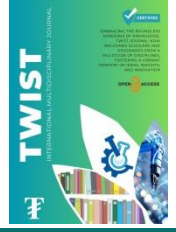




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Circular Economy for a Sustainable Future: Re-evaluating Resources

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Abstract

The 21st century seems to be a period in which environmental, social and economic problems are increasing day by day for humanity and the universe. Different stakeholders are endeavouring to develop solutions to solve these problems. One of the most recent and current topics of these efforts is circular economy. In terms of its relationship with sustainability, it is seen that there is still a limited number of academic studies on this subject, which has become a topic that attracts attention not only in the field of business, but also in design, engineering and many other fields. In this context, the aim of this study is to examine the master's theses, doctoral dissertations and academic studies published in international journals in the last 10 years in Turkey that research sustainability and circular economy in the field of business administration and to summarise the findings here. The results of the study show that although the circular economy has started to gain a place in academic studies in the last five years, there are still not enough studies and contributions, and the existing studies generally consist of literature reviews and conceptual studies.

Keywords

Circular Economy, Sustainability, Conceptual Study

INTRODUCTION

Loss of biodiversity, environmental issues such as water, air, and soil pollution, depletion of resources, and excessive land use, along with social factors such as high unemployment, poor working conditions, social vulnerability, poverty trap, increasing inequalities, bring along economic and financial problems due to reasons like social causes and supply risk, problematic ownership structures, unregulated markets, and flawed incentive structures. The concept of the circular economy is seen as an important way out for solving these problems, and companies and managers are increasingly becoming aware of the opportunities promised by the circular economy and understanding the value potential for themselves and their stakeholders (Geissdoerfer et al., 2017).

The new development understanding brought by the United Nations has transitioned to a new model that considers the social, economic, and cultural dimensions of development rather than unlimited growth. This perspective focuses on staying within the planet's boundaries. Along with this perspective, the concept of circularity has become more talked about, making it necessary to adopt a paradigm that focuses on the quality of life and sustainability of existing generations as well as future generations (Erdölek-Kozal and Barbaros, 2020; Şen and Tarabah, 2020).

According to CGRI (2021) (Circularity Gap Report 2021), it is emphasized that global circularity needs to double from the current rate to avoid the worst climate scenarios (8.6% → 17%). Research indicates that the world has become less circular compared to the previous year. The report shows that 100 billion tons of materials are consumed annually, while the world is also 1 degree warmer compared to pre-industrial times.

It is inevitable to review the current situation regarding this issue, which is slowly gaining importance in academia and working life. In this context, within the scope of the study, six business and economics master's and doctoral theses written in Turkish were accessed through searches conducted at the National Thesis Center between 2010 and 2022 using keywords such as "circular economy" and "circular economy and sustainability". In addition, 19 articles written in English were examined through research conducted with similar keywords on Google Scholar covering the years 2010-2022. In the study, firstly, the circular economy and other related concepts were explained, and the relationship between circular economy and sustainability was elucidated. Subsequently, the steps taken in the business world towards the circular economy were shared. In the ongoing section, Turkish master's and doctoral theses and English articles examining the relationship between circular economy and sustainability were examined, and the study was completed with a general evaluation and discussion section on the subject.

CIRCULAR ECONOMY AND SUSTAINABILITY: BASIC CONCEPTS

Discussions on the concept of Circular Economy have actually been gaining momentum since the late 1970s (EMF, 2013 cited in Geissdoerfer et al. 2017). Andersen (2007), and Ghisellini, Cialani and Ulgiati (2016) attribute the introduction of the concept to the work of Pearce and Turner (1989). They explore the linear characteristics of contemporary economic systems, explaining how natural resources affect the economy by providing inputs for production and consumption and acting as a sink for outputs in the form of waste (Geissdoerfer et al. 2017). In order to understand the essence of the concept, it is necessary to define what circularity refers to.

