A bibliometric analysis of entrepreneurship research in Iran

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Abstract: This research aims to examine the bibliometric characteristics of entrepreneurship research published with the subject of Iran in the Scopus database from 2000 to 2021. The study identifies the most prolific years, key areas, laborious authors, influential journals, and leading institutions in entrepreneurship research. Afterwards, co-authorship network and keyword co-occurrences network maps are provided. 644 documents were used to retrieve the bibliometric analysis as a thematic search. Data analysis was performed by the scientometrics software of Sci2, Gephi and RStudio. Findings show the upward trend in publishing documents in the entrepreneurship field during the last 20 years. Moreover, 2018 and 2016 were the most abundant years regarding publication (92 papers) and citation (677 citations), respectively. We generated the co-authorship networks with 1,358 authors. Methodologically speaking, this research contributes a study into using a more robust approach to discover the scientometric trends about entrepreneurship in Iran.

Keywords: bibliometric; entrepreneurship; Iran; scientometrics; Gephi; Sci2; Scopus; RStudio; bibliometrix; biblioshiny; bibliographic; co-authorship.

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1 Introduction

Entrepreneurship is a crucial factor in wealth creation, increasing social welfare, and economic development (Emami and Klein, 2020). Today's rapid changes in the scientific and technical fields and the exacerbation of social and monetary system issues, increasing unemployment and poverty paved the way for more serious attention of policymakers and thinkers to concepts such as entrepreneurship (Amorós and Bosma, 2014). Entrepreneurship is regarded as one of the primary scholarly discussions in management and economics disciplines. There is an agreement that conducting research using scientific products and a scientometric approach in this important area is beneficial to understanding pertinent studies' current status and the procedure to perform such research (Vošner et al., 2016).

The Global Entrepreneurship Monitor (GEM) is the largest and most proficient university consortium in entrepreneurship and examines the state of entrepreneurship in the world. It was founded in 1999, and Iran became a member in 2008 (Zali et al., 2012). In the GEM report, the division of countries was in terms of three levels of national income: low, medium, and high. In this category, Iran is at the level of medium national income. GEM report shows that the total percentage of entrepreneurial activities in Iran in 2019 is 23%, while a 7% voluntary exit from the business. In other words, about 16% of the country's adult population is involved in various entrepreneurial activities (GEM, 2019). In most metrics, entrepreneurial activity in Iran fell in 2020, perhaps to uncertainty and maybe reluctance due to the COVID-19 pandemic. In 2020, 51% of Iranian adults (18–64) said the pandemic had resulted in a loss in overall household income. While this was a high percentage, it was lower than other comparable economies such as the United Arab Emirates (68%) and Saudi Arabia (71%). However, considering the pandemic's uncertainty, Iran's rate of adults planning to establish a business within the next three years fell from 38% in 2019 to 24% in 2020. However, 62% of these businesses said the pandemic had affected their decision. Regarding the present uncertainty, a significant drop in aspiring entrepreneurs and the rate of individuals affected by the pandemic imply that some potential entrepreneurs avoid launching a firm. At the same time, such unpredictability motivates some people to start their businesses, possibly out of need (GEM, 2020).

Iranian government's policies to encourage knowledge-based businesses were so effective; hence, the rate of improvement in entrepreneurship motivation has been steadily increasing until 2019. However, government policies related to taxation, particularly concerning value-added tax, harmed entrepreneurship, with established small businesses particularly affected. Considering GEM Iran's 2019 survey results, it is clear that there is a need to develop knowledge-based companies and innovation centres within its universities. Many Iranian universities offer some entrepreneurship programs or courses for their students, and entrepreneurial education has considerably increased since 2017 in Iran. However, this trend is lower than in the United Arab Emirates and Turkey (GEM, 2019).

There are different approaches for studying the trend of science evolution. Some bibliographic studies have surveyed the direction of scientific publication in various fields of science (Zancanaro et al., 2015). Through such studies, influential documents can be found by leading authors, universities, and institutions in producing entrepreneurship science. Precise analysis of the trend of scientific publications,

especially in reputable data, can determine the trajectory of thematic areas and help high-level policymakers and planners design their country's scientific map (Hamdipour, 2020).

Bibliometrics has gained prominence in science policy and management with specific developments in studies analysis (Bornmann and Marewski, 2019). The quantitative study of academic literature is possible with bibliometric analysis (Cancino et al., 2018). This way allows researchers to look at more data than they could with systematic literature reviews, while maintaining a high degree of rigor, scientific soundness, transparency, and replicability (Dada, 2018). Bibliometrics is a quantitative evaluation of publications, calculating document characteristics via the appropriate statistical techniques (Godin, 2006). Bibliometric researchers evolved numerous methodological concepts to collect data using unique techniques such as citation analysis, social network analysis, content analysis, and text-mining applied in existent research (Leung et al., 2017). The findings of bibliometric analyses can reveal characteristics that strengthen the contribution of studies in a study field and help scientists perform appropriate research (Akhavan et al., 2016).

Furthermore, by searching the scientific sources of Iranian authors in the field of entrepreneurship in the Scopus database, it is found that no study has reviewed bibliographic articles on the subject of entrepreneurship. Analysing scientific publications in entrepreneurship provides profound insights into a national and international collaboration of researchers and improves the quality and quantity of future research outputs of scholars in the world in this field. Therefore, this study attempts to explain the pattern of collaboration among Iranian authors in the entrepreneurship field by conducting comprehensive research on a sample of entrepreneurship publications. In this vein, we seek to answer the following research question: What are the main characteristics of this co-authorship network and its thematic trends?

