

# A Bibliometric Analysis of Studies on 'Start-up Success' Covering the Period 1981-2019

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## ABSTRACT

Despite being received increasing attention from academic scholars, there have yet any review study on the topic of start-up success. This work fulfills this research gap by investigating 1554 start-up success documents collected from Scopus dataset between 1981 and 2019. Using bibliometric analysis, we reveal that the topic of start-up success only receives more attention from academic scholars since 2011 onwards. Regarding geographical distribution, the US, Germany, and the UK are the three countries contributing the highest number of start-up success related documents. Besides, it's revealed that 305 (or 19.6%) start-up success documents were published in the top 20 journals. The co-author analysis found that the research groups of start-up success are still small and dispersed and there was a lack of continuity in the research. The science mapping identified six main topics of start-up success, including: (1) Business in General, (2) Start-up Ecosystem, (iii) Academic Start-up, (iv) Drivers of Start-up Success, (v) Resources for start-up, and (vi) Start-up Model. The study's findings provide implications for stakeholders, including academic scholars, policymakers, start-up owners, entrepreneurs, and practitioners.

**Keywords:** Start-up, Success, Bibliometrics, Review, Science mapping, Scientometric, Research trend.

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## INTRODUCTION

Start-ups are paramount to the development of any economy.<sup>[1-2]</sup> Previous scholars identified various roles of start-ups in the economy, including driving force for modern economic development,<sup>[3-6]</sup> source of technological creativity<sup>[7-8]</sup> and engines for innovation. Start-ups are supposed to grow more rapidly,<sup>[9-10]</sup> and deal more flexibly with difficulties than conventional businesses.<sup>[9]</sup> Initiating a start-up is rarely painless.<sup>[11]</sup> Some start-ups succeed, grow quickly and exit the start-up phase, while many others fail or languish as small firms.<sup>[12-13]</sup> During the start-up step, businesses are often highly vulnerable<sup>[14]</sup> since they must face various challenges such as selecting co-founders, selecting investors, determining capital contribution within the founding team.<sup>[15]</sup> They are also confronted by cultural barriers, barriers to market entry, barriers to access to financial support, barriers to experience.<sup>[16-17]</sup> The shortage of resources such as financial capital, human capital, and social capital<sup>[18-19]</sup> may also distrust

a start-up's growth opportunities. Besides, contextual factors also affect the success opportunities of start-ups.<sup>[20]</sup>

There have been several previous authors investigating the topic of start-up success. For instance, Gyimah *et al.*<sup>[21]</sup> Hormiga and Batista;<sup>[22]</sup> Meshram and Rawani;<sup>[23]</sup> and Spiegel *et al.*<sup>[24]</sup> tried to introduce conceptualizations and Ahmad and Hoffmann;<sup>[25]</sup> Kessler *et al.*<sup>[26]</sup> Maurya;<sup>[27]</sup> Murphy *et al.*<sup>[28]</sup> Rompho;<sup>[29]</sup> Tehseen and Ramayah;<sup>[30]</sup> and Duchesneau and Gartner<sup>[31]</sup> endeavour to measure of start-up success. Parallely, Abimbola and Agboola;<sup>[32]</sup> Gelderen *et al.*;<sup>[33]</sup> Santisteban and Mauricio;<sup>[34]</sup> and Song *et al.*<sup>[35]</sup> examined the various critical factors of start-up success. In addition, some extant studies aimed to look at the characteristics of founder that influence start-up success, such as psychological characteristics, the entrepreneur's personality, gender, the entrepreneur's educational level, previous start-up experience.<sup>[36-43]</sup> Regarding the scope of the study, most previous start-up success research focused on a single country such as Singapore,<sup>[44]</sup> Nigeria,<sup>[32]</sup> India<sup>[45]</sup> or the US.<sup>[46]</sup> Some approaches of industry field range as fresh juice distributors industry.<sup>[31]</sup>

Thus, there is lacking an overview analysis of start-up success at a global scale. Hence, this study aims to fill this gap by conducting a bibliometric analysis on start-up success with

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data obtained Scopus database. Bibliometric analysis is widely used in order to draw a comprehensive picture in particular research topic such as education,<sup>[47]</sup> entrepreneurship,<sup>[48]</sup> tourism<sup>[49]</sup> and social Media,<sup>[50]</sup> machine learning.<sup>[51]</sup> Bibliometrics analysis helps to capture various features from the extant literature on start-up success, including number of related articles over longitudinal perspective, geographical distribution of the authors, co-author collaboration pattern, major sources of publication, major authors, research groups or topics.

Specifically, this study intends to address the following research questions (RQ):

RQ1: What is the overall volume, growth pattern, geographical distribution of publications on start-up success?

RQ2: What are the most important outlets (i.e., journals, books, book series or conferences), authors, research groups and publications on start-up success?

RQ3: What are the most important topics in the start-up success literature?

## METHODOLOGY

This review used bibliometric methods to examine trends and patterns in the scientific database relating to start-up success published in the early 1980s. The bibliometric approach builds bibliometric networks based on knowledge downloaded from bibliographic databases (e.g., Web of Science or Scopus).<sup>[52]</sup> Bibliometric analysis technique review aims to understand the trends and systemic structure of the knowledge base in different disciplines.<sup>[53]</sup> Hence, differing from the traditional review method, the bibliometric analysis examines bibliographic meta-data, which seek to integrate substantive findings within a field of study.<sup>[52]</sup>

### *Search Criteria and Identification of Sources*

There are two most common scientific databases, including Scopus and the Web of Science, which are often selected by previous authors for bibliometric review.<sup>[54]</sup> In this particular case, however, Scopus is more suitable for the reasons below:

First, according to Hallinger and Nguyen,<sup>[55]</sup> Scopus was selected because the collection of documents for inclusion in its index uses a consistent standard. Second, Scopus has more coverage than Web of Science.<sup>[56-58]</sup> Moreover, in Social Sciences and Humanities, Scopus is more widely used than Web of Science.<sup>[59]</sup>

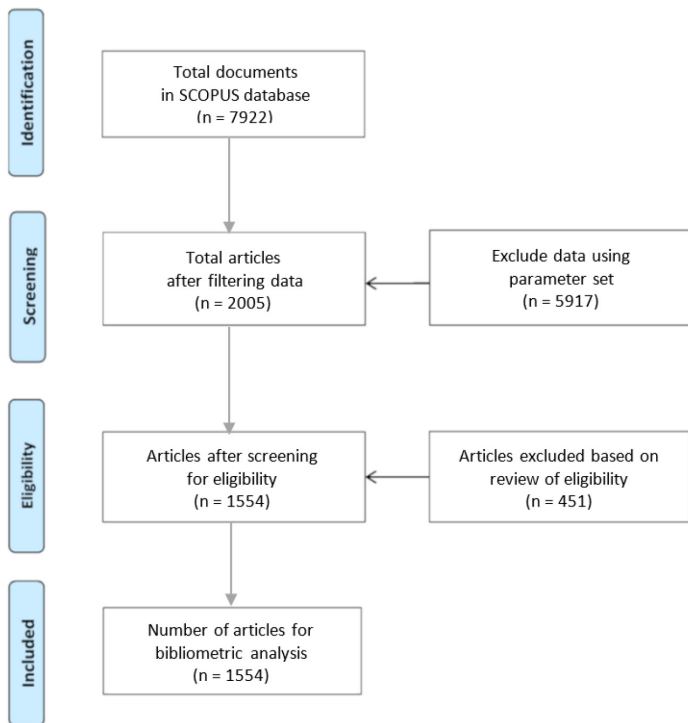
The review's topical emphasis was delimited to "start-up success"; however, variations of the keyword "start-up\*" were also used for search, such as "start-up\*" and "startup\*"—the search for documents encompassed journal articles, books, book chapters, and conference proceedings. The search

query was conducted in September 2020. No limitation was set on searching for the earliest "start-up success"-related publications. However, concerning the latest publications, we allowed Scopus to search to the end of 2019. Regarding the languages of searched publications, following<sup>[57]</sup> we only focused on English while ignoring other languages, including Chinese, French, Spanish, Bahasa Indonesia, etc. In view of this, we admit from the outset that one of the drawbacks of our research is this ignorance.