Circularity

The Industrial Revolution not only enabled increased production but also led to escalated harm to both humans and the planet, resulting in the emergence of waste issues due to an economy focused more on production and consumption. This necessitated new perspectives. Initially, waste management, and subsequently recycling practices as a means of generating income and employing new technologies, began to emerge in the 1990s. While initially defined narrowly as the recycling of waste in production, packaging, distribution, and consumption stages, the concept of circularity has evolved to encompass various practices such as reuse, alternative usage, produce-reuse-reproduce-recycle, and others (Erdölek-Kozal and Barbaros, 2020; Şen and Tarabah, 2020).

Circular Economy

The contemporary understanding of the Circular Economy and its practical applications to economic systems and industrial processes have evolved to include features and contributions different from various concepts sharing the idea of closed loops. The most common definition of the Circular Economy by the Ellen MacArthur Foundation describes it as "an industrial economy that is restorative or regenerative by intention and design" (2013, cited in Geissdoerfer et al., 2017). Webster (2015, cited in Geissdoerfer et al., 2017) provides a more detailed description, stating that the Circular Economy is "an economy designed to be restorative by nature and aims to keep products, components, and materials at their highest utility and value at all times." Finally, Bocken et al. (2016) define the characteristics of the Circular Economy as "design and business model strategies that slow down, close, and narrow material loops." Considering different concepts and definitions, Geissdoerfer et al. (2017) define the Circular Economy as "a regenerative system that slows down, closes, and narrows material and energy loops, minimizing resource input and waste, emissions, and energy leakages." Achieving this involves designing for longevity, maintenance, repair, reuse, remanufacturing, and recycling. Today, there is a wealth of research on the Circular Economy. Much of this research focuses on examining the conceptualization, definitions, driving forces, criteria, and the role of the Circular Economy in sustainability in the research literature.

The Relationship between Circular Economy and Sustainability

While the terms Circular Economy and sustainability garner increasing interest among academia, industry, and policymakers, the similarities and differences between these concepts remain uncertain. The relationship between the concepts remains unclear in the literature, which blurs their conceptual frameworks and restricts the effectiveness of approaches in research and application (Geissdoerfer et al., 2017). Regarding its connection to sustainability, previous research suggests the existence of a relationship between the Circular Economy and sustainable development, a claim corroborated by the study conducted by Schögl, Stumpf, and Baumgartner (2020).

According to definitions made by various stakeholders, the Circular Economy appears to be connected to recycling and waste planning, but the fundamental problem stems from the lack of a clear articulation of the Circular Economy's sustainability link (Geissdoerfer et al., 2017). The solution to this problem lies in adopting a holistic perspective that considers the environmental, human, commodity, and planetary relationships in defining the concept (Erdölek-Kozal and Barbaros, 2020). Additionally, Table 1 presents ten key indicators that provide a clearer understanding of the Circular Economy.

Discussions on Circular Economy in the Business World

Alongside the increasing but still limited number of studies in academia, steps are also being taken in the Turkish business world regarding the circular economy.

Through collaboration between SKD Turkey and the European Bank for Reconstruction and Development (EBRD), contributions have been made to the establishment of the Turkey Materials Marketplace (TMM) ecosystem, focusing on the concept of the circular economy. This initiative aims to steer the business world away from traditional, low-impact methods and towards experimenting with new business models by developing various tools and technical support. Additionally, the Turkey Circular Economy Platform has been established to address the need for information/resources in the circular economy field, provide measurement mechanisms, offer technical grant support, and create collaboration opportunities (Circular Economy Platform, 2022).

In addition to these efforts, various NGOs and the United Nations Development Program (UNDP) continue their work in the "Business for Goals Platform" with the "Working Group for Green and Circular Economy." The aim of this working group is to identify areas of need for transitioning to a circular economy and to create a space for generating ideas and projects contributing to this transformation.

Furthermore, McKinsey & Company has released a special issue aimed at creating awareness in the business world about the circular economy. The issue covers topics such as developing products for a circular economy across different sectors to extract more value from resources, offering better experiences to customers, introducing a new fast fashion formula, a competitive vision for a circular economy in Europe, waste management in developing markets, and the new plastic economy, among others (McKinsey, 2016).