Drawing on a scientific map of entrepreneurship research in Iran, we find dynamics and trends of literature in entrepreneurship with the most productive journals and top researchers, universities, and institutions in Iran. Besides, the most cited articles, the most frequent keywords, co-occurrence of keywords, and co-authored status were reported and discussed. The term 'co-author' denotes several authors together in one paper and shows the cooperation of various institutes or countries (Mutschke, 2003). Documents with more than one author are referred to as co-authorship, which allows for identifying scientific collaboration. Co-occurring keywords appear more frequently in the same body of text (Merigó et al., 2018).

We reviewed the Scopus database to collect the most relevant entrepreneurship articles published between 2000 and 2021. Then, we analysed the articles based on the number of publications per year, number of author's papers, and number of article's citations. We first describe our methodology in the following sections, report our findings, and discuss their implications for future research.

2 Literature review

Few bibliometric researches has focused on entrepreneurship, and relevant topics, with some, focused on specific issues of entrepreneurship studies. Moya-Clemente et al. (2021) survey trends in scientific research on sustainable entrepreneurship during 1999–2019, based on the Web of Science (WoS) database, found that the publication

trend increments from 2015 onwards. However, 2018 and 2019 have seen the most significant publication of articles. Forliano et al. (2021) reviewed research related to entrepreneurial universities in business and management over 30 years ago. Looking at the authors and papers as a unit of analysis, the USA and Europe do well in productivity and relevance, but the phenomenon is globally pertinent. Gössling et al. (2021) investigate how institutions use bibliometrics and how researchers have adapted. The findings show that the institutions use various techniques to evaluate research success, implying the rise of new kinds of 'academic entrepreneurship,' defined by increasingly subtle ethical patterns of manipulation.

Andrade-Valbuena et al. (2019) focused on entrepreneurship research involving entrepreneurial orientation using information available via WoS during 1976–2017. Among the noteworthy scholars in the entrepreneurial orientation literature, key contributors are Lumpkin, Payne, Short, Covin, Dess, and Wiklund. Moreover, Dolhey (2019) analysed global scientific production in entrepreneurial intentions during 2000–2018 and showed that the most prolific journal is the *International Journal of Entrepreneurship and Small Business*.

Many studies were conducted in co-authorship networks to identify the structure of scientific collaborations by different authors in various fields of knowledge. A review of previous research shows that the co-authorship networks of articles published in the field of entrepreneurship in Iran have not been studied much. The present study aims to identify the scientific collaborations of researchers in the entrepreneurship field in Iran using social network analysis indicators.

An initial era of primarily descriptive thematic or journal content studies in entrepreneurship has given way too many more diversified and complicated analyses reflecting the field's development. New foci include evolving theoretical foundations, key concepts, methodological approaches, or critical authors' identification across the area and within specific sub-domains such as digital entrepreneurship, sustainable entrepreneurship, environmental entrepreneurship, entrepreneurial ecosystems, and entrepreneurial universities.

3 Material and method

One of the primary issues in data analysis is having a dataset containing helpful, reliable, and unbiased information (Chen et al., 2010). The number of publications in 'humanities, social sciences, and arts' in Scopus are almost twice as much as the WoS database. The quality of Scopus publications in terms of the 'up-to-date and stability' index and 'ease of access and retrieval' index is more than the quality of publications in the WoS database (Vafaeian et al., 2011). Scopus is broadly recognised and used for quantitative evaluations as often as possible. For these reasons, it is the most suitable database for data mining which has become one of the primary databases used by scholars to conduct the bibliometric analysis (Waltman and Van Eck, 2012). Due to these advantages of the Scopus database associated with the entrepreneurship domain, the scientific documents indexed by the Scopus database are used for this research. Besides, we did not use Google Scholar because it is possible for authors to manipulate citations, authorship, and co-authorship, which creates the problem of data reliability.

To identify and form the co-authorship network, we used Sci[2] software, then, we entered the result of data analysis into Gephi software for further studies. Gephi software was applied for network visualisation. Then, we used RStudio software, one of the most used tools by researchers and data analysts, to conduct statistical analysis (Forliano et al., 2021). R integrates several packages such as Bibliometrix developed by Aria and Cuccurullo (2107). Bibliometrix package has been gaining increasing attention from scholars in various disciplines (Linnenluecke et al., 2020). It enables them to perform descriptive analysis starting with bibliographic databases. Thus, for additional reports, we use Biblioshiny, a shiny app providing a web interface for Bibliometrix.

We used the following keywords as our search string: TITLE-ABS-KEY(Entrepreneur*) AND AFFILCOUNTRY(Iran) AND (PUBYEAR > 2000) AND (PUBYEAR < 2021). We performed the search on October 2021. The initial search returned 654 records. Then, all records, including title, abstract, keywords, and other essential information, were downloaded and stored on a personal computer for further investigation.

4 Results

The following summarises the database's descriptive statistics as compiled by Bibliometrix. There are 654 documents in the database, with 1,358 authors (2.26 authors per document). The reference period covers the years 2000 to 2021 (Table 1).

Table 1 Types of published documents

Description	*Results*
Timespan	2006:2020
Documents	654
Authors	1,358
Sources	288
References	28,875
Author's keywords	1,689
Single-authored documents	75
Authors of single-authored documents	68
Authors per document	2.08
Documents per author	0.482
Collaboration index	2.23

Scopus published all 654 documents in 288 scientific sources (journals, books, and so forth). Regarding the types of published papers, the results showed that the recovered scientific products included nine types of documents. Among them, the highest number was 516 (79%) original research articles. We ranked published items under the title of the book chapter with 64 cases (9.8%) second, and conference papers with 45 cases (6.9%) were ranked third (according to Table 2).

