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Systematic Review

Circular Economy in the European Union: A Prisma-Based Systematic Review and Meta-Synthesis

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Abstract: The most significant impact of the industrial production process is the environmental damage caused by the waste generated during production. European Union countries aim to reduce environmental harm by reintegrating waste, production inputs, and materials generated during production and consumption activities back into the production process. The purpose of this study is to evaluate the studies related to the circular economy in the context of European Union countries within the circular economy literature. For this evaluation, the authors used the studies from the circular economy literature available in the SCOPUS database for the period between 2004 and 2024. The analysis of the obtained dataset was conducted using the PRISMA (2015) approach. According to the findings, although many studies exist, most focus on implementing circular economy regulations and laws. Upon reviewing these publications, many were found unrelated to the circular economy. Furthermore, there is a significant gap in studies employing econometric models to analyze the circular economy, and no research has been found that performs a literature review using meta-synthesis methods specifically on the circular economy within the context of EU countries. These findings aim to fill this gap and guide academics and policymakers researching the topic.

Keywords: circular economy; linear economy; European Union; PRISMA (2015); systematic review; meta-synthesis analysis

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1. Introduction

The most significant result of population growth and industrialization worldwide is the pressure on ecosystems. In addition to the increase in greenhouse gas emissions (GHGs), the rapid rise in domestic and industrial waste has become an important global issue that needs to be addressed. The growth of global GHG emissions continues to accelerate, particularly due to the increase in emissions from China and developing countries, reaching a record level after the COVID-19 pandemic. According to studies, in 1970, China alone emitted around 748.51 megatons of CO_2, which is comparable to the emissions of Japan and Germany, one-fifth of the emissions from the United States, and one-quarter of the emissions from the EU [1]. Global GHG emissions reached a new record in 2022, surpassing the pre-pandemic peak level by 2.3%, reaching 53.8 Gt CO_2 equivalent [2]. As highlighted by the United Nations Environment Program (UNEP) and the International Resource Panel

(IRP), global resource use has increased threefold since 1970 [3]. The linear (or 'take-make-dispose') economic model, which began with the Industrial Revolution and shaped the global economy, has turned natural resources into waste, leading to the exceeding of the Earth's capacity [4]. The day when humanity consumes the natural resources that the planet can regenerate in a year is referred to as 'Earth Overshoot Day'. According to the Global Footprint Network, this day was declared to be 2 August 2022. This situation shows that humans consume the resources the Earth can provide in 12 months in just 7 months, depleting the resources of 2023 in the remaining 5 months and consuming as if there were 1.7 Earths. The continuous growth of the global population will further increase the pressure on resources. According to the reports of the IRP [3] and OECD [5], global material use is expected to more than double by 2060. The depletion and destruction of natural resources, along with extraordinary weather events caused by climate change, natural disasters, environmental pollution, infectious diseases, biodiversity loss, and other issues, have become key priorities for the World Economic Forum and the United Nations [6].

Although the pressure exerted by economic activities on limited resources was first raised in 1972 by Meadows et al. [7], representatives of the Club of Rome, in their publication 'The Limits to Growth', and although international efforts to reduce environmental pressures have increased over time (such as the Kyoto Protocol signed in 1997 and the Paris Agreement on climate change adopted in 2015), the ongoing climate-related issues and the continued rapid depletion of resources demonstrate that the traditional linear economic model cannot solve these problems. The IRP [3] report reveals that the current production system is responsible for 90% of biodiversity loss, at least 90% of water stress, and 50% of global GHG emissions as of 2017. The circular economy is an alternative model to the linear economic model that dominates today's economies. A circular economy is a system that minimizes the waste generated as a result of production and consumption activities and ensures that inputs and materials, along with production factors, are reintroduced into the production process at the end of their lifecycle, thereby aiming to maintain the value of products for a long time [8]. The distinction between the linear economy model and the circular economy model was aptly presented by Taleb [9] (Figure 1).

