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Factors and Structures that contribute to the formation of an Entrepreneurial University

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Abstract

Entrepreneurship is a strategic element for promoting the socio-economic development of countries or regions, encouraging the creation of new businesses and the generation of technological innovations. In this context, the concept of entrepreneurial university emerges, an institution based on the generation and transfer of knowledge, from the development of teaching, research, extension and entrepreneurial activities. Thus, this research sought to identify in the scientific literature factors and structures that contribute to the formation of an entrepreneurial university. Therefore, a search was performed in the SCOPUS database with the search string "entrepreneurial university" or "enterprising university" and then applied the filters 'All Open Access' and 'Sort on: Cited by (highest)'. The articles were analyzed according to the following elements: year; title; objective; summary; key words; conclusion; and number of citations. The main results indicate that the conception of the entrepreneurial university requires planning and the existence of management models that contemplate, in addition to basic activities, entrepreneurial actions focused on developing entrepreneurial behavior and promoting economic and social development. In addition, the scientific literature has presented models of several factors and structures that contribute to the formation of the entrepreneurial university.

Keywords: Entrepreneurship. Innovation. University spin-offs. Economic and social development.

1. Introduction

Entrepreneurship is a strategic element in promoting the socio-economic development of countries or regions, whether from the opening of new companies, creation of new business models or generation of technological innovations. Thus, the inclusion of the entrepreneurship discipline in the curriculum of several educational institutions is linked to the objectives of stimulating the development of entrepreneurial behavior and meeting the constant demands for innovation and organizational value creation (Ferreira & Pinheiro, 2018). This circumstance has increased interest in entrepreneurial education. In addition, it encourages the development of research in order to present new practical and theoretical approaches, as well as methods aligned with the

perspective of favoring entrepreneurial training (Schaefer & Minello, 2020).

The purpose of entrepreneurship education is related to the development of entrepreneurial behavior, and not necessarily with the creation of new businesses. In this sense, entrepreneurial training must be understood as a dynamic and continuous process that requires the existence of several actors (Krüger, Johan & Minello, 2018) as well as a structure compatible with the realization of theoretical and practical activities.

In the search for the association between theory and practice and the need to transform the scientific and technological knowledge generated into value for society, entrepreneurial universities emerge (Volles, Gomes & Parisotto, 2017). These institutions present a favorable environment for the development of knowledge, innovations, intellectual capital, entrepreneurial skills and abilities (Salume et al., 2021).

Rodrigues et.al (2020) emphasize that entrepreneurship in academic spaces favors the development of cognitive and psychological capacities and entrepreneurial behavior. According to Krakauer, Krakauer and Coda (2020), in addition to the classroom, the teaching and practice of entrepreneurship requires the existence of methodological approaches and institutional structures compatible with the development of theoretical classes and experimentation.

Therefore, universities can contribute to the formation of an entrepreneurial mindset. However, this demands the ability of the university to carry out structural changes, addressing aspects related to teaching, analyzing its fundamental principles, priorities, physical structure and defining entrepreneurship strategies, innovation and articulation with agents external to the academic environment (Ghobril et.al., 2021).

Thus, it is understood that the definition of entrepreneurial university goes beyond the didactic-pedagogical practices used in the discipline of entrepreneurship, requiring the existence of academic structures associated with innovation and influences from external agents focused on promoting economic and social development (Etzkowitz & Zhou, 2017). In this sense, what factors and structures contribute to the formation of an entrepreneurial university? Thus, the objective of this research is to identify in the scientific literature factors and structures that contribute to the formation of an entrepreneurial university.

Studies that analyze the scientific literature are relevant to different areas of knowledge. Specifically in relation to the theme Entrepreneurial Universities, these studies can present data and information to support academic management in the processes of decision-making in relation to planning and defining strategies to become entrepreneurial universities.