We observed the dynamics of publishing documents from 2000 to 2021, with the lowest number of documents with one article in 2006 (less than 0.2%) and the most significant number of documents with 92 papers in 2018 (14%). Finally, in 2020, 83 articles (13%) were published (see Figure 1).

Table 2 Documents description

Document type	*Results*
Article	516
Book chapter	64
Conference paper	45
Review	16
Retracted	5
Book	3
Editorial	2
Letter	2
Data paper	1

Figure 1 shows that the studies on entrepreneurship in Iran have been increasing over the years. Published articles from 2000 to 2010 were negligible. Then, there was an impressive increase from 2011 to 2018; documents rose from 42 to 92. Furthermore, we can see that maximum of papers were published in the last three years. These findings clearly show that the interest of authors in this field has increased significantly in recent times.

Figure 1 Number of documents per year (see online version for colours)

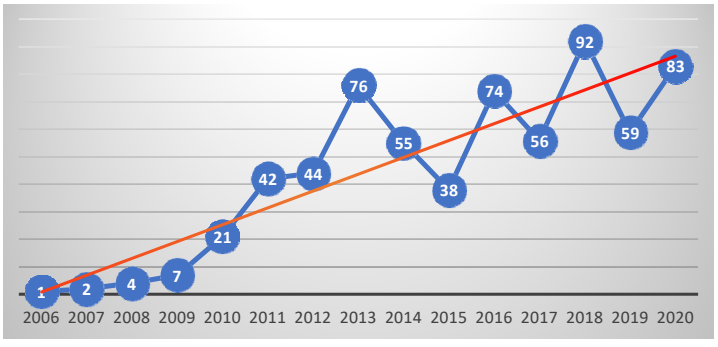
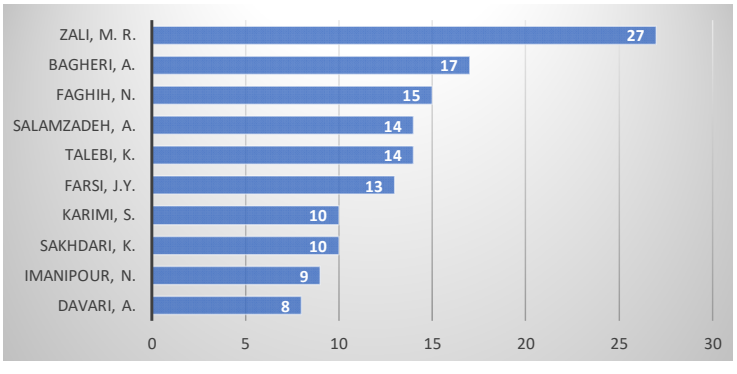


Figure 2 The top 10 prolific Iranian author (see online version for colours)



Among Iranian researchers, the first article with entrepreneurship subject on Scopus was published in 2006 by Albadvi and Saremi in the 'International Conference on Management of Innovation and Technology'. Hence, the findings show that the most prolific author is Zali, with 27 papers (see Figure 2).

234 documents are affiliated with the University of Tehran. It accounts for 36% of all documents. Moreover, about 50% of Iranian papers indexed in the Scopus in entrepreneurship were produced by universities in Tehran. This issue could be in terms of the concentration of facilities and the residence of researchers in this city (see Figure 3).

Figure 3 The top 10 productive institutions (see online version for colours)

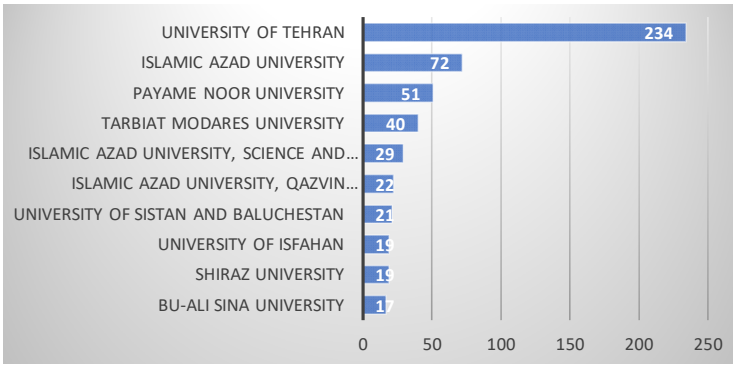
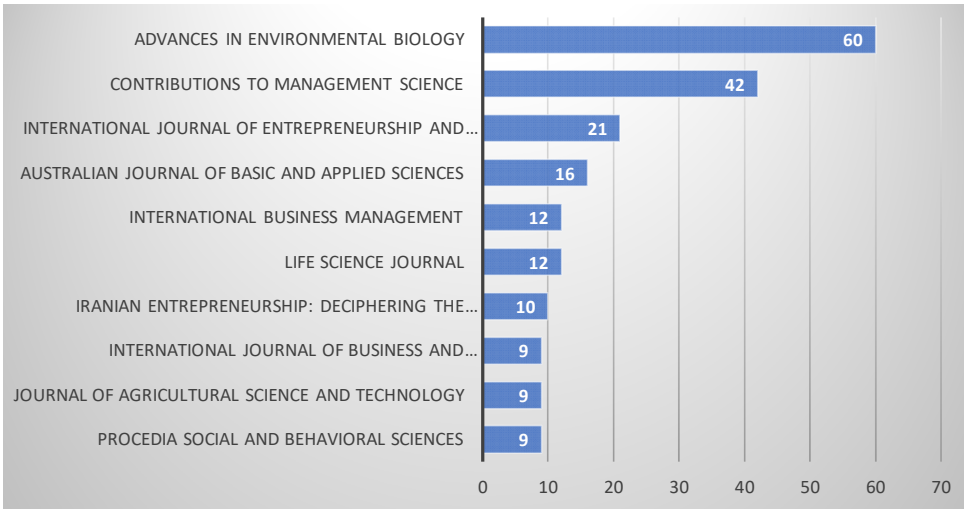


Figure 4 The top 10 journals (see online version for colours)



The share of the research budget in Iran from the gross domestic product (GDP) has been about 0.32% (http://www.Amar.org.ir, 2020)[1]. While on average, in developed countries, more than 2% of GDP is spent on research and development. In recent years, credit resources of Iranian universities in the field of study were minimal (from 0.83% in 2017 to 0.32% in 2020), and due to the devaluation of the national currency, these budgets have become less effective (Emami and Khajehian, 2019). Furthermore, if this trend

continues, its effect will be in the coming years, most likely declining Iran's scientific ranking globally and in the region.

