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Mapping Circular Economy Phenomenon in Emerging Markets

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Abstract

The circular economy concept is becoming more important worldwide, promoting the closed-loop production cycle paradigm as opposed to the linear economic model. For emerging markets, the concept of CE is equally important. However, emerging economies have specific contextual conditions, which might hinder the CE's successful implementation. Preliminary research showed the lack of comprehensive reviews on CE in emerging markets context, which became a prerequisite for conducting a systematic literature review. The purpose of the study is to distinguish research streams, concepts, and topics in the field of CE in emerging markets from a longitudinal perspective as well as to define features and conditions of CE implementation in emerging markets. The analysis was conducted using the Biblioshiny R-package tool. The results show that barriers and drivers to CE implementation in emerging markets are the most studied research areas. The most common drivers of CE development in emerging markets are attitude, social pressure, environmental commitment, consumer behavior, and institutional pressures. Low awareness and lack of environmental education are the most widespread impediments that lead to insufficient development of particular disposal. In addition, lack of regulatory incentives and insufficient infrastructure are also common barriers that limit CE development in emerging economies. The influence of Industry 4.0 technologies on CE implementation, circular business models and waste management are of increasing scientific interest. Moreover, features and conditions of CE implementation in emerging markets were derived. In addition, the content analysis identified possible research directions to be investigated.

Keywords: Circular Economy, Emerging Economics, Circularity Principles, Literature Review, Bibliometrix, Biblioshiny

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Дамушы нарықтардағы циркулярлы экономика феноменіне шолу

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Түйін

Циркулярлы экономика (ЦЭ) тұжырымдамасының өзектілігі артып келеді, оның мәні сызықтық экономикалық модельге қарағанда айналмалы өндірістік цикл парадигмасын алға жылжыту болып табылады. Дамушы нарықтар үшін де ЦЭ тұжырымдамасы аса маңызды. Алайда, дамып келе жатқан нарықтық экономикасы бар елдерде циркулярлы экономиканың сәтті іске асырылуын шектей алатын ерекше контекстік жағдайлар бар. Алдын-ала зерттеу нәтижесінде осы тақырыптағы дамушы нарықтар контекстінде жан-жақты шолулардың жетіспеушілігі анықталды, бұл осы жүйелі әдеби шолуды жүргізудің алғышарты болып табылады. Зерттеудің мақсаты – дамушы нарықтардағы ЦЭ саласындағы зерттеулердің бағыттарын, тұжырымдамалары мен тақырыптарын ұзақ мерзімді тұрғыдан айқындау, сондай-ақ дамушы нарықтардағы ЦЭ қағидаттарын енгізудің ерекшеліктері мен шарттарын айқындау. Талдау Biblioshiny құралын қолдану арқылы жүргізілді. Зерттеу нәтижелеріне сай, дамушы нарықтарда ЦЭ енгізудің кедергілері мен драйверлері – ең көп зерттелген тақырыптар. Дамушы нарықтардағы ЦЭ дамуының ең көп таралған драйверлері қарым-қатынас, әлеуметтік қысым, қоршаған ортаны қорғауға міндеттеме, тұтынушылардың мінез-құлқы, институционалдық қысым болып табылады. Хабардарлықтың төмен болуы және экологиялық білімнің болмауы – қалдықтарды сұрыптаудың жеткіліксіз дамуына әкелетін ең көп таралған кедергілер. Сонымен қатар, реттеуші ынталандырудың болмауы және инфрақұрылымның жеткіліксіздігі де дамушы нарықтардағы ЦЭ шектейді. 4.0 индустрия технологияларының ЦЭ- ны енгізуіне әсері, циркулярлы бизнес-модельдер және қалдықтарды басқару тақырыптарына ғылыми қызығушылық артып келеді. Сондай-ақ, мақалада дамушы нарықтарда ЦЭ енгізудің ерекшеліктері мен шарттары атап өтілді. Контент - талдау болашақ зерттеулердің ықтимал бағыттарын анықтады.

Түйін сөздер: циркулярлы экономика, дамушы нарықтар, циркулярлық қағидалары, әдеби шолу, Bibliometrix, Biblioshiny.

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Обзор феномена циркулярной экономики на развивающихся рынках**Жидебеккызы А.^{1*}, Калмакова Д.¹, Билан С.²**¹ *КазНУ им. аль-Фараби, пр. аль-Фараби 71, 050040, г. Алматы, Казахстан*² *Жешувский технологический университет, Повстанцы Варшавы 12, 35-959, Жешув, Польша***Аннотация**

Концепция циркулярной экономики (ЦЭ) становится все более актуальной в мире, сутью которой является продвижение парадигмы замкнутого производственного цикла в противовес линейной экономической модели. Для развивающихся рынков концепция ЦЭ не менее важна. Однако в странах с формирующейся рыночной экономикой существуют особые контекстуальные условия, которые могут ограничить успешную реализацию ЦЭ. Предварительные исследования выявили недостаточность всеобъемлющих и комплексных обзоров в контексте развивающихся рынков, что стало предпосылкой для проведения систематического литературного обзора. Цель исследования состоит в том, чтобы выделить направления исследований, концепции и темы в области ЦЭ на развивающихся рынках с долгосрочной точки зрения, а также определить особенности и условия внедрения принципов ЦЭ на развивающихся рынках. Анализ проводился с использованием инструмента Biblioshiny. Результаты показывают, что барьеры и драйверы внедрения ЦЭ на развивающихся рынках являются наиболее изученными областями исследований. Наиболее распространенными драйверами развития ЦЭ на развивающихся рынках являются отношение, социальное давление, приверженность охране окружающей среды, поведение потребителей, институциональное давление. Низкая осведомленность и отсутствие экологического образования являются наиболее распространенными барьерами, которые приводят к недостаточному развитию селективной утилизации отходов. Кроме того, отсутствие регулирующих стимулов и недостаточная инфраструктура также являются распространенными препятствиями, которые ограничивают развитие ЦЭ в странах с формирующимися рынками. Влияние технологий индустрии 4.0 на внедрение ЦЭ, циркулярные бизнес-модели и управление отходами представляют все больший научный интерес. Кроме того, были выделены особенности и условия внедрения ЦЭ на развивающихся рынках. Контент-анализ выявил возможные направления исследований, которые необходимо исследовать.

Ключевые слова: циркулярная экономика, развивающиеся экономики, принципы циркулярности, литературный обзор, Bibliometrix, Biblioshiny

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Introduction

Over the last years, circular economy (CE) has become one of the most important themes worldwide thanks to its aim to provide a new paradigm instead of the classical linear economic model [1,2,3]. With the introduction of circular economy policies in major regions of the world economy (namely, China in 2002 and the EU in 2015), interest in the concept has increased significantly in the past few years [4,5,6]. CE attempts to overwhelm and leave behind the traditional linear economy based on taking virgin materials from nature and making products to be either consumed or disposed of. CE can be defined as an industrial system that is restorative or regenerative. It intends to close the loop of the linear product lifecycle, substituting the end-of-life concept with restoration [7,8].

Despite the active research in CE, there are still very few reviews on this topic in the context of emerging markets. Emerging economies possess specific contextual conditions that may further hinder CE implementation [9]. Emerging economies need high economic growth, and with their normally high population, they are generating an enormous amount of waste and adding strain on their depleting resources [10].

Therefore, we made an attempt to conduct such a review, which consists of a descriptive part and a content analysis. The descriptive study was carried out using the R-package Bibliometrix, Biblioshiny tool [11]. For detailed information, one can read Aria & Cuccurullo [12]. Our review aims to give an exhaustive overview of research streams, their current state and evolution, implementation features of CE in emerging markets as well as potential future research directions on this topic.