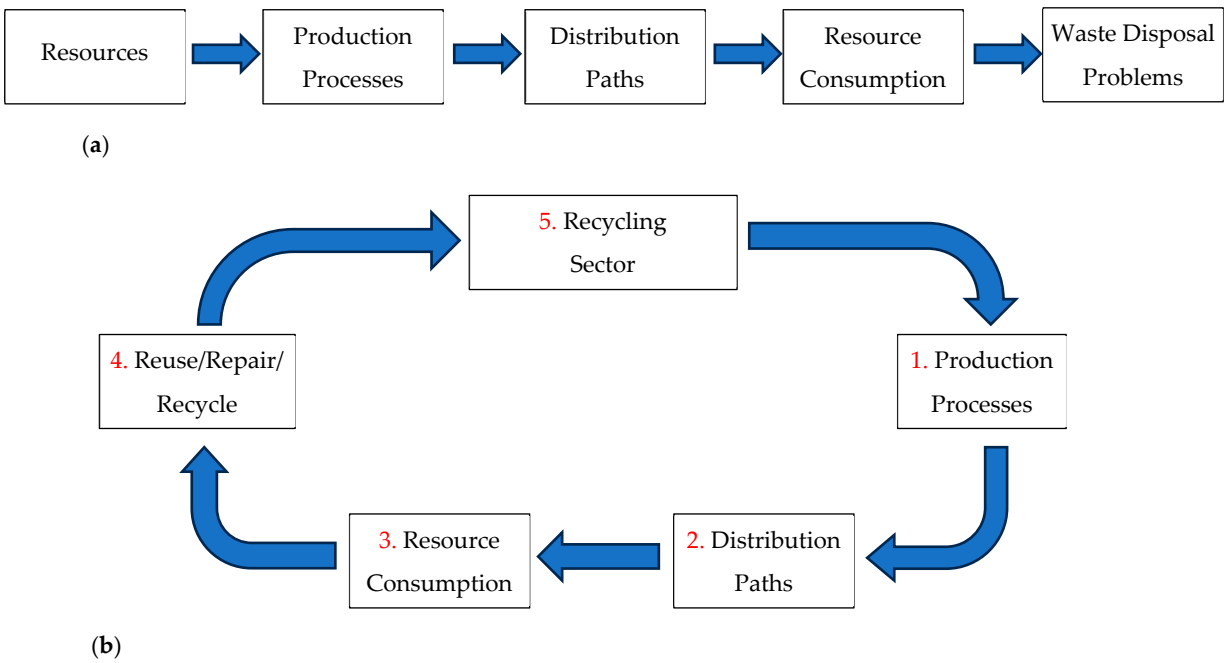


Figure 1. Comparison of linear and circular economy models: (**a**) linear economy model; (**b**) circular economy model.

As is well known, the United Nations has set 17 goals for Sustainable Economic Growth. In addition to being seen as a solution to address the limits and challenges of local and global resource consumption, the circular economy has also become an important tool for ensuring sustainable economic growth [10,11].

The benefits to be gained from adopting a circular economy can be listed as follows [12–14]: (i) all resources, including energy, are used efficiently; (ii) the added value of products and services in the economic value chain is maximized; (iii) waste that harms the environment is minimized; (iv) resources are used for a longer period within the economy; (v) economic growth is contributed (due to efficient resource use, contributing up to 2 trillion USD by 2050); (vi) employment increases (the labor-intensive recycling sector, particularly in logistics and other service sectors, will encourage employment); (vii) innovation (new ways of thinking and business models will increase innovation); and (viii) increased environmental awareness, conscious consumption, and production.

According to the Circularity Gap Report (2020), only 8.6% of the global economy is circular, a figure that, unfortunately, declined compared to the previous year. However, the International Resource Panel [3] predicts that if necessary measures are taken to ensure resource efficiency and promote sustainable production and consumption, resource use could be reduced by 25%, greenhouse gas emissions could decrease by 90%, and economic activity could increase by 8% by 2060. Specifically, incorporating materials such as cement, steel, aluminum, and plastics into the circular economy is expected to reduce greenhouse gas emissions by 45% by 2050.

An increasing number of countries worldwide are taking steps to transition from a linear economy to a circular economy. For instance, China has adopted a circular economy strategy to achieve sustainable development and enacted the "Circular Economy Law" in 2009 for this purpose. Similarly, Japan and Austria are also promoting circular economy practices. The European Union, similar to its support for renewable energy, places special emphasis on the circular economy and leads many initiatives in this field [15]. Investments made by the EU in this area are reported to amount to EUR 650 million. The EU's common environmental policy prioritizes reducing waste, preventing waste generation, reusing materials, and recycling within the framework of sustainable growth. In return for these investments, the EU aims not only to reduce environmental pressures but also to achieve significant economic savings and create new job opportunities [16].

