International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-9, Issue-9; Sep, 2022
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.99.51

Business Incubators and Sustainability: A Literature Review

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Received: 26 Aug 2022,

Received in revised form: 19 Sep 2022,

Accepted: 24 Sep 2022,

Available online: 30 Sep 2022

***Keywords*— Business incubator, Entrepreneurship, Sustainability, Sustainable Development.**

***Abstract*—** *Incubators are models to support entrepreneurship, being central to economic growth and as catalysts for the formation of new business. Incubators have a practical relevance as an effective mechanism to support small business development. In relation to the sustainability, however, few authors have explored the notion of incubation for sustainability to meet global development agendas. The incubator-sustainability relationship in practice can support sustainable development through new companies and incubators profiled on sustainable. Few attentions have been given to the engagement of incubators in activities aimed at sustainable development. In this sense, the present study aims to investigate the application of the term sustainability in studies on business incubators. For this a literature review study was conducted, based on the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) and bibliometric techniques. This review identifies links between incubators and sustainability and observes differences in the application of the notion of sustainability. From the analysis updated terms emerges related to sustainability may represent trends and new areas of interest. The findings of the review highlight that knowledge is expanding and still need to be deepened for strengthen the role of incubators in sustainable development. As limitations, we can highlight the lack of clear definition of concepts and a research agenda on the topic. At the end, it is suggested that future work may expand the research on incubators and sustainability.*

I. INTRODUCTION

Business incubators emerged within the scope of entrepreneurship to support the creation of new businesses and ventures at an early stage. Its traditional focus is linked to inexperienced entrepreneurs, technology-based incubation, with emphasis on university-based incubators and a regional development focus. Hausberg and Korreck (2020) note that other formats of incubators, such as accelerators, have emerged and reconfigured the phenomenon. There is a growing variety of incubator models, defined with heterogeneity and specialization of the phenomenon (Klofsten *et al.*, 2020). There are both technology-based incubators, with others for social purposes, government incubators, corporate incubators in companies and incubators created by academic institutions, aimed at meeting economic and social demands.

The number of incubators has exceeded 7,000 units worldwide (Eveleens *et al*., 2017). Mian *et al*. (2021) identified the existence of more than 1,400 incubators in the United States, according to data from iNBIA. Mian *et al*. (2021) discusses this universe from information collected in national and regional professional associations of incubators and web sources, on the numbers of existing incubation programs in several countries: Germany, three hundred (BVIZ, 2019); Brazil, 363 (ANPROTEC, 2019); China, 670; and India, 276 (IIM, 2019).

Parallel to the practical phenomenon, a research tradition has been formed and research interest has been maintained, generating recent studies deriving themes and constant academic publication (Hackett & Dilts, 2004; Albort-Morant & Ribeiro-Soriano, 2016). The literature on business incubators has expanded, as shown by literature reviews that systematized research in incubation, currently focusing on accelerators, startups, and technology base (Eveleens *et al*., 2017; Hausberg & Korreck, 2020). In general, incubators continue to provide services to support business development, in its initial stages, through diverse services and access to knowledge (Deyanova *et al*., 2022). Hackett and Dilts (2004), almost twenty years ago, signaled that much attention had been paid to the facilities of incubators and little attention was focused on incubated companies, innovations they disseminated and incubation results. Since then, studies have addressed the performance of incubators, effectiveness (Theodorakopoulos *et al*., 2014) and incubation impacts (Albort-Morant & Ribeiro-Soriano, 2016).

Previous studies highlight the gap in explanation of the link between incubators and sustainable development (Hernández & Carrà 2016). And even if an increase in the number of studies on innovation and technology focused on sustainability is observed (Markard *et al*., 2012), the role of technological innovation in the Sustainable Development Goals (SDGs) is still considered unexplored and a research gap (Castro *et al*., 2021). Despite this, studies have specialized in the importance of technology to address the SDGs (Secundo *et al*., 2020). In the growing field of studies on incubators, there are studies on sustainability-oriented incubators (Bank *et al*., 2017) or their involvement in activities aimed at sustainable development (Battering & Masurel, 2020).

There are studies on opportunities for creating green jobs (Gliedt *et al*., 2018) and reflections on what incubation services would be needed to develop eco-opportunities (Battistoni & Barbero, 2019). The performance of incubators in relation to the environment or from the perspective of a more sustainable society can be evaluated in terms of their environmental maturity (Fonseca & Chiappetta Jabbour, 2012). There are theoretical developments of this incubator-sustainability relationship that in practice can support sustainable development through new companies (Bank *et al*., 2017).

