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ORIGINAL ARTICLE

Overview of the factors that influence the competitiveness of startups: a systematized literature review

Visão geral dos fatores que influenciam a competitividade das startups: uma revisão sistematizada da literatura

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Abstract: This research presents a systematized literature review to identify the main critical success factors (CSFs) that influence startups' competitiveness. Considering that aspects related to competitiveness should be the target of organizations, especially early-stage companies, this paper identifies a broad of factors regarding startups' competitiveness. A total of 36 articles were selected in Scopus and Web of Science databases and an in-depth bibliometric analysis of the corpus was performed using the VOSviewer software. 25 CSFs that influence startups' competitiveness were identified and categorized into three fundamental points of view (FPVs), namely: organizational, human, and environmental. Organizational FPV covers factors that define the internal characteristics of startups. Human FPV, in turn, consists of characteristics of human capital, while the Environmental FPV refers to external factors and the startup context. This work could help practitioners and policymakers by enlightening them about startups' competitiveness and the elements involved therein, along with providing them with a robust conceptual framework.

Keywords: Systematic literature review; Competitiveness; Critical success factors; Startups; Technology-based firms.

Resumo: Esta pesquisa apresenta uma revisão sistematizada da literatura para identificar os principais fatores críticos de sucesso (FCS) que influenciam a competitividade de startups. Considerando que aspectos relacionados à competitividade devem ser o alvo das organizações, principalmente das empresas em estágio inicial, este artigo identifica uma ampla gama de fatores relacionados à competitividade das startups. Foram selecionados 36 artigos nas bases de dados Scopus e Web of Science e realizada análise bibliométrica aprofundada do corpus por meio do software VOSviewer. Foram identificados 25 FCS que influenciam a competitividade das startups e categorizados em três pontos de vista fundamentais (PVF), a saber: organizacional, humano e ambiental. O PVF organizacional abrange fatores que definem as características internas das startups. O PVF Humano, por sua vez, consiste em características do capital humano, enquanto o PVF Ambiental refere-se a fatores externos às startups e ao contexto em que atuam. Este trabalho pode ajudar profissionais e formuladores de políticas, esclarecendo-os sobre a competitividade das startups e os elementos envolvidos nisso, além de fornecer-lhes uma estrutura conceitual robusta.

Palavras-chave: Revisão sistemática de literatura; Competitividade; Fatores críticos de sucesso; Startups; Empresas de base tecnológica.

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1 Introduction

The dynamics of the business environment are related to globalization, increased competition, maturation of corporate networks, and emphasis on customers (Rosa et al., 2016). In addition, changes in intellectual capital, technological advances, and the importance of stakeholders have guided companies on the path of competitiveness (Behl, 2020). Organizations are continually looking for new ways to generate ideas and turn them into innovative products and services (Reis et al., 2019). In this context are startups–companies that operate in a highly competitive environment–whose main advantage over other players in the massive use of innovation in product and service development processes. Innovation is a key factor for the competitiveness and survival of this type of organization (Agarwal et al., 2013).

A startup's definition is widely debated in the academic field. According to Ries (2012), a startup is a human enterprise designed to create products/services under conditions of high risk and uncertainty. Krejcí et al. (2015) indicate that startups are early-stage and temporary companies that have a business model based on innovation and technology. Also, their main characteristic is the search for ways to scale their business model through the development of solutions with a high degree of innovation and low expenditure of human and financial resources (Berg et al., 2020; Clarysse & Bruneel, 2007). The business model is crucial for digital startups even before the organization starts operating (Kainde & Batmetan, 2019). Thus, startups have different objectives and priorities when compared to other companies. Startups focus mainly on their genesis and later their survival in the market (Ojaghi et al., 2019).

The literature suggests that the startup failure rate is around 90% (Erdogan & Koohborfardhaghighi, 2019). To overcome high mortality rates, startups need to search for highly profitable niches to innovate without the need for large investments, introducing differentiated products and services with the goal of customer loyalty (Jugend & Silva, 2010; Moroni et al., 2015). Accelerators and incubators are mechanisms that can support startups by reducing the risk of failure (Gazel & Schwienbacher, 2021). In addition, business accelerators stimulate the dynamic capabilities of startups, helping them to gain competitive advantage and superior performance in the market compared to startups that are not inserted in an acceleration environment (García-Ochoa et al., 2022). Nonetheless, startups must create something new or improve an existing product or service, seeking to solve a real problem in the market. The results of Santisteban & Mauricio (2017) suggest that a startup's success is not dependent on obtaining economic benefits, but mainly on the creation of something that contributes to improving people's lives. In this sense, the success of a startup depends on other factors related to leadership, disruptive innovation, and location within specialized clusters (Abadía, 2021).

Recently, competitiveness has gained visibility in scientific and business contexts, as countries and companies strive to increase performance (Santos et al., 2019). To become competitive in an environment full of larger organizations and resources, startups need to understand which factors are predominantly important to boost their level of competitiveness. This article aims to identify the main critical success factors (CSFs) that influence startups' competitiveness. Despite the substantial increase in research related to innovation and startups, research similar to the scope of this article has not been found in the literature. Santisteban & Mauricio (2017) developed a framework with the main factors for the success of information technology startups. However, the factors raised are not related to competitiveness, in addition to using only information technology startups as an object of study.

This research, therefore, contributes to the literature by presenting a broad analysis of the factors associated with startups' competitiveness. Also, this panorama is a starting point for researchers and professionals who work in the startup ecosystem, to understand in-depth the elements involved in improving the competitive power of the organization.

2 Materials and methods

The systematic literature review method provides a comprehensive and contemporary evaluation of the research using transparent methods, to minimize bias (Needleman, 2002). All sources are examined and described systematically, enabling the reproduction of the research protocol (Fink, 2019), as shown in Figure 1.

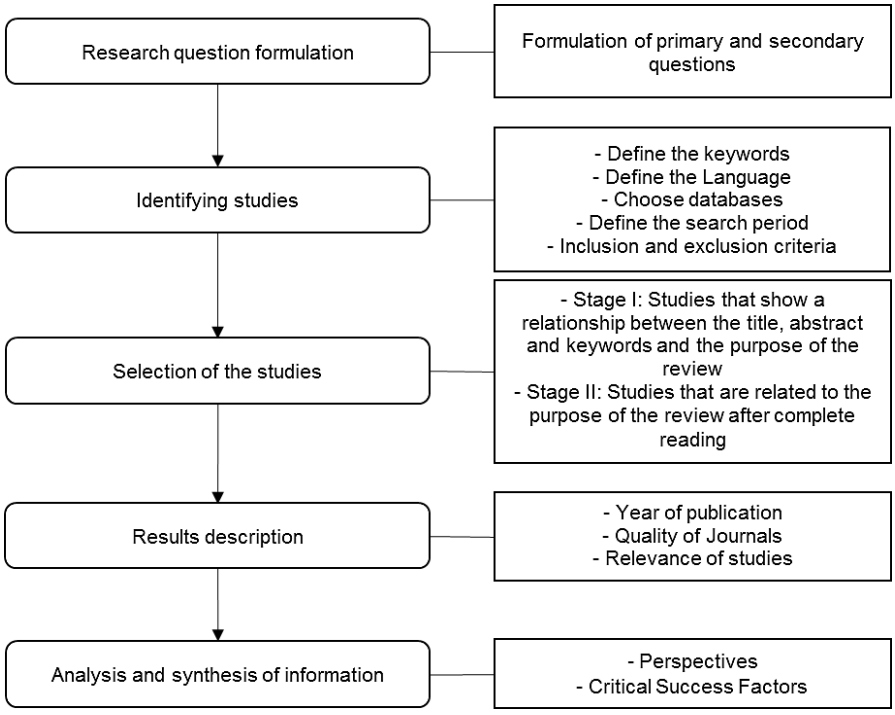

Figure 1. Research protocol.