MATERIALS AND METHODS

Scope of the Study

In the context of the circular economy, which is increasingly debated in academia and the business world, it is observed that there are few studies addressing this concept in Turkey until 2022. Within this scope, searches were conducted for English and Turkish thesis titles and keywords published in Turkey regarding the concepts of 'circular economy,' 'circular economy,' and 'circular economy and sustainability.' Subsequently, articles with the keywords 'circular economy' and 'circular economy and sustainability' were researched in international journals. Detailed information about the examined studies is provided in the following sections and is also presented in tabular form in the appendices at the end of the study.

Literature Review

Özdemir (2018)'s master's thesis was examined. The researcher conceptualized the 7R Innovation Approach based on the circular economy perspective (resources-production-distribution-consumption-recycling and back to resources). Emphasis was placed on this new approach's foundation on natural resources and the circular economy. It is believed that this innovative approach, which will contribute to the dissemination of innovation economies in developing countries like Turkey, could bring multiplier and accelerator effects and could be easily applied.

In the second study examined chronologically, Tezel (2019) investigated the externalities created by the Edirne Solid Waste Union (EDİKAB) facility, which began operating in 2018 in Edirne, the opinions of personnel responsible for waste management services in the region, household and business attitudes towards waste separation, recycling, and environmental product labeling. According to the study's results, which aimed to examine different stakeholders' views and provide recommendations, steps need to be taken in areas such as education, effective management, legal regulations, environmental product subsidies, introduction of waste management facilities, widespread adoption of waste management facilities, transition to recycling, interagency coordination, and transparent management.

Candemir (2021) examined the transition from a linear economy to a circular economy at the country and company levels by researching the reasons for transitioning to a circular economy and the applied business models. In addition, the study shared practices in Turkey and developed countries with readers. The study demonstrates that the circular economy process often offers a competitive advantage to companies, despite being daunting. However, factors such as different consumer behaviors, scarcity of resource supply, and technological disruption lead to differences in transitioning to a circular economy for countries and industries.

Akarsu (2021) aims to contribute to the literature by examining the circular economy from the perspective of the tourism sector. In this context, the researcher identified 8 critical success factors through a literature review. These criteria include strong and compelling legal regulations, support from public institutions (tax incentives, grants, subsidies, etc.), ease of access to financing, dedication of top management, technical equipment and knowledge of the business, company culture, awareness level of society and customers, and collaboration and coordination with stakeholders. The research results emphasize that 'Dedication and leadership of top management' is the most critical success factor among the 8

factors identified for tourism businesses in transitioning to a circular economy. The literature review conducted also supports the notion that the results and recommendations of this study are not limited to the tourism sector alone. Yılmaz (2021) examined the concept of circular economy from the perspective of waste management and investigated the suitability of transitioning to resource management through a PEST analysis. The study results indicate that in Turkey, the political infrastructure regarding the circular economy needs to be established and supported with economic and technological tools. The continuity of environmental awareness campaigns, another finding, is supportive of other studies in the literature.

Ekmekci-Yüce's (2020) doctoral dissertation focuses on investigating the extent to which circular economy, green management practices, and innovation affect firm growth performance in the manufacturing sector. It was aimed to determine that green management and innovation positively affect companies' growth performance, while costs associated with green production negatively affect company performance. No positive or negative effect of circular economy on firm growth performance was observed, and the likely reasons for this were outlined by the researcher. Accordingly, reasons such as low awareness of the circular economy, unawareness that practices are carried out within the scope of the circular economy, and the concept focusing only on environmental benefits while ignoring the economic aspect were identified. The research underscores the need for developing circular economy models in Turkey. It is also noted that the circular economy concept is not limited to environmental issues alone, and its relationship with production activities and concepts of sustainable growth and development is not clearly understood.