This study began with a question concerning the application of the concept of sustainability in business incubators research and incubation. It was found that the relationship between these elements has not yet been analyzed in studies and reviews, being an opportunity to present a synthesis of this knowledge in the field of business incubation. With the absence of systematization on this topic, the research then aimed to provide an overview of existing studies on incubators with a focus on the application of the concept of sustainability.

Considering the evolution of studies on business incubators we research about the application of the term "sustainability". This research thus conducts a literature review and mapping of this knowledge. This review aims to clarify and identify the differences in the application of the term sustainability in studies on business incubators.

The article is structured as follows: Introduction, section 1, presents the problem, gaps in previous work, contribution, and objective of the article. Section 2 on the method describes the investigation procedures and research development stages. In Results and Discussion, Section 3, presents the results of the literature review and discussion. In the conclusion, section 4, presents final considerations of the main points, applications, advantages, and limitations of the article.

II. METHOD

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) standards were followed in the conduct of this systematic review (Page *et al*., 2021). Additionally, the seven-step method described in Booth (2016) and Freitas *et al*. (2022) were utilized, which consists of seven steps: planning, defining the scope, searching the published research, assessing the evidence base, synthesizing, analyzing, and writing. To provide an overview and synthesis based on the scientific articles available in the Scopus and Web of science (WOS) databases. This review is based on the use of bibliometric techniques to map the application of the concept of sustainability associated with business incubator e networked incubation.

2.1 Planning

In the context of the objective of the article, of the literature on business incubators and the relationship between incubators and sustainability is observed in the studies through bibliometric analysis of the literature. This study aims to inform about the literature, using techniques

of citation analysis, networking of authors' keywords, mapping, and analysis of literature. In the study, the bibliometric method is applied analyzing selected studies, strictly in the production of original and review articles published and stored in a scientific knowledge database.

Databases were consulted between December 2021 and March 2022, and data were extracted from Scopus and Web of Science databases. Bibliographic analyzes and scientific mappings consider the number of publications and citations, journals, and countries in the selected studies. The most influential authors are identified based on citations and the most cited articles. After defining the initial research intention and the topic to be addressed, exploratory searches were conducted in the databases for original and review articles to verify the existence of a research gap to be explored.

2.2 Defining the Scope

Defining the scope relates to research questions. To investigate the research gap, two pertinent research questions were formulated for this review, namely: Q1: How is the concept of sustainability applied in research on business incubators? And Q2: What are the main characteristics of the use of the notion of sustainability and sustainable development in business incubators?

2.3 Literature Search

To this end, steps were defined to be followed. In the initial search, the following search descriptors were used: “business incubator”, “incubation”, “sustainability”, these terms, to be found in the article title, abstract or keywords. The descriptors used were "business incubator" and "business incubation". The search string was as follows: “(title ("business incubator") OR title ("business incubation") OR key ("business incubator") OR key ("business incubation"))". Considering the variations “sustainability” and “sustainable”. Several combinations of these descriptors with logical operators were evaluated in the search for review articles and originals.

As a search step 1, we used an initial String, and aimed at searching for studies and most influential works. In search stage using the String we searched for studies focusing on the guiding question of the research, with the relationship between business incubators and the term sustainability. The selection was finalized in April 2022. The result of the search is shown in Table 1.

Table.1: Search results in the databases

Search step 1: String	**WOS**	**Scopus**
((business incubator AND sustainab* development))	68	100

2.4 Assessing the Evidence Base

In the study, from the original articles and published review articles, the guiding question is aimed at selecting and electing studies on business incubators with a focus on the application of the concept of sustainability. After filtering and exclusion procedures, forty-seven documents remained. Of these, were excluded twenty-one due to duplicity and due to thematic criteria after reading the abstracts. Remaining in twenty-six studies for analysis on the question raised, as shown in Fig. 1. The assessment step applied inclusion and exclusion criteria filters to reduce the number of related articles identified during the search step. By combining the following exclusion criteria, we to limit the number of documents identified: E1: Exclude articles that did not include the terms “sustainability”, “Sustainable Development”. And E2: Exclude articles that did not contain the terms "incubator", "incubation".

2.5 Synthesizing and Analyzing

Based on the identified works and abstracts, studies on incubators were included and those that did not have thematic relevance or did not meet the criterion of the guiding question were excluded. After this selection and eligibility step, reading the abstracts and documents, they were selected for analysis in the Vosviewer software.