The present review was developed from November 2019 to May 2022 and developed based on Biolchini et al. (2005), Kitchenham (2004), and Tranfield et al. (2003). The research protocol was structured in five sections: Section 1 presented the contextualization. Section 2 presents the research questions, describes the process of identifying the studies, and presents the stages of selection and evaluation of the articles. In Section 3, quantitative information extracted from studies of the textual corpus is presented. Section 4 describes the analysis and synthesis of the information, Section 5 presents the proposed conceptual framework, and Section 6 reports the conclusions reached.

Research questions (RQ) are intrinsically related to the purpose of the review. The present study can be considered the starting point of the discussion on the factors that contribute to the achievement of competitiveness in startups. Considering the research context, the following questions were asked: (1) RQ1: What are the factors that influence startups' competitiveness?; (2) RQ1a: What are the characteristics of publications on

competitiveness in startups throughout the research period?; and - (3) RQ1b: What aspects are inherent to research on competitiveness in startups?

The primary (RQ1) and secondary research questions (RQ1a and RQ1b) definition was the first step in the development of the review. The primary question is closely linked to the research objective, while the secondary questions corroborate the support and relevance of the study. The next step of the review is the search for articles, using keywords related to the theme, the language of the studies, the databases, the research period, and the inclusion and exclusion criteria. The next step presents the methods for locating articles in the databases.

The criteria used for searches in the databases considered the keywords, language, year of publication, and inclusion and exclusion criteria. Table 1 presents the criteria used to parameterize the searches. The articles were searched in Scopus and Web of Science databases, both databases index most high-impact journals (Nascimento et al., 2020; Garlet et al., 2020; Kaczam et al., 2021; Neuenfeldt et al., 2016; Rediske et al., 2019). The inclusion and exclusion criteria were based on the existing literature, serving to refine the search results and select articles related to the purpose of the review (Narciso et al., 2014; Rediske et al., 2019; Tranfield et al., 2003).

Table 1. Search criteria parameters.

Keywords 1	*startup*, technology-based firm*, high-technology startup*, high-tech startup*, startup firm*.*
Keywords 2	*competitive*, competition, competitive advantage, competitive capability, competitive strategy.*
Keywords 3	*factor*, aspect*, affect*, effect*, cause*, impact*, influence factor*.*
Inclusion criteria	(a) Articles published and available in full in scientific databases; (b) Articles published since 2000; (c) Articles that present factors that influence startups' competitiveness.
Exclusion criteria	(a) Articles that do not present factors related to competitiveness; (b) Articles published as short or informative articles; (c) Articles that are not available in journals, conference proceedings, or are not available online; (d) Articles that are outside the review scope.
Databases	Web of Science and Scopus
Document type	Journal and proceedings papers
Language	English

The keywords were defined after reading key articles on the topic, while a word cloud was built to determine which keywords would be used in the search for the articles. In each database, articles were searched for using three clusters of keywords. The first cluster of keywords related to the startup, the second cluster of keywords related to competitiveness, and the third cluster of keywords related to the term factor. The following search string was used in the databases: TITLE-ABS-KEY ("startup*" OR "technology-based firm*" OR "high-technology startup*" OR "high-tech startup*" OR "startup firm*") AND TITLE-ABS-KEY ("competitive" OR "competition" OR "competitive advantage" OR "competitive capability" OR "competitive strategy") AND TITLE-ABS-KEY ("factor*" OR "aspect*" OR "affect*" OR "effect*" OR "cause*" OR "impact*" OR "influence factor*"). The only difference in searching articles in the Web of Science database is the use of the term "Topic" instead of "TITLE-ABS-KEY". Such delimitation was developed to reduce the universe of research and find studies strictly linked to the objective of the review. Some terms were followed by an asterisk to find words written similarly, increasing the search

capacity. The inclusion and exclusion criteria are expressed in the protocol to ensure a review of the best available evidence.

The search for articles was limited to those written in English and published between the years 2000 to 2022. The search for articles started in the year 2000, representing the peak of the so-called “dot-com bubble”, where investments and stock prices of technology-based companies grew exponentially (Bouwman et al., 2012; Ljungqvist & Wilhelm, 2003; Min et al., 2008; Morris & Alam, 2012).

The selection of articles that compose the textual corpus of the review was developed to find the studies related to the objective of this research. The process consists of two stages. In the Stage 1, the articles were selected based on the inclusion and exclusion criteria described in the previous section. Only full articles published in journals and conference proceedings were considered. Also, content analysis of the titles, abstracts, and keywords was performed to select the articles with the greatest adherence to the research objective. Duplicate items were eliminated at this stage. In the second stage, the selected articles were read in full and studies with no relevance to the research were eliminated. The searches in the databases returned a total of 743 articles. Stage 1 consists of a screening of articles returned in the initial search. The floating reading of the title, abstract, and keywords, aiming at the adequacy of the articles for the review, resulted in 107 articles. Once the appropriate articles were defined for the review, the documents were read in full to identify the consonance and quality of the research, reaching the textual corpus of the research, which consists of 36 articles, ending Stage 2.

3 Descriptive results

In this section, the characteristics of the articles that are part of the textual corpus will be presented. The description of the results present in this section considers the year of publication, the quality of the journals, and the relevance of the articles. Figure 2 shows the number of articles published which are part of the sample used in this review.

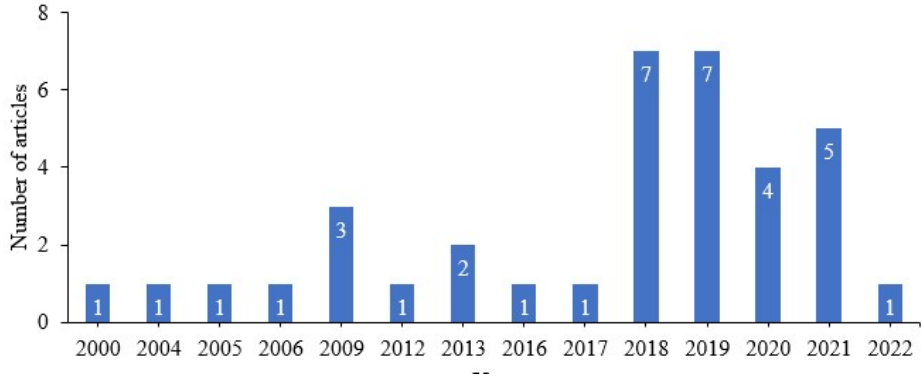

Figure 2. Overview of the number of articles per year.