2. Approaches to Entrepreneurship in The World Context

The conceptual basis of the term entrepreneurship was built in an interdisciplinary way. In the economic view, for example, entrepreneurship is associated with innovation; from the perspective of the Social Sciences, entrepreneurship is understood as a behavioral issue; in the administrative view, entrepreneurship is associated with the creation of new businesses (Schumpeter, 1961).

Commonly, entrepreneurship is approached from the perspective of creating new businesses. However, Krakauer, Krakauer and Coda (2020), present entrepreneurship as a phenomenon that integrates a holistic perspective, contemplating the social, psychological, economic and management areas. From this perspective, entrepreneurship education should not only focus on the creation of new businesses. It is necessary to approach

entrepreneurship as a behavioral issue, enabling the teaching and development of entrepreneurial characteristics and skills (Coda, 2016).

The Global Entrepreneurship Monitor (GEM) presented a concept aligned with the administrative vision, defining entrepreneurship, as "any attempt to create a new business, be an autonomous and individual activity, a new enterprise or the expansion of an existing enterprise" (GEM, p. 20, 2019)**.**

In Brazil, the term entrepreneurship is also directly associated with the emergence of micro, small and medium-sized organizations. This association may be a consequence of the way the topic is approached in different media that present business entrepreneurship as strategic for the promotion of economic and social development.

In fact, entrepreneurship is perceived as essential to foster the development of countries, both developed and under development (Janssen, 2020). In Brazil, for example, research conducted by GEM points to an expansive growth of 23.3% in initial entrepreneurship in 2019, an increase of 6.4% over the previous year. The research relates this increase to some political factors such as "the operationalization of the labor reform; the reduction of public expenditures; the approval of the tax and administrative reform" (GEM, p.30, 2019).These factors contributed to this growth, producing new spaces to promote economic development.

In this context, Brazil presented a total entrepreneurship rate (TTE) of 38.7%. This percentage represents, approximately, 53 million Brazilian adults aged between 18 and 64 who have developed some entrepreneurial activity (GEM, 2019). In view of these data, theoretically, the country has fostered entrepreneurship in its entirety, still with limitations but with positive percentages, which generates greater involvement of the population and a change in perspectives in relation to entrepreneurship.

2.1 Teaching Entrepreneurship and Entrepreneurial Universities

The teaching of entrepreneurship still presents difficulties in its construction and application within universities. A survey carried out in Brazilian universities based on subject plans, pointed out that there is a complexity in understanding how to teach entrepreneurship (Krakauer, Krakauer & Coda, 2020). In the absence of compatible guidelines and structures, teachers can focus their activities only on teaching a business plan (Ferreira & Pinheiro, 2018). In this sense, teaching is directed towards the creation of companies, thus neglecting the teaching of entrepreneurship as a behavior.

Ferreira and Pinheiro (2018) highlight the need to include students and teachers in entrepreneurship networks, since they are the agents that lead the teaching-learning process. In addition, the authors emphasize that professors are strategic in the process of developing and forming an entrepreneurial mindset at the university. For an effective teaching of entrepreneurship, it is necessary to understand that entrepreneurial education is not done only with a focus on textbooks or even business plans linked to the opening of a company, but through a set of actions that consider from the perception of the world, to the professional experiences of each one.

In this context, the concept of entrepreneurial university becomes legitimate for the construction and promotion of the teaching of entrepreneurship. Thus, the entrepreneurial university can be characterized by the delivery, not only for teaching, research and extension, but also for promoting economic development (Schaefer & Minello, 2020). In order for there to be this promotion of knowledge and the relationship between theory and practice, Etzkowitz and Zhou (2017) state that it is necessary to have a triple helix, that is, a

partnership between university-industry-government so that teaching generates development and continuous innovation.

For this, the scientific literature presents some institutional structures for entrepreneurship to be taught in a theoretical and practical way. In that regard, Silva and Patrus (2017) point to the use of passive and active approaches in teaching entrepreneurship. According to the authors, passive learning encompasses lectures, teaching cases, seminars and lectures with entrepreneurs; active learning has technical visits; business plans; business incubators; business games and simulations; junior company; and research and extension projects. In addition, other structures such as spin-offs, innovation laboratories and technology parks can favor the teaching of entrepreneurship by associating theory and practice.