Two research questions were identified:

1) What research streams, concepts and topics can be distinguished in the field of CE in emerging markets, from a longitudinal perspective?

2) What are the features and conditions of CE implementation in emerging markets?

To answer these research questions, the paper is structured as follows: Section 2 briefly describes the process of data sampling and collection. The research results are then presented in Section 3, first, by showing and analyzing the evolution of themes and clusters in CE research in emerging markets and, second, by providing content analysis of the most relevant papers. The findings are then discussed in Section 4, and conclusions, future research directions are dealt with in Section 5.

Methods

This paper follows a mixed-methods approach to analyze the body of literature on circular economy in emerging economies context.

Data sampling and collection

The sample of publications for analysis was obtained using a four-step procedure from the Scopus database [13]. Scopus offers about 20% more coverage than the Web of Science for citation analysis. Also it covers a wider range of journals that help in both keyword searches and citation analysis [14].

The search was conducted in June 2021 and contained papers published up to and including June 2021. The initial search string used was circular econom*, which resulted in 15,189 papers. Then the sample was limited to such subject categories as social sciences; business, management and accounting; economics and econometrics. This limitation yielded 5,040 results. The next step was restriction to the context of emerging markets by identifying two search terms “circular econom*” AND “emerging market” while maintaining limitations on subject categories. This step resulted in 741 outcomes. The last stage was indication of publication year. For review the period from 2012 till 2021 was chosen. We excluded the first two years of publication activity (2010 and 2011) because we decided that the difference between 741 (with 2010 and 2011) and 716 outcomes (without 2010 and 2011) is not crucial. This choice led to sample of 716 papers, which was finally used for descriptive analysis, as well as for thematic mapping. Both were conducted using the R-package Bibliometrix, Biblioshiny. For a more detailed introduction to thematic mapping, one can read Schöggel et al [4].

For content analysis, 15 most relevant and cited papers (according to total citations) were selected. Moreover, extra 15 papers were chosen from reference lists by the snowballing process. These publications were selected so that they correspond to the topic of the current paper, namely the circular economy in emerging markets. Eventually, 30 most relevant papers were derived for content analysis (Figure 1).

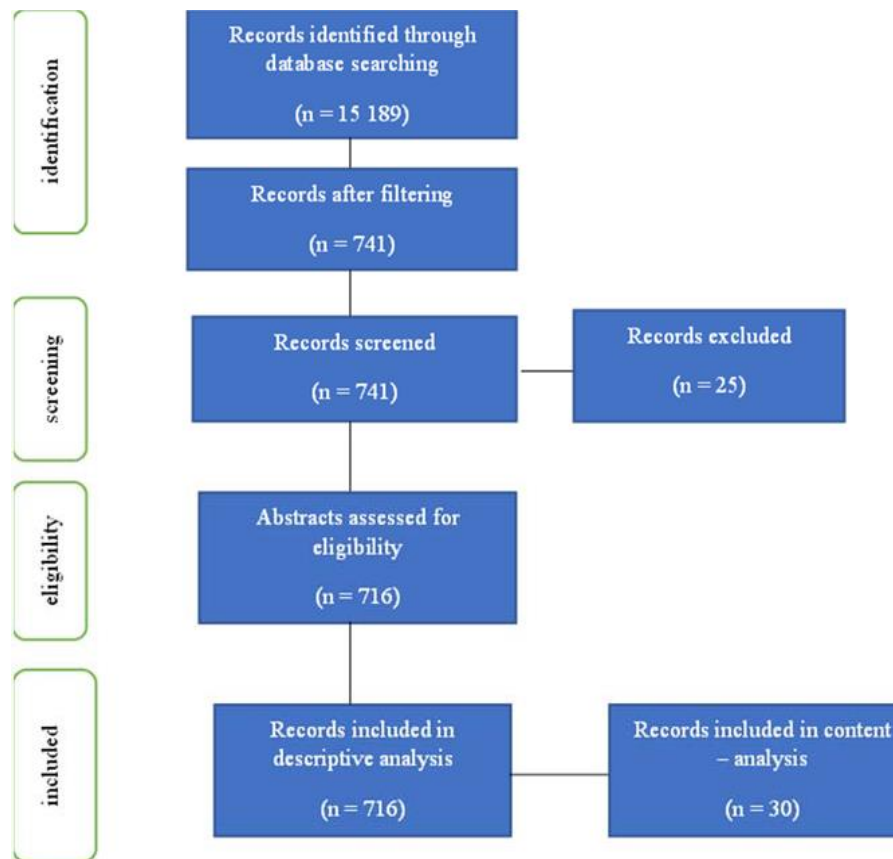


Figure 1. Outline of the research steps

Results

Descriptive results

The identified articles are analyzed regarding annual scientific production, most relevant sources, most relevant affiliations, co-occurrence network, as well as thematic mapping and evolution in order to understand trends in the body of knowledge on CE in emerging markets context. Descriptive analysis was conducted using an R-package Biblioshiny tool.

Annual scientific production

Figure 2 shows an annual scientific production of CE research in the context of emerging markets. If we consider the first two years, only four papers were published on this topic. However, it is a stable increase in scientific production from 2015, particularly an annual number of publications that increases by at least by 50%. If only 11 articles were published in 2015, in 2016, this amount reached 25 articles, 46 in 2017, and 82 in 2018. In 2020, almost as many articles (212) were published as in 2018 and 2019 combined. Such a steady increase in publication activity from 2015 may be due to the adoption of the first circular economy Action plan by the European Commission [5], which drew attention to the concept of circular economy from both the academic and political communities.

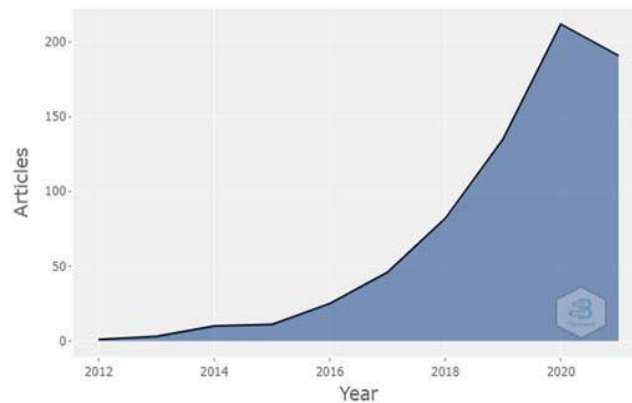


Figure 2. Annual scientific production

Three-fields plot

Within the three-field plot, one can see the interconnection of paper attributes. For instance, figure 3 shows which countries and journals are most involved in studying a particular area of CE. Figure 4 shows the same for the author’s affiliation. The majority of papers originated from Italy and the UK (192 and 185 papers, respectively). Two emerging economies that are most represented in the affiliations are India and China (89 and 77 publications, respectively). As for the association of countries with keywords, absolutely all countries deal with “CE” and

“sustainability” or “sustainable development”. Besides, Sweden, for example, mostmainlyearches “resource efficiency”, “business model” and “circular business models”. Finland deals with “bioeconomy” and “business models”. India is most associated with “ Industry 4.0”, whereas China, to a more extent deals with “recycling”. (Figure 3).

As for university affiliation, Lund university is the leading one in the number of papers published (46 papers) as well as in the number of keywords dealt with. Lund University has publications on 9 out of 10 key research areas in the field of CE. Among universities from emerging markets, only the University of Johannesburg is reflected, which, in addition to CE and sustainability, also studies Industry 4.0. (Figure 4).

