

**ACADEMIC ENTREPRENEUR IDENTITY: A SYSTEMATIC LITERATURE REVIEW  
WITH THE AID OF BIBLIOSHINY AND RESEARCH RABBIT**

**JOSÉ IRAN BATISTA DE MELO FILHO**  
UNIVERSIDADE DE FORTALEZA - UNIFOR

**EZEQUIEL ALVES LOBO**  
PROGRAMA DE POS GRADUAÇÃO EM ADMINISTRAÇÃO - PPGA UECE

**SAMUEL FAÇANHA CÂMARA**  
UNIVERSIDADE ESTADUAL DO CEARÁ (UECE)

**PAULO TORRES JÚNIOR**  
PROGRAMA DE POS GRADUAÇÃO EM ADMINISTRAÇÃO - PPGA UECE

**RAFAELA CAJADO MAGALHÃES**  
UNIVERSIDADE ESTADUAL DO CEARÁ (UECE)

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# **ACADEMIC ENTREPRENEUR IDENTITY: A SYSTEMATIC LITERATURE REVIEW WITH THE AID OF BIBLIOSHINY AND RESEARCH RABBIT**

## **1 INTRODUCTION**

Understanding academic entrepreneurship solely through the creation of spin-off companies (Roberts, 1991; Shane, 2004) has not been the only approach found in the literature. Klofsten and Jones-Evans (2000), for example, expanded the role of academic entrepreneurship by including other technology transfer activities such as patent licensing and various collaborative activities with industry (Baldini et al., 2007; Fini & Toschi, 2016; Bodas Freitas & Verspagen, 2017; Hesse & Brunjes, 2018).

The promotion of the entrepreneurial university perspective supports the idea that contextual factors, such as legal and institutional frameworks, are sufficient to drive greater intensity in technology transfer, understood here as the flow of knowledge and innovation from the university to the productive sector (Etzkowitz et al., 2000; Gerrero & Urbano, 2012). However, this view often neglects the individual characteristics shaped by a more complex context, as well as the intrinsic motivational elements of the actors involved (Shinnar, Giacomini & Janssen, 2012).

To advance knowledge in these areas and create more effective mechanisms for promoting technology transfer, a deeper understanding of the individual characteristics of entrepreneurs is necessary. In this sense, these intrinsic and extrinsic factors play a fundamental role in determining the success of technology transfer.

It is known that traditional technology transfer activities cover only part of the scope of academic entrepreneurship research (Huyghe & Knockaert, 2016; Miranda, Chamorro-Mera & Rubio, 2017). However, more systematic analyses at the micro-level of individuals are becoming increasingly relevant as they seek to broaden understanding of academic entrepreneurial behavior (Wright & Phan, 2018; Balven et al., 2018). These studies, which have a more behavioral connotation, focus largely on identifying the characteristics of academic entrepreneurs, such as risk acceptance, competencies, and social ties (Soetanto & Jack, 2016), as well as collaborative aspects such as alliances and strategic partnerships (Ipiranga; Freitas & Paiva, 2010), all of which contribute to promoting an entrepreneurial environment.

Despite this, psychological aspects, which are more essentially behavioral in nature, have been little addressed in the literature on academic entrepreneurship, such as studies on identity and entrepreneurial intention (Bercovitz & Feldman, 2008; Jaime et al., 2009; Scholten et al., 2015; Soetanto & Jack, 2016; O'Kane et al., 2019; Urban & Chantson, 2019; Wang et al., 2021).

In this direction, Neves and Brito (2020) identified that individual characteristics continue to be a relevant topic, such as the positive relationship between academic status, years of research in the institution, and entrepreneurial intentions (D'Este & Patel, 2007; Link, Siegel & Bozeman, 2007; Tartari, Perkmann & Salter, 2014; Bercovitz & Feldman, 2008; Prodan & Drnovsek, 2010); duty, academic and social recognition, as well as peer pressure as drivers of entrepreneurship (Huyghe & Knockaert, 2015; Goethner et al., 2012; Obschonka et al., 2015); propensity for risk-taking, facing challenges, and seizing opportunities in different knowledge transfer activities as contributors to entrepreneurial intention (Wang et al., 2021). In addition to personal motivations, valuing knowledge, entrepreneurial and industrial experience in creating patents and collaborating with industry are factors that promote the formation of entrepreneurial identity (Morales-Gualdrón et al., 2009; Obschonka et al., 2015; Huyghe & Knockaert, 2016; Miranda, Chamorro-Mera & Rubio, 2017; Zahari et al., 2018).

Additionally, Hayter, Fischer, and Rasmussen (2021) studied the construction of entrepreneurial identity among academic scientists based on the liminality theory, supporting the thesis of a process of identity construction that could lead scientists to two types of identities: identity play, where individuals play with the development of an identity, and identity work, where individuals work on constructing their identity. Both identities are influenced by external and internal factors that can either enhance or hinder their development.

Thus, although some studies have sought to delve into the individual cognitive and psychological aspects of academics in the construction of their entrepreneurial identity (Neves & Brito, 2020; Hayter, Fischer & Rasmussen, 2021; Wang et al., 2021), the different aspects contributing to the construction of models that relate identity and entrepreneurial intention of academics are not yet fully defined. Therefore, the following research question arises: What are the relevant cognitive and psychological aspects that the literature on the subject has presented regarding the formation of academic researchers' identity and entrepreneurial intention? To answer this question, this study aims to conduct an updated and comprehensive systematic literature review, pointing to the consolidated current knowledge and revealing possible emerging topics in research on academic entrepreneurial identity and intention.

This work is justified by the inherent need of researchers working in the field to understand the theoretical, methodological, ontological, and epistemological lenses that have been used in previous studies, given the diversity of definitions and theories present in the research field, in order to guide their studies and discoveries. Furthermore, its relevance lies in the social impact that such a study enables, as it connects various areas of knowledge, not limited to the administrative field, promoting analyses of previously overlooked elements and findings, which contribute to academic and social progress in the face of the multitude of cases examined.