Spin-offs, for example, are spaces for the development of technologies in the academic environment for commercialization in the external environment, contributing to economic exploitation (Blumm, 2019). The author adds that this model will only be developed if there is a joint government, university and the business sector to generate such innovation. Corroborating this idea, Juliatto et al. (p.51, 2019) relates spin-off to "results of research in universities"; and is composed of "many stakeholders and participants such as the academic inventor, the university and the entrepreneurs".

In universities, a common structure for the teaching and application of entrepreneurship are Startups. For Marinho (2019), Startups are connected to technological innovations that transform the configuration of certain markets with the insertion of new products and services. This highlights the importance of generating a connection between theory and practice taught in universities, contemplating innovation.

According to Sousa (p.05, 2019),"incubators are a space destined to welcome and support small enterprises that have some emerging profile, transforming ideas into good, processes and/or services". Thus, Gonçalves et al. (2022) state that the concepts of incubators can appear in different ways, but even so, they are related and fulfill the role of "to offer logistical, managerial, technical and technological support and support to emerging enterprises" (Gonçalves et al., p.05, 2022).

Commonly, the terms accelerator and incubator are used synonymously, however these structures have different purposes. According to Travers and Teixeira (2017), Accelerators are institutions in which they help startups to establish and form their initial products, observe where your customers are, as well as maintain your resources. The incubator, in turn, focuses on the development of these enterprises.

Technological parks also represent one of the types of structures that can foster entrepreneurship education. Thus, Boiani et.al (2019) points out that the growing technological change and the promotion of scientific education favor the creation of Technological Science Parks. These spaces emerge as a bridge for the production of knowledge and innovation in the academic environment, providing social and economic development in the regions where they are disseminated.

3. Methodology

This research is classified as qualitative, in terms of approach, and exploratory, in terms of objective. As for the technical procedures, it is bibliographic, as the analysis of the object was based on scientific publications available in databases.

To achieve the objective of the research, a search was carried out in the SCOPUS database, on June 26, 2022.This database includes data from peer-reviewed literature abstracts and citations: scientific journals, books, congress processes and industry publications (Scopus, 2022). For data collection, the expression was defined ("entrepreneurial university") or ("enterprising university") and the following filters were applied:

document type (scientific article only); knowledge subarea: Business, Management and Accounting; temporal cut (2002 to mid-2022), seeking to identify the variation in the number of publications over the period.
Subsequently, two more filters were applied: 'All Open Access' to select scientific articles with an open access policy; and 'Sort on: Cited by (highest)' with the objective of selecting scientific articles that were cited by other researchers (minimum 15 citations).
Finally, scientific articles classified in the open access Business, Management and Accounting subarea were selected and analyzed, that presented the search string in the title and that were cited in at least 15 searches. The articles were analyzed according to the following elements: year; title; objective; summary; key words; conclusion and number of citations.
After the qualitative analysis of the selected articles, the results found were categorized into two groups: 1) Structures; and 2) Factors. Therefore, in this research, it was considered as Structures, spaces that favor the practical training of students, the development of business, services and innovative products. Regarding the factors that contribute to the formation of an entrepreneurial university, Intangible aspects were considered, such as relationship networks, production capacities and knowledge transfers, as well as fundraising.

4. Analysis and Discussion of Results

Considering the period, the search expression and the filters described in the methodology, a total of 137 articles were identified. It is possible to observe that the volume of publications has changed over time, registering the highest volumes in the last years of the period. In this sense, it is observed that 68.6% of the identified works were published in the period 2016-2022. It should be noted that the survey was carried out in June 2022, which contributes to the observed reduction in the volume of publications for the year (Figure 1).