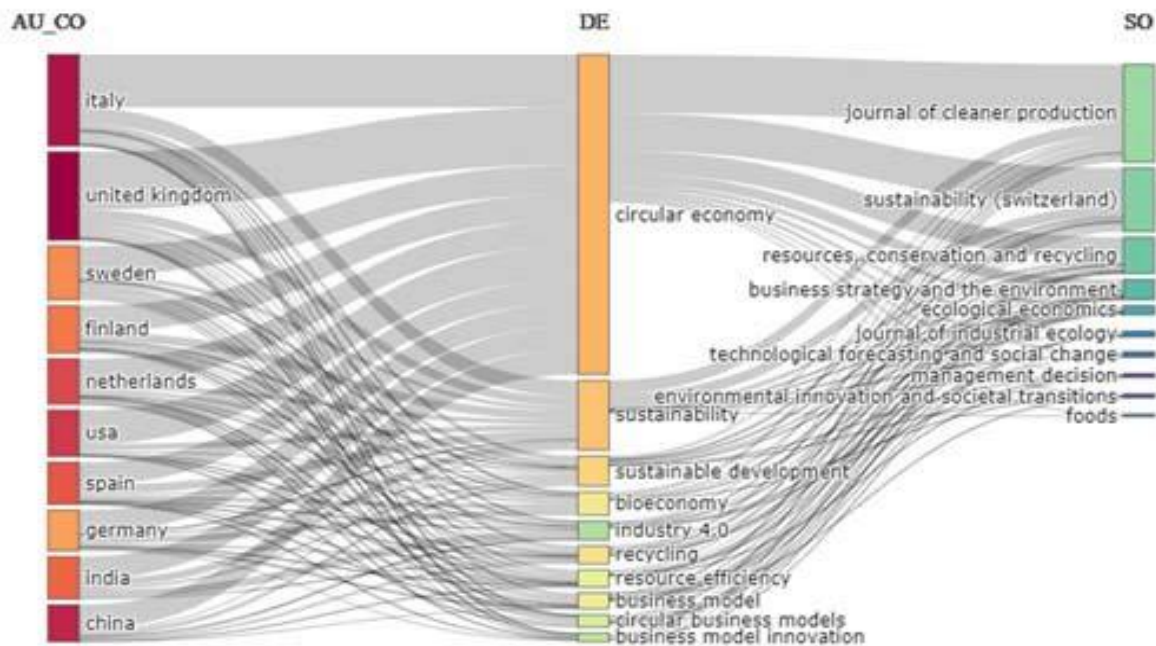


Figure 3. Three-fields plot (Author’s country – author’s keywords – source)

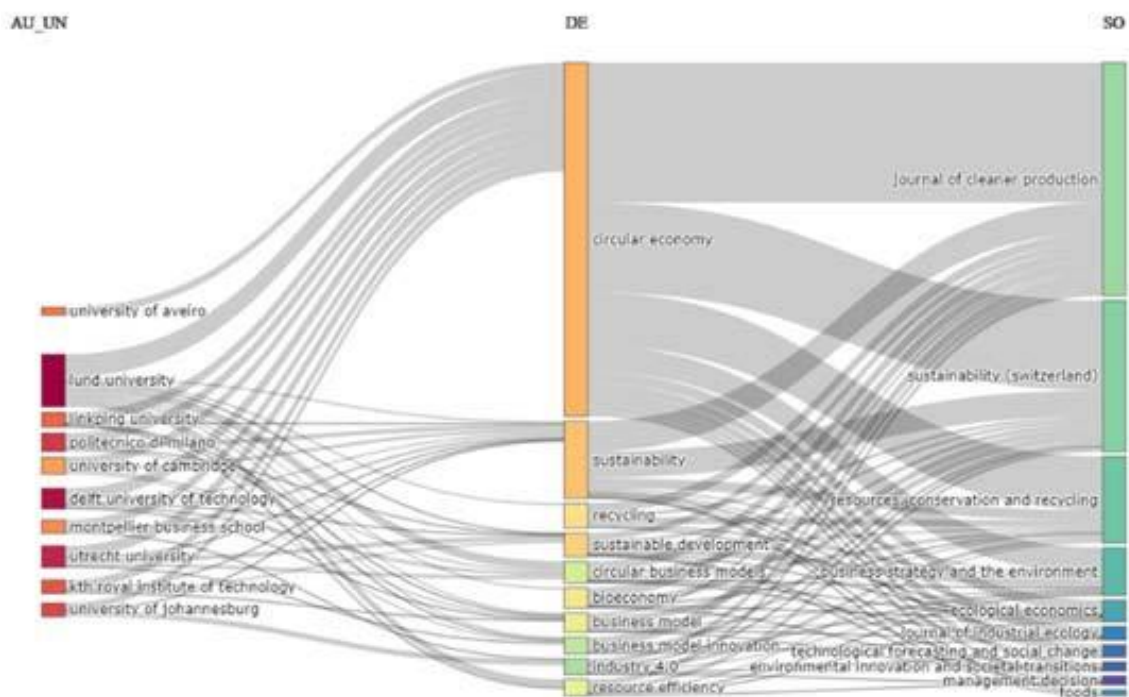


Figure 4. Three-fields plot (Author’s affiliation – author’s keywords – source)

Most relevant sources

Among the top 3 relevant journals which have published the most significant number of papers in the investigated field are the Journal of Cleaner Production, Sustainability (Switzerland) and Resources, Conservation And Recycling

(Figure 5). Almost half of the review collection is published in three journals. According to Bradford’s law (Figure 6), the core is composed of two journals, namely by Journal of Cleaner Production and Sustainability (Switzerland). These two journals have published 40% of the entire collection.