In addition to this introduction, the article provides a brief theoretical framework in the following section. The third section presents the methodology used for the systematic literature review and the steps taken. The fourth section presents the main results of the review analysis, and finally, a concluding reflection is made on the main findings

## **2 THEORETICAL FRAMEWORK**

Driven by the idea of entrepreneurial universities, these institutions have increasingly become the focus for innovation development. This is due to their crucial role in knowledge transfer to the market, connecting science and industry (Etzkowitz et al., 2000; Gerrero & Urbano, 2012). However, although academics play a fundamental role in the flow of knowledge, these entrepreneurial actors still face several barriers to commercialize their discoveries. This includes the consideration of advantageous academic rewards, the need to understand the commercial value of their knowledge, and gathering market information. Some academics perceive this dynamic as a situation where their commercialization efforts come at the expense of their academic activities, putting them in a balancing act between two identities: the academic and the entrepreneurial (Krabel & Mueller, 2009; Jain, George & Maltarich, 2009).

Such challenges require further studies, such as the conflict between the identities of academic individuals, sometimes focused on their basic university research, and other times on applied research in the market. This discussion still lacks in-depth exploration from different angles to contribute to public policies that foster activities and the development of entrepreneurial universities (O'Shea, Chugh & Allen, 2008; Prodan & Drnovsek, 2010).

Research that aims to understand the construction of the entrepreneurial profile of academics has focused on socio-contextual factors such as patenting activity, type of research, personal networks, perceived models, time in the academic institution, entrepreneurial

experience, intellectual property protection, personal opinions on research commercialization, close personal ties with industry, institutional support, and access to venture capital (O'Shea, Chugh & Allen, 2008; Krabel & Mueller, 2009; Prodan & Drnovsek, 2010; Goethner et al., 2012; Obschonka et al., 2015).

Although some studies have already investigated individual-level variables that drive academic entrepreneurship, such as the belief that their academic field is conducive to research commercialization, perceived self-efficacy and feasibility, risk propensity, innovativeness, and identity balance (Krabel & Mueller, 2009; Jain, George & Maltarich, 2009), it is still not clear how other individual-cognitive-psychological variables could contribute to understanding the construction of the academic entrepreneur's identity.

Jain, George, and Maltarich (2009) and Hayter, Fischer, and Rasmussen (2021) shed light on a theory in which entrepreneurial academics end up playing a game between their identities, allowing them to preserve both their academic and entrepreneurial identities. Building on these authors' work, Jain, George, and Maltarich (2009) emphasize that these actors use skills such as delegation and buffering to assist them in transitioning from one identity to another. Delegation involves assigning tasks to others, while buffering involves creating temporal or spatial separations between their academic and commercial identities.

Understanding the mindset of academic entrepreneurs and the specific mechanisms they use to manage their identities is becoming increasingly relevant for the successful promotion of mechanisms that encourage effective technology transfer between academia and society. Public policies emerge in this context as a crucial factor to further facilitate the flow of knowledge, generating development and access (Neves & Brito, 2020; Hayter, Fischer & Rasmussen, 2021; Wang et al., 2021).

### **3 METHODOLOGY**

The study adopts a systematic literature review (SLR) method to conduct a comprehensive survey of the literature related to the overall objective of the work, reducing the risk of selection biases and enhancing transparency in all stages of the research by employing clear and systematic procedures (Colicchia & Strozzi, 2012; Lame, 2019).

Although there are several studies contributing to the methodological approach of conducting an SLR, there is no standard methodological design, and research typically follows a process that includes formulating the research question, identifying keywords for article retrieval, selecting inclusion and exclusion criteria for articles, and evaluating the selected articles (Tranfield, Denyer & Smart, 2003; Colicchia & Strozzi, 2012; Thomé, Scavarda & Scavarda, 2016; Lame, 2019).

In addition to the mentioned steps, this research also includes the analysis of co-citation networks within the selected articles, which was performed using the Research Rabbit platform developed by Chandra, Slater, and Ma (2023). Research Rabbit is a visual discovery tool for scientific articles and citation network analysis based on a bibliographic database. The significance of this analysis lies in the perspective that citation networks act as a system that promotes knowledge modification, assuming that authors within a specific network cite each other to position their work within the field, relying on prior knowledge. Prominent citations tend to serve as pillars of the research tradition being studied. This technique allows for the study of network connectivity, identification of research specialties, and the evolution of traditions and paradigm shifts (Hummon & Doreian, 1989; Colicchia & Strozzi, 2012).

With the research question formulated, a preliminary literature review was conducted to identify keywords for the search in the Scopus and Web of Science databases, considered the largest academic databases (Colicchia & Strozzi, 2012; Mignenan, 2022). The keywords were

organized into three axes: academic entrepreneur, entrepreneurial identity, and technology transfer, as exemplified in Table 1.

**Table 1 - Guiding axes for keyword search**

<b>Axes</b>	<b>Branches</b>	<b>Boolean logic</b>	<b>Authos</b>
<b>Entrepreneurial Scientist</b>	Entrepreneurship aspiration	("entrepreneurial scientist" OR "academic entrepreneur" OR "entrepreneurial researcher" OR "aspiration to entrepreneurship" OR "entrepreneurial behavior" OR "university support" OR "University Environment" OR "university context" OR "entrepreneurial education")	Hessels, Van Gelderen & Thurik (2008) Carsrud & Brännback (2011) Newman et al. (2019) Bullough & Renko (2013) Litan, Mitchell & Reedy (2007) Bayuo, Chaminade & Göransson (2020)
	Entrepreneurial behavior		
	University support		
<b>Entrepreneurial identity</b>	Entrepreneurial culture	("entrepreneurial identity" OR "entrepreneurial consciousness" OR "entrepreneurial intelligence" OR "entrepreneurial self recognition" OR "entrepreneurial culture" OR "entrepreneurial artifact" OR "entrepreneurial conscience" OR "entrepreneurial education") AND ("entrepreneurial engagement" OR "entrepreneurial commitment" OR "entrepreneurial endeavor" OR "entrepreneurial involvement") AND ("entrepreneurial intention" OR "entrepreneurial participation" OR "entrepreneurial will" OR "entrepreneurial disposition" OR "entrepreneurial thinking" OR "entrepreneurial desire" OR "entrepreneurial purpose")	Baum & Locke (2004) Shane & Venkataraman (2000) Van der Zwan et al. (2016) Hessels et al. (2011) Krueger (1993) Chen, Greene & Crick (1998)
	Entrepreneurial engagement		
	Entrepreneurial intention		
<b>Technology transfer</b>	Spin-offs, patents, licenses Consulting Industry collaboration	("technology transfer" OR "spinoff" OR "patents" OR "licenses" OR "science consultancy" OR "industry collaboration" OR "innovation broker").	Guan et al. (2006) Woolley (2017) Tseng, Huang & Chen (2020) Perkmann & Walshe (2007)

Source: Developed by the authors

The axes and branches presented enabled the creation of the Boolean logic also included in Table 1. A survey of possible synonyms and related words was conducted to construct the query strings used in the databases. In total, 38 terms related to entrepreneurial identity were included in the search. It is worth noting that the connector "AND" was used to link the axes, which restricts the search to include all the specified terms.