The articles are distributed between the years 2000 to 2019. Gaps of articles published during the periods from 2001 to 2003, 2007 to 2008, 2010 to 2011, and 2014 to 2015 were verified, and no article related to the theme of this review was found. Between 2000 and 2006, only four articles were published, representing 11.11% of the total publications. The year 2009 showed an increase in the total number of publications, from one to three articles published, corresponding to 8.33% of the total. However, between 2012 and 2017,

the number of publications decreased again, with this period representing 13.89% of the articles present in the research corpus. The period from 2018 to 2022 presented the largest number of published articles, a total of 24, corresponding to 66.67% of the total number of publications in the entire period.

The growth in publications on topics related to startups can be justified by the increased interest of researchers in areas such as economics, technology, entrepreneurship, and innovation (Ojaghi et al., 2019). The interest in researching this phenomenon is related to the accelerated growth in the number of new startups worldwide, being the target of numerous state support initiatives (Cavallo et. al, 2020; Muramalla & Al-Hazza, 2019) and leveraged by venture capital investments and angel investors (Muramalla & Al-Hazza, 2019).

The first publications in the corpus show great emphasis on internal aspects of startups as influencing their competitiveness (Baum & Silverman, 2004; Colombo & Grilli, 2005; Jones & Crick, 2000). From 2006, other factors started to be incorporated into research in startups, such as their location in technological and scientific parks (Dettwiler et al., 2006). The years 2018 and 2019 showed great growth in research on startups' competitiveness, in addition to presenting factors related to the political and competitive environment (Gwebu et al., 2019; Kozubikova et al., 2019; Xiao & Zhao, 2017), human capital (Marullo et al., 2018; Tangkesalu & Suseno, 2018), business intelligence (Caseiro & Coelho, 2018), technological capacity (Potjanajaruwit, 2018), innovation (Samaeemofrad & Van Den Herik, 2018a, 2018b), research and development (Rydehell et al., 2019), and intellectual property protection mechanisms (Teixeira & Ferreira, 2019), among others that will be presented during the review.

Regarding the quality of the journals, Table 2 shows the ten main journals classified based on the Journal Citation Report (JCR) score. The 36 selected articles are distributed in 28 journals and eight conference proceedings. The great dispersion of studies can be explained by the large number of journals that publish studies with the theme of innovation, competitiveness, and startups, being a topic in vogue in the current scientific community.

Table 2. List of top 10 peer-reviewed journals classified by JCR.

Journal	JCR	Papers	H-index	Highest Scopus percentile
Journal of Business Venturing	12.065	1	182	98%
Journal of Innovation and Knowledge	9.269	2	20	97%
Journal of Knowledge Management	8.182	1	113	96%
Small Business Economics	8.164	1	131	96%
Research Policy	8.110	1	238	97%
Technovation	6.606	3	130	97%
Journal of Technology Transfer	5.783	1	79	97%
Management Decision	4.957	2	98	90%
Journal of Small Business Management	4.544	1	112	93%
Emerging Markets Review	4.073	1	50	89%

Articles in the textual corpus have a high JCR score, on average 4.408, with the Journal of Business Venturing being the journal with the highest impact within the sample. Also, all ten journals described are in the first citation quartile of the Scimago Journal Ranking (SJR) and have an average of 115,3 h-index with an average of 95% on the

Scopus percentile. demonstrating the quality and high impact of the journals presented in the corpus of this review.

Table 3 presents the most cited articles in the textual corpus, showing the article reference, the number of citations received, citations per year, and the percentage of citations received to the total citations. The number of citations received indicates the relevance of the articles to the study area. Articles by Baum & Silverman (2004) and Colombo & Grilli (2005) represent almost 80% of the total citations received by the corpus, which reflects their importance to the field of study. In the most cited article in the textual corpus, a model using time series was developed to identify the preference for venture capital investment in 204 biotechnology startups located in Canada (Baum & Silverman, 2004). Additionally, in the second most cited article, an econometric model was proposed to measure the influence of academic training and the founders' previous experience on the competitiveness of 506 technology-based startups located in Italy (Colombo & Grilli, 2005).

Table 3. Most cited articles.

Reference	Citations	Citations per year	(%)
Baum & Silverman (2004)	736	40.9	34.8%
Colombo & Grilli (2005)	647	38.1	36.1%
West & Noel (2009)	168	12.9	9.4%
Dettwiler et al. (2006)	70	4.4	3.9%
Caseiro & Coelho (2019)	52	17.3	2.9%
Wu et al. (2009)	36	2.8	2.0%
Teixeira & Ferreira (2019)	20	6.7	1.1%
Grilli & Murtinu (2012)	19	1.9	1.1%
Behl (2020)	17	8.5	0.9%
Vedula & Fitza (2019)	7	5.3	0.9%

Despite researching different factors related to competitiveness in startups, a common point can be identified. The previously cited articles explore the influence of human capital on the competitive performance of startups, with each piece of research addressing it in a different context. However, some similarities in their results can be seen (Baum & Silverman, 2004; Colombo & Grilli, 2005). The research by Colombo & Grilli (2005) shows a positive relationship between the previous experience, the academic qualifications of the founders, and the competitiveness of Italian startups. Similarly, the article by Baum & Silverman (2004) suggests that the characteristics of top management in startups may attract significantly higher-risk capital financing, in addition to a positive effect on competitive performance. Therefore, such articles have a great influence on other articles in the textual corpus, and this can be observed in the analyses in the following section.

4 Analysis and synthesis of information

4.1 Perspectives

This section presents an in-depth bibliometric analysis of the 36 articles selected in the systematic literature review. In this step, the VOSviewer 1.6.13 software developed by van Eck & Waltman (2010) was used as a tool for co-occurrence and co-citation analysis (Liao et al., 2018). For this, four methods of analysis of the aforementioned articles were

adopted: cited authors, cited references, bibliographic coupling by articles, and co-occurrence mapping based on text data. The full counting method was used, in which all co-occurrences have the same weight (Ren et al., 2019; van Eck & Waltman, 2010).

Figure 3 shows the co-citation map of the 2,730 authors cited in the references of the 36 articles relating to the textual corpus of the review. The cited authors' analysis method was defined, considering a minimum number of nine cited authors. Thus, 26 most cited authors were extracted.

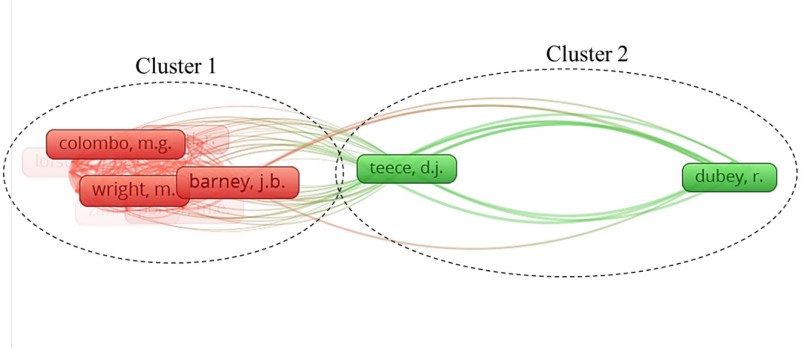

Figure 3. Network visualization of co-citation of the cited authors.