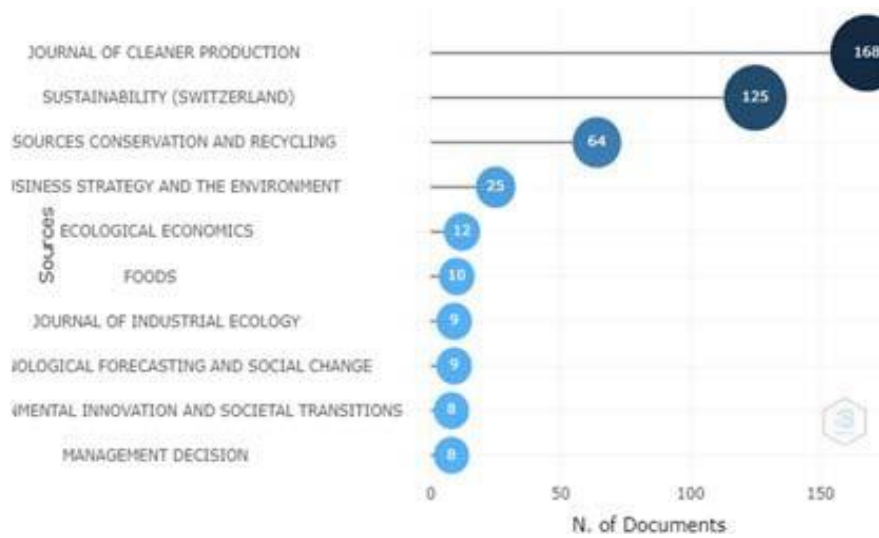


Figure 5. Most relevant sources

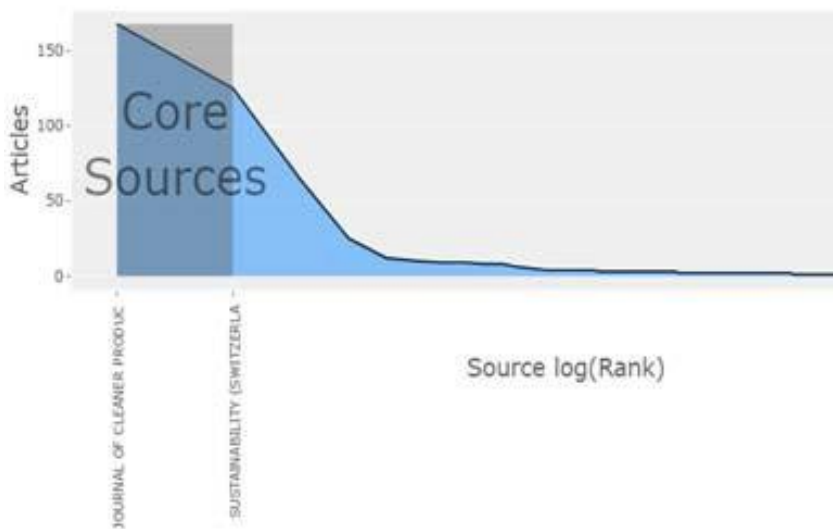


Figure 6. Core sources by Bradford’s Law

Most relevant affiliations

Lund University and the Delft University of Technology are the most relevant affiliations with 22 and 17 papers affiliated with these two institutions, respectively (Figure 7).

According to Figure 8, the most intensive international collaboration is observed in such countries as the UK, China, and Finland. Less intensive international collaboration takes place in Netherlands, Sweden, Germany, Spain, India and Poland.

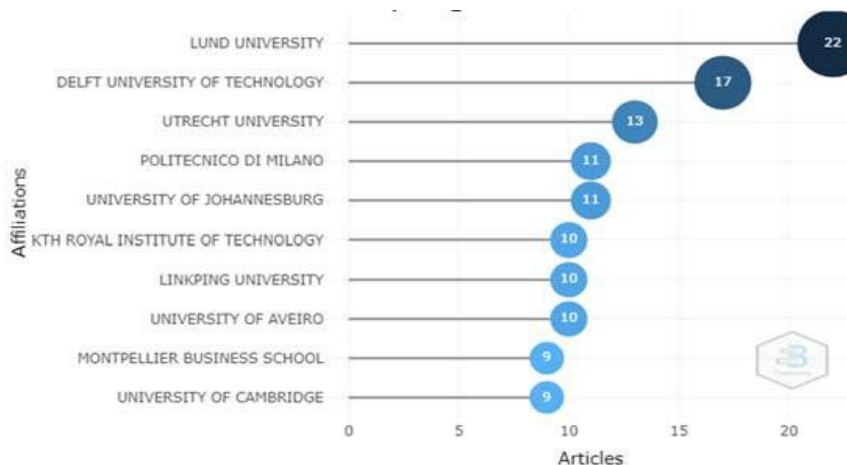


Figure 7. Most relevant affiliations

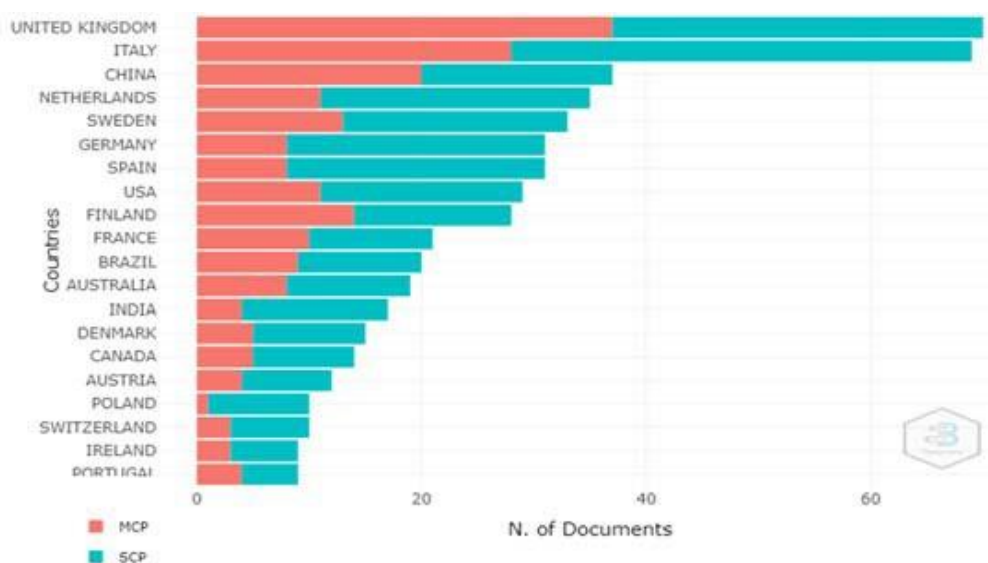


Figure 8. Corresponding author’s country

Co-occurrence network

A co-occurrence network was formed using R-package Bibliometrix with the application of Biblioshiny tool. The author’s keywords with Louvain clustering algorithm were used.

There are six main clusters on the co-occurrence network (Figure 9). The basic, central, as well as largest cluster, is “Circular economy”. “Sustainability” is the second largest node in the CE cluster, which follows the CE node. “Sustainability” is inside the CE node, which means that these two concepts are closely related to each other. Therefore, it is quite possible that the majority of ongoing research explores these two concepts in interrelation. The same applies to the concept of “Industry 4.0”, which is also located within the boundaries of the CE node. Other nodes of the same cluster, closely located to the central theme of CE, are “recycling”,

“reverse logistics”, “business models”, “sustainable development”, “supply chain”, “circular supply chain”, “e-waste”, “China”. It can be assumed that all these topics are relevant research areas in connection with CE. The reflection of China as a representative of emerging economies on the thematic map indicates its separate role in CE study.

The following largest clusters after the CE are “resource efficiency” and “business model innovation”. These two keywords are bridging in their clusters. Cluster of “resource efficiency” includes such keywords as “reuse”, “remanufacturing”, “waste management” and “life cycle assessment”. “Reuse” and “remanufacturing” refer to value retention options. Their reflection on the thematic map indicates the relevance of these topics in the context of CE, including for emerging economies. The “business

model innovation” cluster includes the keywords “circular business model” and “sustainable business model”, which also indicates the

growing importance of these concepts in the study of CE. The smallest and most peripheral clusters are “governance”, “closed-loop supply chain” and “supply chain management” (Figure 9).

