Integration of Circular Economy for Sustainable Business Performance: Bibliometric and Content Analysis

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Abstract: Expansion of middle-class population and the scarcity of resources urge circular economy to be implemented into business processes. This study aims to gain understanding into the circular economy, including its trends, predominant research themes, and the evolution of knowledge on the topic. A total of 675 documents from 1996 to June 16, 2023 from Scopus analyzed by bibliometric to examine related sources, authors, productivity, citations, to explore research trends and themes, including analysis on the top 10 most influential articles. This study finds that circularity not only fosters environmental sustainability but also economic advantages such as cost savings, the development of new revenue streams, enhanced risk management, increased job market and innovation. This concept has emerged as a niche term of significant interest among academics, policymakers, and companies. This study provides recommendations for future research and provide support for enterprises in incorporating circularity to enhance their sustainable business performance.

Keywords: Circular Economy, Sustainability, Resource Scarcity, Business Performance

1. Introduction

It is one of the greatest global challenges to decouple environmental degradation from economic growth according to the United Nations (UN). This challenge hinders efforts being made to eliminate hunger, reduce inequality and finally ensure planetary health. Therefore, the circular economy was introduced as part of the United Nations Environment Programme (UNEP) to improve economics while protecting the environment and elevating social justice.

Circular economy is an economic model with focus on restoring and regenerating resources to preserve the value and usefulness of products, materials, and components, so that the use of limited resources in the global economy can be reduced [Ellen MacArthur Foundation, 2015]. To attain a high level of sustainability through cutting resource consumption across different dimensions including human, social, natural, and financial capital, particularly in areas of waste production and emissions.

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The traditional linear or ‘take, make, dispose’ economic model has been dominating the industrial revolution until now. It has brought an unprecedented level of growth in industrial development because of reliance on large quantities of easily accessible, therefore cheap materials and energy [Ellen MacArthur Foundation, 2015]. However, the situation has changed in this new millennium considering the rapid expansion of the middle-class which was projected to increase by 160 million people annually until 2030, based on research conducted by Brookings Institution in 2017.

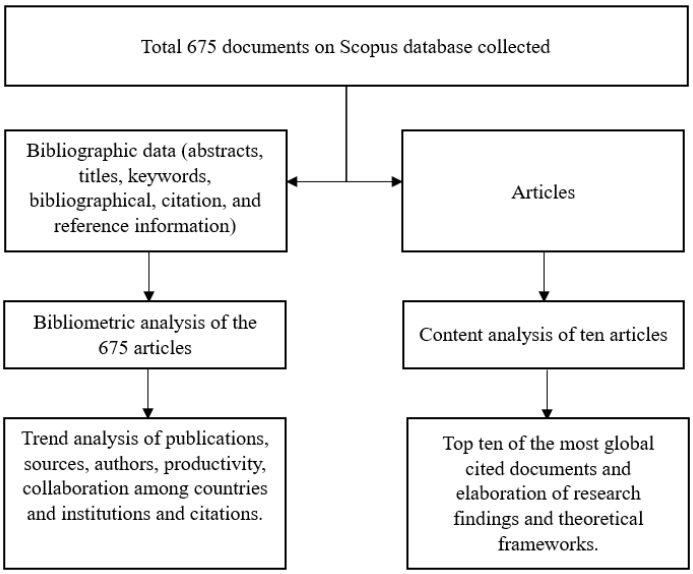
The expanding middle-class demographic elevates consumption rates, prompting consumers to anticipate the fulfillment of their necessities and desires, thereby providing businesses with opportunities for evolution. According to Sariatli [2017], such expansion comes with a burden to meet high levels of investment, particularly infrastructure to support the shift to advanced and emerging economies Failure to meet the level of investment required, the economy will inevitably grow to be supply constrained. Moreover, scarcity of resources added to the unlimited demand will push prices to rise, the problem is that customers will choose to buy goods or services that are lower in price with the same quality. Thus, companies are adjusting their prices amidst a highly competitive environment to gain competitive advantage. This phenomena contributes to price volatility that puts pressure on companies' profits which leads to a decrease in the overall value of economic output. This happens as a result of refraining from passing the increasing prices on to customers, because they do not want to lose existing customers and hoping for new ones.