Considering the presented network, the existence of two clusters and a total of 26 authors that form the association network can be observed. Cluster 1 (red) contains 20 elements and Cluster 2 (green) contains six elements. According to the network, in Cluster 1, Jay Barney is the most cited author, accounting for 23 citations. These represent 7.5% of the total citations received (307) for all articles in the textual corpus and 270 link strengths, which is equivalent to 5.1% of the total link strengths in the corpus (5,336). In Custer 2 there are two authors with the highest number of citations, both with 11 citations, they are Angappa Gunasekaran and Rameshwar Dubey. Together, they represent 7.2% of the total citations received by the textual corpus.

Figure 4 shows the co-citation network extracted from the 2,043 references cited. A minimum number of four citations was considered, allowing the best visualization of the clusters, resulting in a total of seven authors most cited simultaneously.

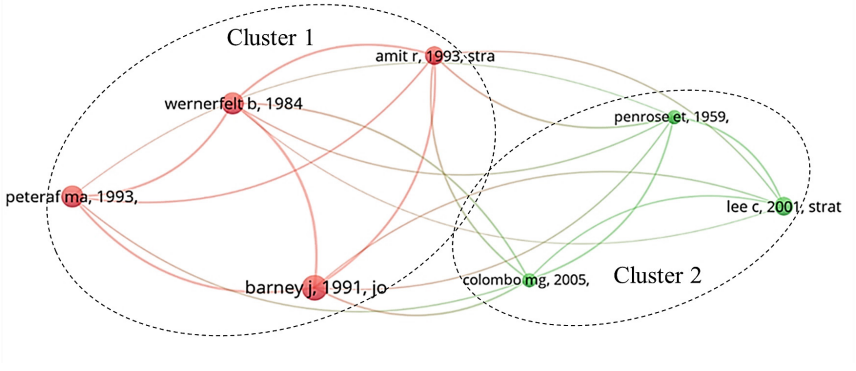

Figure 4. Network visualization of co-citation of the cited references.

Two complementary research topics are identified: Cluster 1 (red) for the resource-based view, influenced by Wernerfelt (1984), and Cluster 2 (green) for the theory of the

growth of the firm, mainly influenced by Penrose (1959). For the resource-based view, the article most cited within the textual corpus is a study developed by Barney (1991) in the area of strategic management, which deals with the understanding of the resources available in companies as a source of competitive advantage. It received 13 citations from the total citations of the articles present in the textual corpus, which represents 38.2% of the total citations received within the cluster (34), in addition to also presenting 24 link strengths, equivalent to 30% of the total of link strengths (80) of the cluster.

In the cluster related to the theory of the growth of the firm, the research by Colombo & Grilli (2005) stands out as it received four citations from the articles present in the textual corpus, which represents 30.7% of the total citations (13) within of the cluster, in addition to having 16 link strengths, which is equivalent to 40% of the total link strengths (40) within the cluster.

The next analysis technique used is bibliographic coupling, to measure the level of similarity between different articles, considering the number of equivalent references between the two articles. In Figure 5, proximity indicates how much the articles are bibliographically similar, sharing a considerable amount of references (Niknejad et al., 2021). A total of 26 articles are connected among all 36 articles in the textual corpus.

Five clusters are formed. Cluster 1 presents nine articles, among them West & Noel (2009), Blank (2021), and Acosta-Prado et al. (2020) with the highest link strengths, respectively 68, 53, and 41 link strengths. Cluster 2 has the weakest link strength among the five clusters. Wu et al. (2009) and Behl (2020) with respectively 42 and 17 link strengths. Cluster 3 consists of six articles with considerable similarity due to the strong influence of Colombo & Grilli (2005) and Baum & Silverman (2004), considering the references used in the study, which are generally used by other authors regardless of the research topic. The articles by Marullo et al. (2018) and Nigam et al. (2021) present the largest link strengths in the cluster, 38 and 33 consecutively.

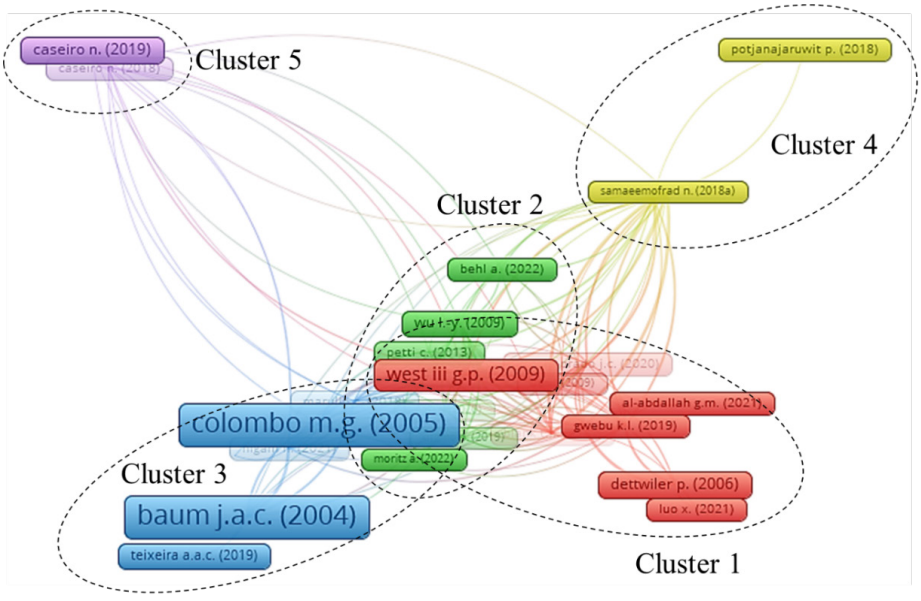

Figure 5. Bibliographic coupling network by articles.

The fourth cluster of the map consists of three articles, highlighting two works written by the same authors (Samaeemofrad & Van Den Herik, 2018 a,b). Therefore, they have

the highest link strength among all clusters, respectively 77 and 79 (about 20% of all links in the corpus). Similar to Cluster 4, the fifth cluster is formed by articles written by the same authors (Caseiro & Coelho, 2018, 2019).

The last analysis is the co-occurrence map based on text data. Figure 6 shows a word map of the most frequent words in the titles and abstracts of the 36 articles in the textual corpus. For it, words with at least two occurrences in the articles of the textual corpus were considered. For a total of 175 keywords from the entire textual corpus, 26 keywords are connected.