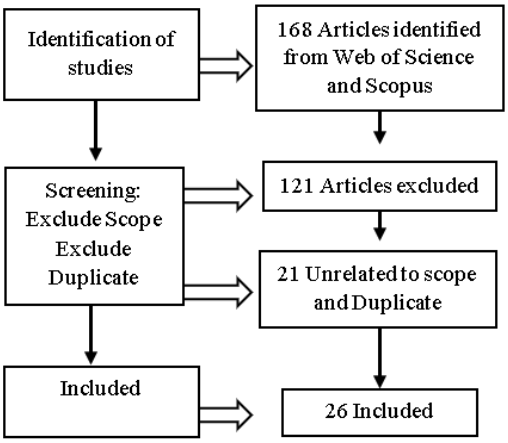

Fig. 1: flow diagram for inclusion of articles.

III. RESULTS AND DISCUSSION

In the literature on business incubators, studies on the performance of incubators, the impact of support and the effects of incubation on the growth of incubated ventures are traditional. The theme of performance brings the concept of sustainability closer, associating it with the sustained growth of the incubator or the supported business. However, there is no review on this approach and application of the concept in studies on incubators, nor on incubators linked to sustainable development

specifically. In this context, there is no clear distinction on the application of the term sustainability in these studies, which suggests an opportunity for review and systematization. In this sense, Table 2 shows the reviews produced on business incubators.

Table.2: Previous literature reviews published on business incubators

Author (Year)	**Title**	**Times cited**
Hackett and Dilts (2004)	A Systematic Review of Business Incubation Research	462
Albort-Morant and Ribeiro-Soriano (2016)	A bibliometric analysis of international impact of business incubators	139
Hausberg and Korreck (2020)	Business incubators and accelerators: a co-citation analysis-based, systematic literature review	81
Theodorakopoulos *et al*. (2014)	What matters in business incubation? A literature review and a suggestion for situated theorizing	75
Eveleens *et al*. (2017)	How network-based incubation helps start-up performance: a systematic review against the background of management theories	64
McAdam *et al*. (2006)	Business Processes and Networks in University Incubators: A Review and Research Agendas	45
Deyanova *et al*. (2022)	Hatching start-ups for sustainable growth: a bibliometric review on business incubators	1

As shown, previous reviews of the literature on business incubators have not yet addressed sustainability. Business incubators have great practical relevance (Deyanova *et al*. 2022) and there are no signs that other models are replacing them to support entrepreneurship. Incubators remain an effective mechanism to support small business development (Mcadam & Marlow 2008). In the recent period, shown in Fig. 2 and Fig. 3, the number of original and review articles published and the citations in the last 10 years is observed. The average publication per year was forty articles. And these articles had an average of 821.7 citations per year in the period between 2012 and 2021.

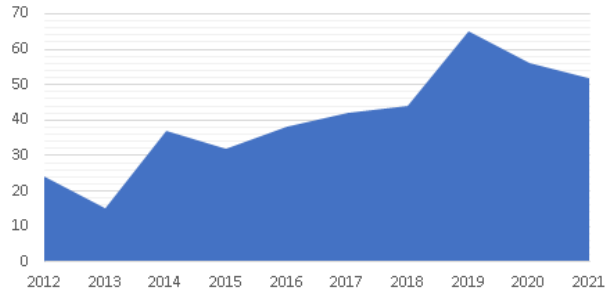

Fig. 2: business incubators, number of original and review articles published per year

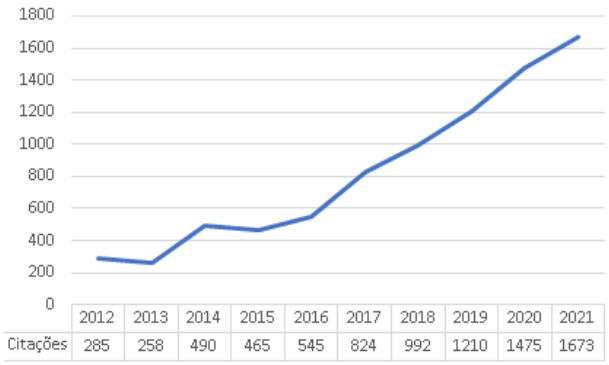

*Fig. 3: b*usiness incubators, *number of citations of these documents per year*

With entrepreneurship being central to economic growth in most developed economies, incubators serve as catalysts for the formation and development of business clusters, according to Carayannis and Von Zedtwitz (2005). Technological incubators, for example, have been used by governments as an effective strategy to facilitate technological innovation (Sun & Cheng 2021). In addition, incubators are also seen as mechanisms that facilitate social inclusion and inclusive growth, according to Baskaran and Chandran (2019). However, there is almost no attention to the engagement of incubators in activities aimed at sustainable development, even though a significant proportion of European incubators engage in activities for sustainable development, according to Battering and Masurel (2020). And few studies have focused on sustainable incubators or those aimed at supporting sustainable development through new companies (Bank *et al*., 2017).