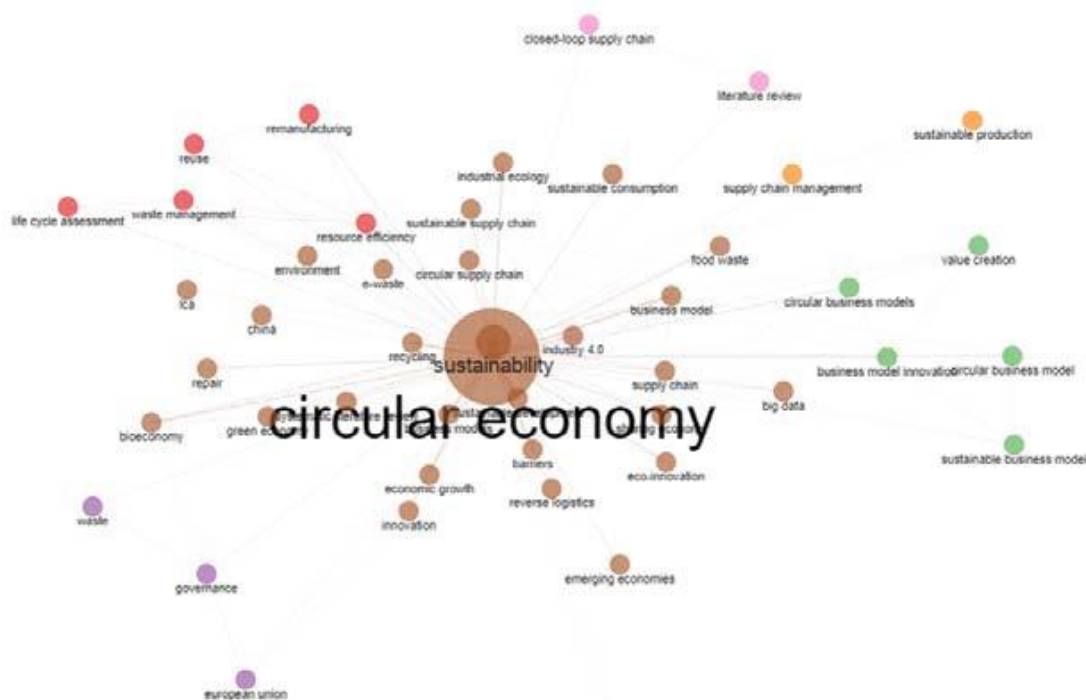


Figure 9. Co-occurrence network

Thematic map

Figure 10 shows a current state-of-the-art of CE research in the context of emerging markets. For obtaining thematic map author’s keywords were used and minimum cluster frequency of points was set. Moreover, full data sample of 716 papers was used for the thematic mapping.

Among central clusters the largest one is “circular economy” which includes such frequently occurring keywords as “sustainability” and “sustainable development”. Moreover, within the “circular economy” cluster, there is an emphasis on “circular business models”. “Recycling” together with “resource efficiency” and “waste management” form the second largest central cluster. Another keywords with high occurrence number here are “remanufacturing”, “life cycle assessment”, “reuse”, “ewaste”, “repair”, “sustainable consumption”. Another fairly large cluster, closely located to the “recycling” cluster, is the “industry 4.0” cluster. This cluster focuses on the concept of circular supply chain. Besides, the keyword “China” is highlighted separately here. The cluster “barriers” together with keywords “big data”, “emerging economies” is on the verge of becoming a central topic.

As for motor themes, the only “bioeconomy” cluster relates to this category. Unlike motor themes, peripheral topics are represented by larger number of clusters. The largest peripheral clusters are “industrial ecology” and “circular business models”.

Trend topics

Trend topics include such themes as “circular business model”, “sustainability”, “recycling”, “Industry 4.0”, “waste management”. This goes in line with the results of cooccurrence network. The concept of “reuse” was quite wide-spread in 2018, followed by the increasing popularity of “remanufacturing” and “waste management”.

Thematic evolution

Thematic evolution shows an extension of research areas. Recycling was divided into 5 topics such as sustainable development, waste management, electronic waste, environmental impact. Economics was incorporated into waste management.

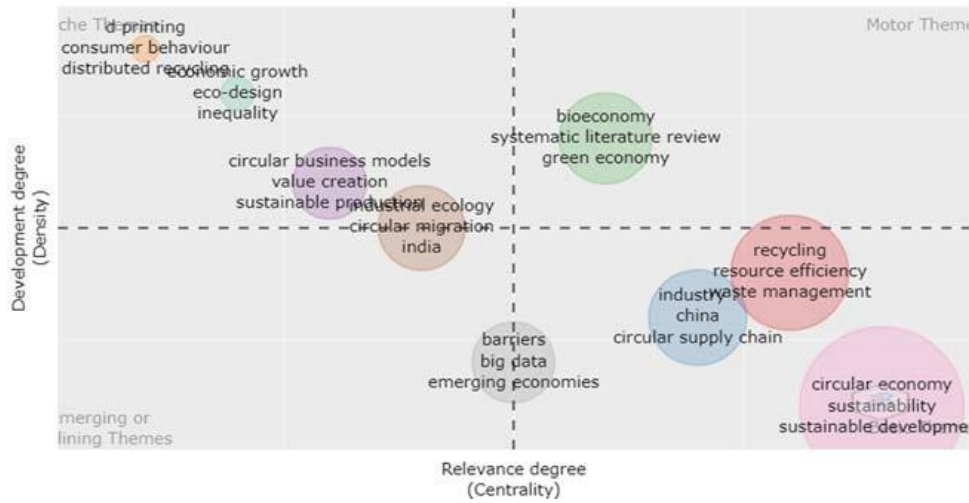


Figure 10. Thematic map

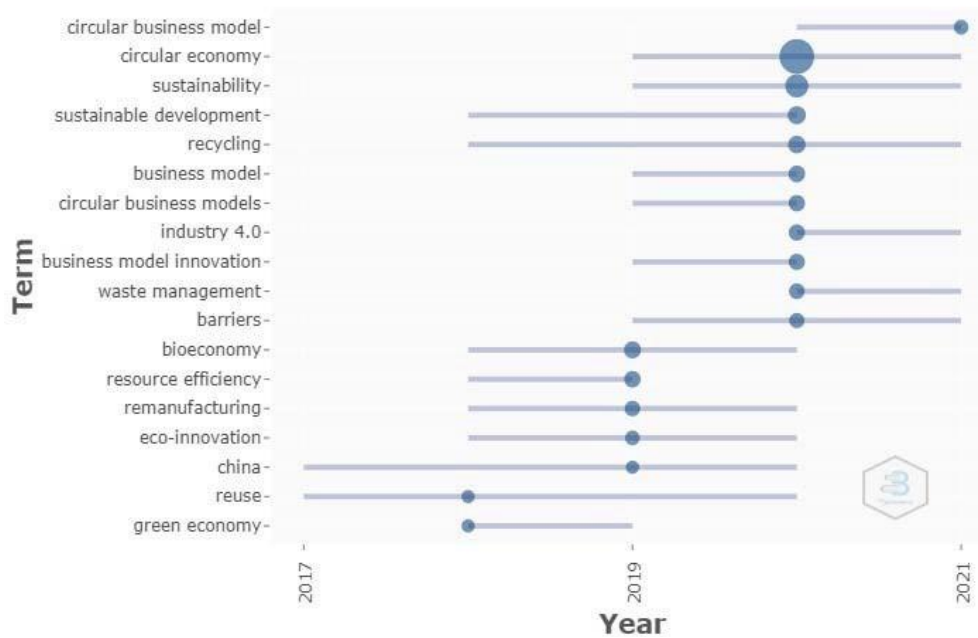


Figure 11. Trend topics over 2017-2021

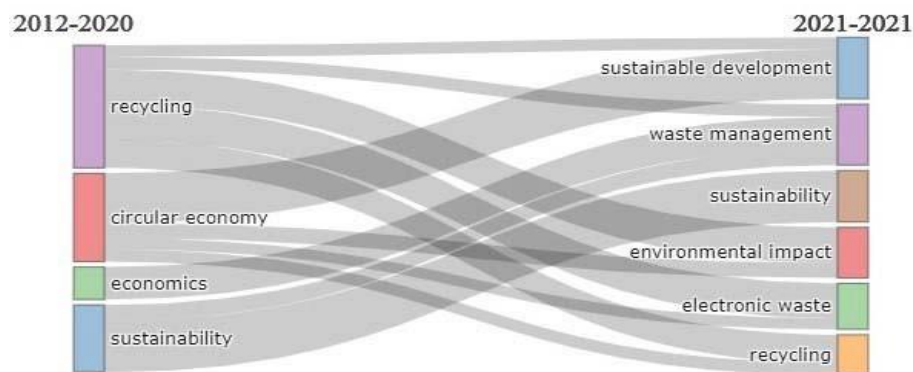


Figure 12. Thematic evolution over 2012-2021

Except for the current state of research, the thematic map reveals changes in theme temporal development. The full sample of 716 papers was used for the thematic evolution. This dataset was split into three-time slices. Time slices were chosen according to the degree of publication activity. The first time slice (2012-2015) contains relatively poor publication activity (Figure 2 – Annual scientific production), whereas the second time slice (2016-2018) is witnessing the growth of publication activity. As for the third time slice (2019 - 2021), is characterized by the explosive growth of publication activity (Figure 2 – Annual scientific production). The author’s keywords that occurred at least five times (min Freq.) per subperiod were illustrated in the resulting three thematic maps (Fig. 13-15). In each thematic map, the y-axis measures the density, and the x-axis the centrality of the identified themes. The volume of the spheres is proportional to the cumulative frequency of the keywords (Schöggl et al., 2020).