These terms were used in the Scopus and Web of Science databases, selecting the option to search in titles, abstracts, and keywords. Regarding the article selection criteria, in this initial data collection phase, it was decided not to restrict the search in order to gather the

maximum number of studies possible. Therefore, there were no limitations regarding the field, language, or year. The only criterion was that the articles should be already completed.

The two databases returned a total of 1,043 articles, which were grouped and analyzed using R 4.1 software, through the bibliometrix library and its biblioshiny add-on (Aria & Cuccurullo, 2017). This led to the exclusion of 159 duplicate articles, leaving 884 articles.

Furthermore, non-article documents were excluded, resulting in 431 papers for analysis. During the mining analysis, some articles were selected for the next stage. However, all 431 articles had their abstracts analyzed. Those that were relevant to the theme of the entrepreneurial scientist's identity were grouped into a co-citation network. These articles were then fully analyzed through content analysis. The aim was to identify the variables that contribute to the formation of scientists' entrepreneurial identity, as well as the factors that influence entrepreneurial intention.

#### 4 RESULTS AND DISCUSSION

The general bibliometric details based on the search terms used and obtained through the biblioshiny add-on are presented in Table 1. The data collection period spanned from 1996 to 2022, with a total of 431 articles analyzed from 218 sources within this period. The average publication growth rate is 15.02% per year. Additionally, the published documents have an average age of 4.29 years, and the average number of citations per document is 10.64.

The analyzed documents feature 618 keywords assigned by the sources, 1,166 keywords assigned by the authors, and 17,336 references used. The analysis includes 1,138 authors, with 53 authors having single-authored documents. Regarding author collaboration, the co-authorship index is 2.91 authors per article, and the international collaboration rate reaches 23.9% of the 431 articles analyzed.

**Table 1 - Key Information about the Database**

<i>Description</i>	<i>Results</i>
<i>General Informations</i>	
<i>period</i>	1996 : 2022
<i>source</i>	218
<i>documents</i>	431
<i>annual growth rate %</i>	15,02
<i>average document age</i>	4,29
<i>average citations per document</i>	10,64
<i>total references used</i>	17.336
<i>keywords</i>	
<i>keywords plus (id)</i>	618
<i>author keywords</i>	1.166
<i>authors</i>	
<i>Document authors</i>	1.138
<i>Authors of single-authored documents</i>	53
<i>Author collaboration</i>	
<i>co-authors per document</i>	2,91
<i>% of international co-authorships</i>	23,9

Source: Developed by the authors

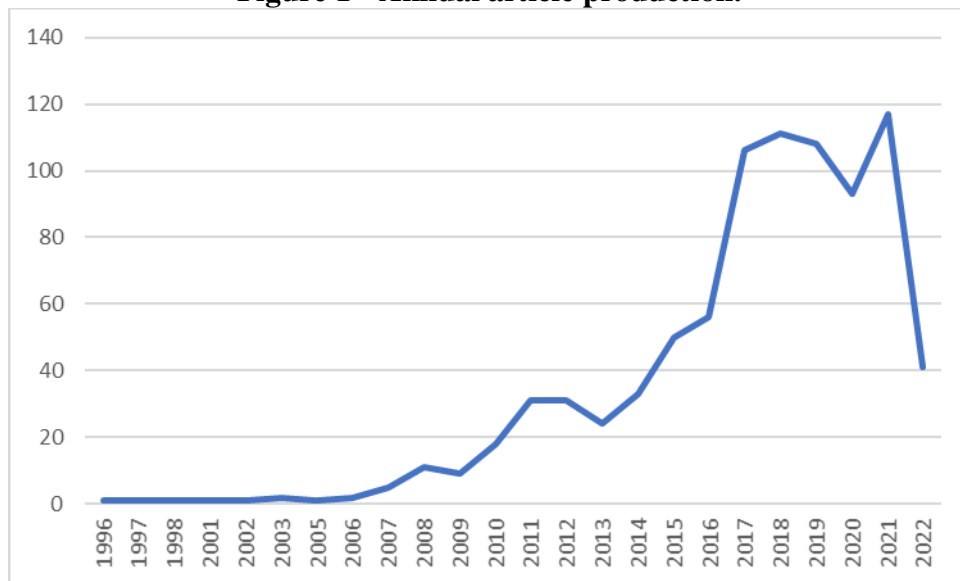
Figure 1 illustrates the annual article production on the subject, with the first publication in 1996 and the peak of publications in 2021 with 117 articles, up until the data extraction, which occurred in the second semester of 2022. The publication by Shimron & Klos (1996) discusses the implementation of entrepreneurial education in the educational curriculum of Israel. According to the authors, this shift in perspective from collectivist values to a competitive perspective embedded in entrepreneurship is due to the country's strategic vision of creating avenues for the formation of entrepreneurial individuals.

Valencia-Arias, Arango Botero, and Sánchez-Torrez (2021), Tiwari, Bhat, and Tikoria (2022), Breznitz and Zhang (2022), Kayed, Al-Madadha, and Abualbasal (2022), for example, explore various attributes, including social entrepreneurial education, empathy, university environment, and culture, which can contribute to the development of entrepreneurial intention.

Furthermore, Donoso-González, Pedraza-Navarro, and Palferro-Fernández (2022) seek to understand how entrepreneurial education affects the formation of identity in pre-university students, through pedagogical and environmental factors present in an entrepreneurial education program.

Based on this analysis, there is a shift in focus from a perspective initially centered on the debate of the possible effects of entrepreneurial education to one that investigates the attributes that can foster the formation and development of entrepreneurial intention, as well as the effects of these attributes on the formation of individuals' identities.

**Figure 1 - Annual article production.**



Source: Developed by the authors

Table 2 presents the top ten sources with the highest number of publications on the researched topic within the period covered until the present study.