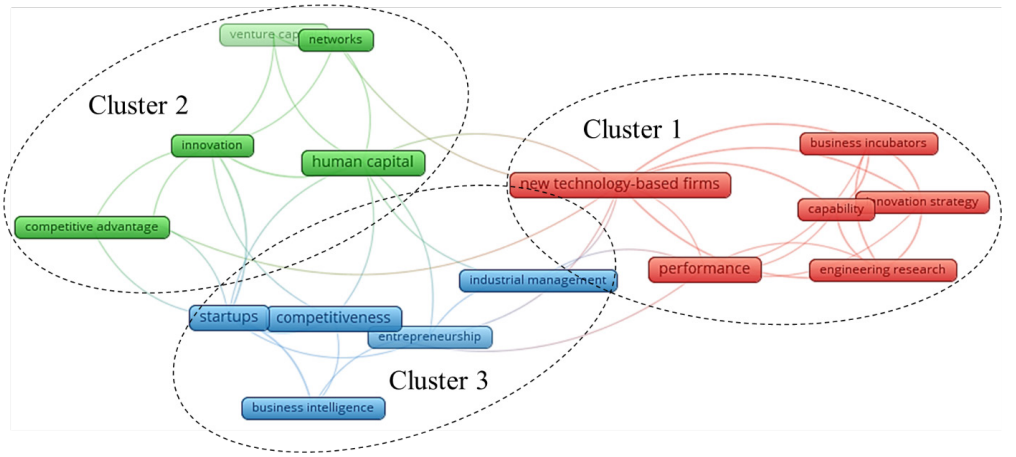

Figure 6. Co-occurrence network of most used words in titles and abstracts.

It can be seen that the words were categorized into three clusters: The keywords in Cluster 1 are related to one of the main environments where open innovation takes place–business incubators–characterized by research involving innovation strategy, capability, and performance of new technology-based firms. Cluster 2 represents research that focuses on competitive advantage linked to human capital and innovation and supported by venture capital. Cluster 3 focuses on research related to startup competitiveness and entrepreneurship. The word with the highest occurrence within the textual corpus is “startups”, showing a relationship with all the other words in the corpus. The next ones are “human capital”, “competitiveness” and “performance”, all with five occurrences. The words “innovation” and “competitive advantage” appear with three occurrences. The other words present two occurrences within the corpus.

4.2 Critical success factors

Considering the publications in the corpus, there has been notable growth in recent years in research related to startups’ competitiveness. In addition, most articles are published in high-impact journals, which shows the growing interest in the scientific community field.

From the systematized literature review, it was possible to identify the CSFs directly related to startups’ competitiveness. Considering the influence on competitive aspects, a total of 25 CSFs were defined, based on the 36 scientific articles in the textual corpus. Through the similarities found in the previous section, all 25 CSFs were organized into three fundamental points of view (FPV): Organizational, Human, and Environmental.

4.2.1 FPV 1: Organizational

Within the Organizational FPV, the CSFs that characterize the internal environment of startups are allocated, considering aspects related to innovation, intellectual property,

investment in research and development (R&D), competitive strategy, capacities, and internal processes. The CSFs framed in the Organizational FPV are shown in Table 4.

Table 4. CSFs related to FPV1: Organizational.

Id	CSF	Definition	References
CSF 1.1	Innovative profile	The startup's ability to develop innovative products.	Caseiro & Coelho (2019); Samaeemofrad & Van Den Herik (2018b; 2018a); Jones & Crick (2000); Skawińska & Zalewski (2020); Tangkesalu & Suseno (2018); Teixeira & Ferreira (2019); Xiao & Zhao (2017)
CSF 1.2	Intellectual property protection	Formal and informal mechanisms for the protection of intellectual property.	Marullo et al. (2018); Teixeira & Ferreira (2019)
CSF 1.3	Research and Development (R&D)	Investments in research and development within the organization.	Franca Vargas et al. (2016); Jones & Crick (2000); Rydehell et al. (2019); Singh & Bala Subrahmanya (2020); Xiao & Zhao (2017)
CSF 1.4	Resources available at startups	Financial, physical, human, and organizational assets that companies use to develop, produce, and deliver their products or services to the consumer.	Asadinasab et al. (2013); Asmoro & Nugroho (2018); Dezi et al. (2009); Gwebu et al. (2019); Skawińska & Zalewski (2020)
CSF 1.5	Absorptive capacity	Ability to absorb and use information as a competitive advantage.	Caseiro & Coelho (2019); Marullo et al. (2018); Petti & Zhang (2013); Samaeemofrad & Van Den Herik (2018b; 2018a); Utomo & Simatupang (2019)
CSF 1.6	Financial capacity	Ability to obtain and access capital resources.	Marullo et al. (2018); Samaeemofrad & Van Den Herik (2018b; 2018a); Tangkesalu & Suseno (2018)
CSF 1.7	Technological capacity	Technologies used for communication and learning.	Franca Vargas et al. (2016); Marullo et al. (2018); Potjanajaruwit (2018)
CSF 1.8	Dynamic capacity	The startup's ability to adapt to market changes.	Asadinasab et al. (2013); Behl (2020)
CSF 1.9	Value creation	Performance of value creation processes for the final customer.	Asmoro & Nugroho (2018); Franca Vargas et al. (2016); Skawińska & Zalewski (2020); Xiao & Zhao (2017)
CSF 1.10	Competitive strategies	Effectiveness of competitive strategies defined by startups.	Al-Abdallah et al. (2021); Asmoro & Nugroho (2018); Franca Vargas et al. (2016)
CSF 1.11	Organization quality	Characteristics and nature of startups related to the performance of internal processes.	Asmoro & Nugroho (2018)
CSF 1.12	Organizational culture	Encouraging the feeling of belonging and cohesion among the team, a democratic and innovative environment.	Xiao & Zhao (2017)

Innovation refers to a organization's tendency to engage with and support new ideas, experimentation, and creative processes that can result in new products, services, or technological processes. Despite not having a direct relationship with competitiveness, innovation indirectly contributes to a better competitive capacity (Caseiro & Coelho, 2019).

In addition, the innovative profile works as a mediator of competitiveness (Teixeira & Ferreira, 2019) and a source of competitive advantage (Skawińska & Zalewski, 2020).

Defining the types of mechanisms for protecting intellectual property rights (IPR) also affects startups' competitiveness. In general, the most competitive companies are those that use less formal protection of IPR. Also, when IPR protection mechanisms are broken down by type, it has been found that the use of informal protection mechanisms, especially lead time and trade secrets, promotes startups' competitiveness; while the use of formal protection mechanisms, in particular patents, trademarks, and geographical indications, negatively impact competitiveness. In summary, the IPR strategy influences startups' competitiveness (Teixeira & Ferreira, 2019).

The R&D system plays a significant role in promoting technological innovation, in addition to determining competitiveness. The works identified in this review point to a direct influence of R&D on startups' competitiveness (Franca Vargas et al., 2016; Jones & Crick, 2000; Rydehell et al., 2019; Xiao & Zhao, 2017). Singh & Bala Subrahmanya (2020) argue that a high-tech startup to achieve increasing competitiveness must innovate in new products or technologies throughout its life cycle, investing in R&D continuously. Besides, the resources that startups have similarly influence their competitiveness. Organizational resources are important factors that significantly impact the startup's competitive performance. For the authors, resources are the source or supply from which the benefits (product) are produced (Asmoro & Nugroho, 2018; Gwebu et al., 2019). Resource support had a significant influence on the success of startups (Asmoro & Nugroho, 2018). Also, Asadinasab et al. (2013) and Skawińska & Zalewski (2020) demonstrate that when an organization has a series of heterogeneous, strategic, and rare resources, it will certainly lead it to superiority over other competitors in the market, increasing its competitive capacity. Similarly, startups need to develop knowledge-based resources with their local networks, such as participating in research programs with other companies to increase their competitive advantage in global markets (Dezi et al., 2009).