Eventually, the following keywords were used for the search query:

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TITLE-ABS-KEY ( success* AND ( "start up*" OR "start-up*" OR startup* ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "cp" ) OR LIMIT-TO ( DOCTYPE , "ch" ) OR LIMIT-TO ( DOCTYPE , "bk" ) ) AND ( EXCLUDE ( PUBYEAR , 2021 ) OR EXCLUDE ( PUBYEAR , 2020 ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( SUBJAREA , "BUSI" ) OR LIMIT-TO ( SUBJAREA , "SOCI" ) OR LIMIT-TO ( SUBJAREA , "ECON" ) OR LIMIT-TO ( SUBJAREA , "DECI" ) OR LIMIT-TO ( SUBJAREA , "ARTS" ) OR LIMIT-TO ( SUBJAREA , "PSYC" ) OR LIMIT-TO ( SUBJAREA , "MULT" ) )
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In this study, the authors used the literature search guiding principles outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).<sup>[60]</sup> PRISMA is followed by many scholars to conduct systematic evaluation, such as education,<sup>[57]</sup> tourism.<sup>[49]</sup> In the field of entrepreneurship, scholars use PRISMA to make systematic assessments as.<sup>[61-62]</sup> PRISMA allows authors to make all steps in the process of quest and screening clear (Figure 1). Specifically, the first search query yields a preliminary result of 7922 documents. Next, following PRISMA guideline, we only include the eligible documents and eliminate the ineligible documents. Eligible criteria include: (i) type of document: journal article, conference paper and book/book chapter; (ii) language: English; (iii) time period: 31 December 2019 backward; (iv) subject area: Business, Management and Accounting; Social Sciences; Economics, Econometrics and Finance; Decision Sciences; Arts and Humanities; Psychology; and Multidisciplinary. The initial Scopus search yielded 2005 documents. Following Gümüş *et al.*'s suggestion,<sup>[47]</sup> two co-authors scanned the titles and abstracts of articles to identify their relevance with the research questions. This step was undertaken between September and October 2020. At the final step, the comparison of the two co-authors yielded a 98% agreement on the inclusion/exclusion of articles. If certain publications receive mixed opinion between the two co-authors, the two co-authors will discuss together until the agreement is reached. In this final step the authors removed 440 non-conforming documents and 11 duplicate documents.



**Figure 1:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram detailing steps in the identification and screening of sources for review of start-up success.

Eventually, we obtained 1554 publications for final analysis (Figure 1).

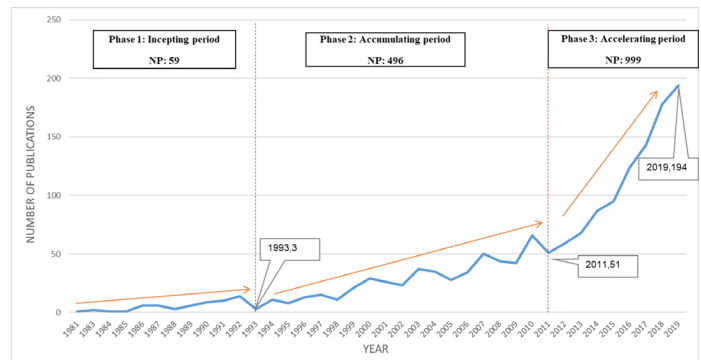
**Data Analysis**

Bibliographic data (authors, titles affiliations, citations, etc.) related to the 1554 start-up success documents were exported from Scopus into a master Excel file. Excel was used to perform descriptive statistical studies to chart the landscape of start-up success scholarship. (e.g., growth pattern, geographical distribution, types of research papers). VOSviewer software, a bibliometric software package used for science mapping, was used to analyze data in this master Excel file.<sup>[63]</sup> Using VOSviewer software, visual maps are extracted to illustrate citation analysis and co-citation analysis. The VOSviewer software package has been widely used in published reviews of research fields such as social sciences,<sup>[64-65]</sup> business and management,<sup>[66]</sup> medicine<sup>[67]</sup> and education.<sup>[68-69]</sup> Biblioshiny package was also used to perform extraction of related Figures.

**RESULTS**

In this section, we represent the results of the bibliometric analysis of start-up success, which correspond with our three research questions.

*Total volume, growth pattern and geographical distribution of start-up success literature*



**Figure 2:** Growth pattern of start-up success literature in Scopus between 1981-2019.

In this sub-section, studies on start-up success are considered in three aspects: total volume, growth pattern and geographical locations.

As mentioned above, we obtained 1554 start-up success documents for final analysis. These documents were comprised of 1159 journal articles (74.6%), 58 books (3.7%), 121 book chapters (7.8%) and 216 conference papers (13.9%). These 1554 documents were published in 769 outlets (i.e., journals, books and conferences). Figure 2 presents documents on start-up success over the years, with 1981 marking the first time that a study on start-up success was published.<sup>[70]</sup> Longitudinal analysis revealed that start-up success knowledge base might be divided into three periods, namely *Incepting period*, *Accumulating period*, and *Accelerating period*

- *Incepting period* from 1981 to 1992, during which 59 start-up success documents were published. This period contributed 3.8% of the total 1554 publications on start-up success between 1981 and 2018. In average, one year within this period contributes about 4.9 documents. The year with highest number of publications in this period is 1992 with 14 published documents.
- *Accumulating period* from 1993 to 2010, during which 496 start-up success documents were published. This period contributed 32.9% of the total 1554 publications on start-up success between 1981 and 2018. In average, one year within this period contributes about 27.6 documents. The year with highest number of publications in this period is 2010 with 66 published documents.
- *Accelerating period* from 2011 to 2019, during which 999 start-up success documents were published (or 99.9 documents per year). This period contributed 64.3% of the total 1554 publications on start-up success between 1981 and 2018. In average, one year within this period contributes about 99.9 documents. The year with highest number of publications in this period is 2019 with 194 published documents.

