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MAPPING THE RESEARCH LANDSCAPE: EXPLORING THE RELATIONSHIP BETWEEN CORPORATE ENTREPRENEURSHIP AND THE CIRCULAR ECONOMY

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Abstract

Purpose: The analysis of current research trends in a specific research topic provides a starting point for future research. As a means to represent the conceptual structure of this field of study, this paper aims to analyse how the relationship between the research topics of corporate entrepreneurship and the circular economy has been studied in the literature.

Design/methodology/approach: The methodology employed herein is the bibliometric technique of co-words. Specifically, 138 documents were analysed, obtained from the Web of Science (WOS) database and published between 2003 and 2022.

Findings: Through co-word analysis, this study maps the most relevant themes in the research between corporate entrepreneurship and the circular economy. The strategy map reveals diverse thematic approaches, including organisational learning and the role of managers.

Originality: This study combines corporate entrepreneurship and the circular economy and provides new insights through bibliometric co-word analysis. By connecting these two topics, it assists researchers, practitioners, and policymakers in advancing knowledge and practice in the related literature.

Keywords: Corporate entrepreneurship; circular economy; bibliometric analysis; co-word analysis

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Introduction

The circular economy has become one of the main pillars of policies in developed countries, which strive to develop policies, measures, and objectives towards the implementation of a circular system (European Commission, 2017; Murray *et al*., 2017). Along these lines, the Spanish Government has developed a Spanish Circular Economy Strategy, known as the Spain Circular 2030 (Government of Spain, 2020), in line with the principles of the European Green Pact (2019), which lays the foundations for the promotion of a new production and consumption model in which the value of products, materials, and resources is retained in the economy for as long as possible.

The transition into a circular economy is challenging due to the economic investment required and the production system complexity (Veleva and Bodkin, 2018), which requires companies to rethink product and process design (European Commission, 2015). This transition entails a resource revolution involving disruptive change, entrepreneurial spirit, and radical socio-economic changes. Massive innovation and mental shifts are required in order to address this transition, which grant tremendous entrepreneurial opportunities (Veleva and Bodkin, 2018). Corporate entrepreneurship refers to a phenomenon that encompasses the creation of new businesses, entry into new markets, and the development of new products by established firms to promote and sustain corporate competitiveness through improving the firm's position, transforming the organisation, markets, and industries, exploiting value-creating opportunities, and achieving superior results (Antoncic and Hisrich, 2004; Guth and Ginsberg, 1990; Zahra, 1991, 1993). Circular entrepreneurship initiatives address sustainability by enabling the introduction of short-term responsiveness and autonomous radical change in entrepreneurial

firms (Zucchella and Urban, 2019). The circular economy demands innovation at all levels in order to achieve economic and social benefits (Veleva and Bodkin, 2018). Corporate entrepreneurship offers value to companies by identifying new opportunities, fostering innovation development, the emergence of new businesses, and renewal (Zahra, 2007), and by providing a creative approach to addressing circularity objectives.

The academic debate on the circular economy is relatively new and remains insufficient. Research on the topic has been conducted at macro, meso, and micro levels, as it is estimated that implementation requires change at each level. At the macro level, this involves adjusting the industry and structure of the economy (Kirchherr *et al*., 2017), and promoting circularity in cities, provinces, regions, or countries through environmental policies and institutional actions (Du *et al*., 2009; Van Buren *et al*., 2016; Schneider *et al*., 2017; Merli *et al*., 2018; Prieto-Sandoval *et al*., 2018; Ormazábal *et al*., 2016). At the meso level, companies' relationships at the territorial level promote eco-parks and industrial symbiosis through eco-industrial networks (Murray *et al*., 2017; Neves *et al*., 2020). At the micro level, studies aim to identify ways to increase circularity through process improvement or innovations that improve consumption and production methods (Kirchherr *et al*., 2017; Merli *et al*., 2018). Overall, the implementation of the circular economy requires change at each level to promote a recycling-oriented and environmentally concerned society.

Studies into entrepreneurship in a circular economy focus on individual enterprises, but relatively few studies explore the transition to a circular economy in established companies (Cullen and Angelis, 2021; Veleva and Bodkin, 2018). At the individual level, entrepreneurship translates circular opportunities into circular economy practices with the creation of start-ups that reduce negative impacts on the environment and society, while corporate entrepreneurship is recognised as comparable to individual entrepreneurship from a business perspective (Elert and Stenkula, 2022). While existing research has highlighted the potential of corporate

entrepreneurship to foster innovation, resource efficiency and sustainable practices, it has done so primarily through the business benefits it offers and its impact on firm performance. There is therefore a need for empirical research that directly links corporate entrepreneurship activities to the successful adoption and implementation of circular economy principles within organisational settings (Lupoae *et al*., 2023). A comprehensive analysis is therefore needed to explore their interconnectedness and conceptual structure.

In order to fill this research gap, this paper attempts to identify the most relevant issues and research trends concerning the topics of corporate entrepreneurship and circular economy to represent the conceptual structure of this field of study. To this end, bibliometric techniques based on co-word analysis are employed to answer the following research questions:

RQ1: What are the characteristics of the research that analyses the relationship between corporate entrepreneurship and the circular economy?

RQ2: What is the conceptual structure and what trends can be identified?