**Table 2 - Key sources of publications on the researched topic**

<i>Source</i>	<i>Articles</i>
<i>EDUCATION AND TRAINING</i>	26
<i>INTERNATIONAL JOURNAL OF ENTREPRENEURIAL BEHAVIOR &amp; RESEARCH</i>	23
<i>FRONTIERS IN PSYCHOLOGY</i>	22
<i>SUSTAINABILITY</i>	21

<i>INTERNATIONAL JOURNAL OF MANAGEMENT EDUCATION</i>	11
<i>JOURNAL OF SMALL BUSINESS MANAGEMENT</i>	9
<i>QUALITY MANAGEMENT IN HIGHER EDUCATION VOL 1</i>	9
<i>INDUSTRY AND HIGHER EDUCATION</i>	8
<i>INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL</i>	8
<i>JOURNAL OF SMALL BUSINESS AND ENTERPRISE DEVELOPMENT</i>	8

Source: Developed by the authors

The journal *Education and Training* appears with 26 publications. It is a periodical that focuses on young students in universities, supporting investigations that study the transition from academic settings to employment. Among these 26 publications, the study by Nielsen and Gartner (2017) stands out with 27 citations to date. The authors investigate various individual factors that play a role in students' internal reflection as they attempt to develop an entrepreneurial identity, from a perspective of multiple identities and the influence of external factors, such as the university environment.

Table 3 presents the top ten most cited references within the analyzed author database.

**Table 3 - Top ten most cited references within the database**

References used	Citations
AJZEN I, 1991, ORGAN BEHAV HUM DEC, V50, P179, DOI 10.1016/0749-5978(91)90020-T	116
KRUEGER NF, 2000, J BUS VENTURING, V15, P411, DOI 10.1016/S0883-9026(98)00033-0	88
BAE TJ, 2014, ENTREP THEORY PRACT, V38, P217, DOI 10.1111/ETAP.12095	85
LINAN F, 2009, ENTREP THEORY PRACT, V33, P593, DOI 10.1111/J.1540-6520.2009.00318.X	74
SOUITARIS V, 2007, J BUS VENTURING, V22, P566, DOI 10.1016/J.JBUSVENT.2006.05.002	72
OOSTERBEEK H, 2010, EUR ECON REV, V54, P442, DOI 10.1016/J.EUROECOREV.2009.08.002	64
FAYOLLE A, 2015, J SMALL BUS MANAGE, V53, P75, DOI 10.1111/JSBM.12065	63
MARTIN BC, 2013, J BUS VENTURING, V28, P211, DOI 10.1016/J.JBUSVENT.2012.03.002	63
ZHAO H, 2005, J APPL PSYCHOL, V90, P1265, DOI 10.1037/0021-9010.90.6.1265	57
KURATKO DF, 2005, ENTREP THEORY PRACT, V29, P577, DOI 10.1111/J.1540-6520.2005.00099.X	55

Source: Developed by the authors

The theory of planned behavior studied by Ajzen (1991), which falls within the theoretical field of social psychology, seeks to predict and explain human behavior based on attitudes, subjective norms, and perceived behavioral control. This work seems to serve as a broad umbrella for many research studies related to the analyzed theoretical field. Among the 431 articles, this work is cited in 116, representing 26.92% of the entire analyzed database, positioning it as a guiding theoretical lens among researchers in the field.

Among the most cited and recent references in this field, the study by Bae et al. (2014) stands out. They conducted a meta-analysis of 73 studies to examine the effect of entrepreneurial education on entrepreneurial intentions. Despite a small effect, the authors were able to establish a significant relationship. Other works add insights into the entrepreneurial behavior of academics, such as the study by Krueger, Reilly, and Carsrud (2000), which compares two models based on intention in terms of their ability to predict entrepreneurial intentions: Ajzen's theory of planned behavior (TPB) (1991) and the entrepreneurial event



model (SEE) by Shapero and Sokol (1982), which is also part of the theoretical field of social psychology. In this study, the authors explore the social dimensions of entrepreneurship, examining the role of social factors in the entrepreneurial process and how they influence the creation and development of new ventures. It is noteworthy that the attribute of entrepreneurial education is widely used as a promoter of entrepreneurial intention, and alongside that, the investigation of factors that shape entrepreneurial capacity is also among the most cited. The literature seems concerned with identifying the variables that can contribute to the promotion of entrepreneurship among individuals.

Examining the literature analyzed from a geographic perspective of its origin, Table 4 presents the most productive countries based on the location of their authors, using two indicators: single-country publications (SCP) and publications with international contribution (MCP).

**Table 4 - Corresponding countries of the authors**

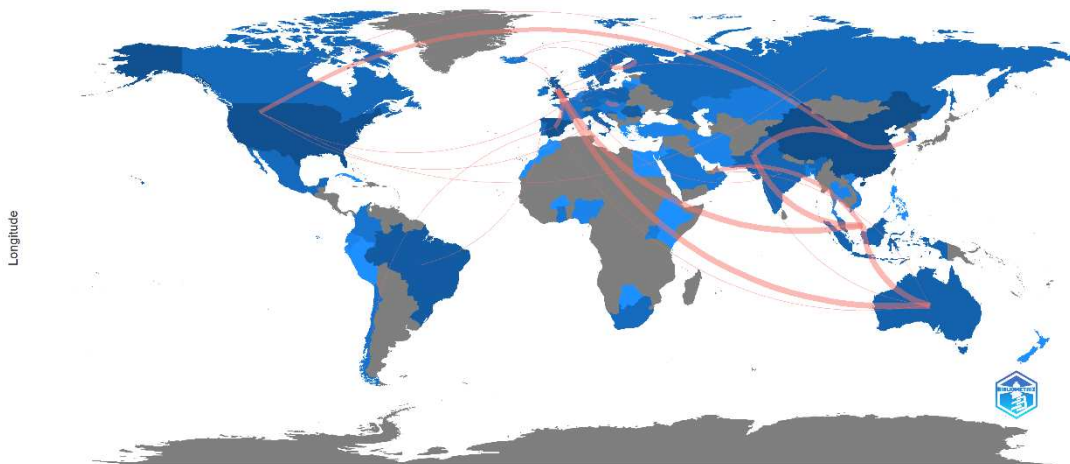
<i>Position</i>	<i>Countries</i>	<i>Articles</i>	<i>SCP</i>	<i>MCP</i>	<i>MCP_%</i>
1	CHINA	51	40	11	21,60%
2	SPAIN	38	34	4	10,50%
3	USA	35	31	4	11,40%
4	BRAZIL	21	19	2	9,50%
5	ROMANIA	19	18	1	5,30%
6	INDONESIA	14	12	2	14,30%
7	ITALY	14	11	3	21,40%
8	UNITED KINGDOM	14	11	3	21,40%
9	POLAND	13	11	2	15,40%
10	MALAYSIA	12	5	7	58,30%

Source: Developed by the authors

Table 3 contains the ranking of the top 10 most productive countries. It is notable that the majority of publications come from authors located in China with 51 articles, followed by Spain with 38 and the United States of America with 35 publications. Brazil is in fourth position with 21 publications.