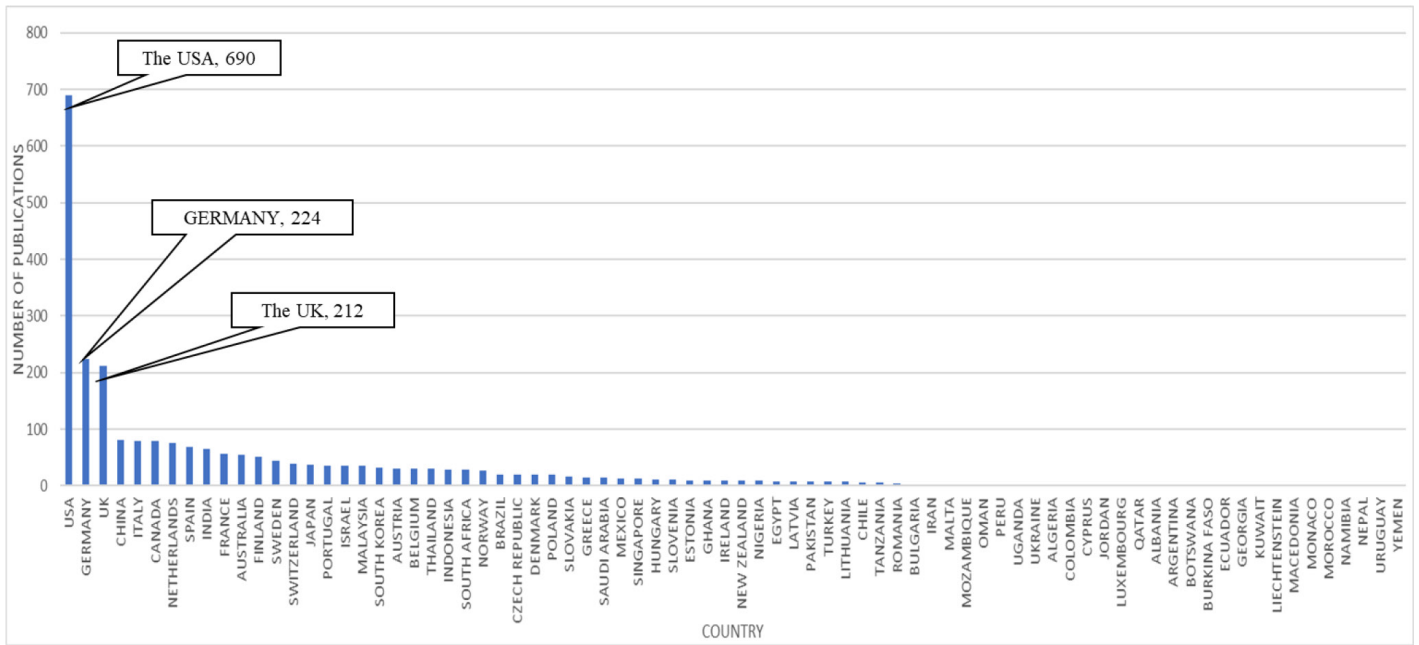


Figure 3: Geographical distribution of start-up success literature in Scopus between 1981-2019.

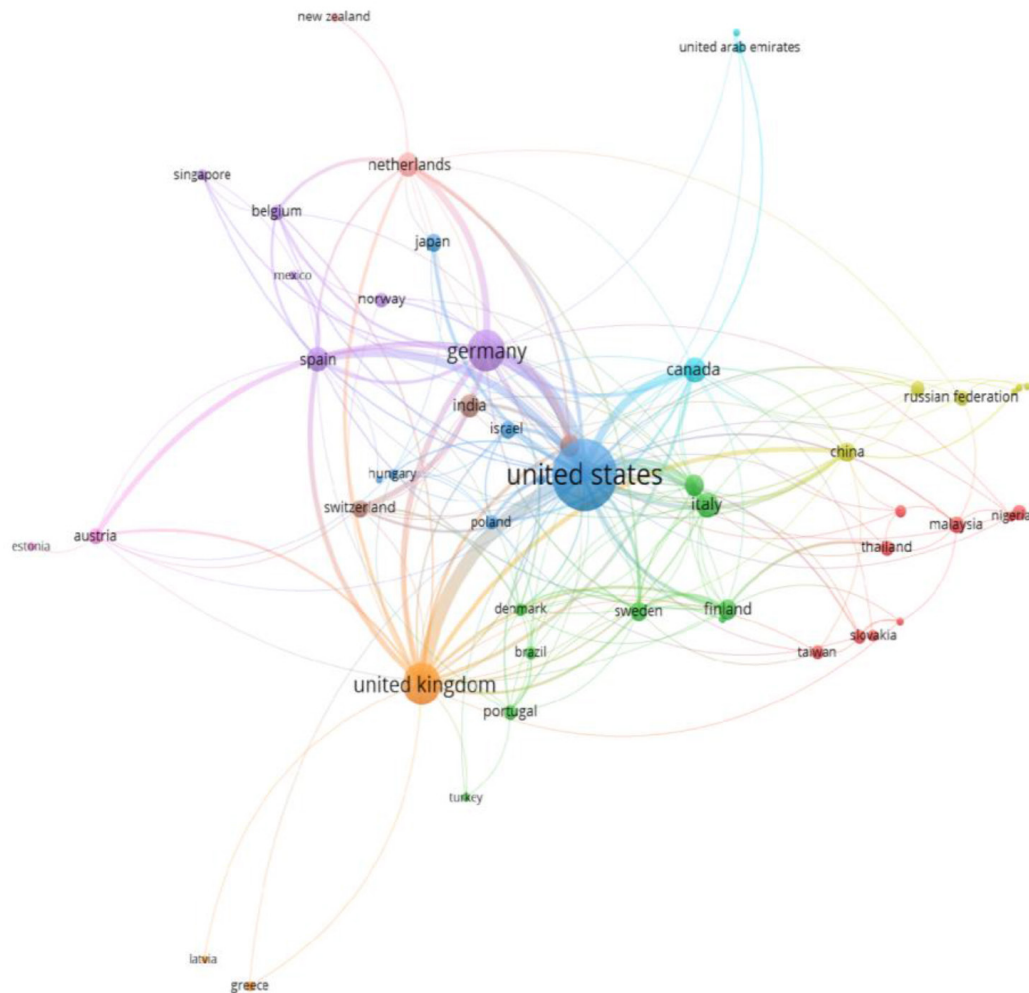


Figure 4: Co-author collaboration network by country from start-up success literature in Scopus between 1981-2019.

Note: Science mapping showed a collaboration network of 50 countries with at least five published documents in a period of time between 1981 to 2019.



