmad and Ahmad, 2018)	115	Journal of Social Science Research
2	Tourism Education: What about entrepreneurial skills?	(Daniel et al., 2017)	48	Journal of Hospitality and Tourism
3	Core entrepreneurial competencies and their interdependencies: insight from a study of Irish and Iranian entrepreneurs, university students and academics	(RezaeiZadeh et al., 2017)	48	International Entrepreneurship and Management Journal
4	Entrepreneurship education in a multidisciplinary environment: Evidence from an entrepreneurship program held in Turin	(Fiore et al., 2019)	36	Administrative Sciences
5	The entrepreneurial process: The link between intentions and behavior	(Gieure et al., 2020)	34	Journal of Business Research
6	Individual and organizational inhibitors to the development of entrepreneurial competencies in universities	(Gümüşay and Bohné, 2018)	34	Research Policy
7	Relationship between entrepreneurial competencies and small firm performance: Are dynamic capabilities and the missing link?	(Hashim et al., 2018)	27	Academy of Strategic Management Journal
8	Entrepreneurial competency, competitive advantage and performance of informal women micro-entrepreneurs in Kelantan, Malaysia	(Zainol and Al Mamun, 2018)	24	Journal of Enterprising Communities
9	Entrepreneurial competencies and SMEs' growth: the mediating role of network competence	(Tehseen et al., 2019)	23	Asia-Pacific Journal of Business Administration
10	Entrepreneurial competencies and intentions: The role of higher education	(Solesvik, 2019)	23	Forum Scientiae Oeconomia

R=Rank; TC=Times cited



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Fig. 5: Documents by subject area

Fig. 6 presents the co-citations of authors in entrepreneurial competencies. The publications of Chandler and Jansen (1992) and Mitchelmore and Rowley (2010) are widely cited articles in the entrepreneurial competencies research, hence these authors are the most cited. The various colors presented in Fig. 6 demonstrate several clusters and their connections.

Fig. 7 shows the bibliographic connection of the articles as well as the color-coded visual indication of clusters. Referring to Fig. 7, the unique size of nodes corresponds to the overall number of citations of each article. In addition, the network's distance or closeness between studies reveals how the articles

are correlated to each other or bibliographically connected the nodes are. The node here is referred to as papers. For example, the proximal distance of the two nodes or articles indicates that these articles have a large number of references in general (Marchiori and Franco, 2020). The articles that have at least five citations were selected for this analysis. From the total of 220 documents collected from Scopus, 64 related articles were selected. For each of the 64 documents, the calculations were made to determine the overall strength of connections between documents via bibliography, in addition, the documents with the largest total connections' strength were selected.