The Ellen MacArthur Foundation [2015] stated circular economic opportunities such as enhanced economic growth, significant savings in net material costs, the generation of job opportunities, and heightened innovation. Jørgensen and Pedersen [2018] confirm that circularity addresses resource depletion and pollution while fostering cost savings, establishing novel revenue streams, and improved risk management for businesses. Such potential benefits influence business leaders, academics and policy makers to acknowledge the pressing need to reassess the way materials and energy are utilized [Hartley et al., 2020, Merliet et al., 2018]. Therefore, circular economy has become a term that is being promoted and expected to be implemented within business processes.

Based on the descriptions above, this study seeks to employ bibliometric and content analysis techniques to discern insight about circular economy along with its trends, prominent research themes and knowledge evolutions. The primary contributions encompass the trend analysis of related journal productions with the sources, authors, productivity such as international collaborations among countries and institutions, citations including content analysis on the top 10 most influential articles as well as patterns and structures explorations in research trends and themes. The author hopes that this study will present guidelines for related companies and for the next research associated with circular economy.

2. Methods

Optimal methodology in visualizing scientific understanding related to environmental sustainability disclosure is an integrated method involving bibliometric analysis and systematic literature review or a hybrid review [Paul & Criado, 2020]. This paper highlights the evolution of the circular economy amongst researchers, which shows the popularity level of the topic and how it affects the performance of companies to enhance sustainability. This study utilizes hybrid review to disclose integration of the circular economy in business performance with Figure 1 to illustrate the research design.



Source: Writer

Figure 1. Research Design

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Writer uses Scopus to find related documents by using “circular and economy and performance” as keywords over the period from 1996 to June 16, 2023 or the date of data extraction, then limit the subject area to business, management and accounting. The result showed a total of 675 relevant documents available. The writer utilizes R studio to run a bibliometric analysis on those documents. Data were retrieved in Comma-Separated Value (CSV) format from the Scopus database.

Asserted by Ranjbari et al [2021], the process of data cleansing constitutes a fundamental phase for subsequent analysis, particularly in bibliometric analysis. Therefore, the data underwent cleaning procedures using Microsoft Excel to rectify inconsistencies and inaccuracies. Adjustments included converting double spaces to single spaces and rectifying spelling errors.

3. Result and Discussion

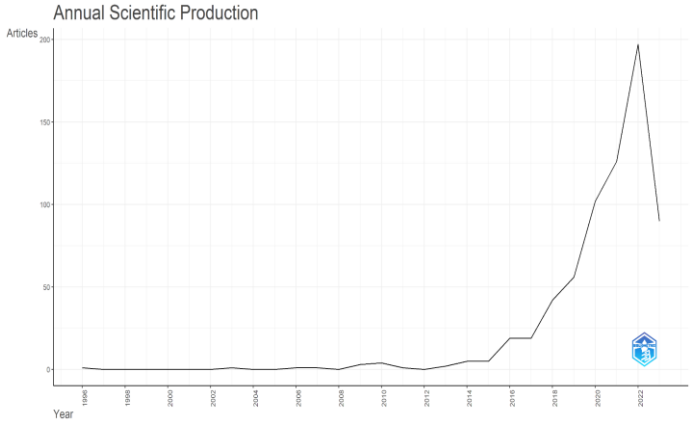
An overview of Bibliometric analysis result based on data Scopus with key words “circular and economy and performance” and subject area focus only in relation to business, management and accounting, shows that there are 675 documents in the timespan from 1996 until June 16, 2023, with average annual growth of 18.14%.

The findings of this study indicate that circularity offers financial benefits through cost-saving, fostering the development of new revenue streams, integrating into risk management strategies, reinforcing the job market, and stimulating innovation. The circular economy also fosters the sustainability of businesses by preserving their competitive edge through its environmentally conscious characteristics. Additionally, it bolsters companies' dynamic capabilities, enabling them to adapt effectively and efficiently when incorporating strategies and utilizing technology within rapid changes in the business environment.