**Table 1: Top 20 Active Journals Published in start-up Success Literature, 1981–2019.**

No	Source	Publisher	Country	Scope	Quartile (2019)	h-index (ranking)	TC (ranking)	NP (ranking)	PY_start
1	Journal of Business Venturing	Elsevier Inc.	Netherlands	Start-up focused	Q1	44	11428 (1)	57 (1)	1985
2	Small Business Economics	Springer Netherlands	Netherlands	Business	Q1	18	1867 (2)	28 (2)	1990
3	Entrepreneurship and Regional Development	Routledge	United Kingdom	Start-up focused	Q1	14	1218 (3)	19 (4)	1989
4	Technovation	Elsevier Inc.	United Kingdom	Technology	Q1	12	1004 (5)	17 (6)	1986
5	Journal of Technology Transfer	Kluwer Academic Publishers	United States	Technology	Q1	12	759 (6)	14 (8)	2001
6	International Journal of Entrepreneurial Behaviour and Research	Emerald Group Publishing Ltd.	United Kingdom	Business	Q1	10	439 (7)	22 (3)	2006
7	Research Policy	Elsevier Inc.	Netherlands	Management in general	Q1	10	1017 (4)	11 (11)	1983
8	Journal of Small Business and Enterprise Development	Emerald Group Publishing Ltd.	United Kingdom	Business	Q1	8	297 (12)	17 (7)	1998
9	Journal of Cleaner Production	Elsevier Inc.	Netherlands	Interdisciplinary	Q1	7	250 (13)	8 (15)	2015
10	Regional Studies	Routledge	United Kingdom	Interdisciplinary	Q1	7	298 (11)	7 (18)	1999
11	Venture Capital	Routledge	United Kingdom	Start-up focused	Q2	6	133 (15)	11 (12)	1999
12	Journal of Small Business Management	Wiley-Blackwell Publishing Ltd	United Kingdom	Business	Q1	6	342 (9)	9 (14)	2000
13	International Entrepreneurship and Management Journal	Springer New York	Germany	Start-up focused	Q1	6	216 (14)	8 (16)	2007
14	Harvard Business Review	Harvard Business School Publishing	United States	Management in general	Q2	6	307 (10)	7 (17)	1992
15	Journal of Business Research	Elsevier Inc.	Netherlands	Management in general	Q1	6	124 (16)	7 (19)	2013
16	International Journal of Entrepreneurial Behaviour and Research	Emerald Group Publishing Ltd.	United Kingdom	Start-up focused	Q1	6	383 (8)	6 (20)	1998
17	International Journal of Entrepreneurship and Small Business	Inderscience Enterprises Ltd.	United Kingdom	Start-up focused	Q2	5	118 (17)	19 (5)	2010
18	International Journal of Entrepreneurship and Innovation Management	Inderscience Enterprises Ltd.	United Kingdom	Start-up focused	Q3	5	74 (18)	14 (9)	2001
19	Journal of Small Business and Entrepreneurship	Taylor and Francis Ltd.	United Kingdom	Start-up focused	Q2	5	64 (20)	13 (10)	1996
20	Sustainability (Switzerland)	MDPI AG	Switzerland	Interdisciplinary	Q2	5	72 (19)	11 (13)	2017

Note: TC: total citations; NP: number of publications; PY: published year of the first document. Authors synthesized form scimagojr.com

Regarding geographical locations, 1554 start-up success documents were co-authored by 3120 scholars, distributed in 79 countries (or territories). This, indeed, implies considerable attention from the academic sector toward the topic of start-up success. Nevertheless, a closer look at details on co-authors' locations revealed a noticeable geographical imbalance in this knowledge base (Figure 3). The US is the country with the highest number of authors in start-up success. Specifically, 44.40% of start-up success documents were published by authors from the US (or 690 documents). Followed by the US are Germany, UK, China, Italy, Canada, Netherlands, Spain, India, and France. The respective Figures for these countries are 224 documents (14.41%), 212 documents (13.64%), 81 documents (5.21%), 80 documents (5.15%), 79 documents (5.08%), 76 documents (4.89%), 69 documents (4.44%), 66 documents (4.25%), và 56 documents (3.60%),

Among developing countries, Southeast Asia appears to be a region, which has had a special interest in start-up success topic. In total, authors from Southeast Asian countries contribute 115 documents (or 7.40 % of the total 1554 documents). Specifically, our data revealed that there are 35 start-up success documents published by Malaysian co-authors (2.3%). The respective Figures for other Southeast Asian countries, such

as Thailand and Indonesia, are 30 documents (1.93%) and 29 documents (1.87%).

The colour of the nodes represents the experiences of the respective countries in start-up success literature. The purple ones (e.g., the US, the UK, Canada, Japan, Israel or Belgium) indicate that co-authors from the respective countries had the most experiences in studies of start-up success (prior to 2012). Meanwhile, the green ones (e.g., Germany, Spain, Thailand, Malaysia, Nigeria) show that co-authors from the respective countries seem to start their attention on start-up success between 2012 and 2015. Last, it appears that co-authors from India, Brazil, Portugal, Slovakia and some other yellows are the newbie in this research topic. Interestingly, co-authors from Germany are not among the most experienced scholars in start-up success literature despite that they have become the second most productive scholar community (behind the US) on this topic at the present time. The first start-up success document authored by a scholar from Germany was in Heuer.<sup>[71]</sup>

The widths of the lines connecting different nodes illustrate the co-author patterns between scholars from respective countries. The wider a line is, the more documents are co-published by authors from the two countries. As shown in Figure 4, the two countries groups with the most co-publications on start-up success (15 co-published documents) are the US-the UK and the US-Germany). They are followed by the US-Canada) and the US-Spain with 9 co-published documents.

**Table 2: Top 20 most contributing authors in Start-up success Literature Ranked by Number of Publications and Total Citations.**

No	Author	h <sub>1</sub> index	Total Cited	TC (ranking)	Number of Publication	PY <sub>1</sub> start
1	Gartner WB	5	1201	1201 (1)	7	1990
2	Avnimelech G	5	281	281 (6)	6	2003
3	Reynolds PD	5	1001	1001 (2)	6	1996
4	Teubal M	4	242	242 (9)	6	2003
5	Frank H	4	168	168 (11)	4	1989
6	Wright M	5	494	494 (4)	5	1999
7	Jones O	4	41	41 (17)	4	2008
8	Littunen H	4	309	309 (5)	4	1998
9	Audretsch DB	3	202	202 (10)	3	1997
10	Chrisman JJ	3	146	146 (12)	3	1987
11	Doutriaux J	3	135	135 (13)	3	1987
12	Dowling M	3	64	64 (16)	3	2006
13	Edelman LF	3	270	270 (7)	3	2008
14	Fichter K	3	20	20 (19)	3	2012
15	Frese M	3	750	750 (3)	3	2000
16	Kaciak E	3	35	35 (18)	3	2013
17	Kessler A	3	95	95 (15)	3	2007
18	Klofsten M	3	114	114 (14)	3	1999
19	Sanandaji T	3	19	19 (20)	3	2014
20	Song M	3	262	262 (8)	3	2008

Note: TC: total citations; NP: number of publications; PY: published year of the first document

*The most influencing outlets, authors, and documents on start-up success*

Table 1 presents the top 20 most influencing outlets of start-up success. So far, these 20 outlets published 305 start-up success documents, which is equivalent to 19.6% of the total 1554 documents. Some bibliometric indicators were taken into consideration, including a number of start-up success documents, journal *h*-index, journal quartile (as accounted in <https://www.scimagojr.com/>), and a number of citations.<sup>[57]</sup> Among others, it appears that the Journal of Business Venturing (Q1, *h*-index 44) is the most important journal of start-up success with 57 published documents on start-up success (ranked number 1) and 11,428 citations (ranked number 1). The first document on the start-up success of this journal was published in 1985, only four years after the first document on start-up success had been published in 1981. Other high profile outlets of start-up success include Small Business Economics (Q1, *h*-index 18, 28 documents, 1,867 citations, first publication on start-up success in 1990), Entrepreneurship and Regional Development (Q1, *h*-index 14, 19 documents, 1,218 citations, first publication on start-up success in 1989), Technovation (Q1, *h*-index 12, 17 documents, 1,004 citations, first publication on start-up success in 1986), Journal of Technology Transfer (Q1, *h*-index 12, 17 documents, 759 citations, first publication on start-up success

in 2001). Regarding the scope of the outlets in start-up success, as shown in Table 1, there are eight startup-related journals in the top 20. The respective Figures for technology-related, management/business in general, and interdisciplinary are 2, 7, and 3.