CE research in emerging markets context between 2012 and 2015

As can be seen in Fig. 11, during the first four years of CE in emerging markets related research, a total of six themes could be identified as the key ones. “Economic growth” being the largest and the only basic theme contained 11 occurrences including such themes as “economic growth”, “epidemiology”, “health”, “inequality”, “poverty”. “Circular economy” was the only motor theme containing four occurrences during 2012-2015. During this period, the CE theme was strongly connected to other clusters as well as highly developed. The theme of “emerging markets” with high density but relatively low centrality represented an isolated peripheral theme. The topics of “China”, “circular migration” and “Romania” were among the emerging themes.

As for CE research in the context of emerging markets during the first time slice, there was a separate specialized theme “emerging markets” and an emerging theme “China”, indicating the leading role of China as an emerging economy in CE research.

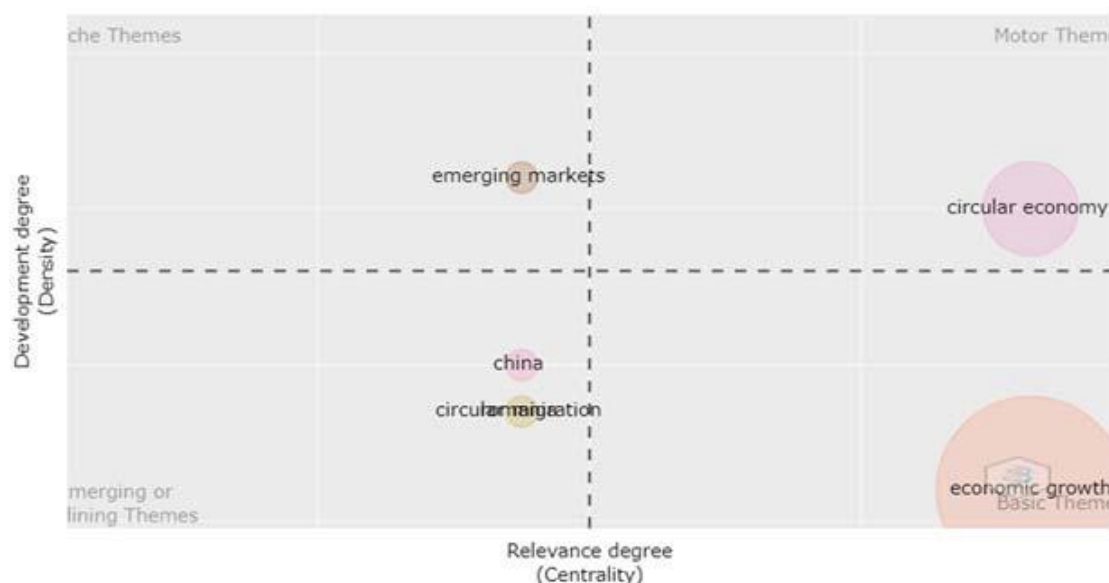


Figure 13. Thematic map of circular economy in emerging markets research between 2012 and 2015 (n = 25 papers). Sphere size is related to the number of publications associated with a theme.

CE research in emerging markets context between 2016 and 2018

Between 2016 and 2018, six times more articles were published than in the previous period (153 compared to 25). The number of themes increased by two times and amounted to 12. Such a rather noticeable increase in the number of topics indicates the expansion of research areas. As illustrated in Fig. 12 the theme of “economic

growth” disappeared as a separate theme and became part of the “circular economy” cluster, which became the basic theme. The CE-related theme showed the largest occurrence number (ON) of 147, followed by the themes “bioeconomy” (ON = 19), “re- manufacturing” (ON = 12), “circular migration” (ON=9), and “collaborative consumption” (ON=8). The R-strategy “remanufacturing” emerged as a separate theme

and together with “India” were also basic and intersected themes with high centrality. The period also witnessed a growing focus on collaborative consumption (economy).

The theme of “circular migration” had expanded and increased its density, moving from the category of declining/emerging to the category of isolated ones. “China” was incorporated into the “decoupling” cluster, having increased its importance in terms of both density and centrality. The remaining ten clusters only emerged from 2016 to 2018. The majority of newly emerged themes were the motor ones (“collaborative consumption”, “decoupling”, “scenario analysis”, “product development”). Besides, “Green supply chain management” appeared as a separate emerging/declining theme.

During this more active period of research, a total of 29 keywords were part of the CE-related theme, with the highest keyword occurrences being for “circular economy” (89), “sustainability” (12), “sustainable development” (10), “resource efficiency” (8) and “recycling” (7).

As for CE research in the context of emerging markets, in the second time slice, the cluster of “emerging markets” disappeared. However, the basic theme “India” became separate, indicating the rising role of India in dealing with CE research. Besides, the keyword “China” remained, being incorporated in “decoupling” cluster, and thus, having raised both its density and centrality. This indicates the continuing growing importance of China in the study of the circular economy.

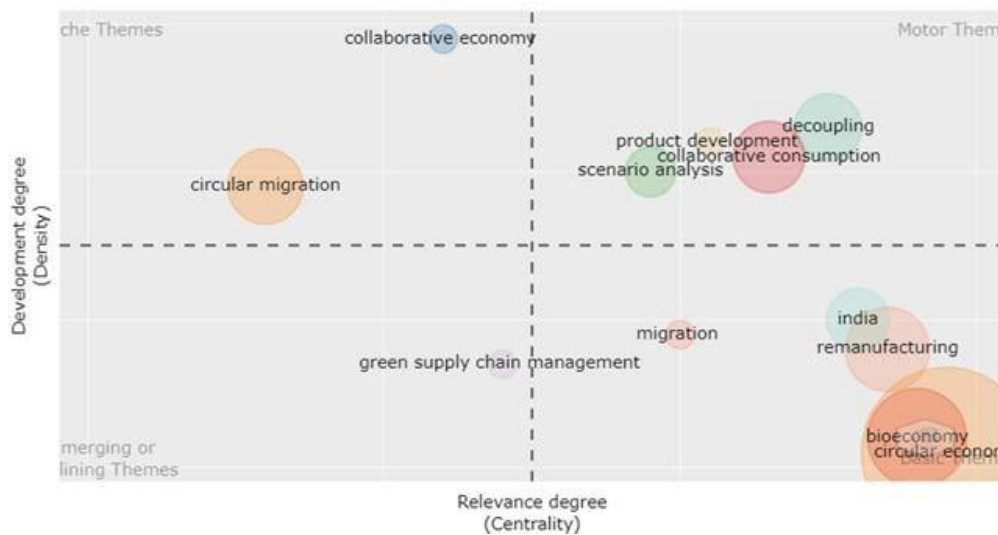


Figure 14. Thematic map of circular economy in emerging markets research between 2016 and 2018 (n = 153 papers). Sphere size is related to the number of publications associated with a theme

CE research in emerging markets context between 2019 and 2021

Figure 13 shows the third thematic map for the years 2019-2021. In this period, there was more than threefold increase in the number of publications (153 to 538), though the number of themes was almost the same (11). “Circular economy” is still the largest basic cluster, having increased the number of publications by 4 times. Within the framework of the “circular economy” cluster, the number of articles on the topic “sustainability” and “sustainable development” has increased by 8 and 2 times respectively. In comparison with the previous period, it can be noted that “circular economy” has branched out into such topics as “circular business models”, “recycling” and “barriers”.