According to Hernandez and Carrá (2016), there is a gap in theoretical explanation for understanding incubators linked to sustainable development. There is even a lack of proposals to assess the "greening" of incubators or even

discussions about incubators and the environment (Fonseca & Chiappetta Jabbour 2012). Incubators as innovation intermediaries could be employed for green economic development" and creating a window of opportunity to create "green jobs" (Gliedt *et al*., 2018).

Sustainability and growth, suited to sustainable transitions and the circular economy, seem to have been neglected by traditional entrepreneurs, according to Millette *et al*. (2020). However, science, technology and innovation have been seen to achieve sustainable development goals (SDGs) through start-ups (Surana *et al*., 2020). The so-called sustainable development start-ups (SDSs) are high-risk ventures for investment, which, with a network of financial support, investments, and knowledge, could reduce these restrictions, according to Van Rijnsoever (2022).

There is an emerging field of research called "Sustainable Entrepreneurial Ecosystems", aiming at the nexus between entrepreneurship and sustainability, in which the explicit link with the SDGs appears as the current stage of evolution of this field, according to Volkmann *et al*. (2021). Bajwa *et al*. (2021) identifies the concept of sustainability with alignment with sustainable development and reports that despite the private sector having a proactive stance towards the SDGs, the initiatives have not gained scale. The authors explore the concept of thematic incubation for corporate sustainability to meet global development agendas through innovation, products, and services. The Sustainable Development Goals involve ending poverty, protecting the planet, and improving the lives of people everywhere. There are seventeen goals that were adopted by all UN Member States in 2015, as part of the 2030 Agenda for Sustainable Development, in which a 15-year plan was established for achieving the goals (UN).

The circular economy concept, in turn, would seek to integrate economic growth and sustainability. Aiming to extend the useful life of resources and minimize waste through reuse, recycling, repairs, and remanufacturing. In this cycle proposed by the circular economy, four components would be necessary for the concept: 1) resource recirculation, demand minimization and waste value recovery, 2) a multilevel approach, 3) its indication as a means for sustainable development, and 4) a close relationship with the form of innovation in society. (Prieto-Sandoval *et al*., 2018).

Innovation studies have discussed ways and policies to deal with climate change and accelerate the transition to sustainability (Fagerberg, 2018). Eco-innovations, one of these forms, are determined by drivers and barriers that affect companies that decide to innovate with a focus on sustainable transition (Kiefer *et al*., 2019). The drivers are resources, competences, physical capacity, involvement in green supply chains, corporate culture favorable to eco-innovation, technology, market attraction and internal financial resources, according to research by Kiefer *et al*. (2019).

In a systematic review work on innovation intermediaries in transitions to sustainability, Gliedt *et al*. (2018) found studies on innovation intermediaries as incubators and accelerators with a focus on sustainability. These intermediaries play the role of providing information, services, and mediation, connecting activities and institutions by disseminating new technologies and practices (Gliedt *et al*., 2018). In the field of research on business incubators, there are research topics and interests related to types of incubators. The specializations in the practice of incubation and developed through studies encompass the theme of sustainability, which, although it is explored, has not had its development reviewed or structured. If this complex and dispersed field of studies also has a high production of academic publications (Deyanova *et al*., 2022), it is necessary to seek to consolidate the themes and research paths. To structure the knowledge of the studies carried out and available approaches for future research and solutions to current and future problems.

The analysis data presented in this section serve to establish the subject and the evolution of both the context related to sustainability and the evolution of the incubators and the connection between the themes identified. From the literature it is also possible to identify main ideas under discussion. We propose an initial contextualization also of a bibliometric nature to situate the results on incubators and sustainability.

3.1 Sustainability and incubators

Thus, we raise the issue of sustainability from the descriptor "Sustainability" in the Scopus database. The descriptor "Sustainability" in the title in combination with one of the keywords "Sustainable Development", "Sustainability", "Sustainable Development Goals", "Sustainable Development Goal", "SDGs", "Sustainable Development Goals (SDGs)", extracting only documents from the "Business" area, 3,800 documents were found. The figures below show the Number of articles published per year (Fig.4), main journals (Fig.5), authors (Fig.6) and countries of origin (Fig.7), for the descriptor "Sustainability" (in title) combined with the keyword Sustainable Development Goals. Here, strictly considering documents such as original and review articles, from 2015 to 2021. On average, 1,841 articles were published per year. Adding a total of 12,891 documents in 7 years (2015-2021). The year 2015 was the starting point for the SDGs.