Of the total, our database reveals that there are 3120 authors who have published at least one document on start-up success. Despite the large number, few authors have a substantial

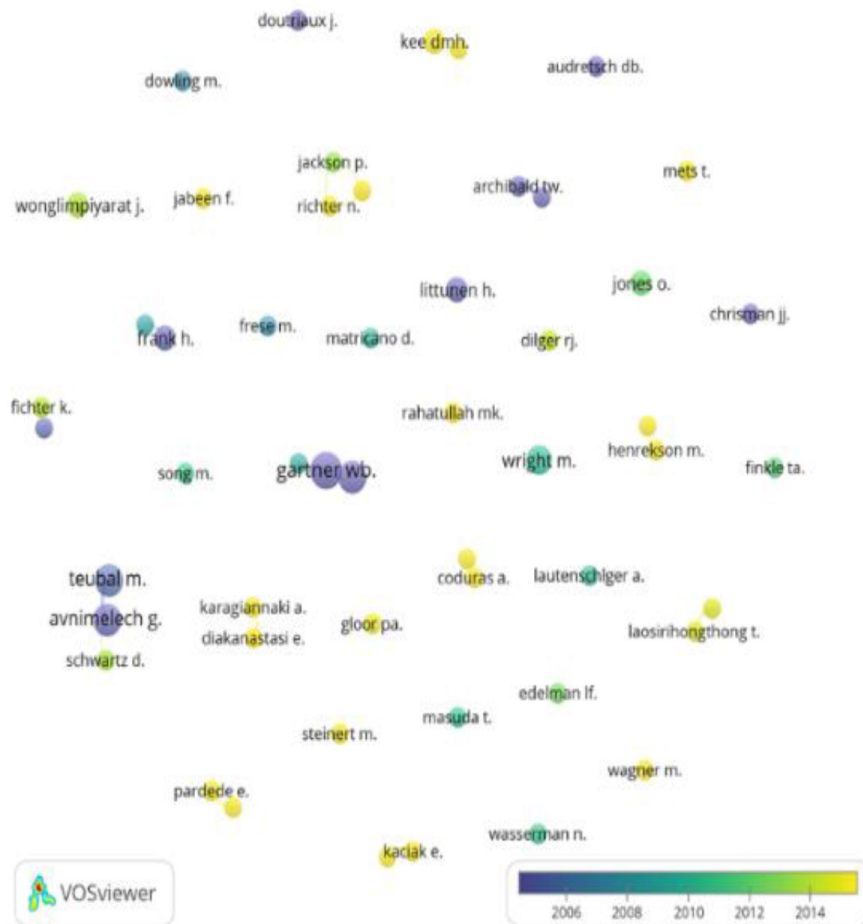
number of documents in this subject, as about 2,828 authors (about 90.6%) have only one publication. Authors who have more than 1 publication include 239 authors (7.7%) with 2 publications, and 53 authors (1.7%) with more than 2 publications. To identify the most influencing scholars, *h*-index, the number of publications and total citations are used, respectively. Table 2 presents information regarding the 20 main contributing authors, who accounted for 4.4%

**Table 3: Top 20 publications in start-up Success, 1981-2019.**

No	Title	Author	Source	Published year	Total Citations (TC)	TC per Year
1	The role of social and human capital among nascent entrepreneurs	Davidsson P; Honig B	Journal of Business Venturing	2003	2037	113.17
2	Differences between entrepreneurs and managers in large organizations: biases and heuristics in strategic decision-making	Busenitz LW; Barney JB	Journal of Business Venturing	1997	1228	51.17
3	The dynamics of crowdfunding: an exploratory study	Mollick E	Journal of Business Venturing	2014	1202	171.71
4	Explaining the formation of international new ventures: the limits of theories from international business research	Phillips Mcdougall P; Shane S; Oviatt BM	Journal of Business Venturing	1994	860	31.85
5	The influence of the management teams international experience on the internationalization behaviors of smes	Reuber AR; Fischer E	Journal of International Business Studies	1997	674	28.08
6	Let's put the person back into entrepreneurship research: a meta-analysis on the relationship between business owners' personality traits, business creation, and success	Rauch A; Frese M	European Journal of Work and Organizational Psychology	2007	663	47.36
7	Exploring start-up event sequences	Carter NM; Gartner WB; Reynolds PD	Journal of Business Venturing	1996	463	18.52
8	A longitudinal study of cognitive factors influencing start-up behaviors and success at venture creation	Gatewood EJ; Shaver KG; Gartner WB	Journal of Business Venturing	1995	346	13.31
9	Venture capital financing and the growth of start-up firms	Davila A; Foster G; Gupta M	Journal of Business Venturing	2003	336	18.67
10	Entrepreneurship and university-based technology transfer	Markman GD; Phan PH; Balkin DB; Gianiodis PT	Journal of Business Venturing	2005	303	18.94
11	Elitists, risk-takers, and rugged individualists? an exploratory analysis of cultural differences between entrepreneurs and non-entrepreneurs	Mcgrath RG; Macmillan IC; Scheinberg S	Journal of Business Venturing	1992	294	10.14
12	Characteristics and goals of family and owner-operated businesses in the rural tourism and hospitality sectors	Getz D; Carlsen J	Tourism Management	2000	292	13.90
13	Experienced entrepreneurial founders, organizational capital, and venture capital funding	Hsu DH	Research Policy	2007	284	20.29
14	Academic and surrogate entrepreneurs in university spin-out companies	Franklin SJ; Wright M; Lockett A	Journal of Technology Transfer	2001	284	14.20
15	On the survival prospects of men's and women's new business ventures	Boden JR. RJ; Nucci AR	Journal of Business Venturing	2000	277	13.19
16	Entrepreneurs' networks and the success of start-ups	Witt P	Entrepreneurship and Regional Development	2004	272	16.00
17	A profile of new venture success and failure in an emerging industry	Duchesneau DA; Gartner WB	Journal of Business Venturing	1990	269	8.68
18	Gender as a determinant of small business performance: insights from a british study	Rosa P; Carter S; Hamilton D	Small Business Economics	1996	267	10.68
19	The ambitious entrepreneur: high growth strategies of women-owned enterprises	Gundry LK; Welsch HP	Journal of Business Venturing	2001	261	13.05
20	Gender differences in business performance: evidence from the characteristics of business owners survey	Fairlie RW; Robb AM	Small Business Economics	2009	253	21.08

of the total data collected (69 documents). The authors' influence is considered not only by the greatest number of published documents but also by the higher *h*-index of their published documents. As shown in Table 2, it may conclude that Gartner WB is the most important scholar of this topic, regardless of criteria, number of publications or total citations. Since the first publication on start-up success in 1990,<sup>[31]</sup> this author published seven documents on start-up success and received 1201 citations in total. Other influencing authors in this topic include Reynolds PD (6 documents, 1001 citations, first publication on start-up success in 1996), Frese M (3 documents, 750 citations, first publication on start-up success in 2000), Wright M (5 documents, 494 citations, first publication on start-up success in 1999), Littunen H (4 documents, 309 citations, first publication on start-up success in 1998). The findings that all the most influencing scholars on start-up success only published less than ten documents implies that despite start-up success has received attention from scholars for almost 40 years, few established research groups on this topic have been formed.