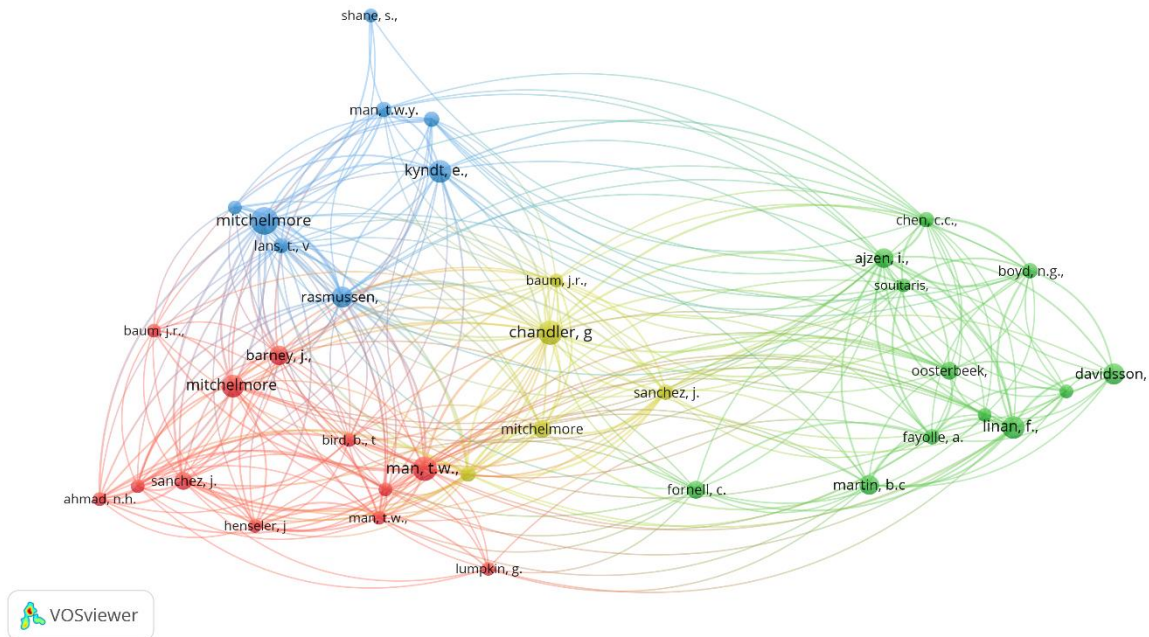


Fig. 6: The co-citation of authors in entrepreneurial competencies research

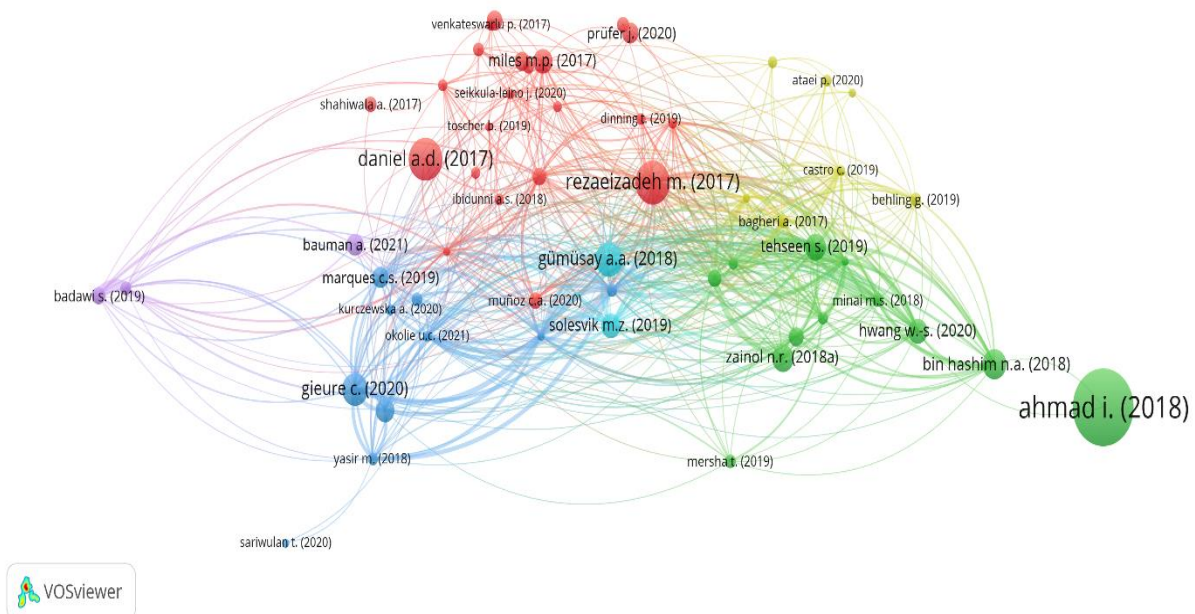


Fig. 7: The bibliographic connection between articles

According to the graphical view of the overall bibliographic connection between countries presented in Fig. 8, the developing country, India has

made the highest publication. This analysis was obtained when an article from country X and country Y both cite a common article from country Z. The

node in Fig. 8 indicates a country and the size of the node reflects the number of articles published in that country. The finding is in line with the recent GEM report, that India has a high degree of entrepreneurship with a rising number of new startups and Indian adults expressing strong confidence in their entrepreneurial competencies (GEM, 2022). Apart from India, Malaysia, and the United Kingdom are at the forefront of developing entrepreneurial competencies research, and it is consistent with the finding presented in Fig. 4.