This study examines 138 articles from the Web of Science database to explore and demonstrate the connection between corporate entrepreneurship and the circular economy (Lee, 2008; Leydesdorff and Welbers, 2011). It elucidates the relationship between these subjects through co-word analysis and proposes ways to commence research on policies related to corporate entrepreneurship.

This paper outlines a research agenda for future studies in corporate entrepreneurship and the circular economy. It includes bibliometric analysis, results, conclusions, and suggestions for future research, thereby facilitating further exploration and advancement in this area.

Theoretical foundations of the bibliometric study

A bibliometric co-word analysis was utilised to examine research on corporate entrepreneurship and the circular economy. This method offers several advantages over Systematic Literature

Reviews, including those of broad publication coverage, trend analysis, and valuable insights for future research directions. The combination of the two methods can provide a comprehensive understanding of a research field, and offers a well-rounded perspective for researchers (Zupic and Čater, 2015).

Co-word analysis is a quantitative method that quantifies and synthesises bibliographic data from articles to identify patterns of knowledge across the scientific literature (Theeraworawit *et al*., 2022) based on the concept of co-occurrence, that is, the simultaneous occurrence of words in the same document (Callon et al., 1983). The content of the literature enables the creation of a network of knowledge entities through networks of co-words (Wang et al., 2015) that make it possible to show the evolution of the field (Pinillos *et al.,* 2022; Xu *et al.,* 2018).

Co-word analysis clusters words from articles, by identifying strong links within semantic groups. It quantifies the intensity of relationships between clusters to identify significant clusters (Cobo *et al.*, 2011).

The strategic map is a tool employed to analyse research topics through the determination of their density and centrality. Density measures the strength of relationships between words, while centrality measures the intensity of these relationships, and indicates their significance in the field (Callon *et al.*, 1991; Cobo *et al.*, 2011). The greater the centrality, the greater the significance of the research topic in gathering essential research for the development of the research field (Ribeiro *et al.*, 2022).

Considering these factors, the themes can be categorised into a two-dimensional space based on the quadrant in which they appear (Cobo *et al*., 2011), as can be observed in Figure 1:

1. Motor themes: These are collected in the upper right-hand quadrant and refer to themes that are well-developed and significant in the structuring of a research field. The papers collected in

this quadrant have strong centrality and high density. The placement of themes in this quadrant implies that the themes are related to concepts applicable to other themes with which they have a conceptual relationship.

2. Niche themes: In the upper left-hand quadrant, there are themes that have well-developed internal links but unimportant external links. They represent topics of marginal importance to the field as they are highly specialised and peripheral in nature.

3. Emerging or declining themes: The lower left-hand quadrant represents those themes that are weakly developed and marginal. They are characterised by low density and centrality and are therefore considered to be emerging or declining.

4. Basic themes: represented in the lower right-hand quadrant are those themes that are important for a research field but have not yet been developed.

Figure 1

Methodology

For the selection of the articles to be analysed, the Web of Science was employed as a certified database and the PRISMA methodology (Moher *et al*., 2009) was followed. Specifically, the selection process is carried out in four stages (identification, selection, eligibility, and inclusion), as shown in Figure 2.

The study analysed 294 articles published between 2003 and 2022, including search terms in their titles, keywords, and abstracts. Based on the work of Urbano *et al*. (2022) the final sampling of articles was carried out using keywords, Boolean operators, and advanced search options to find the topics of study (see query in Figure 2). The final sample consisted of 138 documents, excluding 130 that failed to meet the inclusion criteria. The selection phase established inclusion and exclusion criteria, while the eligibility phase determined the number of articles included. Given the small number of papers that addressed both constructs

simultaneously, papers were included that addressed one or more dimensions of corporate entrepreneurship (innovation, venturing, or renewal) with one or more dimensions of the circular economy policies, thereby excluding all papers that addressed only one of the constructs, and also included papers on the circular economy that considered the individual level of analysis.

Figure 2

The author's keywords have been revised to avoid confusion with the CE acronym, and has replaced the expressions *corporate entrepreneurship* and *circular economy* with *entrepreneurship* and *circular economics*. A bibliometric study using the Bibliometrix package obtained 495 keywords, 74 synonyms, and eliminated meaninglessness words and those with an incomplete meaning.

Descriptive analysis

A descriptive analysis of the final database is first provided, as shown in Table I. The 138 articles of the sample were written by 369 different authors, with an average of 2.8 authors per article. Approximately 31.16% of these authors collaborated internationally. The total number of references used was 8,263 and the total number of author's keywords used was 495.

Table I

The evolution of the literature from 2003 to 2022 shows an irregular distribution. The first paper considered appeared in 2003, and there was continuous growth since 2018, as shown in Table II. The number of published articles reached 63, contributing 45.65% of the total, and resulting in an annual growth rate of 18.94%.

Table II

Concerning the journals that have published such articles and their impact, a total of 92 journals have been used. The top 10 journals have published 45 papers out of the total (32.61%)

and have received a total of 1,472 citations (48.56%), while 60% of the remaining sources (55 journals) have only published one article each. These journals include "Small Business Economics" (8), "Entrepreneurship Research Journal" (6), "Journal of Cleaner Production" (6), "International Entrepreneurship and Management Journal" (5), and "Journal of Entrepreneurship in Emerging Economies" (5), and these 30 articles have received a total of 940 citations. The results are shown in Table III.