Among 288 scientific sources in the Scopus database, ten of the most prolific journals in the sense that they published the most Iranian articles are shown in Figure 4. *Advances in Environmental Biology* journal has published the most documents of Iranian researchers with 60 articles, belongs to *American-Eurasian Network for Scientific Information* publishers.

By entrepreneurship becoming an independent research domain and the emergence of journals such as *International Journal of Entrepreneurship and Innovation* dedicated to entrepreneurship studies, there is a need to identify significant factors which have made entrepreneurship studies more sight and subsequently impactful in the literature.

Table 3 Most global cited papers

Rank	*Authors*	*Year*	*Journal*	*Total citation*
1	Moiano, Gorgievski, Laguna, Stephan and Zarafshani*	2012	*Journal of Career Development*	238
2	Karimi*, Biemans, Lans, Chizari* and Mulder	2014	*Journal of Small Business Management*	163
3	Fathian*, Akhavan* and Hoorali*	2008	*Technovation*	119
4	Esfandiar*, Sharifi Tehrani*, Pratt and Altinay	2017	*Journal of Business Research*	104
5	Rahdari*, Sepasi* and Moradi*	2016	*Journal of Cleaner Production*	86
6	Sohrabi*, Raeesi Vanani*, Tahmasebipur* and Fazli*	2012	*International Journal of Hospitality Management*	79
7	Naudé, Zaefarian G*, Najafi Tavani*, Neghabi* and Zaefarian R*.	2014	*Industrial Marketing Management*	54
8	Karimi*, Biemans, Naderi Mahdei*, Lans, Chizari* and Mulder	2015	*International Journal of Psychology*	52
9	Zaefarian*, Eng and Tasavori*	2015	*International Business Review*	52
10	Wei, Lv, Chen M., Wang, Heidari*, Chen H. and Li	2020	*IEEE Access*	48

Note: *Iranian authors.

Among 654 articles, the top ten articles that received the most citations are presented in Table 3. Moiano, Gorgievski, Laguna, Stephan, and Zarafshani are the most cited papers with 238 total citations. Their article was published in *Journal of Career Development*. This paper was published in 2012. In 2014, Karimi, Biemans, Lans, Chizari, and Mulder published their article in the *Journal of Small Business Management* with 163 total citations.

Researchers collaborate and interact with each other with different goals and methods. Authors earn numerous benefits by participating in the production of global scientific collaboration. This collaboration promotes a fair exchange of ideas, improves the quality of collaborative articles, and receives more citations (Hudson, 1996). Scientists in collaboration networks share their opinions, use similar techniques and

methods to extract and analyse data, and in other words, influence each other's work. As a result of scientific collaborations between researchers in a field, a co-authorship network is generated (Mousavi Chalak et al., 2018).

To analyse the position of Iranian scholars, we setup a co-authorship network in Sci^2. The generated network has 1,358 nodes (authors), 2,043 edges (co-authorship), and 50 isolated nodes. Using Network Analysis Toolkit (NAT) option in Sci^2, general information of this network is obtained according to Table 4.

Table 4 General information of co-authorship network

Item	*Value*
Nodes (# authors)	1,358
Edges (# co-authorship)	2,043
# isolated nodes	50
Average degree	3.007
Density	0.002
# nodes in largest component	336
Average path length	5.996
Diameter	15

Isolated nodes allude to nodes that do not have any connections with other nodes in the network, which means scholars who have published individual documents without co-working with others. The average degree (= 3.007 as reported by Table 4) expresses the number of edges occurrence, and density (= 0.002) refers to the ratio between the moderate degree and the number of possible edges in the graph, which can change between 0 and 1. Diameter (= 15) refers to the size of the most considerable geodesic interval between any pair of nodes in the co-authorship network (Elango, 2017). The largest component's number of nodes is 336, organised 24% of the total nodes. The average shortest path among a pair of network nodes is 5.996. It is observed from Table 4 which the network is not dense, and the cooperation level between the scholars seems to be below. To address this issue, authors should form their research teams, which will increase the density of the co-authorship network and the flow of knowledge becomes more widespread (Sedighi, 2017).

For a better understanding of networks, the large graphs visualisation was evolved for years in many successful projects (Adar, 2006). Visualisations are helpful to force the perceptual capabilities of humans to discover traits in network structure and data (Perer and Shneiderman, 2006). Generating the scientific and social network of researchers in a scientific field provides valuable information about their position in the scientific structure. Examining co-authorship networks allows researchers to get acquainted with the participation pattern of researchers in their field, identify individuals, institutions, and organisations that are highly productive and the core of their field, and discover thematic areas of interest in their field (Sohieli et al., 2015).

Such visual representations enable researchers to apply graph theory because, without this theory, it is complicated to analyse such relationships, especially in cases with a large amount of data (Sharma and Urs, 2008). Gephi visualises the co-authorship network (see Figure 5). In this layout, each node denotes one author, and the size of each node is proportional to the number of documents published by each author in Scopus. The thickness of edges demonstrates the number of co-authored articles.