It is observed that there are still few studies and efforts in the academic and practical fields where master's and doctoral theses concentrate their topics. However, it is noteworthy that there is a concentration on keywords such as circular economy, sustainable development, waste management, and sustainability. Moreover, it is notable that awareness of the circular economy is still low, there is a universally applicable perspective in every sector, and contributions from different stakeholders are required.

RESULTS, DISCUSSION AND CONCLUSION

While the importance of the concept is acknowledged for academia, policymakers, and businesses, the conceptual relationship between the circular economy and sustainability remains unclear. This ambiguity could potentially have detrimental effects on the advancement of sustainability science and the dissemination of applications based on these concepts. Therefore, this research aims to contribute to conceptual clarity by investigating the similarities, differences, and relationships between the two concepts in theory (Geissdoerfer et al., 2017).

The research reveals that the study of the circular economy is relatively new in Turkey, as evidenced by the limited number and publication dates of thesis studies. Examination of the methodologies used in these studies highlights the predominance of theoretical and conceptual frameworks, with few empirical studies on the subject (Özuyar & Gürsoy, 2021).

Future research needs to explore the relationship between the circular economy and emerging concepts such as performance economy and sharing economy, which represent new business models. Furthermore, investigating the effects of supply chains, business models, and innovation systems on performance would enhance understanding of the relationship between the circular economy and sustainability. Many other literature review studies also offer suggestions for future research areas, such as the role of the circular economy in sustainability (Goyal, Chauhan, & Mishra, 2021).

The majority of theses and research on the subject highlight the drawbacks of the classical economic approach in terms of production, environment, economy, and social aspects, thus explaining the need for the circular economy as an alternative solution. The pressure exerted on natural resources by the increasing global population, coupled with the disruption of sustainability in economic, social, and environmental terms, along with population growth and income levels, constitute the rationale for the circular economy model. Studies indicate a common finding that environmental pollution increased during the early years of economic development following the Industrial Revolution (Özuyar & Gürsoy, 2021). Additionally, it is observed that research on the circular economy focuses on its role in economic well-being, followed by environmental quality, without necessarily addressing its connection to social equity and sustainable development.

Lastly, despite being a relatively new field, there are also studies critiquing the circular economy model and proposing alternative models. Prendeville et al. (2014) suggest that perhaps the most frequently cited alternative model is the steady-state economy. Achieving a steady-state economy requires keeping material output in an economy relatively constant, much like the population. This could present an alternative model to the circular economy. Another suggestion by researchers is sustainable degrowth, which aims to achieve planned economic contraction to ensure society lives within environmental limits. Although often considered distinct from a steady-state economy, some researchers indicate that sustainable degrowth may be the ultimate path to a steady-state economy.

During a Google Scholar search covering the years 2010-2022 with the keywords 'circular economy' and 'circular economy and sustainability,' 19 articles were found. The subject is becoming increasingly popular, and it is observed that the number of articles published is growing each year (Fig. 1). Goyal, Chauhan, and Mishra (2021) have particularly observed a significant increase in publications on the subject after 2015 (Özuyar and Gürsoy, 2021). It is also noteworthy that the first study on the subject was published as early as 2006.