Table III

The contribution of the authors and their impact is reflected in the number of papers published and citations received both locally and globally. Most of the authors have written a single paper on these topics, and only the top 15 have contributed two or three papers. Table IV shows the most relevant authors in terms of scientific output and research impact. The top 10 contributing authors have published 22 papers (approximately 16% of the sample), while only the top 6 have been cited at least 66 times. Zahra, SA. and Urbano, D. published three articles with 18 and 12 citations, respectively. In terms of impact, the 10 most relevant authors obtained a total of 1,880 citations (62% of the total citations received by the sample), where Zahra, SA., Kuratko, DF., Filatotchev, I., and Wright, M. with only 7 articles between them, received a total of 926 citations, while Deng, WJ., Hu, J., and Ma, SS. jointly published a single article that received 159 citations. These results show the predominance of interest in corporate entrepreneurship over that of the circular economy, which can be due to the newness of this line of research, which prevents the most recent papers from being cited in the sample.

Table IV

The results show the impact of the articles through the total number of citations and are shown in Table V, which highlights the papers that relate to the circular economy and to corporate entrepreneurship. The papers by Kuratko and Audretsch (2013), Kuratko *et al*.

(2015), Bierwerth *et al*. (2015), and Zahra *et al*. (2009) received 17, 14, 11, and 9 citations, respectively, in the database. These articles examine corporate entrepreneurship as a way to revitalise businesses and they address the new challenges of a highly uncertain environment by improving business performance. The theoretical foundations provided by these articles also show their relevance at a global level within the field of entrepreneurship, with citations received from outside our field of study. The importance of these articles may be due to the need to favour certain internal characteristics of the company that facilitate the identification of the opportunities offered by the circular economy to companies to develop innovation, renewal, and the creation of new companies.

Table V

The articles analysed used a total of 455 keywords, which were used 579 times. The top 15 keywords were used 105 times (18.13%) and are shown in Table VI. "Innovation" (16), "entrepreneurship" (12), "corporate venturing" (7), "strategic entrepreneurship" (9), and "strategic renewal" (4) are related to the fields of study of the individual entrepreneur and corporate entrepreneurial behaviour, with a frequency of use of 48 (8.29%). “Sustainability” (10) and “bio-economy” (3) reflect relevant aspects of the circular economy with a frequency of 13, representing 2.25% of the total number of keywords used. Sustainability focuses its analysis on the incorporation of the three principles of sustainability (environmental, economic, and social) from a broader perspective than does the circular economy, while the bio-economy is associated with the idea of replacing fossil resources with bio-based resources through the development of knowledge and innovation.

Table VI

The remaining keywords (among the top 20 most cited) represent the lines of research on both the circular economy and corporate entrepreneurship related to the characteristics of the

company that favour the development of both policies within organisations. "Firm performance" is in second place with a total of 15 uses, which reflects the importance of corporate entrepreneurship or the circular economy in business results.

Results and discussion

In response to the initial question, analysing the authors' keywords helps us to pinpoint the main thematic areas of interest in the field of study. Figure 3 depicts the co-word network, which can be utilised to identify and interpret the research themes. The co-word network graph displays the co-occurrences of words, with nodes representing words, and lines reflecting their relationship. Corporate entrepreneurship and the circular economy were excluded from this graph due to their distortion of the representativeness of the search.

Figure 3

Three clusters of words can be distinguished, representing the different research themes. The largest cluster is shown in red and is called "innovation" as it is the most representative node. The most closely related keywords are "innovation," "entrepreneurship," “family business," “corporate strategy", and “human resource management". It highlights the importance of innovation and entrepreneurship in the corporate strategy, which facilitates the integration of circular economy principles through the exploration and exploitation of new opportunities offered by the circular economy. These results are in line with previous studies, such as those carried out by Sehnem *et al*. (2022), which show that innovation can support the implementation of the circular economy and the circularity of resources. The remaining keywords reflect the need to adapt policies on human resources to facilitate the development of entrepreneurial initiatives and to stimulate entrepreneurial behaviour in firms, as shown in previous studies (Castrogiovanni *et al*., 2011).

The second group, represented in green, includes research on the circular economy and sustainability, where the keywords are "sustainability", “firm performance”, and “urban planning", which indicate not only the need to incorporate sustainability principles to improve firm performance, but also the importance of studying the interaction between entrepreneurship and sustainability in the context of cities (Foster, 2020). These findings are in line with Lichtenthaler (2021), who shows that companies can achieve and maintain a competitive advantage in a circular economy that is increasingly dominated by sustainability. In the third cluster, in blue, the main relationships lie between “corporate venturing", “strategic entrepreneurship”, and “family business”, and represent research that studies the creation of new ventures by established firms as a means of implementing strategic entrepreneurship, as well as studying their impact on family firms, since corporate venturing activities are particularly relevant to this type of firm (Minola *et al*., 2021). The analysis of the research themes was completed with a strategic diagram that shows the importance of the themes according to their density and centrality, and places them in different quadrants. As shown in Figure 4, eleven research themes were identified, with four marginal themes located in the left-hand quadrant of the figure and a further seven in the right-hand quadrant, representing topics of interest or potential for research.

The lower left-hand quadrant contains themes that have a weak internal structure and remain underdeveloped. The themes “employee engagement” (13) and “dynamic capability” (12) represent topics with low centrality and density, which implies that they are emerging or declining topics with little research relevance. Of particular note are the papers by Dai and Liu (2015) and Ahmed *et al*. (2020), which analyse the role of employees and dynamic capabilities in the development of corporate entrepreneurship activities and reinforce the idea that active employee engagement and organisational adaptability are key factors in achieving the transition to business models of a more circular and sustainable nature.