Figure 5 Co-authorship network (see online version for colours)

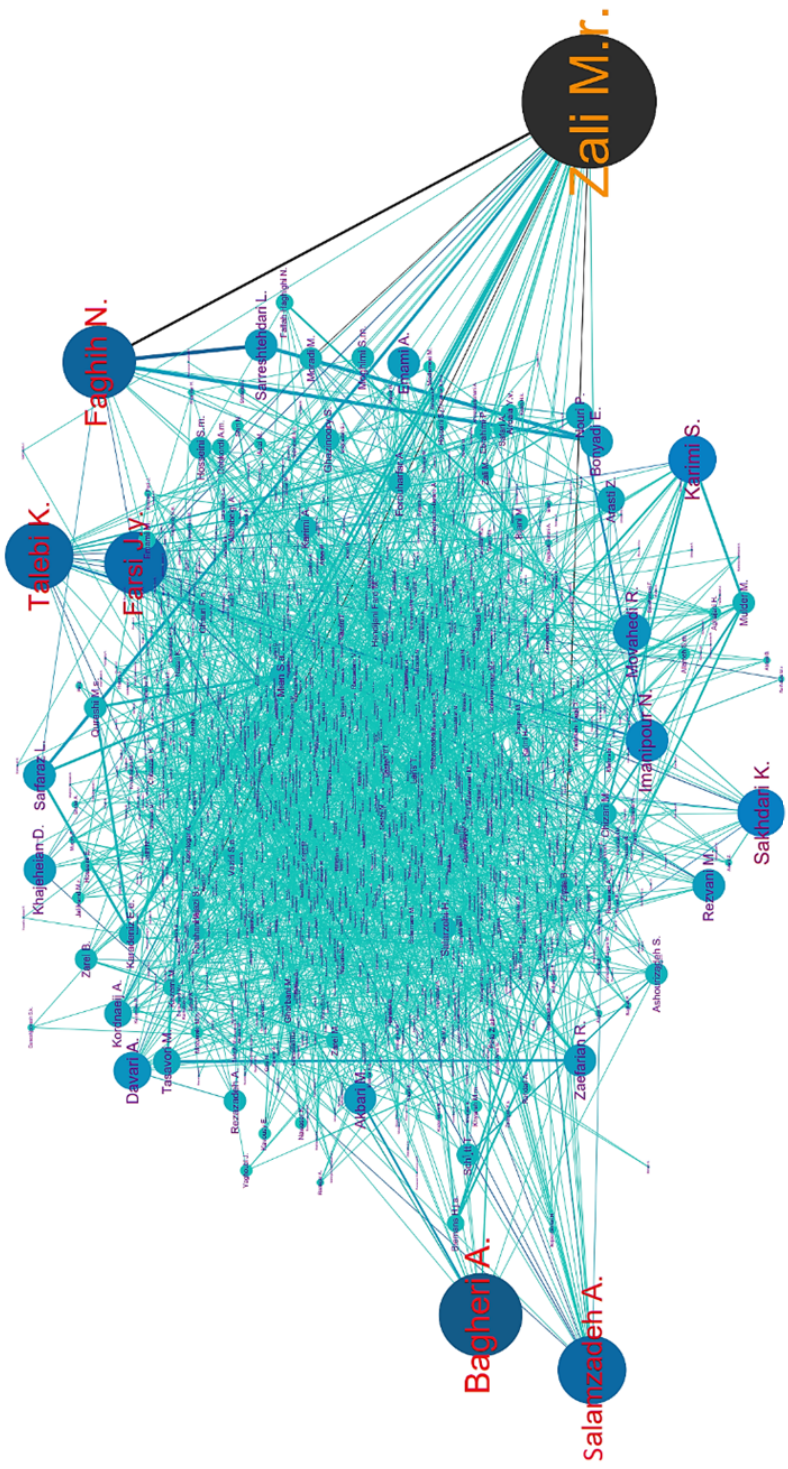
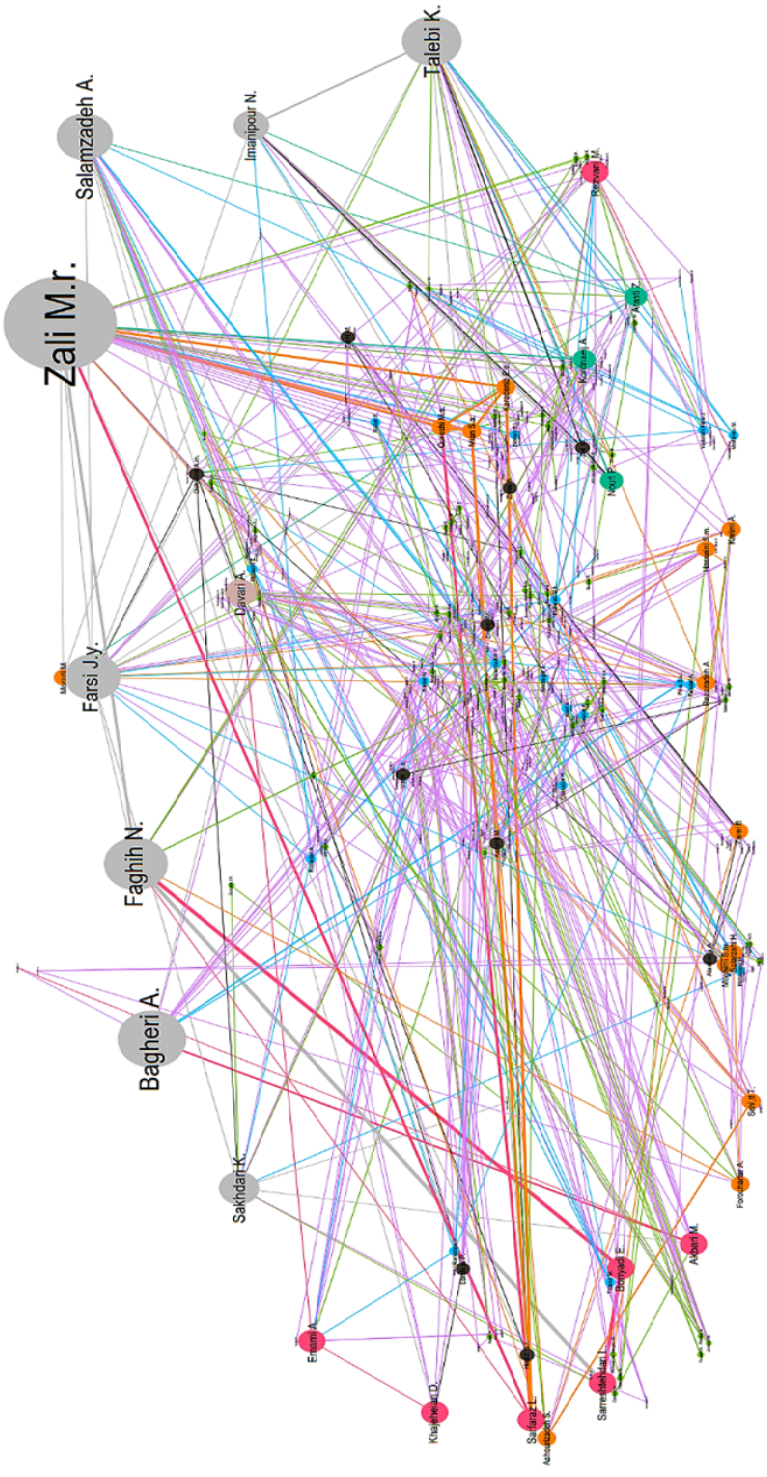