When analyzing the index of international contribution participation (MCP\_%) by countries, we observe that Malaysia is the country with the highest level of international contribution in the research process within this field, with international contribution in 58.30% of its research. China follows closely with 21.60%, and Italy and England come next, both with 21.40%. Brazil appears second to last, indicating that it is one of the countries with the lowest level of international contribution in its research within the investigated theoretical field. Figure 2 illustrates the discussed dynamics.

**Figure 2 - Dynamics of international contribution.**

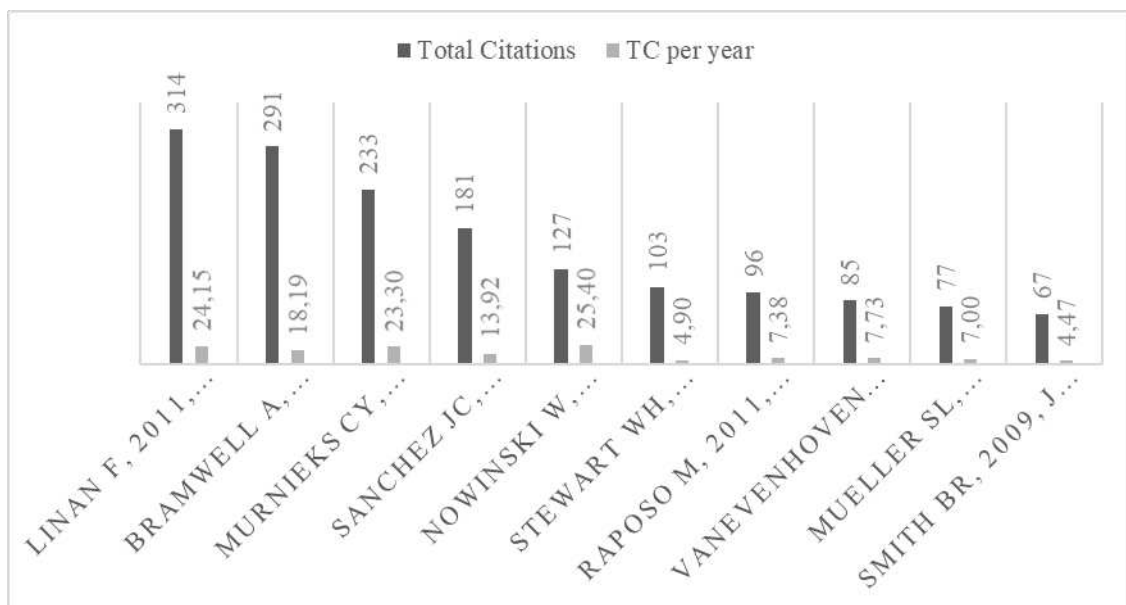


Source: Developed by the authors

Figure 2 clearly shows the limited participation of South American and African continents, with North America represented by the United States of America, Asia represented by Malaysia and China, and Europe represented by England, Italy, and Spain taking the lead.

Figure 3 displays the most cited articles. Among them, some discuss the influence of factors that can contribute to the development of an entrepreneurial characteristic. These discussions are directly related to the theme of entrepreneurial identity, which is the focus of investigation in this study.

**Figure 3 - Most cited articles.**



Source: Developed by the authors

As shown in Figure 3, the article by Liñán, Rodríguez-Cohard, and Rueda-Cantuche (2011) stands out with 314 citations to date. The authors investigate which elements of a cognitive approach, considering personality traits, play an influential role in forming the personal decision to start a business.

Murnieks, Mosakowski, and Cardon (2014) examine the influence of passion among entrepreneurs. The authors integrate identity theory with literature on passion to investigate the

possible pathways through which entrepreneurial identities can influence passion, as well as the relationship between passion and entrepreneurial behavior.

Vanevenhoven and Liguori (2013) conduct their research using a secondary database from <http://www.trepeducation.com>, an entrepreneurial education project rooted in cognitive theory. This database is based on a longitudinal study where university students provide data-driven insights into the impact of entrepreneurial education on (1) the motivational processes underlying their journey from student to entrepreneur and through the entrepreneurial process, and (2) the transformation process from student to entrepreneur.

Finally, Mueller and Conway (2013) investigate how biological sex, social roles, self-efficacy culture, and entrepreneurial motivation influence the formation of the entrepreneur stereotype that balances stereotypical feminine and masculine characteristics.

These studies provide a starting point for investigating the factors that can impact the development of entrepreneurial identity among scientists, as well as the specific mechanisms through which the development of this identity influences entrepreneurial intention.

The identified literature has connections between themes and actors, allowing us to understand their most relevant niches. Thus, by clustering the articles with the themes present in the theoretical field of the database, it was possible to identify the following clusters: impact, innovation, business incubation, identity, secondary education, systems, lessons, emergence, and returns. However, only the innovation cluster significantly relates to the identity cluster. Therefore, other works related to the theme of identity were captured. Table 5 presents the results.

**Table 5 - Document adherence to the theme.**

<i>Title</i>	<i>Year</i>	<i>Innovation</i>	<i>Identity</i>	<i>Cluster</i>	<i>Total citations</i>
<i>Personalizing Entrepreneurial Learning a Pedagogy For Facilitating The Know Why</i>	2014	0,529	0,464	Innovation	55
<i>Entrepreneurial Education for the Entrepreneurial University a Stakeholder Perspective</i>	2020	0,127	0,867	Identity	26
<i>What Determines the Entrepreneurial Success of Academics Navigating Multiple Social Identities in the Hybrid Career Of Academic Entrepreneurs</i>	2019	0,691	0,282	Innovation	10
<i>The University as an Entrepreneurial Learning Space The Role Of Socialized Learning in Developing Entrepreneurial Competence</i>	2020	0,362	0,431	Identity	5
<i>Entrepreneurial Intention of Agriculture Undergraduates in Russia</i>	2020	0,172	0,517	Identity	3
<i>Startup Sprint Providing a Small Group Learning Experience in a Large Group Setting</i>	2021	0,639	0,184	Innovation	1
<i>Enabling Academic Entrepreneurship the Icorps Experience</i>	2021	0	0,961	Identity	1
<i>Full Curriculum based Venture Creation Programmes Current Knowledge and Research Challenges</i>	2022	0,725	0,258	Innovation	0

<i>University Technology Transfer and Agricultural Science Entrepreneurial Education a View from Inside</i>	2019	0	1	Identity	0
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Source: Developed by the authors

It can be observed that the articles clustered under the theme of identity are recent, and a total of 10 articles related to both the identity cluster and the innovation cluster were identified. Among the articles exclusively belonging to the identity cluster, the most cited one is "Entrepreneurial Education for the Entrepreneurial University: A Stakeholder Perspective" by Gianiodis and Meek (2020).