The absorptive capacity, from an organizational point of view, refers to the organization's ability to recognize the value of new information applying for commercial purposes (Samaeemofrad & Van Den Herik, 2018b). The results of the study developed by Petti & Zhang (2013) show that a greater absorptive capacity leads to greater technological entrepreneurship, which leads to better performance of technology companies. Considering this, evidence is provided about the existence of a relationship between absorptive capacity and the competitive performance of startups.

Business intelligence (BI) emerges as a relevant aspect of the absorptive capacity and the competitive power of startups. The process consists of methods that organizations use to develop useful information or intelligence, that can help organizations survive and prosper. The product is information that will allow organizations to predict the behavior of their competitors, suppliers, customers, technologies, acquisitions, markets, products and services, and the general business environment, with a particular degree of certainty (Caseiro & Coelho, 2018, 2019). Similarly, several studies demonstrate that financial capacity (Marullo et al., 2018; Samaeemofrad & Van Den Herik, 2018a, 2018b; Tangkesalu & Suseno, 2018), technological capacity (Franca Vargas et al., 2016; Marullo et al., 2018; Potjanajaruwit, 2018), and dynamic capacity (Asadinasab et al., 2013; Behl, 2020) influence the competitive power of startups. Behl (2020), from the dynamic capability theory, argues that Big Data Analytics capabilities influence startups' competitiveness as the startup needs to survive and compete with giant companies.

The startup's competitive advantage depends on its ability to create more value than its competitors. Greater value creation, however, depends on the organization's ability to innovate successfully (Xiao & Zhao, 2017; Skawińska & Zalewski, 2020). Also, the

effectiveness of the competitive strategy can help the startup to defend itself from the power of its competitors and influence them (Asmoro & Nugroho, 2018). The results of the study by Asmoro & Nugroho (2018), show that both the performance of the value creation process and the effectiveness of the competitive strategy influence the success, and consequently, the competitiveness of a startup. In this regard, the competitive strategy adopted by the startup will influence its competitiveness and performance (Al-Abdallah et al., 2021).

Regarding the quality of the startup's organization, there are categories and characteristics related to the nature of the organization that affects business success. The size of the founding team, characteristics of human capital, the availability of professional consultants, the planning and control of organizational processes, and a well-defined business plan influence business competitiveness. Despite the research by Asmoro & Nugroho (2018) not showing a significant relationship between this factor and the success of startups, it is necessary to verify its relationship with the strategy and competitive capacity. Furthermore, organizational culture is another factor influencing competitiveness in startups. The shared vision is important to create a sense of belonging and cohesion among professionals, moreover, the organizational culture of learning determines the level of R&D, the ability to innovate, and subsequently, competitiveness (Xiao & Zhao, 2017).

4.2.1 FPV 2: Human

Regarding the Human FPV, the CSFs discussed in this topic refer to the characteristics of the human capital of startups, and consider aspects related to the formation, satisfaction, and engagement of the work team, in addition to the characteristics of the managers and founders of the startups, as shown in Table 5.

Table 5. CSFs related to the FPV2: Human.

Id	CSF	Definition	References
CSF 2.1	Employee educational level	Academic preparation in team management courses has a positive impact on organizational competitiveness.	Franca Vargas et al. (2016); Kozubikova et al. (2019); Marullo et al. (2018); Skawińska & Zalewski (2020); Tangkesalu & Suseno (2018); Vedula & Fitza (2019); Xiao & Zhao (2017)
CSF 2.2	Founders' characteristics	Describes the entrepreneur's degree of competencies (attitudes, skills, or abilities) to achieve the objectives and goals.	Asmoro & Nugroho (2018); Baum & Silverman (2004); Caseiro & Coelho (2018); Caseiro & Coelho (2019); Marullo et al. (2018); Nigam, Mbarek & Boughanmi (2021); Petti & Zhang (2013); Rydehell et al., (2019); Wu et al. (2009); Xiao & Zhao (2017)
CSF 2.3	Employee satisfaction	Employee satisfaction concerning the functions performed in the organization, as well as recognition by management.	Tangkesalu & Suseno (2018)
CSF 2.4	Capital invested by entrepreneur	Equity is invested by the entrepreneur at the beginning of the business.	Marullo et al. (2018)
CSF 2.5	Founding team experience	The experience of the founding team in the organization and general management of the resources necessary to bring success to the organization.	Colombo & Grilli (2005); Marullo et al. (2018); Rydehell et al., (2019); West & Noel (2009)
CSF 2.6	Employee commitment	The commitment of employees to the achievement of goals and objectives established by the organization.	Wu et al. (2009)

The quality of secondary and higher education and the knowledge and skills of graduates are not important indicators of the quality of education in companies in the Czech Republic and Slovakia. Although, at the same time, the quality of education factor influences competitiveness in the business environment and the decision to start a business in the Czech Republic (Kozubikova et al., 2019). The literature demonstrates that the strategic leadership of entrepreneurs, the innovative spirit, and the cohesion of the entrepreneurial team appear as the main competitive factors for startups in China (Xiao & Zhao, 2017).

According to Vedula & Fitza (2019), high levels of technical knowledge and an educated workforce, when combined with an individualistic culture or with a high level of venture capital, can positively influence the startup's competitive power. The educational level of employees is of great importance to the organization's success, as human resources are the basis for the development and growth of the organization: well-trained, motivated professionals, with innovative ideas and solutions, are the main differential for the organization to be more competitive in the market (Franca Vargas et al., 2016). In addition to the qualification of employees, the search for continuous learning on the part of entrepreneurs is fundamental for the competitiveness of a startup (Nigam et al., 2021; Skawińska & Zalewski, 2020).

The attitudes and motivations of a startup's founders are essential for the organization's competitiveness, as the lack of resources and motivation hinders the development of an innovative small company. In a study of 401 startups located in Sweden, a negative effect of the growth orientation on the part of the founders concerning the initial performance of the companies was identified (Rydehell et al., 2019). It occurs due to the inexperience of the founders, considering that there is a correlation between the experience of the founders and the orientation towards growth. This denotes that the greater the experience, the more influence the growth-oriented characteristic will have on the startup's competitive performance. A positive and significant relationship was found in the literature between entrepreneurial orientation (proactivity, emphasis on R&D, risk-taking, boldness to achieve the established goals) and startups' competitiveness. This signifies that the efforts made in terms of the dimensions of the corporate guidelines have an impact on competitive results (Caseiro & Coelho, 2018).

After analyzing 506 startups in Italy, the results of the research by Colombo & Grilli (2005) demonstrate that the entrepreneur's previous experience influences the company's growth, that is, the level of education and previous work experience, in the same area of activity, are key factors for the growth and startups' competitiveness. Furthermore, the amount of capital invested by the entrepreneur, in addition to the experience of the founders, are important factors to develop the organization's ability to attract new investment and influence its performance (Colombo & Grilli, 2005; Marullo et al., 2018; Rydehell et al., 2019).