Figure 6 The Key members' co-authorship network (see online version for colours)



Like many other social networks, the co-authorship network of Iranian entrepreneurship researchers is composed of a small number of significant components and a large number of small components. The largest component of this network with 336 nodes (according to Table 3) comprises slightly more than 22% of the network nodes. However, Newman (2004), while examining various co-authorship networks, states that 82 to 92% of the total nodes are in the largest component. A component is a group of network nodes connected via co-authorship, and any node in the set can be reached by traversing a suitable path of intermediate collaborators.

In another study, Kretschmer (1994) states that the principal component usually comprises about 40% of the nodes in the network. Therefore, Iranian authors have not formed significant components unlike their foreign counterparts and have not connected effectively with more authors. Most collaborations are limited to the intra-organisational level. However, more attention should be paid to enter-organisational and international scientific contributions for scientific development. Hence, we hope that Iranian researchers' articles will be published in journals with a higher impact factor.

By visualising the co-authorship network in Gephi, we found that within the leading network, a connected subnet was formed with a focus on top Iranian scholars. Using the Modularity option in Gephi, we clustered and formed communities within the relevant network. We identified these communities with a separate colour scheme (as shown in Figure 6).

Zali, Bagheri, Faghih, Salamzadeh, Talebi, and Farsi were also identified as the top researchers in the entrepreneurship field concerning the number of publications. These six top authors' affiliations belong to the University of Tehran, which shows the interest of this university's scholars in the entrepreneurship field.

Figure 7 Country collaboration network (see online version for colours)

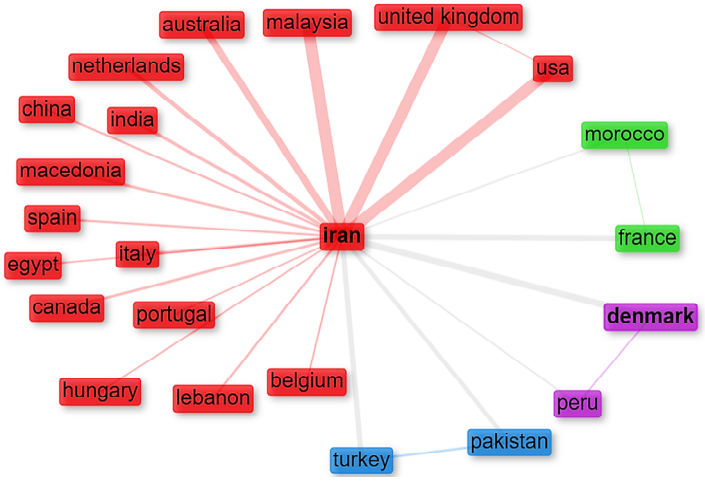


Figure 7 shows the cross-country collaboration network. Most of the international collaboration of Iranian scholars in entrepreneurship is with Malaysia, the UK, and the USA. Malaysia has 23 collaboration frequencies, while the UK and the USA each have 22. In recent years, regarding the education of Iranian graduate students in Malaysia

(Riyazi Tabrizi, 2016) and in the UK (Hariri and Nikzad, 2011), their participation in submitting papers with their professors and colleagues in Iran has increased. Most of the world's journals are published in the USA and developed countries, making researchers in other countries more inclined to publish their articles in these core journals (Farkhari, 2016).