This study also shows that there has not been many publications on this topic and therefore has emerged as a niche term among academics, companies and policymakers. It is a fairly young topic that need attention in order to facilitate sustainability within corporations and contribute to the enhancement of environmental awareness.

Annual Scientific Production

Productions of scientific writing on circular economy in relation to business performance have shown significant rise, particularly in the last five years since 2018. In 2018 there were 42 documents and in 2022 as much as 197 journal articles produced. The change is substantial or as much as 369% increase. On June 16, 2023 or the date that the documents were analyzed by Bibliometric, there are 90 documents or 54% decrease from 2022. However, by the trend of the plot as well as the increasing urgency level for the economy to switch from linear to circular, it is safe to assume that publication on this topic will keep growing.



Source: Primary data processed using Bibliometirx

Figure 2. Annual scientific production

Relevant Sources

Journal of Cleaner Production being the most sourced or 298 articles as depicted in figure 3. There is a strong relationship between circular economy, business management and strategy as well as environment, particularly in terms of processes related to production and how technology is being employed.

Identifying the most pertinent sources of scientific output is crucial, as numerous authors cite these sources, implying their reliability and prominence. To learn about those sources contributes to the continuance of high-quality work as it helps produce scientific writing or research to come. Also, to help writers in achieving their objectives by aiding the readers such as business actors upon implementation, recommendations, solutions and corrective actions related to realization of circular economic model within companies.

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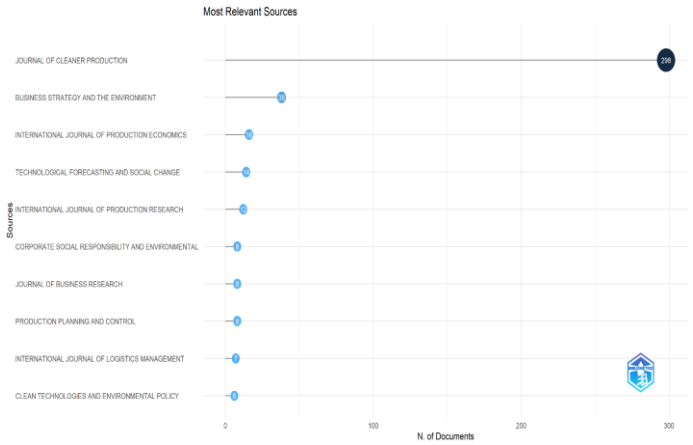
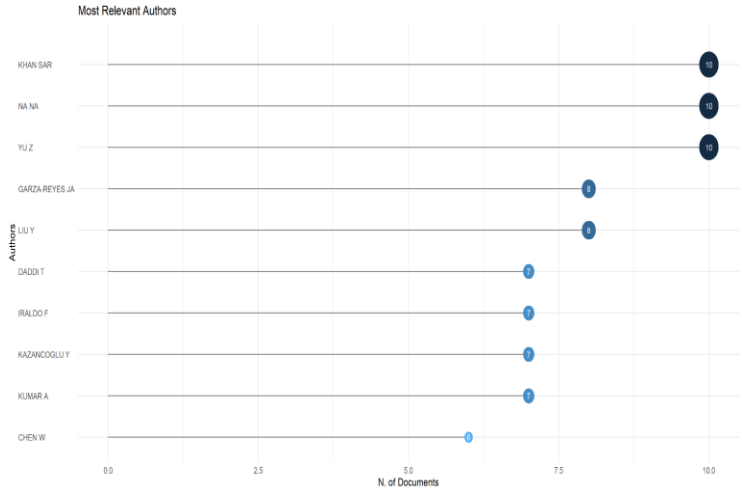


Source: Primary data processed using Bibliometrix

Figure 3. Most relevant sources

Most Relevant Authors

The ten writers who published the most shown in figure 4. They are the main contributors for Scopus in conducting research regarding circular economy's influence on shaping sustainable business performance, when there has not been many writers yet on the topic.