In the lower right-hand quadrant are the core or cross-cutting themes with high centrality and low density, which reflects the fact that these are underdeveloped themes, but with high relevance and with the potential to become driving themes for research. This quadrant hosts the highest number of keywords and, in line with the results shown in the co-word network, its most relevant themes are “entrepreneurship”, “innovation”, and “sustainability”, although it does include less important themes, such as “middle managers”, “bio-economy”, and “SMEs”.

The “entrepreneurship” research theme includes the most words, such as "entrepreneurship" (12), "strategic entrepreneurship" (8), "corporate venturing" (7), and "human resource management" (6), among others. The most relevant work is provided by Kuratko *et al*. (2013), Kuratko *et al*. (2015), and Rutherford and Holt (2007). This line of research focuses on entrepreneurship, both at the individual and firm levels, as a way to improve the circularity of firms. On the one hand, at the individual level, employees play a major role in identifying entrepreneurial opportunities (Rutherford and Holt, 2007; Vargas-Halabí *et al*., 2017), while from a corporate perspective, firm transformation should be directed not only towards the creation of new businesses (Kuratko *et al*., 2015), but also towards the search for new opportunities that can change industry norms in terms of product offerings, markets, and internal processes (Kuratko *et al*., 2013), and can lead to the transformation of the firm. In this context, the firm needs to embrace circularity to gain a competitive advantage through corporate entrepreneurship activities.

Closely related to this “entrepreneurship” group, is the research topic named "innovation", which groups four keywords, among which “innovation” (16) and “firm performance” (15) stand out, with the works of Yunis *et al*. (2018) and González-Moreno and Sáez-Martínez (2009). These studies highlight the importance of innovation in achieving sustainable development of corporate entrepreneurship activities and in improving business performance. The use of information technology (Yunis *et al*., 2018) and the technological intensity of the

environment (González-Moreno and Sáez-Martínez, 2009) play a key role in the success of corporate entrepreneurship and the exploitation of new opportunities, which makes them conducive to the implementation of circular strategies based on the application of Industry 4.0 advanced technologies (Khan *et al*., 2021; Jabbour *et al*., 2019).

The third group of words "sustainability" (10), "sustainability performance" (3), and "urban planning" (3) constitute the "sustainability" research theme. This topic focuses on the need for agreements between institutions so that the circular economy focuses on more than just waste management, recycling, and material efficiency. The relationship between entrepreneurs and companies enables the use of technological advances through strategic partnerships to implement innovative strategies (Veleva and Bodkin, 2018), and leads to business models that require systemic change (Anttonen *et al*., 2018).

The remaining themes in this quadrant, "middle managers", "bioeconomy", and "SMEs", focus on the role of managers and employees in implementing entrepreneurial activities (Bierwerth *et al*., 2015; Laasonen, 2023; Limroscharoen *et al*., 2017) and in achieving higher levels of circularity through their business models by exploring outcomes in small and medium-sized enterprises (Alcalde-Calonge *et al*., 2022).

In the upper right-hand quadrant, there is the driving theme "organisational learning" which groups the words "organisational learning" (3), "knowledge transformation" (2), and "knowledge creation" (2). It is characterised by high centrality and density and therefore drives the research area as it is well-established and has strong implications for the other research themes. Organisational learning refers to the need to develop the knowledge to explore and exploit the circular opportunities that arise in the environment. Corporate entrepreneurship is a source of new knowledge (Zahra, 2015) that can be harnessed from digital platforms (Arfi and Hikkerova, 2021) to create new capabilities to address the technological, social, and demographic changes that arise as a result of applying circular principles.

The upper left-hand quadrant contains specialised research topics such as "circular purchasing" and "conceptual model", with high density but low centrality. This indicates their marginal importance in corporate entrepreneurship and circular economy research.

Figure 4

These results show that the research relating to both topics is characterised by being in a phase of expansion and development, where innovation and the identification of circular opportunities are considered relevant when developing new strategies aimed at sustainability. The importance of organisational learning and its relationship with the creation and exploitation of knowledge is shown to constitute the basis upon which companies must develop corporate entrepreneurship to exploit the circular opportunities that appear in the environment. Similarly, innovation and venturing are identified as the main entrepreneurial activities that facilitate the incorporation of circular principles, such as the reuse and recycling of materials, eco-design, and the improvement of the environmental effects of economic activity, where strategic renewal is linked to the decisions of management.

To identify the trends that answer the second question, we have analysed the evolution of the research themes over time using the Sankey diagram. Figure 5 shows the evolution over the three study periods. As can be observed, “innovation” is the central theme until 2017, which can be explained by the fact that there is very little scientific production on the circular economy and that it is one of the most relevant dimensions of corporate entrepreneurship. Between 2018 and 2020, innovation shifted towards three areas of interest: "sustainability", "entrepreneurship", and "business performance". In the period 2021–2022, "firm performance" is maintained, and "innovation" reappears.