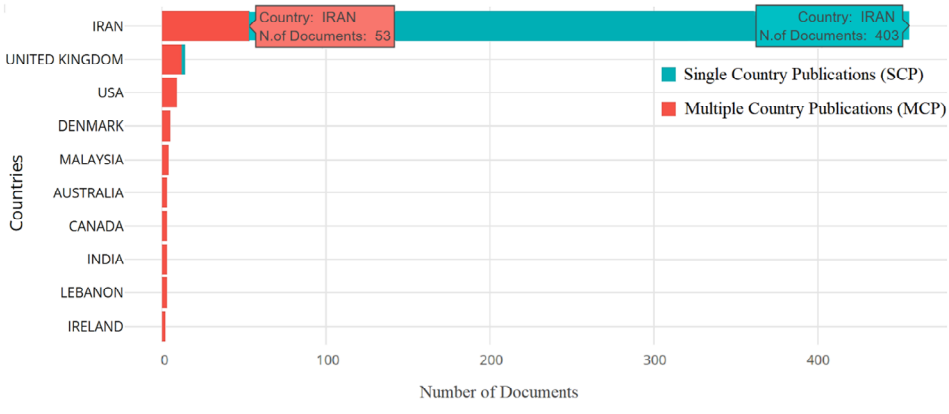
Furthermore, another reason for this cooperation is the global sanctions against Iran, including bans on access to top scientific databases and obstacles to submitting scientific articles to international journals (Keramatfar et al., 2015), which have led Iranian researchers to Malaysian researchers because Malaysia did not participate in the sanctions against Iran (Riyazi Tabrizi, 2016).

Sci-Hub website has been able to help Iranian researchers evade sanctions. Sci-Hub is an online database that grants unrestricted access to millions of research papers and books by circumventing publishers' paywalls in various ways (Bohannon, 2016).

For the ten most productive countries, Figure 8 shows the number of papers with one co-author from a different country at least (in red) and the number of documents with national co-authorship (in green). Iranian researchers mainly cooperate with compatriot researchers. However, using scholars' knowledge from other countries leads to more valuable research. It is expected that if these scholars share their experiences, resources, and scientific facilities with other researchers, they will be able to do more productive research that will improve the ranking of themselves, their universities, and their country.

Policymakers in American scientific databases have focused on English-language scientific publications, and non-English language scientific documents are dwindling (Biglu, 2009). On average, 40% of articles submitted to Elsevier journals are declined before they even reach the review step, and the main reason for the rejection is only the weak writing quality (http://www.Elsevier.com). An issue that requires the careful attention of Iranian writers to increase their impact at a world-class level.

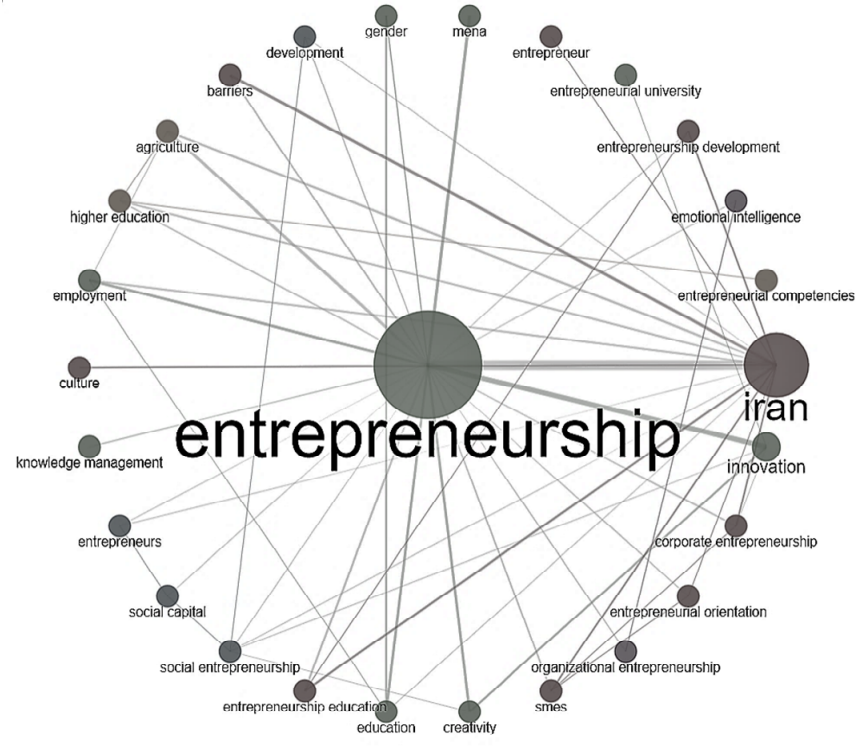
Figure 8 Corresponding author's country (see online version for colours)



The author's keywords are significant because they are the primary concepts that the author has used to contact the reader. Co-occurrence of keywords empowers scholars to calculate and map the thematic evolution of the research field (Akbari et al., 2020). As keywords prepare information about the main content of documents, a keyword network analysis can indicate research topics, the conceptual structure of the research, and the