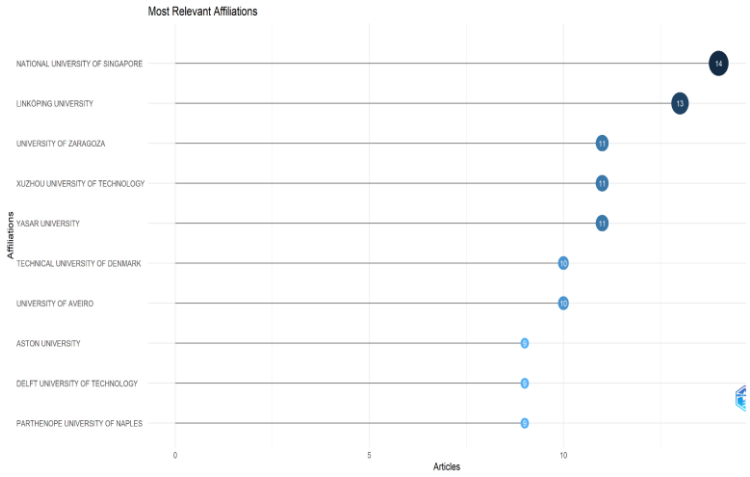
Source: Primary data processed using Bibliometrix

Figure 4. Most relevant authors

Most Relevant Affiliations

The top ten most relevant affiliations are National University of Singapore, Linköping University, University of Zaragoza, Xuzhou University of Technology, Yasar University, Technical University of Denmark, University of Aveiro, Aston University, Delft University of Technology and Parthenope University of Naples.

National University of Singapore and Linköping University published 14 and 13 articles respectively and other institutions are 11 and below in total as shown in figure 5. To produce research in the area of environment, society and sustainability has been one of their agendas and being encouraged by their respective countries.



Source: Primary data processed using Bibliometrix

Figure 5. Most relevant affiliations

Corresponding Author's Countries

Corresponding Author's Countries are mostly from China with a total of 85 documents consisting of 34 Single Country Publications (SCP) and 51 Multiple Country Publications (MCP). The countries are ranked from most to least number of documents illustrated in figure 6.

Single Country Publications (SCP) and Multiple Country Publications (MCP) categorizepublications based on their geographical scope. SCPs focus on exploring one particular nation, on the other hand MCPs compare and contrast different nations. Among the top five, only China and the United Kingdom have superior MCPs compared to their SCPs. This gives an idea that both China and the United Kingdom have the necessary resources such as funding, time, infrastructure and expertise to be able to carry out analysis on extensive data collection in collaboration across countries. Such substantial efforts, surely motivated by meaningful reasons indicate the growing importance of the circular economy within the country itself and globally.

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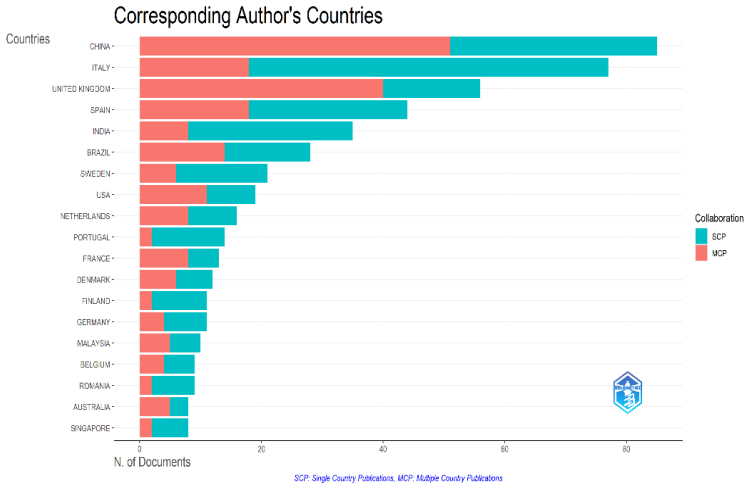
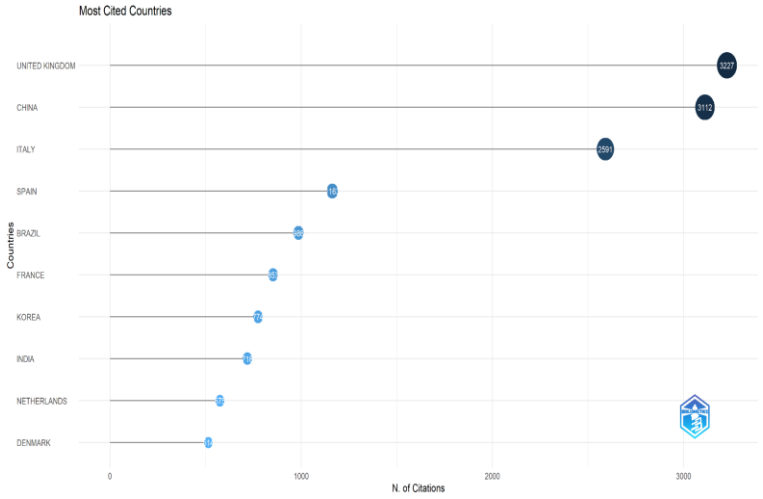