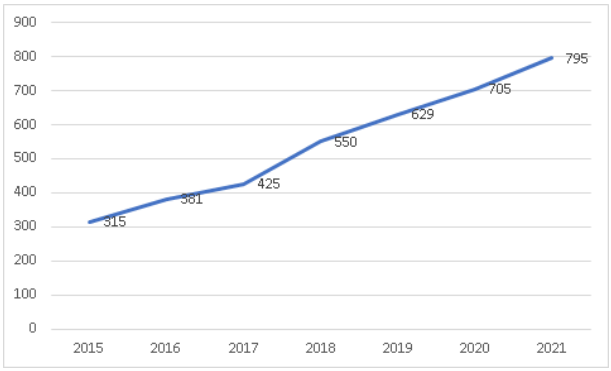

Fig. 4: Sustainability combined with Sustainable Development Goals; articles published per year

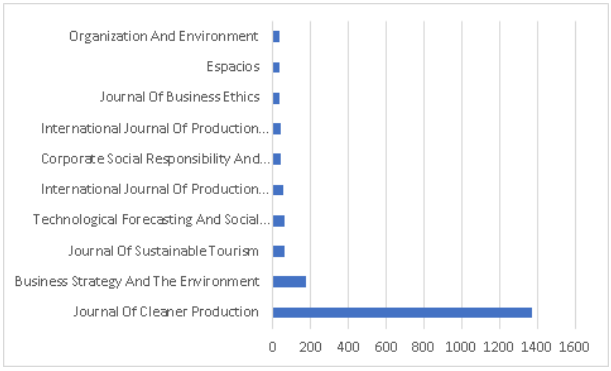

Fig. 5: Sustainability combined with Sustainable Development Goals, main journals

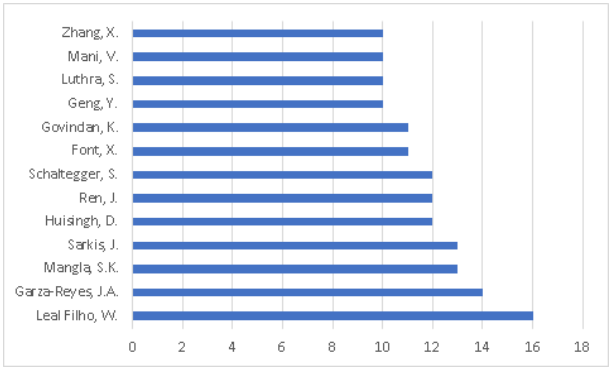

Fig. 6: Sustainability combined with Sustainable Development Goals, authors

The growth of research on this topic and publications already reflects the relevance of this topic. On the other hand, research on business incubators also has an evolution. By offering services, knowledge and access to networks to entrepreneurs, business incubators can help to develop new businesses, products and services intensive in scientific and technological knowledge that improve environmental conditions. What happens from the business incubation experience of each country where the incubators are located is related to economic, social and environmental aspects of each country and region, the institutions, the business culture, innovation policies and their own regulations wich can represent barriers or incentives for the incubation of companies aimed at sustainability. The Table 6 shows the distribution of selected studies by country of origin.

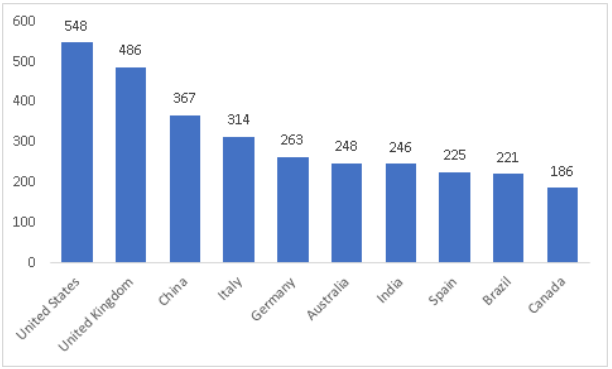

Fig. 7: Sustainability combined with Sustainable Development Goals, countries of origin

Table.3: Articles selected by number of documents published by country and number of citations obtained

Country	Documents	Citations
1. United States	6	30
2. Sweden	4	28
3. Brazil	2	16
4. Germany	2	19
5. India	2	14
6. Italy	1	18
7. Netherlands	1	22
8. Australia	1	11
9. United Kingdom	1	75
10. China	1	28

In this sense, with recent studies conducted and a field growing, creates a need for new literature reviews and updates. Specifically, to the issue of sustainability, climate change, SDG, and Circular Economy, these are emerging themes in relation to the future. Table 4 shows selected studies about these issues, the number of citations obtained and year of publication. Table 5 shows the main journals.