For content analysis, these ten articles were included, along with the works of Donoso-González, Pedraza-Navarro, and Palferro-Fernández (2022), Liñán, Rodríguez-Cohard, and Rueda-Cantucho (2011), Murnieks, Mosakowski, and Cardon (2014), Vanevenhoven and Liguori (2013), and Mueller and Conway (2013), which were found to be related to the theme during the bibliometric analysis mining.

In addition, a review of the abstracts of the other 431 articles was conducted to check if there were any more related to the theme that were not identified during the bibliometric analysis. This resulted in the identification of fifteen more articles related to the theme of the entrepreneurial scientist's identity. All of these articles are listed in Table 2.

**Table 2 - Articles included for the construction of the co-citation network.**

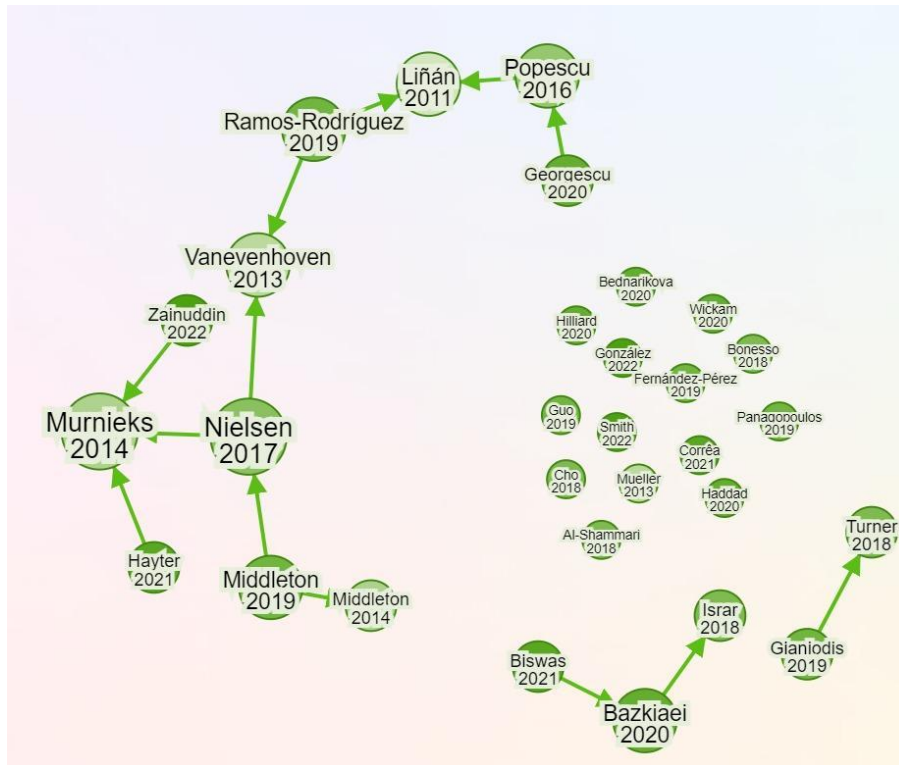
<b>Título</b>	<b>Autores</b>
<b>Factors affecting entrepreneurial intention levels: a role for education</b>	Liñán, Rodríguez-Cohard & Rueda-Cantucho (2011)
<b>Pathways of passion: Identity centrality, passion, and behavior among entrepreneurs</b>	Murnieks, Mosakowski & Cardon (2014)
<b>The impact of entrepreneurship education: Introducing the entrepreneurship education project</b>	Vanevenhoven & Liguori (2013)
<b>Entrepreneurial orientation, entrepreneurial education and performance</b>	Cho & Lee (2018)
<b>Entrepreneurship unleashed: Understanding entrepreneurial education outside of the business school</b>	Turner & Gianiodis (2018)
<b>Emotional competencies and cognitive antecedents in shaping student's entrepreneurial intention: the moderating role of entrepreneurship education</b>	Fernández-Pérez et al. (2019)
<b>An analysis of the determinants of entrepreneurial intentions among students: a Romanian case study</b>	Popescu et al. (2016)
<b>Students' entrepreneurial intentions: The role of prior learning experiences and emotional, social, and cognitive competencies</b>	Bonesso et al. (2018)
<b>Am I a student and/or entrepreneur? Multiple identities in student entrepreneurship</b>	Nielsen & Gartner (2017)
<b>Entrepreneurial intentions among university students in Italy</b>	Israr & Saleem (2018)
<b>Do entrepreneurial education and big-five personality traits predict entrepreneurial intention among universities students?</b>	Bazkiaei et al. (2020)
<b>What determines the entrepreneurial success of academics? Navigating multiple social</b>	Guo et al. (2019)