Source: Primary data processed using Bibliometrix

Figure 6. Corresponding author's countries

Most Cited Countries

United Kingdom, China, Italy, Spain and Brazil with 3227, 3112, 2591, 1163 and 986 number of citations respectively. The third most cited country is 55% higher than the fourth or Italy compared to Spain. The gap is quite big even within the top five which is illustrated in figure 7 below. It means the United Kingdom, China and Italy are the leading countries for circular economy publications and widely referenced by other authors in different countries worldwide.



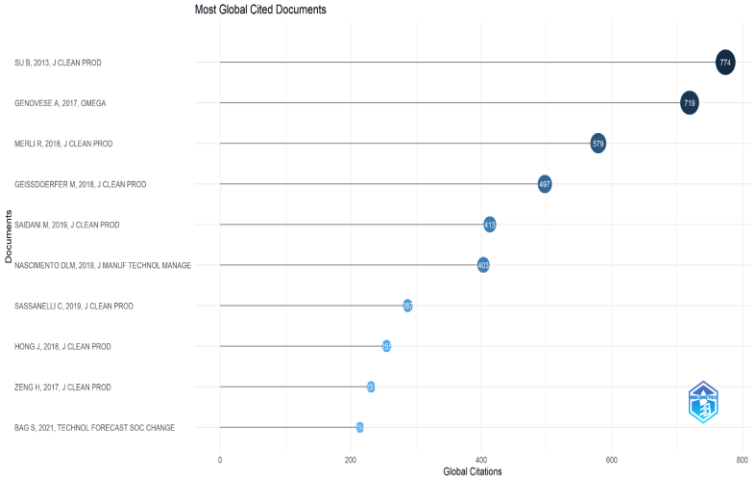
Source: Primary data processed using Bibliometrix

Figure 7. Most cited countries

Most Global Cited Documents

The term "most global cited documents' means that the documents authored by the writers have garnered the highest number of citations from researchers worldwide, which indicates the research studies have given significant impact and influence within the academic community.

The most global cited documents based on figure 8 will be elaborated in figure 9 below, followed with analysis on the documents.