Figure 5 corroborates this assertion. Specifically, Figure 5 represents different research groups on start-up success over time. Each circle represents an author. The size of the node reflects the number of publications on start-up success of respective Figure; meanwhile, the colour is the proxy of experience of the respective Figure in start-up success study: purple colour indicates that the respective author had the first publication on start-up success prior to 2008; yellow colour indicates that the respective author joined the studies of start-up success in recent years, i.e., since 2014; green colour indicates that the respective author published his/her first document on start-up success between 2008 and 2014. Different juxtaposing nodes form a research group. As shown in Figure 5, the research groups of start-up success appear to be fragmented and small, with an average of two to three authors per group. Some research groups were prominent in the past (nodes are large), but recently no new studies have been published (dark nodes), such as the two biggest groups led by Gartner WB (last published in 2009) and Avnimelech G (last published in 2013) seem to not active in recent years as their groups do not have any new co-authors with yellow



**Figure 5:** Co-authorship map of SS scholars between 1981 and 2019 (display 52 authors; threshold three articles).



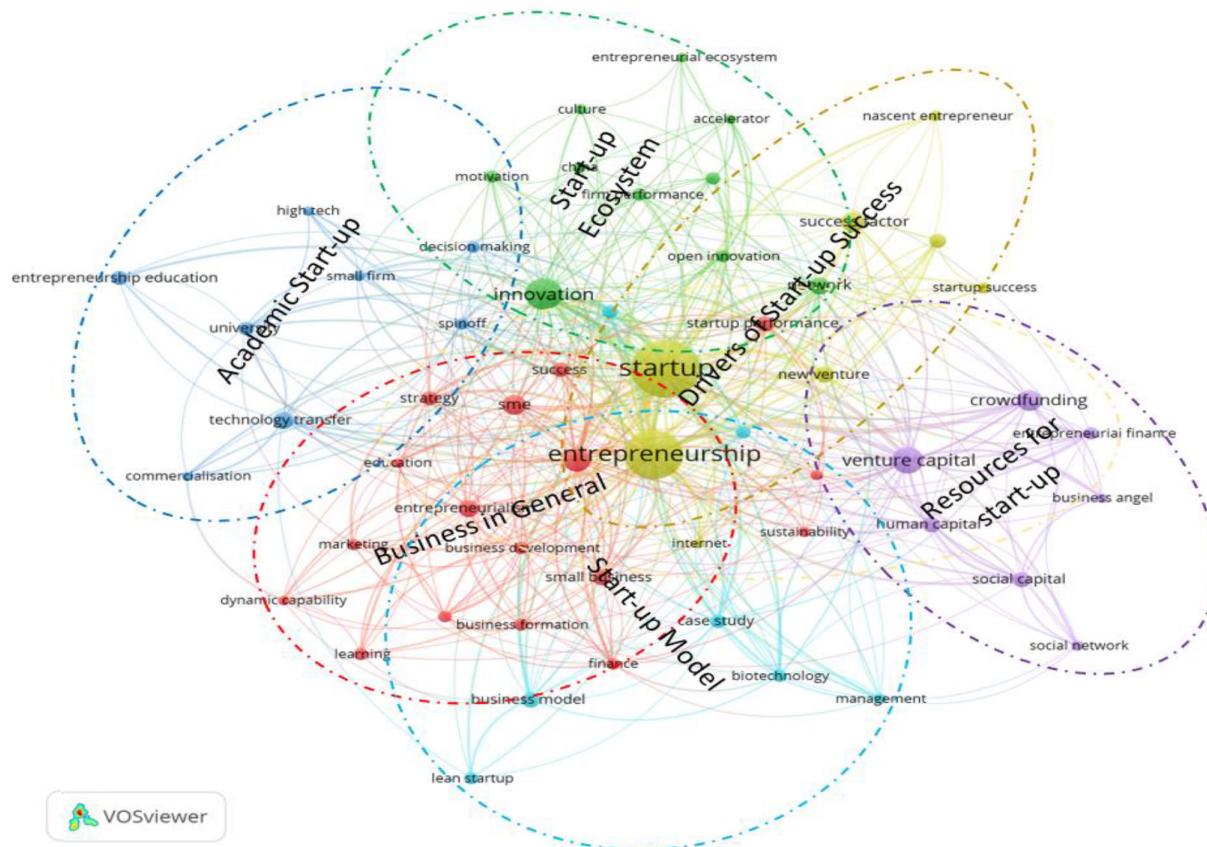
colour. However, there are several new publications on the topic of start-up success (light colored buttons) including single-author and multi-author papers, such as (Jackson P.; Richter N.; and Schildhauer T.); (Kee Dmh.; Rahman Na.); Mets T.; Jabeen F.; and Steinert M (Figure 5).

Next, we used the number of citations and the number of citations per year to identify the most important documents on start-up success (Table 3). Apparently, it appears some documents are authored by top scholars as found in Table 2. For instance, Gartner WB, who is ranked number 1 in Table 2 co-authors three documents which are listed in Table 3.<sup>[31,72-73]</sup> Other authors who are simultaneously found in Table 2 and have documents listed in Table 3 include Reynolds PD, Wright M and Frese M. These authors only have one document for each listed in Table 3.<sup>[72,74-75]</sup> Nevertheless, it appears 15 documents listed in Table 3 not being co-authored by top scholars in Table 2. Especially, the five most cited documents<sup>[76-80]</sup> were all co-authored by less prolific scholars who are not ranked in Table 2. Among the 20 most cited documents, eight are from the Journal of Business Venturing, which ranks first in the top 20 a Journals/Outlets in start-up success literature between 1981–2019 (Table 3); while the remaining eight documents were from seven other publishers (Journal of International Business Studies; European Journal of Work and