<b>Identities in the hybrid career of academic entrepreneurs</b>	
<b>Entrepreneurial intentions of private university students in the kingdom of Bahrain</b>	Al-Shammari & Waleed (2018)
<b>The impact of the family background on students' entrepreneurial intentions: An empirical analysis</b>	Georgescu & Herman (2020)
<b>Why not now? Intended timing in entrepreneurial intentions</b>	Ramos-Rodríguez, Medina-Garrido & Ruiz-Navarro. (2019)
<b>Social capital and individual entrepreneurial orientation: innovativeness, proactivity, and risk-taking in an emerging economy</b>	Corrêa et al. (2021)
<b>Engine of entrepreneurial intentions: revisiting personality traits with entrepreneurial education.</b>	Biswas & Verma (2022)
<b>Becoming an academic entrepreneur: how scientists develop an entrepreneurial identity.</b>	Hayter, Fischer & Rasmussen (2021).
<b>Assessing alignment of Entrepreneurial Spirit to job descriptions seeking business administration or management undergraduates</b>	Wickam, Finley & Saeger (2020)
<b>Analysis of entrepreneurial education—study of the configuration of the entrepreneurial identity through the acquisition of crucial transversal competences for future university students</b>	Donoso-González, Pedraza-Navarro & Palferro-Fernández (2022).
<b>Postgraduate entrepreneurship education: can entrepreneurial passion be developed?</b>	Zainuddin & Mukhtar (2022)
<b>A cross cultural study of gender-role orientation and entrepreneurial self-efficacy</b>	Mueller & Conway (2013)
<b>Personalizing entrepreneurial learning: A pedagogy for facilitating the know why</b>	Middleton & Donnellon (2014)
<b>Entrepreneurial education for the entrepreneurial university: a stakeholder perspective.</b>	Gianiodis & Meek (2020)
<b>The university as an entrepreneurial learning space: The role of socialized learning in developing entrepreneurial competence</b>	Middelton et al. (2019)
<b>Entrepreneurial intention of agriculture undergraduates in Russia.</b>	Bednarikova, Bavorova & Ponkina (2020)..
<b>Start-up sprint: Providing a small group learning experience in a large group setting.</b>	Hilliard (2021)
<b>Enabling academic entrepreneurship: the I-Corps experience.</b>	Al Haddad et al. (2021)
<b>Full curriculum-based venture creation programmes: current knowledge and research challenges.</b>	Smith, Rogers & Bozward (2022)
<b>University Technology Transfer and Agricultural Science Entrepreneurial Education: a View from Inside.</b>	Panagopoulos et al. (2019)

Source: Developed by the authors

With the theme-relevant papers identified, the next step was to analyze the co-citation network of this set of 30 articles. Figure 4 illustrates the co-citation network.

**Figure 4 - Co-citation network of theme-relevant articles.**



Source: Developed by the authors

As observed in Figure 4, the co-citation network revealed four clusters, three of which exhibit connections among the authors, while the fourth cluster lacks citation relationships among its authors. Through the analysis of the co-citation network, it becomes evident that entrepreneurial identities function as cognitive frameworks that enable individuals to understand the meaning of being an entrepreneur (Liñán, Rodríguez-Cohard & Rueda-Cantuche, 2011). These identities are influenced by society and how entrepreneurship is perceived and valued, relating to actions associated with opportunity discovery, evaluation, and exploitation. Among the evaluated papers, several factors contribute to the formation of these identities, with entrepreneurial education being emphasized by many researchers in this field (VanEevenhoven & Liguori, 2013; Nielsen & Gartner, 2017; Turner & Gianiodis, 2018; Gianiodis, 2020). However, there is disagreement among scholars regarding the significance of formal entrepreneurial education in shaping the entrepreneurial identity of academics.

On the other hand, the articles also argue that personal attitude and perceived behavioral control play a relevant role in understanding entrepreneurial behavior (Nielsen & Gartner, 2017). These aspects are related to how academics perceive their ability to act entrepreneurially and believe in the effectiveness of their actions. Additionally, Liñán, Rodríguez-Cohard, and Rueda-Cantuche (2011) highlight that entrepreneurial intention is an important indicator of entrepreneurial behavior. Studies also indicate that the decision to become an entrepreneur is considered voluntary and conscious, and the presence of reference models, mentors, or partners plays a decisive role in promoting individual entrepreneurship (VanEevenhoven & Liguori, 2013).

At the individual level, perceived feasibility and perceived self-efficacy are also influential factors in entrepreneurial intention (Ramos-Rodríguez, Medina-Garrido & Ruiz-Navarro et al., 2019). Perceived feasibility refers to an individual's perception of the viability and success of an entrepreneurial opportunity, while perceived self-efficacy relates to an individual's confidence in their entrepreneurial abilities and capacities.

Furthermore, passion is a highly explored variable in the cluster and is considered significant in individual entrepreneurial behavior and the construction of entrepreneurial identity (Murnieks, Mosakowski & Cardon, 2014; Turner, 2018; Zainuddin & Mukhtar, 2022). These studies, which employ the variable of passion to understand entrepreneurial behavior or the construction of entrepreneurial identity among academics, explore to some extent, albeit not entirely, from a perspective within the broader theoretical field of social psychology.

These research studies focus on the construction of entrepreneurial identity influenced by contextual and social factors. From this perspective, informal educational experiences, attitudes, entrepreneurial personality traits, and available economic and networking resources are identified as other factors contributing to the construction of entrepreneurial identity (Georgescu & Herman, 2020). The intergenerational transmission of entrepreneurial characteristics, such as aspirations, values, and human capital, also plays a significant role in the entrepreneurship passed down through families, as mentioned by Georgescu & Herman (2020). Exposure to entrepreneurial reference models, such as entrepreneurial parents, can influence individuals' perceptions and attitudes towards entrepreneurship.

Ramos-Rodríguez, Medina-Garrido & Ruiz-Navarro et al. (2019) discuss that, in addition to family influence, social support plays an important role in the development of entrepreneurial identity. Support from friends, colleagues, and entrepreneurial mentors can provide encouragement, guidance, and the necessary resources for individuals to feel confident and motivated to engage in entrepreneurial activities. Access to networks and networking opportunities can also enhance the perception of feasibility and attractiveness of entrepreneurship.

Other contextual and social factors, such as available economic and networking resources, also influence the construction of entrepreneurial identity. Access to capital, contacts, and financial support can facilitate engagement in entrepreneurial endeavors and strengthen entrepreneurial identity. Additionally, networks and networking opportunities can provide social support, guidance, and additional resources for entrepreneurs (O'Shea, Chugh & Allen, 2008; Krabel & Mueller, 2009; Prodan & Drnovsek, 2010).

Although these studies are rooted in theories from the field of social psychology, there is a subtle movement in some studies that point towards an approach focused on individual cognitive characteristics related to the field of evolutionary psychology. Additionally, these studies focus on the social context of students, with the exception of Hayter, Fischer & Rasmussen (2022), whose research subjects are scientists.

Murnieks, Mosakowski & Cardon (2014), Nielsen & Gartner (2017), and Hayter, Fischer & Rasmussen (2021) corroborate and highlight that, in the context of academics, the construction of entrepreneurial identity also presents specific characteristics. Assuming the identity of an "entrepreneur" may involve adopting various other identities, and being an entrepreneur can be a way of constructing identity. The interaction between the entrepreneurial process and identity construction is crucial to understanding academic entrepreneurship (Down, 2006; Shepherd & Haynie, 2012).