Source: Primary data processed using Bibliometrix

Figure 8. Most global cited documents

Year	Journal	Title	Author	DOI	Total Citations
2013	Journal of Cleaner Production	A review of the circular economy in China: moving from rhetoric to implementation	Biwei Su, Almas Heshmati, Yong Geng, Xiaoman Yu	10.1016/j.jclepro.2012.11.020	774
2017	Omega	Sustainable supply chain management and the transition towards a circular economy: Evidence and some applications	Andrea Genovese, Adolf A. Acquaye, Alejandro Figueroa, S.C. Lenny Koh	10.1016/j.omega.2015.05.015	719
2018	Journal of Cleaner Production	How do scholars approach the circular economy? A systematic literature review	Roberto Merli, Michele Preziosi, Alessia Ac ampora	10.1016/j.jclepro.2017.12.112	579
2018	Journal of Cleaner Production	Business models and supply chains for the circular economy	Martin Geissdoerfer, Sandra Naomi Morioka, Marly Monteiro de Carvalho, Steve Evans	10.1016/j.jclepro.2018.04.159	497
2019	Journal of Cleaner Production	A taxonomy of circular economy indicators	Michael Saidani, Bernard Yannou, Yann Le roy, François Cluzel, Alissa Kendal	10.1016/j.jclepro.2018.10.014	413
2019	Journal of Manufacturing Technology Management	Exploring Industry 4.0 technologies to enable circular economy practices in a manufacturing context: A business model proposal	Daniel Luiz Mattos Nascimento, Viviam Alencastro, Os valdo Luiz Gonçalves Quelhas, Rodrigo Goyannes Gusmão Caiado, Jose Arturo Garza-Reyes, Luis Rocha-Lona, Guilherme Tortorella	10.1108/JMTM-03-2018-0071	403
2019	Journal of Cleaner Production	Circular economy performance assessment methods: A systematic literature review	Claudio Sassanelli, Paolo Rosa, Roberto Ro cca, Sergio Terzi	10.1016/j.jclepro.2019.05.019	287
2018	Journal of Cleaner Production	Sustainable supply chain management practices, supply chain dynamic capabilities, and enterprise performance	Jiangtao Hong, Yibin Zhang, Minqiu Ding	10.1016/j.jclepro.2017.06.093	255
2017	Journal of Cleaner Production	Institutional pressures, sustainable supply chain management, and circular economy capability: Empirical evidence from Chinese eco-industrial park firms	Huixiang Zeng, Xiaohong Chen, Xu Xiao, Zh ifang Zhou	10.1016/j.jclepro.2016.10.093	231
2021	Technological Forecasting and Social Change	Role of institutional pressures and resources in the adoption of big data analytics powered artificial intelligence, sustainable manufacturing practices and circular economy capabilities	Surajit Bag, Jan Ham Christiaan Pretorius, Shivam Gupta, Yoges h K. Dwivedi	10.1016/j.techfore.2020.120420	214

Source: Primary data processed using Bibliometrix

Figure 9. List of top 10 global cited documents

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Su et al [2013] offer recommendations and suggestions to promote the acceleration of transition to a circular economy in China and on a global level by reviewing its current state, challenges and opportunities. This article identifies barriers including deficiency awareness and understanding, limited technological and financial resources and insufficient policy support. The recommendations given so that policy support can be strengthened, to improve public awareness by socializing and giving education about sustainability, promoting innovation and technology development as well as enhancing international cooperation.

Genovese et al [2017] provide evidence that circular economy brings environmental benefits in its integration into supply chain management, such as reduction of virgin resources usage, carbon emissions and as part of waste recovery. The paper promotes self-sustaining production systems enabling materials to be used over and over again. Make comparisons of performances between traditional and circular production systems of chemical and food industries, taking into account the challenges of emerging supply chain management and market dynamics.

Merli et al [2018] explore the comprehensive analysis of the current findings, knowledge and advancements within the academic community regarding circular economy. They identify cleaner production, waste reduction, and the optimization of process performance and efficiency being the most explored practices. They also underline the importance for social and institutional changes for circularity to be successfully implemented.

Geissdoerfer et al [2018] show much attention to sustainability performance by focusing their studies and to propose a framework on practical implementation of circular supply chains and Circular Business Model (CBM) on organizational level.

Saidani et al [2019] in their paper discuss their proposition of C-indicators or circularity indicators which developed to communicate, assess, monitor and improve the performance of circular economy practices. Drawing from existing taxonomies of eco-design tools and sustainability indicators, the writers analyze C-indicators developed by scholars, consulting companies and governmental agencies. Then, they link these indicators to facilitate the selection of appropriate ones in accordance with specific needs and requirements of users.

Nascimento et al [2019] establish a business model that effectively reuses and recycles wasted materials, including scrap metal and e-waste as part of investigation upon the potential integration of emerging technologies from Industry 4.0 with circular economy practices.

It is not yet a common practice for companies to conduct an assessment on their circularity performances. Through literature review, Sassanelli et al [2019] aim to offer a framework for companies to practically measure and assess their circularity degree, for instance the usage of suitable Key Performance Indicators (KPI).

Hong et al [2018] elaborates the implications of sustainable supply chain management (SSCM) for the dynamic capabilities of the supply chain (SC) in the performance of enterprise and how it encompasses economic, environmental, and social facets. 209 Chinese manufacturing firms being the source of their research, to encourage corporations to strengthen their supply chain dynamic capabilities while executing efficient sustainable supply chain management strategies, particularly those functioning in emerging nations.