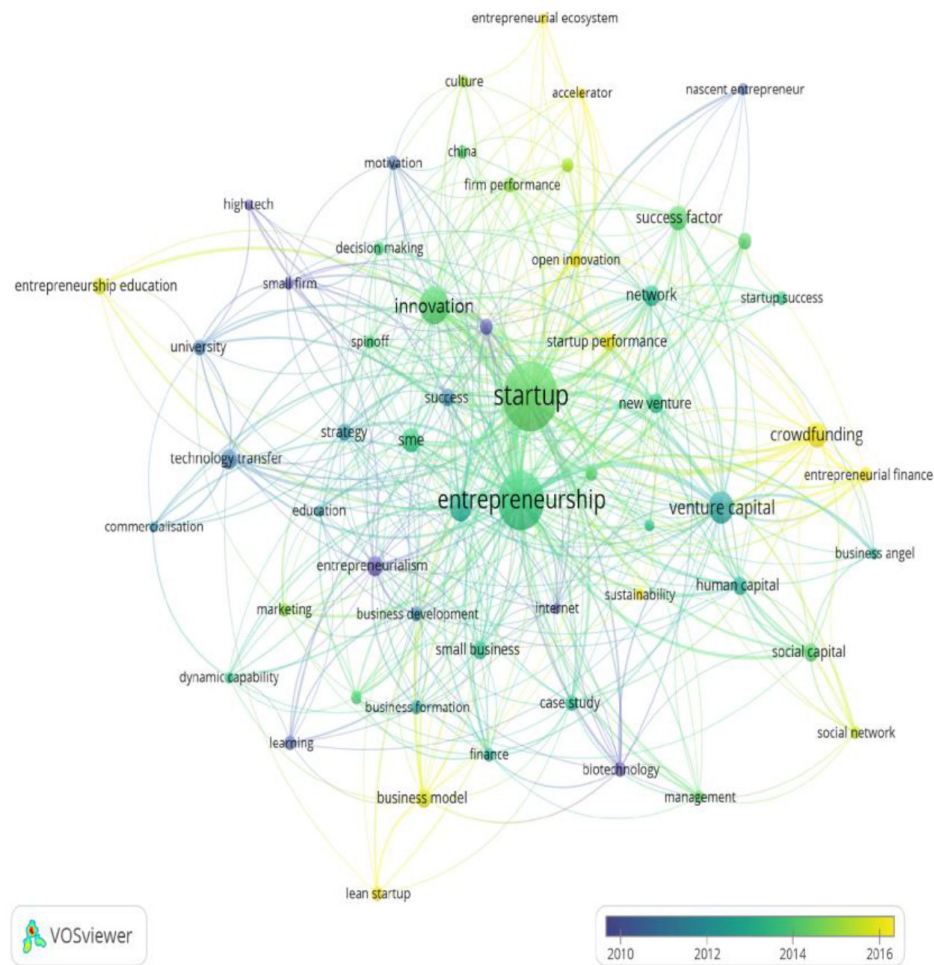
Organizational Psychology; Tourism Management; Research Policy; Journal of Technology Transfer; Entrepreneurship and Regional Development; Small Business Economics).

*Topical trends in the SS knowledge base*

To explore the most important topics in start-up success literature, we investigated keywords of start-up success documents. First, following van Eck and Waltman,<sup>[63]</sup> Zupic and Čater,<sup>[81]</sup> co-keyword analysis was conducted to identify the key themes in start-up success literature. Figure 6 represents our co-keyword analysis. Specifically, 57 keywords corresponding with 57 nodes with at least 9-time occurrences were shown in Figure 6. Similar to Figure 5, the size of each node reflects the number of occurrences of the respective keyword in our studied documents, while the widths of the lines connecting different nodes represent the number of co-occurrences of the respective keywords in the same start-up success documents. As shown in Figure 6, six overlapping clusters representing six topical themes and featured by six colours are identified from the co-keyword analysis: (1) Business in General, (2) Start-up Ecosystem, (iii) Academic Start-up, (iv) Drivers of Start-up Success, (v) Resources for start-up, and (vi) Start-up Model. Each cluster would be comprised of some respective keywords (Table 4).



**Figure 6:** Main driver research in SS based Co-word analysis, 1981-2019. Note: threshold nine author keywords, display 57 keywords



**Figure 7:** Co-word analysis, 1981-2019 (threshold nine author keywords, display 57 keywords).

Apart from cluster identification, VOSViewer also supports researchers to identify the recency of topical themes. Temporal co-word analysis reveals the time period when particular topics were at the height of their popularity.<sup>[52]</sup> As shown in Figure 7, the nodes with purple colour represent the “traditional” topics (i.e., prior to 2010) in start-up success literature e.g., Entrepreneurialism,<sup>[81]</sup> high tech,<sup>[82]</sup> growth.<sup>[83]</sup> Meanwhile, the nodes with yellow colour represent the “recent” topics (i.e., 2015 onward) in start-up success literature e.g., Entrepreneurial ecosystem,<sup>[84-85]</sup> Start-up performance,<sup>[86]</sup> Open innovation,<sup>[87]</sup> and the nodes with green colour represent the topics first appeared between 2010 and 2015.

The combination of occurrence frequency and average publication year of keywords suggests interest of scholars in each period. In the early period (dark colored nodes), scholarly interest centered on “traditional and general economic issues, such as: high tech (9) (2009), small firm (9) (2002), growth (17) (2010), or entrepreneurialism (25) (2008)). Next, the issues of concern focused on issues related to start-up (innovation (84) (2014), entrepreneur (46) (2013), entrepreneurship (213)

(2013)), issues directly related to start-up (success factor (34) (2014); start-up success (12) (2013); network (26) (2013); social capital (20) (2014); firm performance (14) (2015)), or more specifically to an organization (startup (288) (2014)). Later on, scholars go into the depths of the start-up space, solving problems related to the performance of start-up directly or indirectly. Directly, such as: resources for start-up (crowdfunding (39) (2018); Entrepreneurial finance (14) (2017); social network (10) (2015), start-up performance (21) (2016), or business model (21) (2016). Indirectly, through intermediary organizations promoting entrepreneurship as Entrepreneurial ecosystem (9) (2018), accelerator (9) (2017); through education to promote entrepreneurship as Entrepreneurship education (19) (2016). Specifically, the new research direction like Open innovation (15) (2017), suggested by many scholars.<sup>[86-90]</sup>

## DISCUSSION AND CONCLUSION

Despite having received increasing attention from researchers, there has been little known on the overall picture of start-up success literature. To address this research void, we adopted bibliometric analysis to explore the extant literature on start-

**Table 4: Topical trends research in the SS (1981–2019) based on the 57 most common keywords appearing nine or more times.**