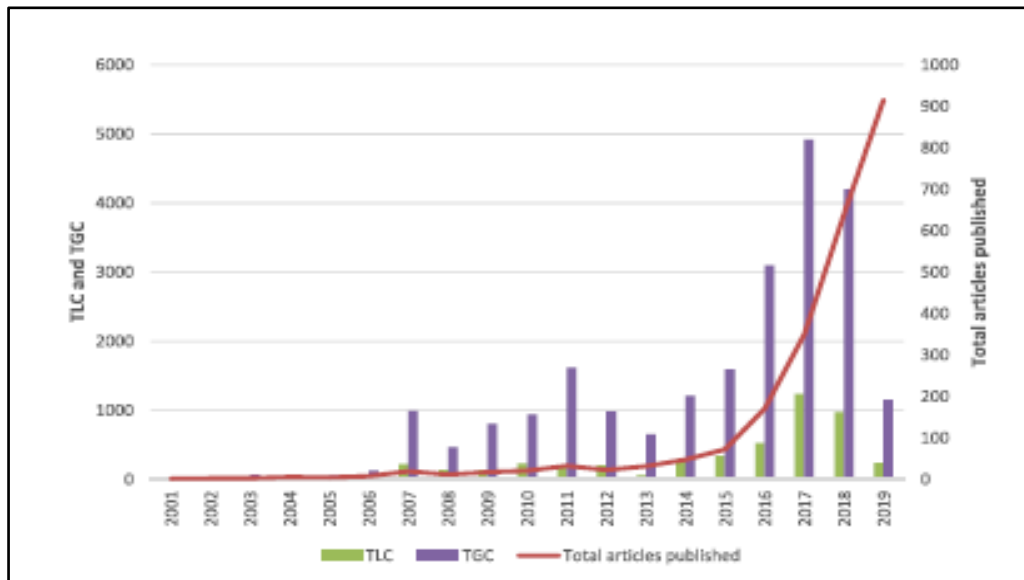


Fig. 1 Distribution of articles on Circular Economy by year [Source: Goyal et al. (2021)]

The top 3 journals with the most publications on the subject are Journal of Cleaner Production and Resources Conservation and Recycling (Luis and Celma, 2020). Most of the studies examined in this research were accessed from these journals.

It would not be wrong to say that China was the first country to use the concept of circular economy within the framework of resource and waste management policies (Güreşçi, 2020). However, when the number of articles published by country is examined, China is at the top, followed by the United Kingdom and Italy (Fig. 2) (Goyal, Chauhan, and Mishra, 2021; Özuyar and Gürsoy, 2021). This indicates that China leads as the top country, and with the Circular Economy Promotion Law in mind, it shows the leadership of a few players in the conceptual development of this new topic, which is not surprising (Lieder and Rashid, 2016; cited in Geissdoerfer et al., 2017).

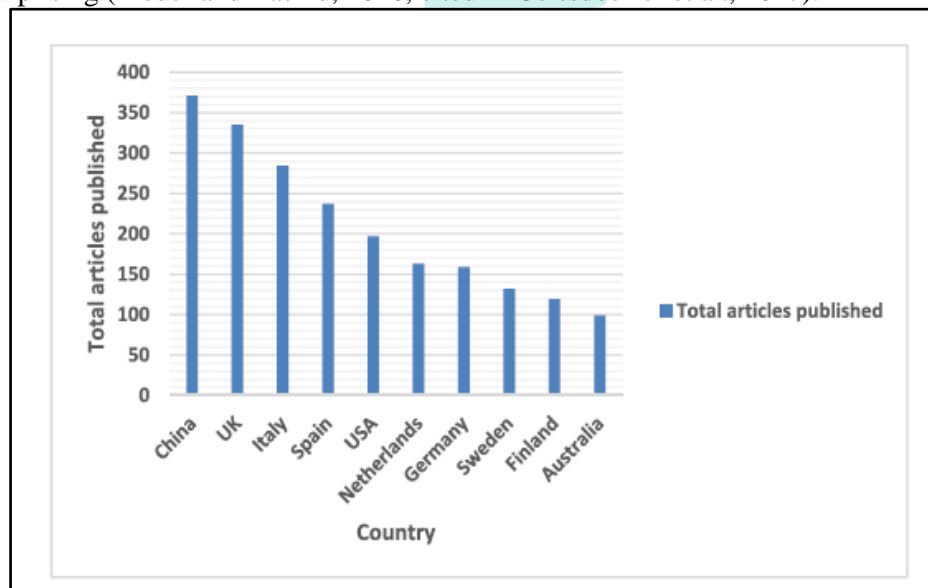


Fig. 2 Distribution of articles published on Circular Economy by countries [Source: Goyal et al. (2021)]

This study differs in terms of scope and timeframe, including studies that compare the concepts of circular economy and sustainable business by Murray, Skene, and Haynes (2017), as well as studies that compare the concepts of circular economy and sustainability by Geissdoerfer et al. (2017) (master's and doctoral theses written in Turkey). It is noteworthy that a significant portion of the English articles examined in this study are literature reviews and conceptual studies. Detailed table regarding the examined articles can be found in Appendix 3.

