## Unveiling the Current Issues in Circular Economy

## Abstract

The circular economy is a top priority issue on the European green agenda. However, despite this topic having been studied for decades, there seem to be no clear ideas about how to carry out the strategies and actions that allow achieving the presupposed objectives. For this reason, this paper aims to offer a systematic literature review that might provide researchers with a synthesis paper on what has been studied so far. To achieve that, descriptive and bibliometric analyses were performed on the bibliographic data obtained from the Web of Science. That, together with the study of the most prominent extant pieces of work in the field, both historical and present, allow offering a comprehensive picture of the state of arts. Thus, the main conclusions are that there is no clear study trend and, consequently, efforts are dissipating. In addition, the problem of the budget limitation is acknowledged since it might prevent researchers from carrying out solid experiments that may allow finding general solutions to the problems derived from the implementation of circular economy strategies or actions.

Keywords: behaviours; bibliometric analysis, circular economy, environment, green economy

## **Extended** abstract

Despite the protection of the environment is not a brand-new term. In recent years its presence in the media has kept strikingly rising and it has become a critical element within the European countries and the European Union policies. Such phenomenon gets reinforced due to the forthcoming implementation of the well-known 'European Green Deal', which is expected to make Europe climate-neutral by 2050. Thus, the European Commission is committed to taking steps in this line through the 'European Green Deal' action plan to achieve a climate-neutral Europe by 2050. Therefore, there is an extant research line –in many disciplines– that analyse the likely effects of the proposed policies framed within circular economy actions. Nevertheless, the main concern is still about Greenhouse Gases emissions (Janik et al., 2020), which is, by far, the most mediatic issue regarding environmentalism. In this sense, it might be highly positive to consider a more widely dimension of 'sustainable development', not only focusing on reducing emissions but also on heading to a 'zero emissions' production system. Regarding this, an indepth analysis should be promoted to support governmental policies at all territorial levels, including supranational policies.

In this context, the importance of the circular economy in the sustainable development of nations, both European and non-European, is obvious. However, even though the issue has been the object of study for decades, the success stories applied at the business or individual level, or any level of governmental administrative management still seem to be far behind. That is why this work aims to be the meeting point for the main ideas and experiences so far, combining the most recent studies with those most relevant from the beginning of the studies on circular economy.

This study employs descriptive and bibliometric analyses to achieve the previously described objectives. The data used in both cases comes from the Web of Science database, after systematic filtering of the high volume – and, in many cases, not very representative – of works returned by the search for the terms circular economy. This filtering aims to retrieve the greater volume of relevant papers generated around the subject without losing sight of the business focus. That is why the articles whose interest is on the technical description of the production processes of a particular product, in the context of achieving the green objectives of the companies, have been excluded.

Once the data was retrieved, the proposed analyses were performed. In the first place, the descriptive analysis consists of the graphic representation of the historical evolution of the number of articles published on the subject, indexed in the Web of Science. Then, interest shifts to the journals that have published most papers in this regard and their temporal distribution. These analyses offer an overview of the distribution of the documents and support the design of the bibliometric one.

As a result of the information extracted from the descriptive analysis, for the execution of the biblio-metric analysis, the division of the sample into non-homogeneous time intervals is considered. Thus, the periods are (1) 1948-1999 (14 documents); (2) 2000-2004 (16 documents); (3) 2005-2009 (26 documents); (4) 2010-2014 (90 documents); (5) 2015-2019 (479 documents); and (6) 2020-2022 (600 documents). The software used is SciMAT (Cobo et al., 2012). It allows performing bibliometric analyses from multiple approaches and offers precise data preprocessing. For this study, the tools used are (1) the evolution map of the clusters identified in each established period; (2) the strategic diagram – which locates the clusters identified in a matrix according to their density and centrality – that is, their relative relevance in the academic context of the subject analysed (He, 1999; Liu et al., 2014); y (3) the networks of the main clusters. The results of these analyses are presented and discussed below.