Cluster's color	Name of Cluster	Keywords (occurrences) (Avg. pub.year)	Quantity
Red	Business in General	Entrepreneur (46) (2012); SME (36) (2014); Entrepreneurialism (25) (2008); Start-up performance (21) (2016); Small business (20) (2013); Strategy (19) (2012); Success (19) (2011); Business development (13) (2011); Business formation (13) (2012); Learning (13) (2011); Business start-up (12) (2014); Finance (12) (2013); Marketing (12) (2015); Gender (11) (2014); Sustainability (10) (2017); Dynamic capability (9) (2013); Education (9) (2012)	(17 keywords)
Green	Ecosystem	Innovation (84) (2014); Network (26) (2013); Open innovation (15) (2017); Firm performance (14) (2015); Incubator (13) (2015); Motivation (13) (2011); China (12) (2014); Culture (11) (2015); Accelerator (9) (2017); Entrepreneurial ecosystem (9) (2018)	(10 keywords)
Blue	Academic Startup	Technology transfer (25) (2011); Entrepreneurship education (19) (2016); University (16) (2011); Decision making (12) (2014); Spinoff (12) (2014); Commercialization (9) (2012); High tech (9) (2009); Small firm (9) (2002)	(9 keywords)
Yellow	Drivers of Start-up success	Start-up (288) (2014); Entrepreneurship (213) (2014); Success factor (34) (2014); New venture (23) (2013); Business incubator (18) (2014); Start-up success (12) (2013); Nascent entrepreneur (11) (2011); Internet (9) (2009)	(8 keywords)
Purple	Resources for Start-up	Venture capital (61) (2013); Crowdfunding (39) (2018); Human capital (22) (2013); Social capital (20) (2014); Entrepreneurial finance (14) (2017); Social network (10) (2015); Business angel (9) (2013)	(7 keywords)
Light Blue	Start-up Model	Business model (21) (2016); Case study (17) (2013); Growth (17) (2010); Biotechnology (15) (2008); Lean start-up (15) (2017); Technology (14) (2014); Management (10) (2014)	(7 keywords)

up success with data obtained from Scopus between 1981 and 2019. Specifically, we focused on three main aspects: (i) overall volume, growth pattern and geographic distribution of the extant publications on start-up success, (ii) the most important outlets, authors, research groups and publications

on start-up success, (iii) the most important research topics on start-up success.

Our study identified 1554 documents on start-up success worldwide from Scopus database. The first start-up success document was published in 1981.<sup>[69]</sup> Nevertheless, it appeared that during the period of 1981-1992 (named as Incepting period), start-up success seemed to not receive significant interests from the academic community as we found only 59 start-up success documents (3.80% of the total start-up success publications) published in this period. Following the Incepting period, our study identified the period of 1993-2010, during which 496 start-up documents (31.92 % of the total publications) were published. In this period, although start-up success appeared to attract more attention from scholars than the previous one, the absolute output of start-up success literature was still limited, and the trajectory of a number of publications per year was still unstable. Thus, this period was named as Accumulating period. Only after 2011, the number of start-up success documents published annually has raised gradually. The year of 2019 marked the year with the highest number of start-up success documents (194 documents). Thus, the period 2011-2019 was named as accelerating period. Overall, the growth trajectory of start-up success studies since 1981 reflects the overall evolvement of the start-up in the actual business environment. It is apparently that start-up has only emerged in recent decades, especially over the past ten years as a global phenomenon. Thus, the accelerating growth of number of start-up success documents in the past ten years, as found in this study is understandable.

Regarding geographical distributions of start-up success publications, our study revealed that the developed countries of which the three most important Figures are the US, Germany and the UK contributed the majority of publications on start-up success. This finding is plausible as the current statistics show that the developed world has been recognized as the hub of start-up worldwide: Europe leads in terms of constituents in the Emerging Ecosystems list with 38 start-up ecosystems. Eight of these are from Eastern Europe. It is followed by North America with 32 start-up ecosystems and Asia-Pacific is third with 22 ecosystems.<sup>[91]</sup>

Regarding the sources of publications, our study explored that start-up success documents were published in different outlets (journals, books, conferences) with different foci, including startup-related journals (e.g., Journal of Business Venturing, Journal of Business Venturing, International Entrepreneurship and Management Journal), technology-related (Technovation, Journal of Technology Transfer), management/business in general (e.g., Journal of Small Business and Enterprise Development, Harvard Business Review, Journal of Business Research ), and interdisciplinary (e.g., Regional Studies, Sustainability). While the appearance of start-up success



documents on startup-related and management/business in general journals is obvious, their appearance on technology-related journals reflects the nature of start-up as technology-based firms rather than regular medium and small firms.<sup>[82,92-93]</sup> At the same time, the finding that some start-up success studies were published in interdisciplinary-oriented journals reflects the nature of the current trend on interdisciplinary research in social sciences.

One of the strengths of bibliometric analysis pertains to its capacity to explore the key authors, research groups of the studied topic. In this project, we revealed top scholars and their research groups as the main hubs of start-up success knowledge. As represented above, our study revealed that despite receiving increasing interests from the academic community, start-up success's knowledge base is not comprised of truly productive and active scholars and research groups. Specifically, the most productive scholar only published seven start-up success documents, whereas most high-profile research groups gather around three or four authors. These Figures are much lower than the respective ones of research topics which were initiated in the same period (i.e., the early 1980s).<sup>[94-96]</sup>

The sample shows that 3120 scholars from 79 countries around the globe have published 1554 documents on the topic of startup success. The topic of startup success has attracted many scholars to research, affirming worldwide interest in SS but also reveals a noticeable geographical imbalance in this knowledge base. There is a lack of continuity in research. Several prominent research groups in the past have not had recent publications. It is uncommon for new scholars to join established research groups, according to the Scopus data.

Last, our study adopted co-word analysis to identify the key themes of start-up success literature. These include (i) business in general, (ii) start-up ecosystem, (iii) academic start-up, (iv) drivers of start-up success, (v) resources for start-up, and (vi) start-up model from longitudinal dimension. The key themes (ii) start-up ecosystem, (v) resources for start-up, and (vi) start-up model have successively published studies in the accelerating period, while the remaining topics have no published studies recently. This study also identified the most recent "hot topics" of start-up success, such as Entrepreneurial ecosystem, Entrepreneurial finance, Start-up performance, Sustainability, Entrepreneurship education Accelerator; along with the more traditional ones Entrepreneurialism, High tech, Technology transfer, University, Internet, Nascent entrepreneur. These findings would be necessary references for future scholars who want to undertake empirical research on start-up success.

This study may provide implications for stakeholders. First, as start-up success has received increasing attention from academic scholars in recent years and is expected to receive more attention in upcoming years; thus, scholars may use this bibliometric analysis as key reference for their further studies on start-up success. Specifically, thanks to this study, scholars on start-up success have already known the key hubs of start-up success studies as well as the collaborating pattern among these key hubs. Besides, this study also identifies for future scholars on start-up success the key outlets for referencing and submitting their works on start-up success. Furthermore, future scholars who want to undertake studies on start-up success may consult from the finding of six topical trends on start-up success as unveiled in this study. Second, not only academic scholars, policymakers, start-up owners, entrepreneurs and practitioners may also use this study as knowledge base for their policy-making and decision-making activities. Last, this study may also be used as material in business course at higher education levels, including undergraduate and graduate education.

### Limitations and Suggestion for Further Research

This study has several limitations, as many others do.<sup>[97]</sup> First, despite the advantages of bibliometric analysis, we should be aware that it only works with metadata information and does not cover the content of start-up success studies. Future attempt to review the current status of start-up success literature may employ different approach such as content analysis<sup>[98]</sup> to get insights into this knowledge base. Second, this study encompasses all studies, irrespective of their sources of studies. Thus, it may provide a worldwide picture of start-up success literature but lack of specific niche which corresponds with different regions or countries. Future scholars who would like to shed further light on start-up success literature may follow the approach of Phillip Hallinger and his colleagues, who conducted a series of bibliometric analysis on educational leadership and management with different contexts such as Europe<sup>[99]</sup> Asia; Africa and Latin America;<sup>[100]</sup> Arab societies.<sup>[69]</sup>

### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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