Table.4: Table caption above the table

Year	Document Title	Cited
Fonseca and Jabbour, 2012	Assessment of business incubators' green performance: A framework and its application to Brazilian cases.	26
Fonseca, 2015	Business incubators as vectors to the promotion of clean technologies in small firms: Limits and possibilities	0
Bank and Kanda, 2016	Tenant recruitment and support processes in sustainability-profiled business incubators.	13
Hernández and Carrà, 2016	A conceptual approach for business incubator interdependencies and sustainable development.	12
Bank *et al*., 2017	Sustainability-profiled incubators and securing the inflow of tenants–The case of Green Garage Berlin.	25
Gliedt *et al*., 2018	Innovation intermediaries accelerating environmental sustainability transitions.	77
Lamine *et al*., 2018	Technology business incubation mechanisms and sustainable regional development.	46
Baskaran *et al*., 2019	Inclusive entrepreneurship, innovation and sustainable growth: Role of business incubators, academia and social enterprises in Asia.	7
Battistoni and Barbero, 2019	Systemic Incubator for Local Eco Entrepreneurship to Favour a Sustainable Local Development: Guidelines Definition.	3
Gonsalves and Rogerson, 2019	Business incubators and green technology: The Gauteng Climate innovation Centre, South Africa	2
Klofsten *et al*., 2020	Incubator specialization and size: Divergent paths towards operational scale	12
Millette *et al*., 2020	Business incubators as effective tools for driving circular economy.	19
Surana *et al*., 2020	Strengthening science, technology, and innovation-based incubators to help achieve Sustainable Development Goals: Lessons from India.	16
Bajwa *et al*., 2021	Co-Producing Knowledge Innovation through Thematic Incubators for Disaster Risk Reduction and Sustainable Development in India.	1
Hull *et al*., 2021	Challenges and opportunities in building circular-economy incubators: Stakeholder perspectives in Trinidad and Tobago.	9
Deyanova *et al*., 2022	Hatching start-ups for sustainable growth: a bibliometric review on business incubators.	0
Van Rijnsoever, 2022	Intermediaries for the greater good: How entrepreneurial support organizations can embed constrained sustainable development startups in entrepreneurial ecosystems	1

Table.5: The main Journals cited by the selected articles

Reference Journals in selected studies	Documents
Journal Of Cleaner Production	77
Technological Forecasting and Social Change	15
Journal Of Technology Transfer	35
Technovation	30
Research Policy	26
Entrepreneurship Theory and Practice	14
Journal Of Business Venturing	14
Journal Of Industrial Ecology	14
Small Business Economics	13
Entrepreneurship Theory and Practice	12

These eleven main reference sources are sources for literature on the topic and dissemination. In this context, 5 main high-impact journals also stand out: Journal Of

Cleaner Production (4 selected studies; 77 references); Technological Forecasting And Social Change (2 selected studies; 15 references); Journal Of Technology Transfer (1 study and 35 references); Research Policy (1 study selected; 26 references); and, Technovation (1 selected studies; 30 references). The distribution of the selected studies by the main countries that produced them, has as main: the United States, Sweden, Brazil, Germany, and India.

In the selected literature, we found differences in the application of the notion of sustainability that allow the concept linked to the global environmental issue and to a sustainability of the incubator as an organization, of the incubated and that extends to business and sustainable or self-sustainable entrepreneurship. In this regard, a first analysis made it possible to distinguish two basic groupings to emphasize the application of sustainability. The first emphasize (Table 6) linked to the effectiveness and sustainability in the sense of survival of the incubator-business. And the second emphasize refers to the treatment of the aspect of social, economic, and environmental sustainability approaching SDG, circular economy, and green economy.