These findings show that, in the first period, innovation can facilitate the implementation of circular principles through innovation in production processes, improvements in the supply

chain, the development of reverse logistics to reduce the consumption of materials and energy, the reuse of waste or recycling (Fernando *et al*., 2023), and through innovation in circular products from design to recovery (García-Muiña, *et al*., 2019). In the second period, the emergence of the themes of sustainability, entrepreneurship, and business performance is justified by the growth of research on the circular economy and the adoption of sustainable development principles by businesses. Eco-innovation, eco-design, and advanced technologies applied to circular practices exert a positive impact on the innovation of business models, new materials, and products and services of a more sustainable nature (Alcalde-Calonge *et al*., 2022; Jabbour *et al*., 2019). The current business environment requires employees to be innovative and to bring new ideas in terms of products, services, and processes (Bičo and Knezović, 2023). This transition requires the exploration and exploitation of new opportunities in the environment through entrepreneurship and the search for actions to maintain and even improve business performance.

Figure 5

In the most recent period, "business performance" and "innovation" have emerged as current research trends, both of which incorporate the theme of "sustainability". The importance of linking corporate entrepreneurship and the circular economy to achieve economic value creation is highlighted. In this respect, the literature recognises that it only makes sense to implement corporate entrepreneurship and the circular economy if there are business opportunities that lead to improved value creation, business performance, and competitive advantage. In particular, innovation appears to be the key dimension of corporate entrepreneurship, which enables the exploitation of circular opportunities that are commercially viable.

Conclusions

The transition to a circular economy from a business perspective remains challenging in its entirety due to the economic investment required and the complexity of the current production system (Veleva and Bodkin, 2018), since it requires companies to totally rethink the design of products and processes (European Commission, 2015). Since corporate entrepreneurship is viewed as a strategic tool that facilitates the identification and exploitation of opportunities, the challenge is to exploit these opportunities in a circular manner (Veleva and Bodkin, 2018). Therefore, through bibliometric techniques based on co-word analysis using Biblioshiny software, the following questions have been answered: *What are the characteristics of the research that analyses the relationship between corporate entrepreneurship and the circular economy?* and *What is the conceptual structure and what trends can be identified?*.

To answer the first question, an analysis of indicators of research activity was carried out. The results highlight the interest and growth experienced since 2018, with increasing publications. This justification may be due to the interest shown by European institutions, which promote the implementation of circular principles by offering companies new business opportunities, thereby challenging the traditional linear production model and promoting approaches of a more sustainable nature. By implementing circular economy practices, companies can optimise resource use, reduce waste, improve efficiency, and create products and services that are more sustainable. These changes in business models require an entrepreneurial approach, which implies the ability to identify opportunities, innovate, and adapt to the changing environment. The themes that have attracted the most interest in the papers analysed focus on the analysis of two of the main dimensions of corporate entrepreneurship, such as “innovation” and “corporate venturing”, together with themes more related to the circular economy, such as “sustainability”, and generic themes such as “firm performance”. This shows that through innovation or the creation of start-ups, companies can develop products, services and processes that are aligned with circular principles, for example,

designing products that are easily repairable, modular, or use recyclable materials. These innovative initiatives not only contribute to environmental sustainability but can also create competitive advantages and improve business performance. Furthermore, the creation of start-ups or entrepreneurial projects within organisations can be an effective way to promote the circular economy. Internal start-ups can act as autonomous units dedicated to exploring and experimenting with new ideas related to circularity. These start-ups can have more flexibility and agility to test innovative solutions and to promote disruptive change within the organisation. Other themes that characterise research between corporate entrepreneurship and the circular economy focus on the role of factors internal to the company in the development of entrepreneurial activities with a high degree of circularity, be it the learning capacity, the development of innovative skills, or the ability to discover opportunities (Turner and Pennington, 2015), in which the managerial role plays a predominant role (Sebora *et al*., 2010).

A thematic evolution analysis was conducted to answer the second question. The results of this analysis will define a future research agenda in this field. The study aims to explore the impact of firm performance and innovation on circular economy policies, delve into the concept of organisational learning, and examine the importance of strategic renewal in corporate entrepreneurship and the circular economy. The focus will be on how companies align their strategies with circular principles and leverage competitive advantages from their circular practices. Moreover, the study will investigate the relationships between various dimensions of corporate entrepreneurship and companies adopting circular strategies using approaches of mixed methods. It will also analyse the influence of managers on entrepreneurial behaviour for circular transformation, and identify management strategies and practices that promote the integration of circular principles and facilitate innovative solutions for sustainability. Furthermore, performance metrics for circular economy initiatives will be assessed to develop and evaluate appropriate measures to gauge their potential effectiveness within organisations.

This will help align these initiatives with overall business performance and contribute towards long-term sustainability goals.

In Table VII, these ideas are summarised by identifying future research questions about the themes identified in the analysis that form an important research agenda:

Table VII

The research presents important theoretical and practical contributions. From a theoretical point of view, the paper contributes to the literature in two ways. The bibliometric study has provided valuable information on the existing literature on corporate entrepreneurship and the circular economy, by shedding light on current trends, key research areas, and potential knowledge gaps. By analysing publication patterns, thematic connections, and emerging themes within the field, the study has contributed to mapping the research landscape. Furthermore, bibliometric analysis has identified key links between corporate entrepreneurship and circular economy concepts such as innovation, sustainability, resource efficiency, and business models. By uncovering these connections, the study has laid the groundwork for future research efforts aimed at exploring the mechanisms through which corporate entrepreneurship can drive the adoption of circular economy practices within organisations.

The methodological contribution demonstrates the effectiveness of bibliometric techniques in identifying research topics related to corporate entrepreneurship and the circular economy, and provides valuable insights for researchers, practitioners, and policymakers.