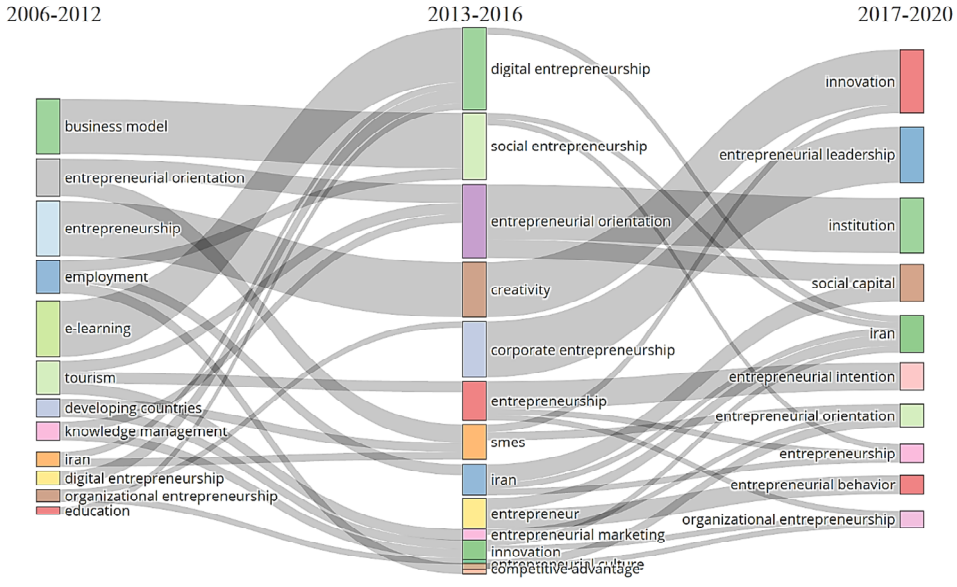
developing research boundaries and concept evolvement (Zupic and Čater, 2015). Findings suggest that Iranian authors used 1,689 different keywords. In the visualised network of repetitive keywords, each node denotes one word, and the node size means the amount of repetition of a word. Most of the author's keywords included 'entrepreneurship (178 occurrences), Iran (82), innovation (31), corporate entrepreneurship (28), and entrepreneurial orientation (21)'. This analysis helps researchers emphasise the relationships among the same terms in a specific collection, known as co-occurrences (Boyack and Klavans, 2010). The most repetitive author's keywords are identified based on co-occurrence, in Figure 9 via Biblioshiny in RStudio software.

Figure 9 Author's keywords co-occurrence network



Theme evolution is the evolution analysis of connections, routes, and trends of a topic in which the structure's tenor, severity, and alteration are figured out during a period. The theme evolution method detects changes in the keywords over distinct durations (Wu et al., 2017). Furthermore, from 2006 to 2012, the scientific development process of the Iranian author's keywords shifted from 'business model and entrepreneurial orientation' to 'digital entrepreneurship and social entrepreneurship' from 2013 to 2016. Then, in recent years, beginning in 2017, it has evolved to 'innovation and entrepreneurial leadership' (see Figure 10).

Figure 10 Thematic evolution map (see online version for colours)



5 Discussion and conclusions

This study made it possible to distinguish both contributions and decretive contributors in progression knowledge about the concept of entrepreneurship in Iran over 20 years of research. This research preferred an overview of the position of Iran in the field of entrepreneurship and the status of Iranian writers in the Scopus database. The results showed that Iranian researchers started publishing Scopus documents on entrepreneurship 15 years ago, and the number of articles in this field is still developing. Regarding the scientific publication process, in general, the number of articles before 2010 was less than 15 documents and gradually increased until it reached 654 scientific papers, indexed in the Scopus database, by 2021. Moreover, the most remarkable growth and intensity of the number of articles has occurred since 2015. These results align with the study's conclusions by Moradi Moghadam et al. (2015).

For these 654 papers, 1,358 authors have participated, which means the average number of authors per article is 2.08. Only 11% of the documents (75 papers) are written by a single author, which signals that they are aware that using more collaborators in a single article can lead to more fruitful and comprehensive findings. The collaboration of several scientists who know each other leads to more robust ideas and theories. Meanwhile, this collaboration persuades them to follow their articles and cite each other in their research. Osca-Lluch et al. (2009) also state that scholars in the social sciences are less likely to collaborate on scientific projects than scientists in the mathematical, empirical, or biological sciences.

Only 654 documents from Iranian researchers in entrepreneurship in the Scopus database indicate the need to focus more on the international arena as a platform to

publish their papers. Keramatfar et al. (2015) similarly found that Iran's scientific output has not kept pace with the country's population.

Results show that the six most prolific authors' affiliations belong to the University of Tehran. The concentration of scientists, labs, institutes, and universities in Tehran has led to the aggregation of scientific products in the capital and unequal distribution of facilities throughout Iran. This issue is similar to the results reached by Bandalizadeh (2015) in her study.

Our findings indicated that the co-authorship network of Iranian scholars in the entrepreneurship field does not have enough integrity. Therefore, the density of this network was low. Integrating small clusters into each other will likely improve this network's integrity, depending on the communication among the authors of these clusters. Density, defined as the number of direct relationships among nodes in the network, was 0.005 for the co-authorship network of Iranian entrepreneurship researchers. This value indicates that only 0.5% of the total possible connections have been realised, which means the low cohesion of the network and insufficient utilisation of the high capacity of this network by experts. It seems that, as Fahimifar and Sahli (2015) have stated in their research, individual research among Iranian scholars is more prevalent because of its advantage in career advancement. Therefore, the greater cooperation of key researchers with each other and the attraction of young researchers to the network can be as effective as possible in its growth and dynamism (Erfanmanesh and Basirian Jahromi, 2013). With more scientific collaboration, there will be more scientific outcomes (Bozeman and Lee, 2003).

In many studies, such as Osareh and Wilson (2002), the USA has been named a significant partner producing international science for Iranian researchers. Thus, the findings confirmed the conclusions of Didgah and Erfanmanesh (2009), who concluded that cooperation between Iranian and Malaysian scholars had begun to increase. Hariri and Nikzad (2011) mentioned that Iranian management scholars tended to collaborate with the UK before others.

The analysis of the evolution of the Iranian author's keywords indicated how the concept of entrepreneurship has widened in response to increasing international challenges, which require an approach to new issues such as entrepreneurial leadership, social entrepreneurship, and digital entrepreneurship. The study's main limitation was using a single keyword, 'entrepreneur', to retrieve articles from the Scopus database, limiting their sample and power to capture more relevant entrepreneurship studies. Besides, the number of publications exploring the targeted field was relatively low at the beginning of the analysed period, leading to limited links among keywords.

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Notes

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