Table.6: Emphasis from the selected articles: Self-Sustainable incubator and the Economic Growth

Author (YEAR)	**Emphasis 1 Self-Sustainable**
Ahmed, *et al*. (2022)	Sustainable growth of entrepreneurship
Franco, *et al*.(2021)	Business sustainability; Economic growth
Deyanova, *et al*. (2022)	Sustainable growth
Gao & Hu (2017)	Self-sustaining incubator
Sun & Cheng (2021)	Incubator efficiency; sustainable economic growth
McAdam & Marlow (2008) Ssekiziyivu & Banyenzaki, (2021)	Incubator sustainability Sustainability of incubators
Carayannis & von Zedtwitz (2005)	Sustainable economic growth
Baskaram, *et al*. (2019)	Sustainable growth
Romein & Trip (2017)	Cluster sustainable development
Hernández & Carrà (2016)	Sustainable development
Almeida, *et al*. (2011)	Sustainability

The second emphasis (Table 67 refers to the treatment of the external aspect of sustainability, in the sense of sustainable development linking social, economic, and environmental issues. In this other approach and application of the notion of sustainability is the approximation of what the sustainable transition proposes. In this emphasis also uses terms such as eco-entrepreneurship, eco-innovation, sustainable products, green performance, green Jobs, and sustainability-oriented incubators, in this emphasis.

Table.7: Emphasis from the selected articles: Sustainable Development

Author (YEAR)	**Emphasis 2 Sustainable Development**
Bajwa, *et al*. (2021). Surana, *et al*. (2020)	SDG
Millette *et al*. (2020)	Circular economy
Gliedt, *et al*. (2018)	Sustainability transitions; green economic development
Lopolito, *et al*. (2022)	Sustainability transitions
Battistoni & Barbero (2019)	Eco-entrepreneurship, eco-innovation opportunities; environmental sustainability
Klofsten, *et al*. (2020)	Sustainability; sustainability-oriented incubators
Yamamoto & dos Reis Coutinho (2019)	Economic and environmental sustainability
Van Rijnsoever (2022)	Sustainable Development Start-ups
Battering & Masurel (2020)	Sustainable development; Sustainable business incubators
Bank, *et al*. (2017)	Sustainability-oriented incubator
Fonseca & Chiappetta Jabbour (2012)	Green performance of incubators
Blankenship *et al*. (2009)	Sustainable development Strategic (SSD); sustainable products
Ho &Yoon (2022)	Social Innovation

In an analysis of the occurrence of the keywords in the selected documents, we visualized the links in the most used keywords and the formation of networks and density

clusters. These links allow visualizing, knowing, and suggesting the formation of clusters as sub-themes as a set of ideas that have been shaping these studies. The Fig. 8 shows the links between keywords.

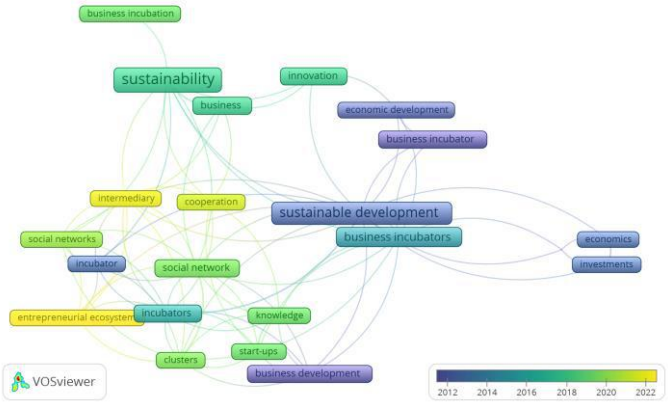

Fig. 8: Network visualization of keywords in selected articles

The Fig. 9 shows clusters of Density map by co-occurrence of the most used words in the selected articles. This serves to illustrate domains that relates incubators and the application of the concept of sustainability.

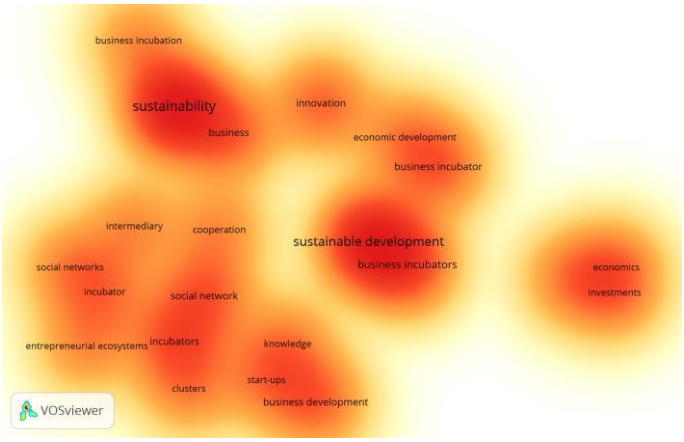

Fig. 9: Density map by co-occurrence of the most used words in the selected articles

For a discussion of these points about the keywords, Emphasis 1 (Self-Sustainable) and Emphasis 2 (Sustainable Development) on the question of the application of the concept of sustainability in studies on business incubators, we can demonstrate a relationship between these elements, still little analyzed in in-depth studies and literature reviews, which can contribute to clarifying the vision of the field of business incubation regarding the involvement with sustainability issues.