On the other hand, the results of the study by West & Noel (2009) do not find a relation between the performance of new ventures and knowledge of the sector obtained from previous experience of the CEO. In contrast, the study concludes that the business relationship is positively associated with performance. The implications are that while the depth of experience in an industry is not particularly useful, the depth of experience in the same type of strategic approach that the new venture is seeking can make a difference.

According to literature, in technology-based companies, trust is an effective way in which entrepreneurs can conquer the commitments of the founding team's partners (Wu et al., 2009). Besides, employee satisfaction is also a factor that determines startups' competitiveness. Thus, the use of these key elements helps technology-based startups to acquire not only the main resources but also indirectly increases their competitive advantage (Tangkesalu & Suseno, 2018).

Although an entrepreneur's resources are not the main cause that influences the commitments of the startup team partners to cooperate, it is an important factor that influences a startup's competitive advantage. The trust that the founding team partners place in the entrepreneur is essential to increase their cooperation commitments. Consequently, friends and close relatives, before the opening of the new venture, can become partners of the startup. Therefore, the use of personal networks is important in the initial stage of technology-based startups; through the creation of networks and the use of trust, an entrepreneur can obtain the essential resources and skills necessary to develop a business (Wu et al., 2009).

4.2.1 FPV 3: Environmental

In the context of Environmental FPV, there are the FCSs related to the scenario in which the startup develops its activity, that is, factors external to the organization that influence its competitiveness. Aspects related to the political and competitive environment, external capital investment, and other stakeholders constitute the FPV. Table 6 shows the CSFs related to the Environmental FPV.

Table 6. CSFs related to the FPV3: Environmental.

Id	CSF	Definition	References
CSF 3.1	State support and political environment	The financial sponsorship of the government in the initial phase of the startup, in addition, to support programs made mainly for startups.	Grilli & Murtinu (2012); Jones & Crick (2000); Kozubikova et al. (2019); Luo et al. (2021); Xiao & Zhao (2017)
CSF 3.2	Alliances formation	Collaboration with external partners, including suppliers, research agencies, consumers, etc.	Asadinasab et al. (2013); Baum & Silverman (2004); Caseiro & Coelho (2019); Jones & Crick (2000); Marullo et al. (2018); Moritz et al. (2022); Potjanajaruwit (2018); Utomo & Simatupang (2019)
CSF 3.3	Relationships with Universities	Relationship with universities and research agencies.	Rydehell et al., (2019); Vedula & Fitza (2019)
CSF 3.4	Support from incubators, accelerators, and technology parks	Financial and organizational support is provided by business incubators, accelerators, and technology parks.	Blank (2021); Dettwiler et al. (2006); Gwebu et al. (2019); Moritz et al. (2022); Samaeemofrad & Van Den Herik (2018b; 2018a); van Rijnsoever & Eveleens (2021);
CSF 3.5	Venture capital	The entrepreneurial capital consists of financing the startup in the growth phase with high potential and risk.	Baum & Silverman (2004); Marullo et al. (2018); Vedula & Fitza (2019); Xiao & Zhao (2017)
CSF 3.6	Economic and technological environment	The entire environment interrelates the positioning of the product on the market, access to financial resources, and the technology applied to increase the quality, variety, and novelty of products.	Xiao & Zhao (2017)
CSF 3.7	Competitive environment	Influence of the complex and dynamic environment on startups' competitiveness.	Acosta-Prado et al. (2020); Asmoro & Nugroho, (2018); Gwebu et al. (2019); Xiao & Zhao (2017)

Amidst the indicators related to the legislative environment, law enforcement was the most important factor for the competitiveness of startups located in the Czech Republic. Financial support and the positive influence of the state on the business environment were the most important factors for regulation and state support in the Czech Republic and Slovakia (Kozubikova et al., 2019). The results of a study developed on startups in Italy demonstrate that the impact of public subsidies on the growth of productivity of startups is positive and of considerable economic magnitude, but only if the subsidies are provided competitively and their objective is to improve the activities of R&D (Grilli & Murtinu, 2012). Corroborating this, Luo et al. (2021) argue that selective government subsidies can influence high-tech startups to maintain high performance, regardless of the legal environment in which they operate. Besides, technological companies that use support from public agencies tend to have better planning and control mechanisms, which implies an increase in competitiveness (Jones & Crick, 2000).

Unlike large companies, smaller companies have limited knowledge and encounter unique challenges related to external sources of knowledge. The literature suggests a positive relationship between the collaboration of external and internal sources of the startup with its competitive performance (Caseiro & Coelho, 2019). On the other hand, the formation of alliances has an indirect impact on the organization's competitiveness through organizational ambidexterity. In most companies, during the “birth” and “growth” stages of the organization's life cycle, the formation of alliances does not directly affect the organization's competitiveness. The authors argue that, at the early stage of the organization, the objective of allying is to develop the competitiveness of startups, allowing these companies to develop more innovative products and services, a better way to sell them, and more insights on how to retain their customers (Utomo & Simatupang, 2019). In addition, startups can form collaborative alliances with each other aiming at their development and competitiveness. Moritz et al. (2022) argue that cooperation between startups, within the environment of an accelerator, takes place through joint projects and exchange, thus creating a competitive advantage for the startups involved.

For startups dependent on external resources in the initial phase, proximity to research universities constitutes an important dimension of intellectual resources, increasing the possibility for a young business to gain access to resources vital to the development of technology (Rydehell et al., 2019; Vedula & Fitza, 2019). In addition, startups residing in science and technology parks, close to complementary companies, and universities demonstrate better performance and sales growth (Dettwiler et al., 2006). The synergy between subsidiary and parent company, and the environment in which a leasing company operates serve as favorable conditions for improving competitiveness (Gwebu et al., 2019). Furthermore, the literature demonstrates that the support activities of business incubators and accelerators, as resources sources for startups, seem to have a direct impact on the performance of companies (Samaeemofrad & Van Den Herik, 2018b; 2018a) and its competitive advantage (Blank, 2021; Moritz et al., 2022; van Rijnsoever & Eveleens, 2021).

Venture capital companies finance startups that have strong technology, but that present short-term risk and, therefore, need management experience (Baum & Silverman, 2004). The authors identified venture capital investment as a factor influencing competitiveness in startups. Similarly, the literature presents venture capital investors as a contributing factor to the success of startups (Marullo et al., 2018). Furthermore, the economic and technological environment (Xiao & Zhao, 2017), in addition to the competitive environment where startups are located (Acosta-Prado et al., 2020; Asmoro & Nugroho, 2018; Gwebu et al., 2019; Xiao & Zhao, 2017) are also external factors that affect the competitive power of startups.

5 Conceptual framework

In this section we developed a conceptual framework related to startups' competitiveness based on CSFs identified in literature review. Figure 7 shows the relationships between the factors and startups' competitiveness.