The following analysis was generated based on the co-occurrence of the author's keywords and this was really a method of completely comprehending the prominent keywords for entrepreneurial

competencies at the time of conducting this bibliometric analysis. Fig. 9 presents the most commonly used keywords by authors in their entrepreneurial competencies research. Apart from entrepreneurial skills and entrepreneurial competencies, entrepreneurship, entrepreneurship education, strategic management/planning, entrepreneurial intention, higher education and Small Medium Enterprise (SME) is the repeatedly used keywords by authors. The recent bibliometric data verified that a greater number of researchers made contributions that are noteworthy to the field of study on entrepreneurship education, notably in higher education (Fagadar et al., 2021).

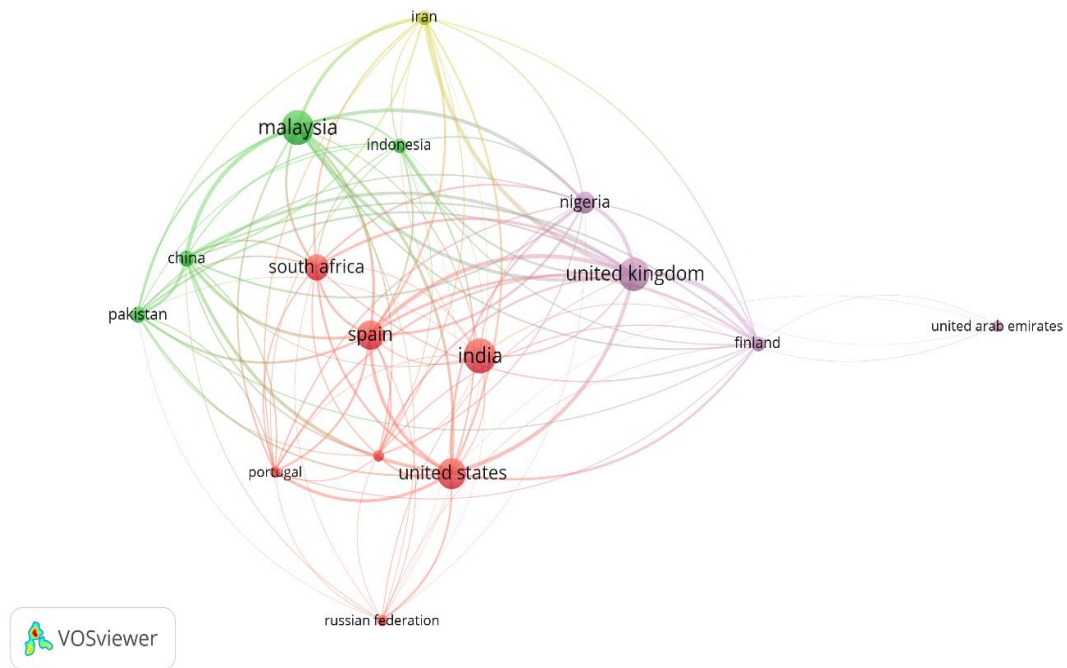


Fig. 8: The bibliometric connection between countries

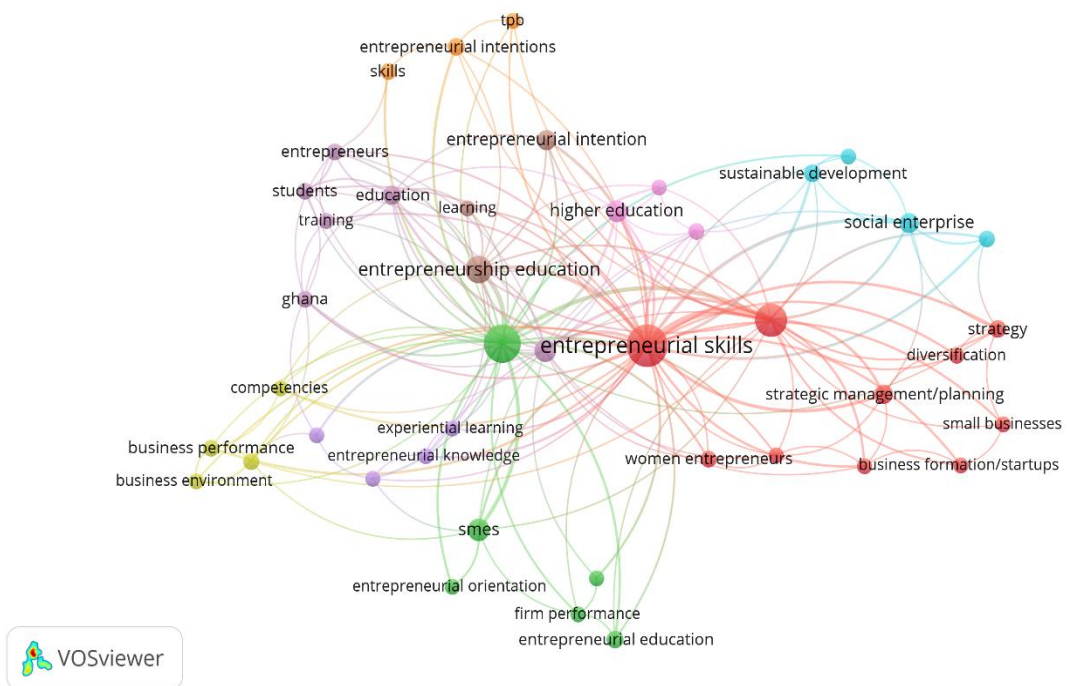


Fig. 9: The author's co-occurrence keywords

Fig. 10 presents an overlay visualization of all keywords' co-occurrence. Although the elements are colored differently, it is similar to network visualization. In overlay visualization, elements can be colored in one of two ways. The shades range from blue, which signifies lighter weight, to green or yellow, which represents heavier weight (Gillani et al., 2022). Fig. 10 shows that before 2019, the research was highly concentrated on the implications of practicing entrepreneurial competencies, and the keywords focused on small

businesses, SMEs, business performance, and firm performance. After 2019, the research focused on entrepreneurial competencies, entrepreneurial skills, entrepreneurship education, entrepreneurial intention, learning, and entrepreneurship. The analytical research indicates a connection between entrepreneurial competencies and entrepreneurial intention, entrepreneurship education, and learning. It also demonstrates the comparable effects of these elements in this research area.