Thus, a sample of these works contributes to researchers and practitioners who have the objective of knowing the panorama of existing studies on incubators with a focus on the application of the concept of sustainability. More in-depth reviews can identify reasons for the differences in the application of the term sustainability in studies and seek practical cases on sustainable incubators with a sustainability profile (Bank *et al*., 2017).

In seeking to answer the research question on how the concept of sustainability is applied in research on business incubators, we visualize characteristics of the use of the notion of sustainability in business incubators. In which we highlight as main points the Emphasis 1 Self-Sustainable and Emphasis 2 Sustainable Development and identified keywords. This study aims to inform the public about the literature through the techniques of citation analysis, network of authors' keywords and literature analysis, based on original articles and review in Scopus and Web of Science databases.

It can be established that the topic is in initial evolution both in the context of sustainability and in the connection with incubators (Battering & Masurel, 2020). From the literature, it was possible to identify the main ideas and a bibliographic contextualization to situate those interested in the relationship between incubators, sustainability and sustainable development (Hernández & Carrà 2016).

Thus, the results of the review and analysis demonstrate that studies on incubators can advance theoretically and empirically in the field of entrepreneurship for sustainability, Eco-entrepreneurship, eco-innovation opportunities, Sustainability transitions; green economic development (Battistoni & Barbero, 2019; Gliedt, *et al*., 2018). Based on the literature, it is possible to identify pioneering studies in the area in relation to the theme that point to sustainable development, green performance of incubators and Sustainable economic growth (Fonseca & Chiappetta Jabbour, 2012; Blankenship, *et al*., 2009; Carayannis & Von Zedtwitz, 2005). This demands new contributions and studies.

Specifically, it is possible to integrate the themes of incubation for sustainability as a necessary strategic action that can collaborate to bring together agents interested in the development of eco-innovations and in the practical perspective of the circular economy (Millette *et al*., 2020).

This study, as presented, helped to identify new terms related to sustainability such as the SDGs, eco-innovations and circular economy that may represent trends and areas of interest in the topic. And it indicates that there may be new research gaps that can be explored by future studies, in a research continuity.

This review identifies uses and links between the topic of business incubators and the concept of sustainability,

observing differences in the application of the term that can be an initial difficulty. although the results of the review and analysis show that sustainable development has had new contributions that can bring together agents interested in entrepreneurship linked to eco-innovations and in the circular economy perspective, for example.

It appears that in the different uses of the term sustainability, a promising line of work may be the identification of new terms linked to sustainability such as the SDGs, eco-innovations and circular economy that may represent trends and areas of interest in the incubator theme. This may indicate new research gaps to be explored by other studies.

When considering the limits of the results and the approach used, it can be considered that the evolution of research on the subject still demands more precise specifications in future research in the studies of incubators with different uses and notions of sustainability. These elements can be considered analytically and in the face of practical problems linked to sustainable development.

As an overview of this thematic articulation, the articles and periodicals identified can allow the follow-up of the evolution of research based on the use and notion of sustainability. Faced with the research question, the different possibilities of use for the term sustainability, generate a difficulty and a line of work that demands new contributions in theoretical and practical studies.

CONCLUSION

This review identifies uses and links between business incubators and the concept of sustainability, noting differences in the application of the term. Studies of business incubators can be identified by different uses of notions about sustainability. These elements can be considered analytically and make it possible to associate incubation with sustainability in relation to practical problems linked to sustainable development.

This study, as presented, helped to identify new terms related to sustainability such as the SDGs, eco-innovations and circular economy that may represent trends and areas of interest in the topic. As limitations, we can highlight the lack of definition of concepts and a clear research agenda on the topic of sustainability and incubators.

There is, therefore, an opportunity for the development of new studies aimed at sustainable development, considering the emerging field of research. It is suggested that future work may deepen and expand the dialogue between business incubators and the focus on sustainability.

New studies can analyze the relationship between authors and the most influential references as indicative of this initial basis on the subject. The findings of the review highlight that current knowledge is still being expanded and the characteristics of the phenomenon of incubators in relation to the theme of sustainability still need to be deepened and its expansion can strengthen the role of incubators in sustainable development.

ACKNOWLEDGEMENTS

The authors would like to thank for financial support from the Fundação de Amparo à Pesquisa do Estado da Bahia (FAPESB), Term of Grant No. BOL0552/2019, REQUEST No. 2116/2019.

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