This study offers practical advice for the development of sustainable, innovative, and competitive business models. Corporate entrepreneurship enables companies to take advantage of the circular economy for competitive benefits. Key internal factors, such as organisational learning, the development of entrepreneurial skills, and policies on human resources, all promote entrepreneurship. Furthermore, innovations in new products, services, and processes can enhance circularity rates.

Inter-institutional agreements are essential for transitioning to a circular economy since they promote entrepreneurship and sustainability through knowledge exchange and strategic partnerships between companies.

Limitations

However, this work is not without its limitations. On the one hand, the papers were retrieved from only the WOS database and therefore not all the relevant papers available on other databases have been captured. Furthermore, the search yielded a high number of papers unrelated to the specific topic at hand, and future research could be more comprehensive. The sample selection period ran until 31st December 2022, and hence it may exclude certain emerging and relevant lines of research that have been published since then. And lastly, this study is not free from subjectivity in the grouping of keywords, which could have biased the results obtained.

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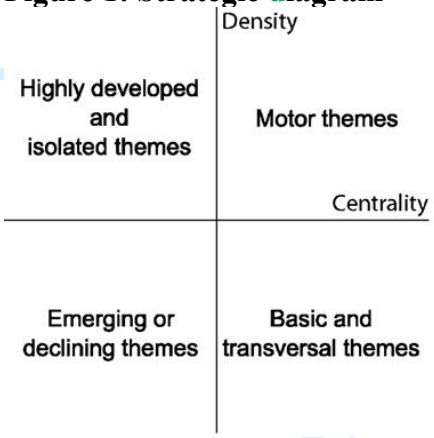
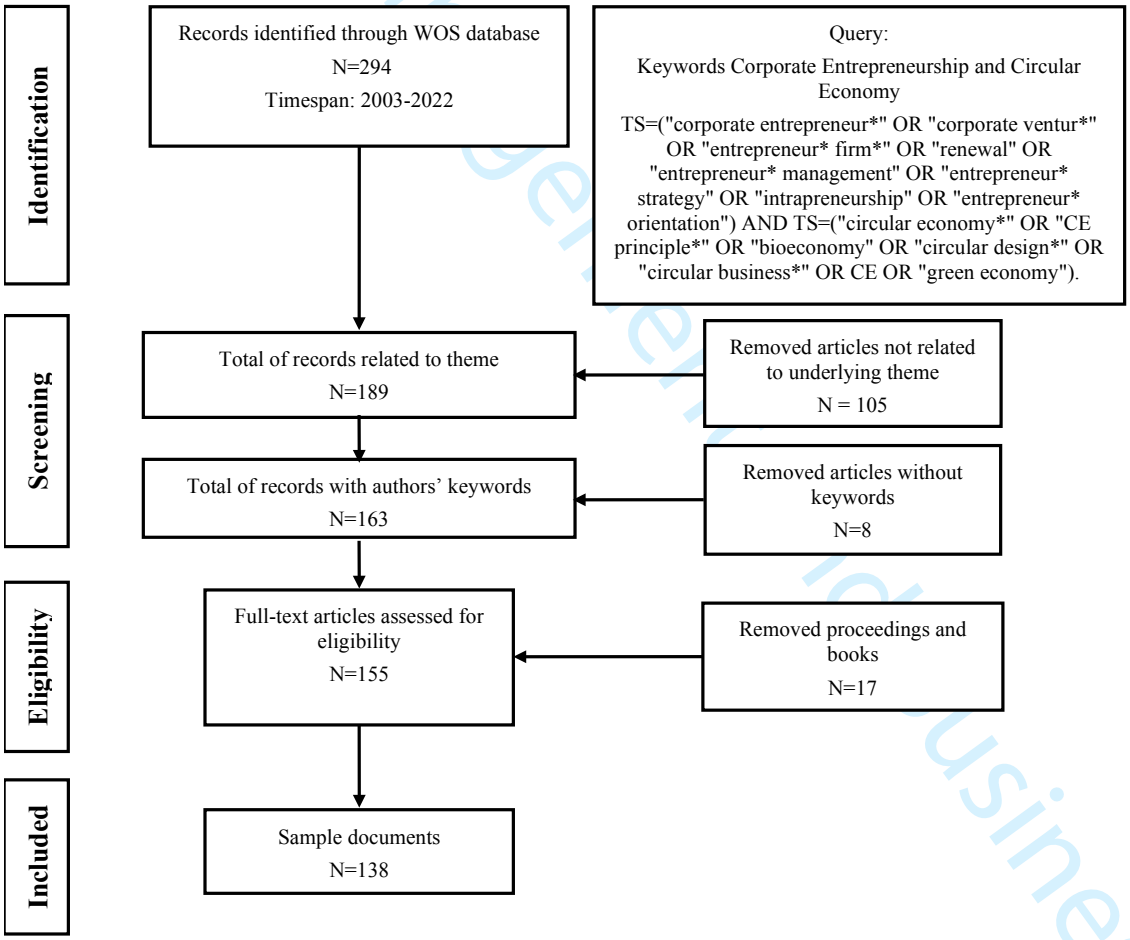
Figure 1: Strategic diagram



Source: Cobo *et. al.* (2011)