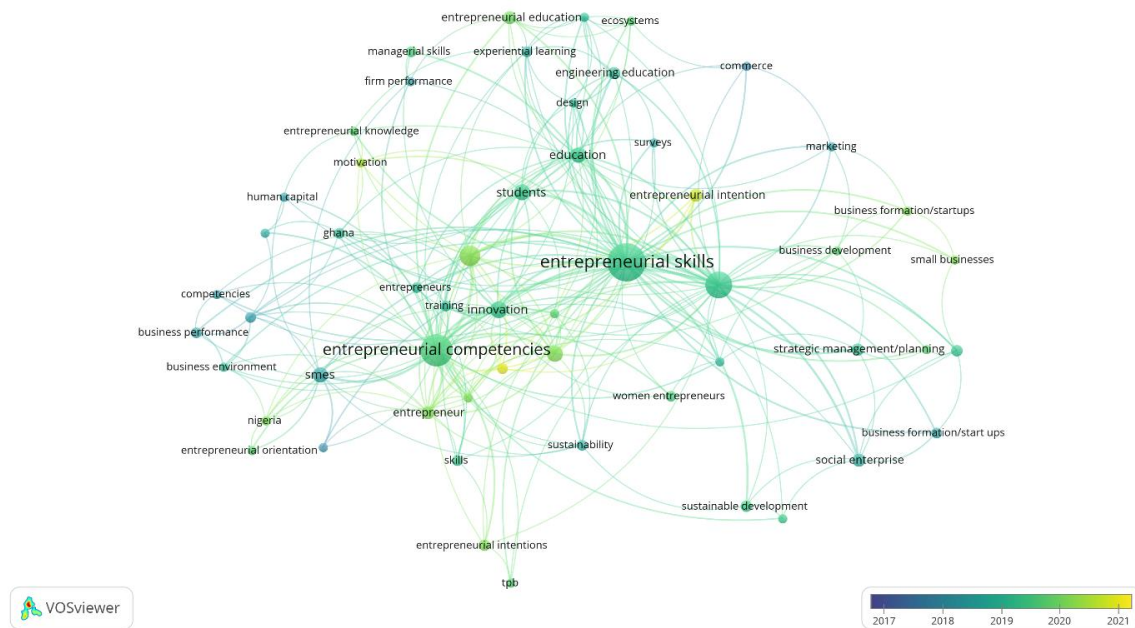


Fig. 10: Overlay visualization of all keywords

5. Conclusion

The study aims to provide a comprehensive bibliometric study on entrepreneurial competencies. The analysis was conducted using performance analysis based on the Scopus database and science mapping using VOSviewer software. The study analyzed articles published from 2017 to 2021. According to the findings, research on entrepreneurial competencies has continued to attract increased attention from academics, notably since 2019. Additionally, the statistics revealed that India, Malaysia, and the United Kingdom are the three leading nations for producing articles on entrepreneurial competencies. The findings also revealed that the most frequently used keywords are entrepreneurship, entrepreneurship education, strategic management/planning, entrepreneurial intention, higher education, and SME. Based on the findings, entrepreneurial competencies research is very much linked to the education field. This means educational institutions are promoting the use of entrepreneurial competencies in education.

Entrepreneurial competencies research provides a common ground for a variety of subject areas. In this perspective, the field's adaptability is likely to have allowed numerous authors to apply entrepreneurial competencies theory to their

business, management, and accounting research. The finding proves that demonstrating entrepreneurial competencies in the workplace has a substantial impact on a company's development and profitability. At the same time, it is revealed that entrepreneurial competencies research in computer science and engineering is still in its infancy with few publications in this subject area. Furthermore, the statistical analysis provides evidence that there is a significant connection between entrepreneurial competencies and entrepreneurial intention, entrepreneurship education, and learning. Thus, this bibliometric analysis can provide researchers with a complete overview of entrepreneurial competencies research thus assisting in future directions.

Despite the positive results of its analysis, this research has some flaws. The data is collected entirely from Scopus. It is possible that the database's weaknesses are being exploited in this work. Statistically, Scopus is a database that collects data using a rigorous counting approach. Therefore, articles with several co-authors are usually considered to be more valuable than those with just one author. Therefore, this study utilized fractional counts in network modeling analysis with VOSviewer software to tackle this problem. The following factors were considered: Co-citation, bibliographic connection, and author keyword co-

occurrence. On the other hand, the results of fractional and comprehensive counting were extremely comparable. The finding and information presented in this article are accurate since there is no visible distinction between the two counting methods.

Recently, research on the practice of entrepreneurial competencies is growing at a rapid pace, hence, the findings in this study are dynamic and will change over the years. Therefore, it is recommended that this study be replicated in the future. Despite the fact that entrepreneurial competencies as one of the most important aspects of entrepreneurial growth in developed nations, according to the data, developing nations have made greater investments in entrepreneurial research. However, additional research in numerous fields of study in both developing and developed nations is needed on the beneficial impact and limitations of adopting entrepreneurial competencies.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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