As depicted in Figure 13, “recycling”, which relate to the R-strategy, separated from “circular economy” and emerged as an independent theme increasing its density. Within “recycling” there is an emphasis on “waste management” (24 occurrences) and “life cycle assessment” (LCA) (17 occurrence). Perhaps “waste management” and “LCA” will also become independent research areas.

Some themes from the previous period were integrated into the framework of larger clusters. For example, “collaborative consumption” became part of two clusters simultaneously (“CE” and “bioeconomy”), while “remanufacturing” was integrated into the “CE” and “industrial ecology”.

“Bioeconomy”, being on the border between basic and motor themes, has strengthened its

internal links, becoming more developed and specialized. Such clusters from the previous period as “circular migration” and “India” were incorporated into “bioeconomy”.

Such keywords as “industry 4.0”, “circular supply chain”, “sustainable supply chain”, “sustainable production”, “circular fashion” form the motor theme “industry 4.0”.

The “big data” which also includes “reverse logistics”, “emerging economies”, “IoT”, “artificial intelligence”, “blockchain”, “digitalization” is maybe on its way from emerging themes to basic ones.

Among specialized themes, which have strong internal ties but weak external ones, are such themes as “circular business models”, “circularity indicators”, “Brazil”, “3d printing”. As for “circular business models”, this theme can be fully developed further, since the “CE” cluster contains a significant number of publications on the topic of business models, including circular ones (59 occurrences). Such keywords as “closed-loop supply chain”, “circular supply chain” are contained in almost all four quadrants and are clearly arousing increasing scientific interest.

The number of “India” and “China” occurrences has increased by 3 times, which indicates the continuing growth of importance of these countries among developing ones in the study of circular economy concept.

It is worth noting that keywords such as “consumer behavior” (6), “consumer perception” (2), “consumer attitudes” (2), “purchase intention”

(3) are commonly met in almost all quadrants, in particular within the framework of the basic topics of “industrial ecology” and “circular economy”, the motor topic of “industry 4.0”, and the specialized topic of “3d printing”. This may indicate that the topic of consumer behavior, consumer preferences and attitudes is of increasing interest.

As for the context of emerging markets, such keywords as “emerging economy”, “developing countries”, “emerging markets” are found in such clusters as “barriers”, “big data”, “industry 4.0”. This suggests that in the context of emerging markets, barriers to CE implementation, as well as the linkage between industry 4.0 and CE are of the greatest interest. In addition, “Brazil” appeared as a separate cluster, indicating the growing role of this country in the study of CE issues.

In general, over the three-time slices, “circular economy” moving from the category of motor topics, steadily settled in the category of basic, central topics. “Bioeconomy” has separated, becoming an independent field of research. There is an emphasis on studying the role of Industry 4.0 technologies in the implementation of CE. The interest in studying the role of circular business models has also increased. In addition, the circular supply chain theme is gaining popularity. The role of China and India as emerging economies continues to strengthen. Moreover, Brazil has become a new representative of emerging markets actively involved in CE research.

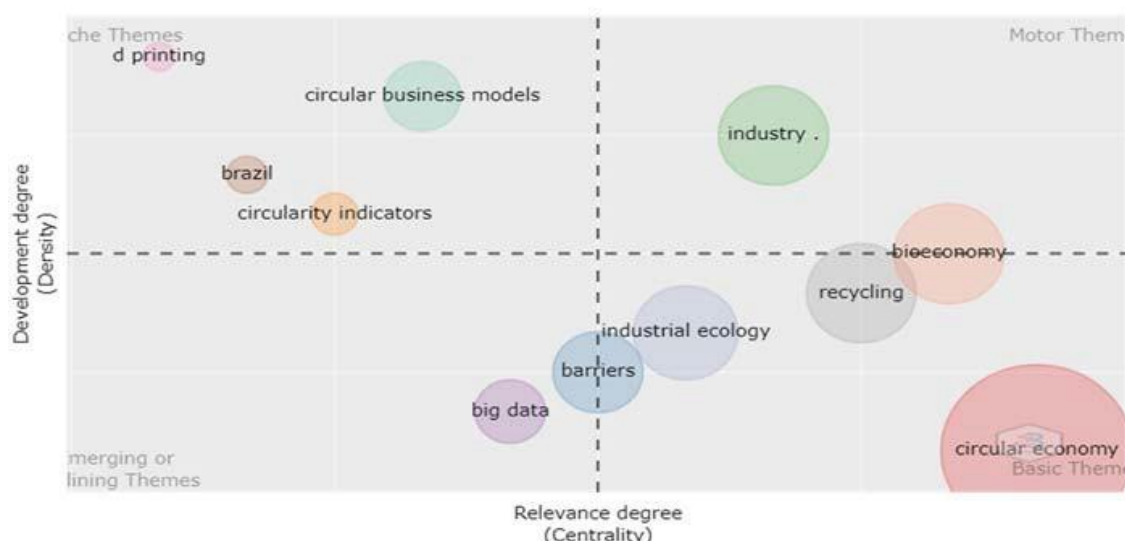


Figure 15. Thematic map of circular economy in emerging markets research between 2019 and 2021 (n = 538 papers). Sphere size is related to the number of publications associated with a theme

Content analysis results

A qualitative content analysis was also performed to complement the previous quantitative bibliographic analysis of circular economy in emerging markets context. This entailed identifying the 30 most relevant and influential papers from the circular economy in emerging markets literature, i.e. those with the highest total citation score. The list of these 30 papers is reflected in Annex 3.

First, we identified key research streams that are of the greatest scientific interest. Then, we identified the key countries and industries, which were the basis for most of the studies conducted. Also, we identified value retention options, the most common in CE research in the context of emerging markets.

Annex 1 shows key research streams among which barriers and drivers to CE implementation in emerging markets is the most studied ones. Among the most common drivers of CE development, the authors identify attitude, social pressure, environmental commitment, consumer behavior, institutional pressures [15,10,16]. For instance, Singh et al. explored CE readiness in manufacturing SMEs in India and concluded that green economic incentives, environmental commitment as well as owner-manager's attitude significantly influence circular economy readiness. Moreover, social pressure is another important determinant that expedites CE readiness. Community and market also impose external pressure on manufacturing firms. Thus, Singh et al. (2018) validate the role of external referents or social pressure in inducing green intention among small firms [15]. Patwa et al. agree with Singh et al. that an attitude and behavioral change by consumers are a fundamental condition for the development of CE [10].

The range of barriers is wider and is represented by a number of factors (Annex 2). The classification of Cantu et al. is taken as a basis [9]. Most often researchers identify such barriers as low awareness and lack of environmental education [17,18, 19, 20, 21], which leads to insufficient development of selective disposal. In addition, lack of regulatory incentives and insufficient infrastructure are also common barriers hindering CE development in emerging economies [17, 20, 21].

The second largest stream explores the influence of Industry 4.0 technologies on CE implementation. Research conducted by Modgil et al. [22] demonstrates the role of big data as an enabler to meet circular economy standards as well as a diagnostic tool for waste and other possible scenarios to comply with circular goals. Ajwani-Ramchandani et al. suggest use a mobile

application with AI technology to control the quality of segregation as well as get details of the composition of the recyclable waste. Moreover, features of the blockchain technology let track the onward journey of the packaging waste [23].