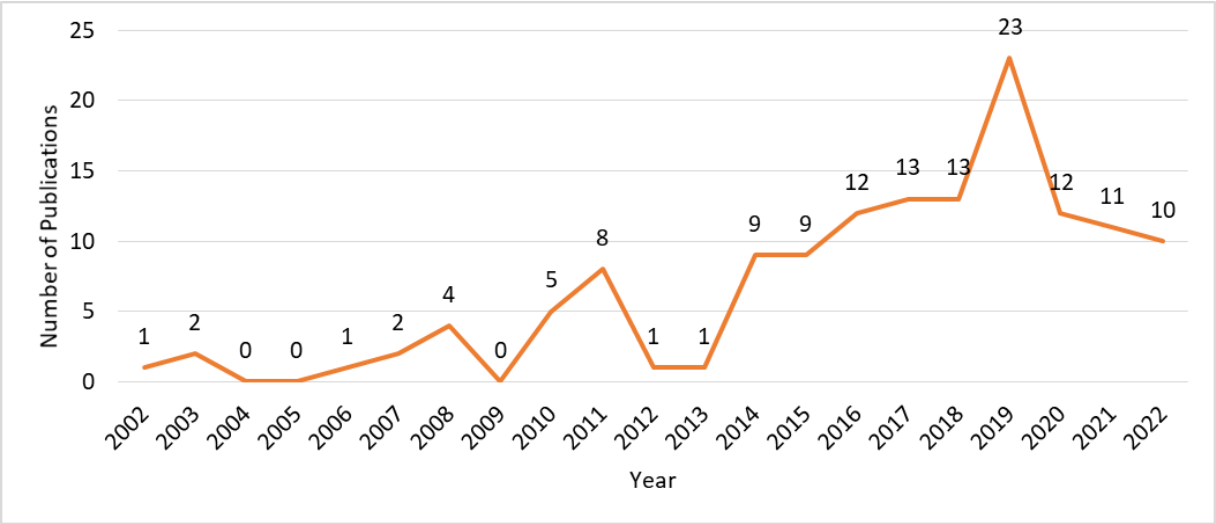

Figure 1 - Volume of publications identified in the period 2002 - 2022 in the Scopus database
Source: survey data (2022)

According to Braun and Nassif (2018), the amount of research on entrepreneurship has increased significantly since the 2000s, especially from 2010. This observed evolution may reflect a series of factors, such as the formation of scientific collaboration networks, the increase in academic production on a global scale, as well as the expansion of the number of journals indexed in the databases (Nunes-Silva, Malacarne & De-Bortoli,

2021).

After applying the filters 'All Open Access' and 'Sort on: Cited by (highest)', 18 articles were selected (Figure 2). Together, the selected articles received a total of 974 citations. In this scenario, three articles published respectively in the years 2015, 2016, 2019 stand out, as responsible for 55.3% of the total citations received.