This study examines the literature on the circular economy with a specific focus on the European Union. The reason for this focus is the EU's adoption of the Circular Economy Package in 2018, which introduced significant legal regulations and investments in this area, along with ambitious targets set for 2035. As part of this effort, the EU has implemented measures, such as the Landfill Directive and the Waste Framework Directive, along with restrictions on the use of plastic bags, plates, cutlery, and similar items. By 2030, the EU aims to recycle and reuse 60% of municipal waste and 70% of packaging waste. In addition, the "Circular Economy Action Plan" adopted by the European Commission in 2015 was revised in 2020 as the "New Circular Economy Action Plan", and the European Green Deal was introduced in 2019. All these initiatives act as driving forces for preventing, reducing, and reintegrating waste into the economy within the EU (European Commission, 2020; European Green Deal, 2019) [17,18].

The purpose of this study is to evaluate the research conducted in the field of circular economy in EU countries within the economics literature over the past 20 years. In this evaluation, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2015) approach and the Critical Appraisal Skills Program (CASP) framework are utilized. Through this evaluation, the development of studies on the

circular economy specific to the EU over different time periods and the quality of the publications are assessed. Thus, the findings are expected to guide future research on the subject and assist researchers in identifying gaps within the relevant literature. In this context, the study analyzes a total of 233 articles published over the past twenty years in the field of the circular economy specific to EU countries, sourced from the SCOPUS and Web of Science (WoS) databases. It provides a synthesis of published articles on circular economy research. Secondly, no prior study focusing on the circular economy specific to the EU exists in the literature. Therefore, this study is expected to contribute to the relevant body of knowledge.

2. Identification of the Dataset Used in the Study and Approaches Applied in the Analysis Process

In this section of the study, the publications used in the literature studies conducted within the scope of the circular economy in EU countries are identified. For this purpose, a dataset compiled from studies published in various databases is determined. Furthermore, the approaches to be used in the analysis of the prepared dataset are discussed. In this context, the PRISMA (2015) approach and CASP approaches to be used in the analysis are addressed.

2.1. The Approach Used in the Study

Systematic reviews (SRs) and meta-synthesis analyses (MS) have been increasingly used in the economics literature in recent years to investigate specific topics, identify existing gaps in the literature, analyze new issues, assess the general status of publications over different time periods, and examine publications in detail [19–21]. These approaches aim to gather and analyze all publications written in a specific scientific field [22]. These methodologies facilitate the collection of datasets and publications to obtain comprehensive, transparent, and reproducible results in the related literature. While SRs and MS conduct literature research on a given topic, their methods for evaluating the resulting dataset differ. In other words, SRs provide a general evaluation of primary studies conducted according to a clear and repeatable methodology, framed by research questions prepared in line with the structure of the study, and containing explicit objectives, materials, and methods in the relevant literature. MS, on the other hand, evaluates the dataset prepared based on research questions formulated on the topic using statistical methods [23,24]. SRs are applied to analyze the research questions of MS [20]. However, to achieve reliable and accurate results with the methods used in SRs, the methodological steps of quantitative research in the data identification process must be employed. These methodological steps can be described as defining research questions and criteria, evaluating publications, and reporting findings.

There are studies in the literature suggesting that MS should utilize publications employing qualitative research approaches [25,26] or those using both qualitative and quantitative research approaches [27,28]. In this context, our study incorporates publications that employ both qualitative and quantitative research approaches.

MS was first developed as a systematic approach by Noblit and Hare [29]. In this context, a flowchart was created, following the methodology outlined in Noblit and Hare [29], to evaluate the publications and construct the dataset (Figure 2).

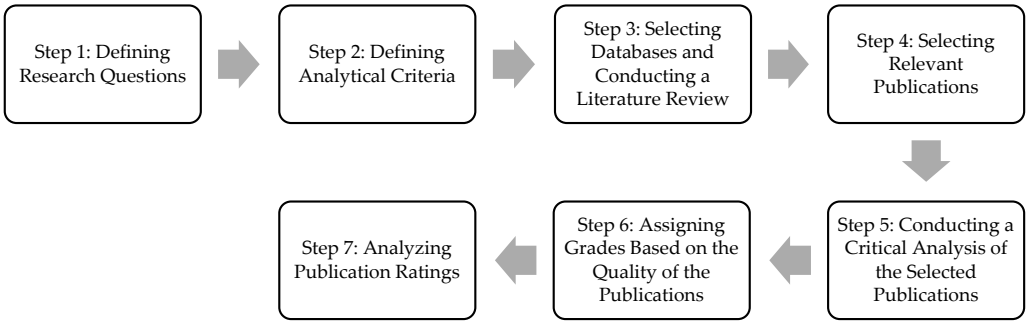


Figure 2. Flowchart representing SRs.