Discussions on circular economy have gained momentum in political, economic, and scientific domains. The increasing popularity of the concept is accompanied by some common findings in many studies, highlighting certain definitional and conceptual uncertainties. Particularly, the relationship and contribution of circular economy to sustainable development and thus to a more sustainable society are open for discussion today. Schöggel, Stumpf, and Baumgartner (2020) contribute to this discussion by providing new insights into the evolution, status, and especially the sustainability implications of circular research over the past twenty years.

One of the most cited works in the field of circular economy, Kirchherr, Reike, and Hekkert (2017), examines 114 definitions of circular economy coded in 17 dimensions. As emphasized in previous sections, different stakeholders

present different views and proposals for defining the concept of circular economy. The research findings indicate that circular economy is most commonly defined as a combination of reduction, reuse, and recycling activities, but often fails to emphasize the systemic change required by circular economy. It is also noteworthy that the definitions show very little clear connection between the concept of circular economy and sustainable development. The authors define circular economy as an economic system based on business models that reduce, reuse, recycle, and recover materials in production/distribution and consumption processes, replacing the concept of 'end of life.' Thus, the aim is to operate at micro-level (e.g., products, companies, consumers), meso-level (e.g., eco-industrial parks), and macro-level (e.g., city, region, nation, and beyond), creating environmental quality, achieving sustainable development benefiting current and future generations, and promoting welfare and social equality.

Another highly cited work, Geissdoerfer et al. (2017), aims to investigate the current state of the field and synthesize similarities, differences, and relationships between the two terms through bibliometric analysis and comprehensive literature review. The study identifies eight different relationship types in the literature and extensively demonstrates the most prominent similarities and differences between sustainability and circular economy concepts.

The main actors guiding developments in the circular economy are legislative and governmental bodies, NGOs, and consulting firms. However, it is noteworthy that a common ground has not been established for the diversity of existing approaches. In this context, Kalmykova, Sadagopan, and Rosado (2018) aim to provide an overall perspective on the various concepts presented in the literature to help actors interested in working in this field have a clearer definition of circular economy. The researchers also note that the uncertainty stemming from the multitude of definitions in the literature is a research objective for them.

Another study emphasizing the confusion regarding definitions, Merli, Preziosi, and Acampora (2018) present the results of a systematic literature review investigating the latest academic research on circular economy. A total of 565 articles collected through the Web of Science and Scopus databases were categorized, associating circular economy with various concepts, and waste management (the most popular finding in the literature) was identified as the most suitable sub-sector. It was also found that unlike some studies in the literature, circular economy is strongly linked with the concept of sustainability. It is noteworthy that the most encountered applications in the literature are related to clean production aiming to reduce environmental impact and waste.

Korhonen, Honkasalo, and Seppälä (2018), examining sustainability and circular economy, attempt to understand the concept of circular economy from the perspective of economic, environmental, and social sustainability dimensions based on the World Commission on Environment and Development (WCED) sustainable development and sustainability science. Secondly, they examine the concept of circular economy in the environmental dimension of sustainability. As a result, six challenges to be addressed for circular economy to contribute to global net sustainability are shared.

Murray, Skene, and Haynes (2017) emphasize the redesign of processes and the circularity of materials that could contribute to more sustainable business models. Additionally, they propose a new definition of circular economy as an economic model where planning, sourcing, supply, production, and reprocessing are designed and managed as both processes and outputs to maximize ecosystem functioning and human well-being. Kristensen and Mosgaard (2020) examine 30 indicators of circular economy at the micro-level, indicating that most indicators focus on recycling, end-of-life management, or remanufacturing, while a smaller number of indicators focus on dismantling, extending product lifecycles, waste management, resource efficiency, or reuse. Circular economy is often presented as a tool for sustainable development, with the majority of indicators focusing on economic aspects, less on environmental and particularly social aspects. This economic-centric approach to circular economy, favoring environmental and social impacts, could lead to a narrower approach for companies (Kristensen and Mosgaard, 2020).