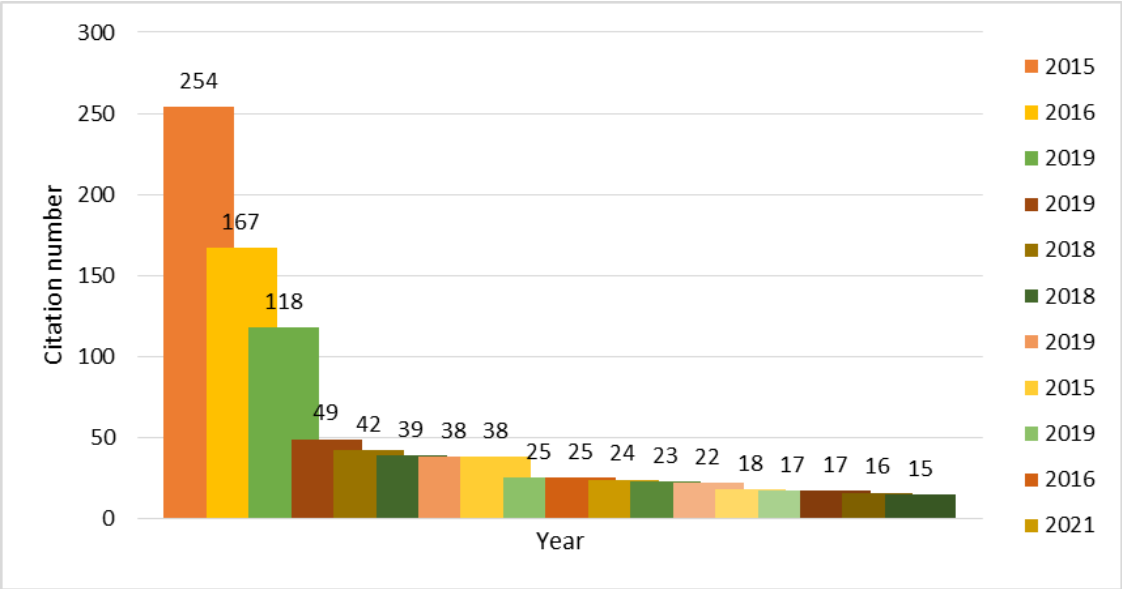

Figure 2 - Volume of selected articles after applying the filters 'All Open Access' and 'Sort on: Cited by (highest)'

Source: survey data (2022)

Therefore, it is possible to verify that the three articles published in the years 2015, 2016 and 2019 have a greater impact when compared to the others that make up the series, since the volume of citations represents one of the main indicators of research impact.

In this sense, Caregnato and Vanz (2020) explain that the evaluation of science in different areas of knowledge is based on the application of scientometric indicators. According to the authors, the expansion in the number of scientific publications was the factor that generated the need to define science evaluation indicators. This situation was decisive for the emergence of the Science Citation Index (SCI), an indicator that considers the average frequency of citations received, evidencing its impact factor.

Comparing the results presented in Figures 1 and 2, it is observed that the volume of publications began to increase more significantly from 2015, registering the highest volume in 2019, same period in which there is the highest volume of citations, 2015, 2016 and 2019. Thus, there seems to be a correlation between the growth in the number of publications and the increase in the number of citations (Gontijo, Hamanaka & Araújo, 2022).

From the word cloud, it is possible to highlight the keywords that were cited most frequently in the 18

selected articles. A total of 86 keywords were identified, on average 5 words per article (Figure 3).

Figure 3 - Keywords presented in the 18 selected scientific articles
Source: survey data (2022)

It is possible to observe that the keywords 'Entrepreneurial', 'Entrepreneurship' and 'University' appear more frequently in the analyzed articles. Together they represent a total of 45.3%. It is observed that these words have a direct relationship with the theme. According to Garcia, Gattaz and Gattaz (2019) the definition of search keywords reinforce indexing in databases, acting as a gateway to articles. The other expressions appear less frequently in the analyzed articles.

From the qualitative analysis of scientific production, it was observed that there are 'Factors' and 'Structures' that determine the formation of the entrepreneurial university. Of the total number of articles selected, 38.9% indicated 'Factors', such as the existence of university-industry engagement and collaboration, knowledge transfer, public policies and funding sources; 27.8% presented 'Structures', such as Spin-off, Startup and Entrepreneurship Centers; and 33.3% argued that the formation of an entrepreneurial university is dependent on the existence of a greater conjuncture, , contemplating 'Factors' and 'Structures' as innovation ecosystems (academic startup and spin-off), university-business-government collaboration and knowledge and technology transfer.

Thus, the formation of the entrepreneurial university is dependent on a series of variables contained in its internal and external environments. In this way, the local academic environment, internally and externally, influences the university's attitude towards entrepreneurship and the formation of collaborative networks. Therefore, this situation represents challenges for universities from the perspectives of academic managers, in the implementation and coordination of entrepreneurial actions and in the establishment of relationships with

strategic audiences (Klofsteba et al., 2019).

According to Budyldina (2018) entrepreneurial universities are generally characterized by diversified sources of funding, including government, high research intensity, broad scope of academic activities and extensive networking activities (including university-business-government cooperation).