Theoretical guidance for successful green production practices of eco-industrial park firms is provided by Zeng et al [2017]. The paper concludes that institutional pressure yields a favorable consequence on supply chain relationship management and the design of sustainable supply chains. It is a study based on the analysis of 363 questionnaires which was spread amongst eco-industrial park firms in China.

Bag et al [2021] indicate that institutional pressures and resources significantly influence the adoption of big data analytics-fueled artificial intelligence, circular economy capabilities including sustainable manufacturing practices in the automotive and allied manufacturing companies in South Africa. Both Zeng et al [2017] and Bag et al [2021] express that circular economy capabilities are motivated by institutional pressures.

Most of the global cited documents predominantly originate from research conducted in China. China as the foremost carbon emitter globally resulting from fossil fuel combustion and industrial processes as the major factors has declared its intention to attain carbon peak and neutrality goals by 2030 and 2060 [Wei, 2022].

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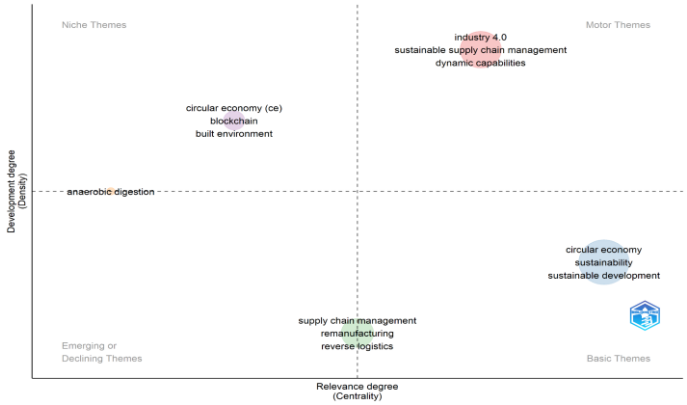
Conceptual Structure

The thematic map in figure 10 is derived by setting the field option to author's keywords and the parameters to 100. Circular economy is a basic and niche theme at the same time, because it is not yet extensively explored or studied in mainstream or broader scientific literature.

With regard to environmental conservation and economic benefits, the purpose is to integrate circularity into business management and operations particularly within companies engaging in the field of production or manufacturing to support the sustainable development in industry 4.0 [Bag and Pretorius, 2020, Nascimento et al., 2019]. Terms related to circular economy including dynamic capabilities theory, sustainable supply chain management, blockchain, and the built environment are also fairly young topics, which recently has attracted great attention from researchers, scholars and business practitioners. These terms also need to be studied for the successful integration of the economic model.



Source: Primary data processed using Bibliometrix

Figure 10. Thematic Map

4. Conclusion

Growing population among middle-class social groups has caused consumerism phenomena. The downgrading of the environment and depletion of resources become the consequences that drive the urgency to create a circular economy. Circular economy means to embed sustainability into the company's operational and managerial framework such as supply chain and blockchain within industry 4.0. This is done by reducing environmental impact, waste production along the life cycle of the product, and to enhance performance and efficiency of processes which finally leads to

sustainable business performance. Integrating circularity into a company's culture is a difficult task that comes with many challenges. In order to achieve such efficient processes companies need thorough preparation taking into account all the resources specifically needed for alteration from linear to circular, particularly technologies and high quality human resources to compliment. These personnel not only for maximazing the utilization of technologies, but also for generating strategic ideas leading to competitive advantage. High level of commitment needed in the process, because companies will have to make big investment in terms of money and time, therefore most suitable for companies that are ready to prioritize the integration and possess sufficient financial resources. Institutional pressures become the most important driver, it has recently become a topic that grabs attention amongst researchers, business actors even supported by the government as policy makers, to take advantage of the financial, environmental and social benefits of the circular economy. This study helps companies evaluate their dynamic capabilities by presenting emerging publications and analysis of most cited journals to ensure successful establishment of circularity. Additionally, it provides guidelines for future researchers.

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