In the first place, it is essential to offer a picture of the temporal evolution of scientific publications throughout the entire historical period. That is represented simply in Figure 1. In that figure, there is a truncation at the beginning of the series – which match the first three periods described in the Materials and Methods section – to simplify the graph. That is because the number of papers in those years oscillates be-tween zero and three, and there is just a one-time peak of seven articles in 2007. Therefore, it was chosen to introduce such a truncation since the trend in these three periods is virtually horizontal. Besides, the beginning of the rise in interest was in 2015, with an increase of 120% compared to 2014. Later, in 2017 there was another step, rising 96% compared to 2016. Since then, the trend has been exponential until reaching the peak of 352 papers in 2021. As of this study, there are already four articles in Early Access dated 2022. All in all, the main conclusion that can be drawn from Figure 1 is that despite the many decades of studies about sustainability, green economy, etcetera, the interest in the circular economy has been in the last seven years.



Figure 1. Evolution of the retrieved papers.

Source: Authors.

Once the distribution of the scientific articles is known, the division of the papers into nonhomogeneous time intervals is justified. These intervals are used in the bibliometric analysis undertaken in this section. In this sense, Figure 2 shows the evolution map of the clusters identified in the six periods previously described. The algorithm for the relationship between periods is the Inclusion Index. However, since in the first two periods any cluster was identified, these periods have been omitted from the figure. Thus, Figure 2 represents, from left to right, the following four periods, that is, 2005-2009, 2010-2014, 2015-2019 and 2020-2022. In the third period, the only identified cluster is Price, whose relationship is exclusive with Market in the fourth period, having no relation with Behaviour. In any case, these two periods are not very illustrative of the state of arts, but they help to visualise the evolution in terms of diversification of the topics addressed as the number of publications on the subject proliferated. In this sense, it is interesting to observe how the Behaviour cluster grows between the fourth and fifth periods, as well as that cluster in the fourth period is related to Attitudes in the fifth one. Furthermore, this relationship appeared again between the fifth and sixth periods, with the consequent increase in the volume of the Attitudes cluster. However, it is noticeable that, in the sixth period, the Behaviour cluster disappears as an independent cluster. The cause of this disappearance is addressed later.

Figure 2. Evolution of the clusters.





After showing the evolution over time, a detailed view of the last two periods seems necessary since it contains a significant volume of clusters. Therefore, Figure 3 collects both strategic diagrams. Following the explanation provided in the Materials and Methods section, these diagrams allow knowing the relative relevance of a given topic (He, 1999; Liu et al., 2014). Thus, the issues located in the upper right grid are called motor clusters and represent the knowledge frontier. In both cases, the predominance of Attitudes is over-whelming. Likewise, the disappearance of Organic-Food and the appearance of Products also stand out.

Figure 3. Strategic diagrams.



Source: Authors.

Of course, it must be pointed out that the cluster Innovation kept being between the motor cluster quadrant and the core cluster one within two consecutive periods. In this regard, the disappearance of the Behaviour cluster at the change of period draws attention once again. For the rest of the clusters in the two remaining quadrants – upper left quadrant, where there are powerful but isolated themes, and lower left quadrant, where emerging or dying themes are found –, the

identified themes differ between periods, and the number of documents is relatively small. That could denote a lack of clear lines of research in the development of scientific studies in the field of circular economy from a business perspective.

In conclusion, this piece of work reviews the literature about the concept of circular economy and green economy from a behavioural perspective. For this, an in-depth analysis was carried out in several stages. In the first place, the introduction includes the temporal evolution of the concepts associated with these ideas from multiple perspectives. Next, descriptive and bibliometric analyses were performed thanks to the data extracted from the Web of Science database. The results of these analyses were especially illuminating. In this sense, the growing interest that the subject has experienced since 2015 stood out, together with the grouping of scientific articles in two journals mainly. In addition, the bibliometric analysis showed the importance of attitudes about environmental behaviour.

That latter point is confirmed with the study of the documents contained in the bibliographic searches that provide data to the analyses carried out in this work. These readings allow observing how the importance of barriers and drivers for the implementation of the circular economy are conditioned in one way or another by the moderating effect that consumers' attitude has on the willingness to apply circular economy measures and on purchase intention. In addition, other factors that make it possible to identify specific groups of consumers more prone to this type of action are shown, in addition to the most favourable ones for companies.

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