Upadhyay et al. (2021) investigate the relationship between blockchain, circular economy, and sustainability, which has become increasingly popular. Their literature review examines the current and potential contributions of blockchain technology to circular economy from the perspectives of sustainability and social responsibility. The study findings indicate that blockchain technology could contribute to circular economy by reducing transaction costs, improving performance and communication across the supply chain, protecting human rights, enhancing patient privacy and well-being in healthcare, and reducing carbon footprint.

Ahi and Searcy (2013) emphasize the need for a triple-bottom-line approach that encompasses environmental, social, and economic dimensions for genuine sustainability. Initiatives related to green supply chains, green human resources, circular economy, or green innovation tend to focus on creating a positive environmental impact. However, without attention to social and economic orientations, these efforts may become limited in scale and impact. Without balancing socio-economic and environmental impacts, sustainability tends to lose its long-term significance.

Ávila-Gutiérrez et al. (2019) propose the development of standardized circular economy under the principles of circular economy and sustainability pillars by examining various aspects of circular economy and digital transformation, aiming to provide a sustainability paradigm under the potential offered by digital transformation.

Circular economy is an economy constructed from societal production-consumption systems that maximize the service generated from the linear nature-society-nature material and energy production flow. A successful circular economy contributes to all three dimensions of sustainable development. Circular economy limits the production flow to a level where natural reproduction rates and ecosystem cycles in economic cycles are respected (Korhonen, Honkasalo, and Seppälä, 2018).

Chen et al. (2021) examine the textile sector from a circular economy perspective, highlighting the need for renewable raw material resources, rethinking production, maximizing the use and reuse of textile products, re-manufacturing and recycling strategies, redistributing textiles to new and parallel markets, and possible approaches including improvisation.

The titles of other studies related to circular economy are shared in the following section. Walzberg et al. (2021) demonstrate that industrial ecology and complex systems science could complement each other in evaluating the sustainability of transitioning to a circular economy. Wastling, Charnley, and Moreno (2018) provide an initial model for understanding the role of the user in transitioning to circular economy and designing behavior change strategies in this context. Poponi et al. (2019) illustrate two possible scenarios defining different roles of stakeholders in the circular approach in the business world. "Social recycling" considers the key role of societal participation and contribution in activities related to circular economy by primary and secondary stakeholders, while "highly regenerative recycling" aims to involve qualified stakeholders in initiating inter-organizational common lives within the circular process. Trica et al. (2019) mention that their econometric model presented in their study offers a system compatible with investment in recycling infrastructure and innovative resources, environmental protection, and sustainable economic growth goals. Gregson et al. (2015) emphasize the challenges faced in making circular economies within the EU, framing resource recovery in the EU within ecological modernization guided by ecological justice and resource (in)security discourses linked to China's resource-intensive development and ethical economies.