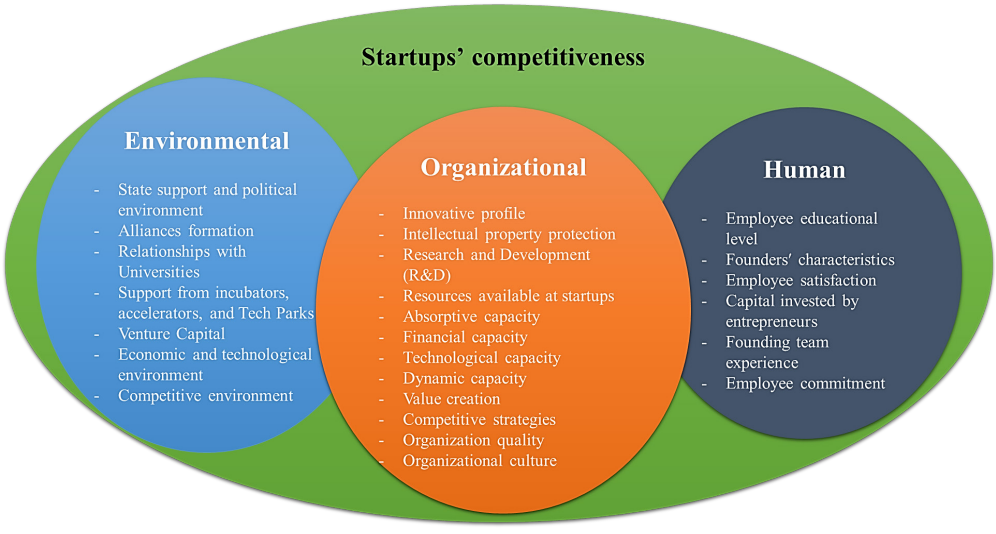

Figure 7. Startups' competitiveness conceptual framework.

After the literature review, a conceptual framework was proposed. FPVs serve as drivers of competitiveness for startups, corroborating a solid position of the organization within a competitive market. Decision-makers within startups must consider the joint effects of the 25 competitive factors to measure and assess their level of competitiveness against other players. As mentioned in the previous sections, competitiveness can be categorized into three FPVs, namely: Organizational, Human, and Environmental. From an organizational point of view, the aforementioned factors guide the startup's internal efforts and should be closely managed to aim the organizational competitiveness. There is a prevalence of studies related to five factors within this FPV, namely: Innovative Profile, R&D, Resources, Absorptive Capacity, and Value Creation (Asadinasab et al., 2013; Asmoro & Nugroho, 2018; Caseiro & Coelho, 2019; Dezi et al., 2009; Franca Vargas et al., 2016; Gwebu et al., 2019; Jones & Crick, 2000; Marullo et al., 2018); Petti & Zhang, 2013; Rydehell et al., 2019; Samaeemofrad & Van Den Herik, 2018a,b; Singh & Bala Subrahmanya, 2020; Skawińska & Zalewski, 2020; Tangkesalu & Suseno, 2018; Teixeira & Ferreira, 2019; Utomo & Simatupang, 2019; Xiao & Zhao, 2017). This suggests that, theoretically, these are the most important factors within the organizational aspect.

Among the factors related to Human FPV, three stand out within the corpus: Employee Educational Level, Founders′ Characteristics, and Founding Team Experience (Asmoro & Nugroho, 2018; Baum & Silverman, 2004; Caseiro & Coelho, 2018, 2019; Colombo & Grilli, 2005; Franca Vargas et al., 2016; Kozubikova et al., 2019; Marullo et al., 2018; Nigam et al., 2021; Petti & Zhang, 2013; Rydehell et al., 2019; Skawińska & Zalewski, 2020; Tangkesalu & Suseno, 2018; Vedula & Fitza, 2019; West & Noel, 2009; Wu et al., 2009; Xiao & Zhao, 2017). Managers should focus on the qualification, satisfaction, and employees' commitment, such aspects of the human FPV are interrelated. In addition, entrepreneurial characteristics and founders' previous experience enable greater competitive power and the possibility of startup success.

Within the Environmental FPV, factors related to State Support and Political Environment, Alliances Formation, Support from Incubators, Accelerators, and Technology Parks, Venture Capital, and Competitive Environment prevail (Acosta-Prado et al., 2020; Asadinasab et al., 2013; Asmoro & Nugroho, 2018; Baum & Silverman, 2004; Blank, 2021; Caseiro & Coelho, 2019; Dettwiler et al., 2006; Grilli & Murtinu, 2012; Gwebu et al., 2019; Jones & Crick, 2000; Kozubikova et al., 2019; Luo et al., 2021; Marullo et al., 2018; Moritz et al., 2022; Potjanajaruwit, 2018; Samaeemofrad & Van Den Herik, 2018a, b; Utomo & Simatupang, 2019; van Rijnsoever & Eveleens, 2021; Vedula & Fitza, 2019; Xiao & Zhao, 2017). Only the environmental FPV is partially dependent on the efforts of the startup team, mainly when related to political and economic factors, which are apart from managers, with policymakers responsible for providing a suitable environment for startups to be competitive. However, such factors should be considered to assess startups' competitiveness, as they directly affect the performance of these companies. Other aspects regarding the startup's relationship with universities and other stakeholders should be strongly encouraged.

This innovative study presents a robust description and analysis of the critical factors for startups' competitiveness. It is also the starting point for further research in the area. In addition, this work could help practitioners and policymakers by enlightening them about startups' competitiveness and the elements involved therein, along with providing them with a conceptual framework presented in Figure 7, to evaluate firm's competitiveness.

6 Conclusions

An innovative approach to identifying the CSFs that influence startups' competitiveness was proposed to contribute to the scientific knowledge of the area. This article was built based on a defined ex-ante research question, developed from the studied literature. For this, a research protocol was structured according to the methodological rigor of a systematized literature review (Tranfield et al., 2003), which resulted in the corpus of 36 articles that were collected from searches in the Scopus and Web of Science databases.

The research questions were answered throughout the study. The results point to an increase in the number of publications on the subject, mainly in the years 2018 and 2019, which is due to the interest on the part of researchers in identifying factors that influence the startups' competitiveness, in addition to the accelerated growth in the number of startups worldwide. Furthermore, a wide analysis of the selected articles was developed, using the VOSviewer software, which mapped the entire textual corpus, allowing the visualization of the main authors, main cited references, how the articles in the corpus are linked bibliographically, and the main keywords used, thus allowing to verify trends and areas to be explored.

Sequentially, a synthesis of the characteristics of each factor influencing the startups' competitiveness was made. A total of 25 CSFs were organized into three FPV (Organizational, Human, and Environmental), considered as key factors to measure the level of startups' competitiveness. Organizational FPV concerns the internal factors of startups and their characteristics. Human FPV encompasses factors related to the human capital of startups and their characteristics. Environmental FPV is related to factors external to the organization which influences its competitiveness. Finally, a conceptual framework was proposed aiming to provide a system capable of assessing startups' competitiveness holistically.

As a limitation, the factors as generic to startups, not being specific to a type of startup, and the relative importance of each factor may change depending on the area of operation of each startup. Another limitation is the research period used in the databases, and new

factors may arise as the scientific knowledge of the study area advances. Future studies may propose a multi-criteria model based on the factors presented in this work, to measure the competitive performance of startups. Another suggestion for future research is the identification of the main factors for each stage of a startup life cycle.

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