Figure 2: PRISMA methodology workflow

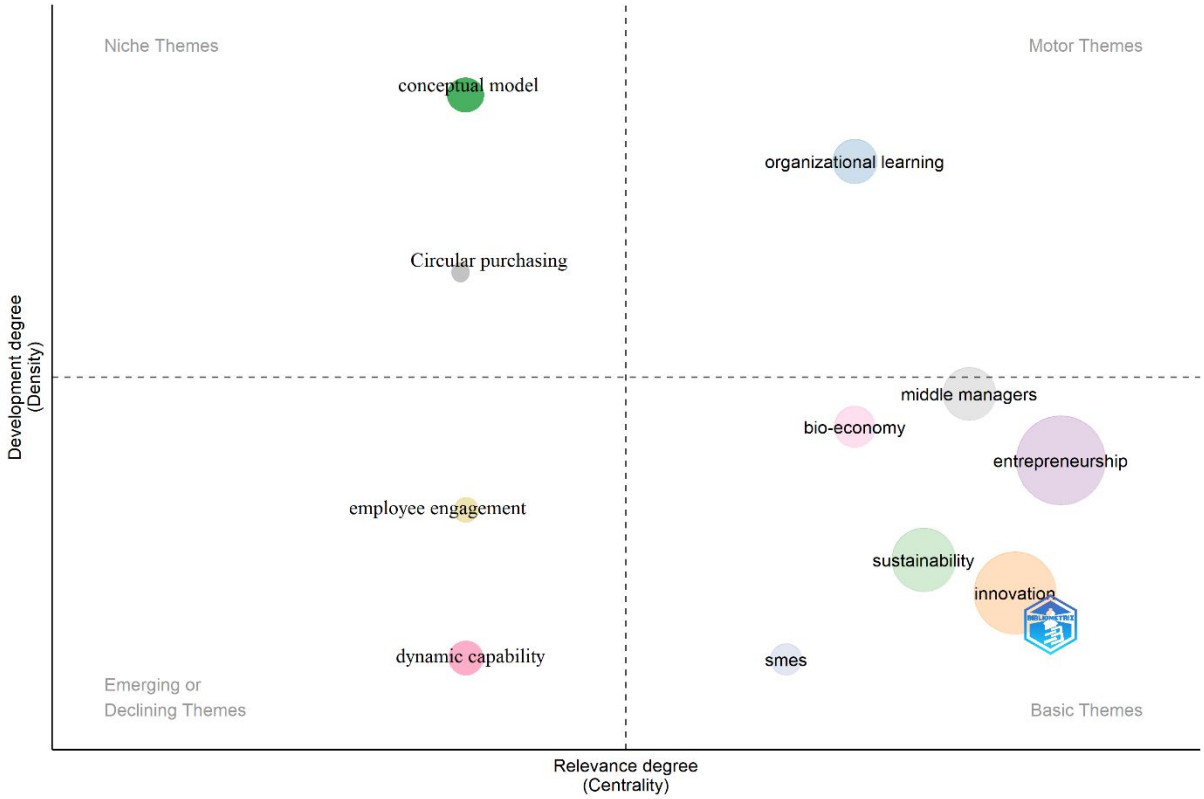


Source: Authors' own

Figure 3: Co-occurrence network

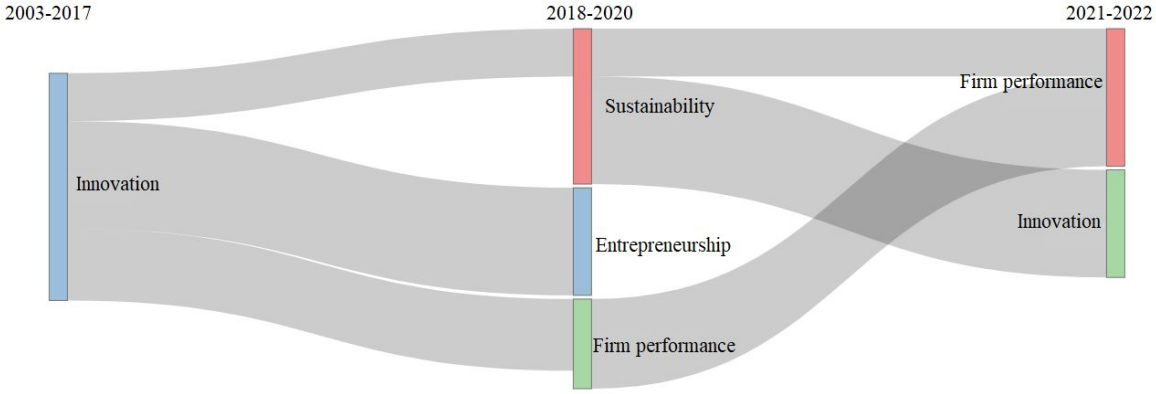
Source: Biblioshiny's output

Figure 4: Strategy diagram in the study of corporate entrepreneurship and circular economy



Source: Biblioshiny's output

Figure 5: Thematic evolution in corporate entrepreneurship and circular economy



Source: Biblioshiny's output

Table I: Sample characteristics

DESCRIPTION	RESULTS
MAIN INFORMATION ABOUT THE DATA	
Timespan	2003:2022
Sources	92
Documents	138
Annual Growth Rate	18.94%
Document Average Age	5.41
Average citations per doc	21.96
References	8,263
Author's Keywords	495
Authors	369
Single-authored docs	19
Co-Authors per Doc	2.8
International co-authorships %	31.16