Regarding purchase intention of remanufactured products, price transparency and price gap between remanufactured products and new products are found to have the biggest impact on purchase intention. Moreover, knowledge of remanufacturing process together with its environmental contribution are important factors for purchase intention improvement [24].

As for value retention options, the only two R-strategies were considered in the reviewed literature, namely remanufacturing and recycling, which is in line with thematic map results. It means that the remaining R-strategies like reuse, reduce, repurpose, refurbish, refuse, etc. have been ignored by scholars or have no place to be in emerging economies.

As for emerging economies, on the example of which the studies were conducted, the most common research object is the practice of China, India, Brazil and the countries of Southern and Northern Africa. The former three are also reflected on thematic maps, but African countries have not yet been reflected there. In the industry context, the vast majority of studies were conducted on the example of the automobile industry, agriculture and manufacturing.

Discussion

In this section, the research findings are contextualized within the current CE in the emerging markets debate.

Research question 1

With regards to the first research question (1) What research streams, concepts and topics can be distinguished in the field of CE in emerging markets from a longitudinal perspective? – The present study, to a certain extent, confirmed the results of previous reviews. As for barriers, the most studied topic, Cantú et al. also indicate poor understanding of consumer's behavior as a factor of both boosting or deterring companies' CE initiatives [9]. In this regard, Wang & Kuah revealed that consumer's status – consciousness influences purchase intention related to remanufactured products [25]. Also Cantú et al. highlighted consumer perception toward remanufactured and reused products as a barrier, because consumers prefer virgin products. They likewise identified lack of adequate legislation, irregular infrastructure as barriers to CE implementation in emerging markets [9]. Current research results are also in line with Patwa et al.

[10] who define consumer awareness as the key factor in the adoption of CE principles in emerging economies.

Moreover, such topics as CE economy and Industry 4.0 technologies, consumer behavior, attitude and green marketing, circular economy business models, waste management, circular supply chain are among key research streams in the body of literature on CE in emerging markets.

It is worth noting that content analysis results coincide with those of the thematic map: the basic topics are also waste management, industry 4.0, circular supply chain. Barriers, big data as one of industry 4.0 technologies and emerging markets form a single cluster that is about to become a central topic. Circular business models and consumer behavior are emerging, niche topics with high internal connections. This suggests that taking into account the results of the content analysis, scientific interest in these areas is likely to grow.

Research question 2

With regards to the second research question (2) What are the features and conditions of CE implementation in emerging markets? – Within the framework of this study, a review and systematization of the features and conditions of CE implementation in emerging markets were conducted.

Implementation of CE in emerging markets is accompanied by the presence of such barriers as low awareness, lack of environmental education and commitment, insufficient infrastructure, including selective disposal, lack of regulatory incentives. Some authors note that in emerging economies like India, repair and reuse has been the traditional norm [10]. Nevertheless, an increasing number of studies on remanufacturing and recycling may indicate the desire of emerging markets to develop these R-strategies.

A number of authors note the peculiarities of consumers in Asian markets, in particular, the fact that Asian consumers are largely inherent in the status or face consciousness. Asian consumers purchase luxury goods to showcase their social status, achievement, wealth, and prestige [26]. Wang & Kuah found that, in general, status-conscious consumers are not interested in purchasing remanufactured products because they consider such products inferior goods, indicated by their lower price [25]. These authors also indicate that companies should not expect this group of consumers to buy remanufactured products without any marketing effort. However, upon perceiving the green attributes of remanufactured products, their

purchase intention increases, as they can showcase their prosocial behavior and altruism by purchasing these products. Therefore marketers could use green marketing to appeal to consumers by redefining “green” as a prosocial behavior [25]. This feature of the Asian markets may affect the CE implementation there, especially in terms of remanufacturing and recycling.

Another feature of emerging markets is the absence of articulation among stakeholders of the innovation ecosystem due to the low level of communication between public and private organizations [27]. This may also hinder the CE development in emerging markets. Moreover, in emerging economies, regulatory pressure and legal compliance significantly dominate and sensitize small firms in the promotion and adoption of green technological initiatives [15]. Patwa et al. also assert that the government plays very important role in seeding the adoption of CE concepts in emerging economies [10].

Thus, to the best of authors’ knowledge, it is the first time when a systematic review on CE in *emerging markets* context was conducted. There were only one literature review, which partially relates to the theme of CE in emerging markets. However it consider only certain research area on the topic of circular economy. Cantú et al. conducted a theoretical review on drivers and barriers to CE implementation [9]. For the first time, the present article has conducted a comprehensive and systematic review of research in the field of CE in the context of emerging markets, mapping the main research streams, features and conditions of CE implementation in emerging markets.

The fact that we determined and systematized these main research streams, features and conditions would allow scholars to be aware of trend topics, as well as to study in more depth the features of emerging markets in the context of CE implementation. Knowledge of the features of emerging markets, in turn, will allow policymakers to implement CE principles in this kind of market more effectively.

Conclusion and future research directions

The objective of this study was to shed light on research streams, their current state and evolution, implementation features of CE in emerging markets as well as potential future research directions on this topic. To do this, a mixed-methods approach was adopted, combining a systematic bibliographic analysis and content analysis

The results indicate that in general, it is a stable increase in scientific production on CE research since 2015. The largest cluster is formed

by “circular economy” together with “sustainability” and “sustainable development”. Moreover, circular business models are also emphasized. Other central topics include “recycling”, “resource efficiency” and “waste management”. Bioeconomy has become an independent field of research. The role of Industry 4.0 technologies in the implementation of CE, as well as circular supply chain themes, are gaining popularity.

Content analysis let derive key research streams that are of the greatest scientific interest. They are barriers and drivers to CE implementation in emerging markets and the influence of Industry 4.0 technologies on CE implementation. Remanufacturing and recycling are the only two R-strategies that were considered in the reviewed literature.

As for implementation features of CE in emerging markets such barriers as low awareness, lack of environmental education and commitment, insufficient infrastructure, lack of regulatory incentives accompany the implementation of CE in emerging markets. Moreover, status or face consciousness is inherent in Asian consumers, which in turn can influence CE implementation in terms of remanufacturing and recycling.

The following suggestions can be made based on the findings regarding further research. First, it was noted that most research was conducted on remanufacturing and recycling value retention options. It would be interesting to see more research on other R-strategies like reuse, reduce, repurpose, refurbish, etc. In addition, there is a lack of research in the field of consumer behavior, namely purchase intention, concerning other R-strategies except remanufacturing (especially reuse, recycle).

Although not much, there are studies on the impact of big data on CE development. However, very little has been studied on how other Industry 4.0 technologies, such as blockchain, augmented reality, or the IoT affect CE implementation in general and circular supply chain in particular [23,28]. Future research may investigate the influence of top management on achieving circular business objectives. It will be interesting to identify the restorative capability of the products derived from the recycling processes so whether recycled products can be further recycled or whether they can potentially affect the environment [20].

Most of the studies are conducted on the example of manufacturing industries. Future researches may analyze CE implementation in service-based sectors.

Due to the active economic growth of developing countries and the strengthening of

urbanization processes in these countries, the construction sector will be increasingly relevant for this kind of country. Therefore, studies on CE potential in the construction sector of emerging markets may be important. Moreover, a study comparing drivers and barriers between developed and emerging economies would be interesting. In addition, a comparison of features inherent in emerging markets and affecting CE implementation in these countries with those ones in developed markets would be an interesting scientific contribution.

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