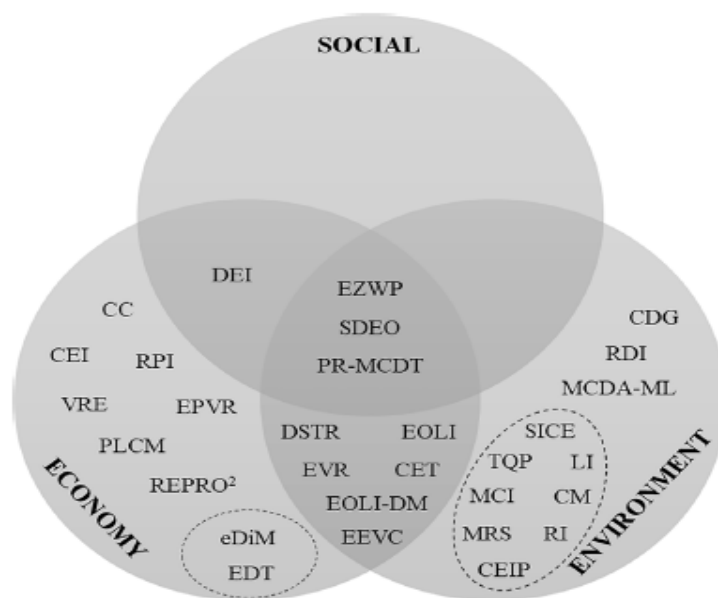


Fig. 3 Mapping of micro-level indicators in the dimensions of sustainability [Source: Kristensen & Mosgaard (2020)]

Circular economy brings a perspective aiming to increase resource efficiency through circular material flow processes, including reuse, recovery, remanufacturing, and recycling of products (Jawahir & Bradley, 2016). Circular economy is defined as a process where technological, social, and organizational innovations are realized in value chains with a holistic perspective (Şen & Tarabah, 2020).

Finally, the framing of the circular economy in Turkey is aimed to be drawn in books published in Turkey. The book edited by Sayın (2020) emphasizes that circular economy is an interdisciplinary field. The study, consisting of 22 chapters, thoroughly examines the relationships between circular economy-sustainability and innovation at micro and macro levels, circular economy-pandemic, circular economy-employment, circular economy-waste management, circular economy-entrepreneurship, circular economy-digitalization, and circular economy-agriculture and construction sectors. In addition, sectoral reviews have been conducted, and a situational assessment has been made in terms of economics, local governance, and environmental policies.

Additionally, it mentions that the transition to a circular economy faces various challenges. These challenges include technological barriers, inadequate financial infrastructure, and the need to change consumer behavior (Yavaş, 2022).

Discussion and Conclusion

Despite the importance of the concept for academia, policymakers, and businesses, the conceptual relationship between circular economy and sustainability remains unclear. This lack of clarity could potentially have detrimental effects on the advancement of sustainability science and the spread of practices based on these concepts. Therefore, this research aims to contribute to conceptual clarity by exploring the similarities, differences, and relationships between these two concepts (Geissdoerfer et al., 2017).

The research indicates that circular economy research, especially in Turkey, is relatively new, as evidenced by the number and publication dates of thesis studies. When examining the methods used in these studies, it is noteworthy that

apart from a limited number of empirical studies, there is a focus on establishing a theoretical and conceptual framework related to the topic (Özuyar & Gürsoy, 2021).

Future research should focus on investigating the relationship between circular economy and emerging concepts such as performance economy and sharing economy, which are associated with new business models. Furthermore, delving into the impacts of supply chains, business models, and innovation systems on performance would provide a better understanding of the relationship between circular economy and sustainability. Many other literature review studies also offer future recommendations related to other potential research areas, such as the role of circular economy in sustainability (Goyal et al., 2021).

The majority of theses and related research studies explain the need for circular economy as an alternative solution due to the shortcomings of the classical economic method in terms of production, environment, economy, and social aspects. The pressure on natural resources created by the increasing global population, along with the disruption of sustainability in economic, social, and environmental terms, coupled with population growth and income levels, are the answers to why a circular economy model is needed. Studies commonly show that during the early years of economic development associated with the industrial revolution, environmental pollution increased (Özuyar & Gürsoy, 2021). Additionally, in circular economy research, it is observed that the focus is initially on the role of circular economy in economic welfare, followed by environmental quality, without much attention to its connection with social equality and sustainable development.

Lastly, despite being a relatively new field, there are also studies critiquing the circular economy model and proposing alternative models. Prendeville et al. (2014) suggest that perhaps the most frequently referenced alternative model is the steady-state economy. To achieve a steady-state economy, the material output in an economy must remain relatively constant, similar to the population. This could provide an alternative model to the circular economy. Another suggestion from researchers is sustainable degrowth, which aims to achieve planned economic shrinkage to ensure that society lives within environmental limits. While often considered different from a steady-state economy, some researchers see sustainable degrowth as the ultimate form of a steady-state economy.

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