Source: Authors' own

Table II: Annual publication and citation

Year	Nº Articles	TC	Mean TC per Article	Mean TC per Year
2003	1	24	24	1.14
2007	2	151	75.5	4.44
2008	1	9	9	0.56
2009	4	216	54	3.6
2010	6	291	48.5	3.46
2011	4	282	70.5	5.42
2012	3	69	23	1.92
2013	5	207	41.4	3.76
2015	12	733	61.08	6.79
2016	6	57	9.5	1.19
2017	15	287	19.13	2.73
2018	7	267	38.14	6.36
2019	9	64	7.11	1.42
2020	17	231	13.59	3.4
2021	19	113	5.95	1.98
2022	27	30	1.11	0.56
Total	**138**	**3,031**		

Source: Authors' own

Table III: Most relevant sources from corporate entrepreneurship and circular economy

Source	Articles	% Total	TC	PY_start
Small Business Economics	8	5.80%	434	2015
Entrepreneurship Research Journal	6	4.35%	31	2016
Journal of Cleaner Production	6	4.35%	314	2011
International Entrepreneurship and Management Journal	5	3.62%	152	2013
Journal of Entrepreneurship in Emerging Economies	5	3.62%	9	2021
Journal of Organizational Change Management	4	2.90%	180	2007

Journal of Business Research	3	2.17%	192	2012
Resources Conservation and Recycling	3	2.17%	130	2020
Management Decision	3	2.17%	7	2020
European Journal of Innovation Management	2	1.45%	23	2017
Total	**45**	**32.61%**	**1,472**	

Source: Authors' own

Table IV: Top 10 most productive authors and most cited

Most productive authors (by nº articles)			Author's impact (by citations)		
Author's name	**Articles**	**Local TC**	**Author's name**	**Articles**	**TC**
Zahra, SA.	3	18	Zahra, SA.	3	272
Urbano, D.	3	12	Kuratko, DF.	2	230
Kuratko, DF.	2	31	Filatotchev, I.	1	212
Mustafa, M.	2	3	Wright, M.	1	212
Urban, B.	2	1	Deng, WJ.	1	159
Kim, D.	2	1	Hu, J.	1	159
Ziyae, B.	2	0	Ma, SS.	1	159
Sáez-Martínez, FJ.	2	0	Wang, MX.	1	159
D'amato, D.	2	0	Xiao, ZB	1	159
Ferreira, JJ.	2	0	Zhou, RJ.	1	159
Total	**22**	**66**	**Total**	**13**	**1,880**

Source: Authors' own

Table V: Most relevant documents of corporate entrepreneurship and circular economy

Document	Year	Local Citations	Global Citations	Normalized Total Citations
KURATKO DF, 2013, INT ENTREP MANAG J	2013	17	120	2.90
KURATKO DF, 2015, SMALL BUS ECON	2015	14	110	1.80
BIERWERTH M, 2015, SMALL BUS ECON	2015	11	93	1.52
ZAHRA SA, 2009, J BUS VENTURING	2009	9	212	3.93
ZAHRA SA, 2015, SMALL BUS ECON	2015	9	53	0.87
TURNER T, 2015, SMALL BUS ECON	2015	8	72	1.18
CASTROGIOVANNI GJ, 2011, INT J MANPOWER	2011	8	53	0.75
SEBORA TC, 2010, J ORGAN CHANGE MANAG	2010	7	24	0.49
RUTHERFORD MW, 2007, J ORGAN CHANGE MANAG	2007	6	87	1.15
NASON RS, 2015, SMALL BUS ECON	2015	6	39	0.64
Total		**95**	**863**	

Source: Authors' own

Table VI: Most frequent author's keywords

Words	Occurrences	%Occurences
Innovation	16	2.76%
Firm performance	15	2.59%
Entrepreneurship	12	2.07%

Sustainability	10	1.73%
Strategic entrepreneurship	9	1.55%
Corporate venturing	7	1.21%
Human resource management	6	1.04%
Corporate strategy	4	0.69%
Dynamic capability	4	0.69%
Middle managers	4	0.69%
Smes	4	0.69%
Strategic renewal	4	0.69%
Training	4	0,69%
Bio-economy	3	0.52%
Capability	3	0.52%
Total	**105**	**18.13%**

Source: Authors' own

Table VII: Research agenda

THEME	RESEARCH GAP- RESEARCH QUESTION
Innovation, circular economy, firm performance	Which corporate entrepreneurship activities improve firm performance when circular strategies are considered? What is the impact of circular policies on business performance, sustainability, and the achievement of competitive advantages?
Corporate entrepreneurship, organisational learning, circular economy	How do organisational learning strategies foster environmental awareness, resource efficiency and collaboration in the corporate value chain? What kind of organisational learning strategies are most likely to develop organisational knowledge that enables the implementation of circular principles?
Circular business models	What kind of corporate entrepreneurship activities facilitate the development of new circular business models? How does innovation in business models favour the creation of new, more sustainable value propositions?
Middle managers, circular economy, and corporate entrepreneurship	What is the role of managers in encouraging entrepreneurial behaviour for a circular transformation in the firm? What management practices favour the development of corporate circular entrepreneurship?
Metrics and indicators	What would the indicators of circularity be that allow the success of circular corporate entrepreneurship to be assessed? What indicators can be employed to assess the social and environmental impact of circular corporate entrepreneurship?

Source: Authors' own