Thus, identity is defined as an individual's self-perception within a specific environment (Weick, 1995), and individuals may perceive themselves in various ways depending on the different social contexts they are exposed to (Weick, 1995). Academic entrepreneurs seek to balance their sense of psychological belonging and distinction in the entrepreneurial process, maintaining their individuality while also seeing themselves as members of a social community. The perspective of identity contributes to connecting micro and macro analyses in the field of entrepreneurship (Downing, 2005).

These studies understand that entrepreneurial identity is formed by the individual's psychological understanding of acting as an entrepreneur, which varies according to the context. This concept aligns with the field of evolutionary psychology, which seeks to understand the

evolution of behavioral and cognitive patterns to enhance individuals' adaptation and survival in their environment.

In this regard, Israr & Saleem (2018), Bazkiaei et al. (2020), and Biswas & Verma (2022) support this understanding of academic entrepreneurial identity within the realm of individual cognitive and behavioral patterns, including personality traits associated with business creation and success, influencing individuals' beliefs regarding their attitude, intention, and behavior. These authors investigated the Big Five personality traits: extraversion, agreeableness, neuroticism, conscientiousness, and openness to experience.

It is worth noting that the research on academic entrepreneurial identity within the co-citation network is largely based on the field of social psychology, and some studies discuss the relationship between individuals' intention and attitude beliefs towards a particular behavior and its consequences, subtly leaning towards the field of evolutionary psychology in seeking to understand behavioral patterns.

Regarding the research from the cluster without co-citations, it was observed that factors such as emotional and cultural competencies, as well as cognitive backgrounds (Fernando-Pérez et al., 2019; Bonesso et al., 2018), as well as previous experiences, the balance between professional and academic identity, and interaction with the context, including challenges and intentional actions faced by student entrepreneurs (Gou et al., 2019; Donoso-González, Pedraza-Navarro & Palferro-Fernández, 2022), are important variables for the development of entrepreneurial identity. These variables, combined with collaboration, communication, curriculum development, mentorship, and training, can facilitate technology transfer and exponentialize entrepreneurship (Panagopoulus, 2019).

Despite the existence of studies that explore factors contributing to the development of entrepreneurial identity, albeit subtly from the perspective of evolutionary psychology, the effects of the human capacity to attribute mental states such as beliefs, desires, intentions, and emotions to others have not been analyzed in understanding the construction of entrepreneurial identity among scientists. This ability to understand that others have a separate mind from ours, based on their own thoughts and feelings, allows a scientist entrepreneur to put themselves in others' shoes, understand their perspectives and interests, and thus establish solid partnerships, productive collaborations, and advantageous business agreements.

In this sense, the field of evolutionary psychology has the potential to contribute significantly to understanding the construction of entrepreneurial identity among scientists by considering the understanding of the mental states involved in this process. Furthermore, scientists can attribute beliefs and intentions to themselves, influencing their entrepreneurial identity, as mentioned in previous studies that emphasized the importance of these elements in shaping the entrepreneurial identity of academics (VanEevenhoven & Liguori, 2013; Murnieks, Mosakowski & Cardon, 2014; Nielsen & Gartner, 2017; Israr & Saleem, 2018; Bazkiaei et al., 2020; Biswas & Verma, 2022). Understanding the cognitive and behavioral processes involved in constructing entrepreneurial identity can contribute to improving entrepreneurial education programs and public policies aimed at fostering entrepreneurship.

## **5 FINAL CONSIDERATIONS**

The process of searching and selecting documents returned 431 articles related to the topic, which were analyzed using the bibliometric package, the web application Biblioshiny. It is worth noting that in recent years, there has been a considerable increase in publications, with an average annual growth rate of 15.02%. The theory of behavior studied by Ajzen (1991) seems to serve as a broad umbrella for many research studies related to the analyzed theoretical field. Among the 431 articles, this work is referenced in 116, representing 26.92% of the entire analyzed database, making it a guiding theoretical lens among researchers in the field.



Regarding the most cited works, the article by Liñán, Rodríguez-Cohard, and Rueda-Cantuche (2011) stands out with 314 citations to date. The authors investigate which elements of a cognitive approach, considering personality traits, play an influential role in the personal decision to start a business.

The Biblioshiny tool enabled other analyses, including the clustering analysis of the documents with the themes present in the theoretical field of the database, selecting articles related to innovation and identity. Another relevant analysis was the abstract analysis of the 431 papers, in which articles related to the topic were also selected. The emerging works from bibliometric mining, cluster analysis of themes, and abstract analysis were selected, and the co-citation network was created using Research Rabbit. To understand the co-citation network, a content analysis was performed to identify individual-level cognitive variables that contribute to understanding the construction of academic entrepreneurial identity. In addition to identifying these variables, the analysis allowed the inference that despite the predominant theoretical field being social psychology (Krueger, Reilly & Carsrud, 2000; Ajzen, 1991; Shapero & Sokol, 1982), some studies are working with characteristics of evolutionary psychology, opening a relevant gap for studies with this perspective (VanEevenhoven & Liguori, 2013; Murnieks, Mosakowski & Cardon, 2014; Nielsen & Gartner, 2017; Israr & Saleem, 2018; Bazkiaei et al., 2020; Biswas & Verma, 2022). This new theoretical approach seeks to understand how behavioral and cognitive patterns have evolved to enhance individuals' adaptation and survival in their environment. Additionally, the interaction between the entrepreneurial process and identity construction is crucial to understanding academic entrepreneurship.

As for limitations, it is important to highlight them to facilitate advancements. The selected analysis period extended until the end of the first semester of 2022, and further research may seek to update the used database. Another limitation pertains to the tool used to analyze the information, which may have failed to present relevant issues for the advancement of the topic and, particularly, in the overall thematic map, hindering the indication of future research directions.

However, this article brings important contributions to the advancement of knowledge on the subject. By identifying the most relevant and influential articles and authors, as well as the journals that have published them the most, it provides a comprehensive view of the current state of knowledge regarding academic entrepreneurial identity. Another significant contribution is the presentation of the thematic field's evolution through the analysis of the co-citation network, helping to better understand it and the debates that have influenced this area, while providing suggestions for future studies, fostering the development of new research and significant advancements.

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