The article that received the most citations sought to contribute to a better understanding of the economic impacts of teaching, university research and entrepreneurial activities. According to the authors, the entrepreneurial university represents an overflowing channel of knowledge that contributes to economic and social development through its teaching, research and entrepreneurial activities, resulting, for example, in human, intellectual and social capital. In addition, they highlight the importance of business spin-offs and the high impact of knowledge transfer processes on economic and social development (Guerrero, Cunningham & Urbano, 2015).

The article that received the second highest number of citations analyzed emerging models of entrepreneurial universities in the new socioeconomic scenario. The authors discussed the role of Entrepreneurial Universities in the development of innovation and entrepreneurship activities. From the managers' perspective, the research highlights management models that consider the participation of the university community and policymakers in the dissemination of the advantages and initiatives of entrepreneurship and innovation (Guerrero et al., 2016). In this sense, it is understood that success in adopting a management model requires the engagement of various strategic actors, involving the internal and external environments to create entrepreneurship and innovation ecosystems to support the actions of universities.

It was also possible to verify the influence of the internal and external environments on the formation of the entrepreneurial university through the analysis of the article that received the third highest number of citations. The researchers discussed the challenges faced by universities in becoming entrepreneurs from the perspectives of management, development and implementation. In addition, they reinforced the understanding that the conditions of the local academic context can generate significant impacts on actions related to entrepreneurship, as well as on the choices of external partners for research collaboration. The researchers also explained that, from the university's point of view, becoming an entrepreneurial institution presupposes the transfer and exchange of knowledge with the industry. In this sense, industry and the environment are recognized as strategic in the generation and absorption of knowledge, favoring the learning and development of the university and society (Klofsten et al., 2019).

Thus, it is understood that the engagement of the entrepreneurial university can converge to the transfer of knowledge and technology or to more general contributions to the economic and social development of the region (Sánchez-Barrioluengo & Benneworth, 2019). In this way, the entrepreneurial university represents a strategic element in innovation ecosystems at the local, regional and national levels. Therefore, the exclusive use of quantitative metrics, such as the number of Spin-offs, number of patents, patent licensing, do not portray the general economic and innovation impact of universities, as they only represent immediate results (Budyldina, 2018).

Fuster et al. (2019) also claim that entrepreneurial universities are agents that drive regional economic growth. In addition, they emphasize the importance of university spin-offs in innovation and entrepreneurship

ecosystems, favoring the transfer of knowledge.

In another perspective, inserting the student in the context of the entrepreneurial university, Guerrero et al. (2018) recognize the importance of academic structures, such as startups, to arouse student interest in entrepreneurship. However, the authors show that individual student factors, such as behavior, have a more significant influence on their entrepreneurial action.

Effectively, it is possible to perceive that there are several factors and structures that determine the conception of the entrepreneurial university. Analyzing the scientific literature on the subject, Forliano, Bernardi & Yahiaoui (2021) noted that several studies suggest that universities should consider five main aspects when adopting an entrepreneurial model: existence of interconnections with governments; industries and societies; existence of different sources of income; involvement of students and teachers in some entrepreneurial activities; creation of academic start-ups or spin-offs; and adapting the university's organizational structure to implement such changes.

5. Conclusion

In the scientific literature, models of various factors and structures that contribute to the formation of the entrepreneurial university are presented. Through the qualitative analysis of the selected scientific production, it was possible to notice that some researchers emphasize the need for a robust internal structure, composed of spin-off, startup and nuclei; and others that highlight the need for different sources of funding, networks of relationships, innovation and entrepreneurship ecosystems, formed by the university and other public and private bodies to support the development of entrepreneurial actions with a focus on regional development. In addition, there are researchers pointing out that the entrepreneurial university needs to promote actions aimed at the development of the student's entrepreneurial behavior.

Thus, the conception of the entrepreneurial university is a process that demands planning, elaboration and implementation of a management model that contemplates, in addition to teaching, research and extension activities, entrepreneurial activities focused on the development entrepreneurial behavior, knowledge transfer, as well as the generation of positive impacts on economic and social development, especially in its territory of operation.

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