Step 1: Defining Research Questions. In the study, all the works in the literature are investigated, focusing on studies conducted on EU countries within the scope of the circular economy. During this research, the nature of the studies in the literature from different time periods is evaluated. While conducting this evaluation, research questions are prepared based on the studies in the literature. The following research questions are proposed.

Q1: What are the results of studies related to circular economy in the economics literature of EU countries?

Q2: What policies have been implemented regarding the circular economy in EU countries?

Q3: What constraints/barriers have been encountered in the transition process to a circular economy in EU countries?

Q4: What business models or strategies can accelerate the transition to a circular economy model in EU countries?

As a result of the research conducted in the literature, four research questions have been identified by the authors.

Step 2: Defining Analytical Criteria. To determine the dataset related to the topic, all qualitative and quantitative book chapters and articles published in English in the literature between 2004 and 2024 were used.

Step 3: Selecting Databases and Conducting a Literature Review. In the study, a repeatable and comprehensive systematic literature search was conducted by the authors to obtain reliable results. During this research, obtaining the correct publications during the evaluation process is one of the most crucial steps for ensuring reliable research outcomes. Therefore, the authors developed search terms within the framework of the research questions while conducting the literature review. These search terms were formed by considering titles, abstracts, keywords, subjects, etc., in the publications. In this context, in our study, the search terms 'European Union' and 'Circular Economy' were used to search the database for publications between 2004 and 2024.

In this study, a literature review was conducted using the keywords 'Circular Economy and European Union Countries' in the WOS and SCOPUS databases on 12 March 2024. The WOS and SCOPUS databases contain numerous publications, including articles, book chapters, books, and conference papers, from authors working in various scientific fields. Therefore, these databases provide a wide range of publications for conducting a comprehensive literature review and facilitate the mapping of publications. As a result, they are frequently used by many researchers [30–32].

Step 4: Selecting Relevant Publications. In the literature review conducted in the study, works related to circular economy in the field of economics concerning the EU were identified from 2004 to 2024. In the dataset, publications found in both databases and those without DOI numbers were identified. In the final stage, the dataset obtained by the authors was evaluated in the first step of the analysis method using the PRISMA (2015) flow diagram (Figure 2).

In the study, the PRISMA (2015) approach was used to ensure transparency, minimize bias, and reduce errors that may arise in the reporting section. This approach has been frequently used in recent years in the economics literature [19–21]. In this approach, by considering the study's criteria, both the abstract and full text are reviewed, which eliminates the risk of bias. As a result, the outcomes obtained are reliable and exhibit consistency [33,34].

Step 5: Conducting a Critical Analysis of the Selected Publications. "The PRISMA approach consists of a PRISMA statement, which includes a 27-item checklist, and a flow diagram. The purpose of the PRISMA Statement is to help authors improve the reporting of systematic reviews and meta-analyses" [33] (pp. 265–266). In this context, a dataset was created by considering publications that met the necessary criteria in line with the PRISMA (2015) approach. In the next stage, publications are evaluated using the CASP approach.

Step 6: Assigning Grades Based on the Quality of the Publications. There is considerable debate in the literature regarding the evaluation of the quality of qualitative publications, and no international consensus exists [35]. However, in general, the CASP approach is used in studies for evaluating the quality of publications [36,37]. In this approach, an unbiased and impartial evaluation was carried out by the authors, taking into account the quality criteria used in the evaluation process. By using the CASP approach, the quality of the publications on circular economy is determined, leading to reliable and consistent results.

In the study, a two-step approach is followed by the authors, taking into account the questions from the CASP qualitative checklist during the evaluation process. First, the questions used for including publications in the evaluation (Table 1) were applied. Second, the CASP approach questions (Table 2) were used to determine the quality of the included publications. Thus, the selected publications related to the topic were evaluated in two stages.

Step 7: Analyzing Publication Ratings. The findings obtained using the PRISMA (2015) and CASP approaches are reported (Figure 3, Tables 3 and 4).

Table 1. Questions used to include/exclude publications from evaluation.

Questions	Evaluation Questions
Question 1	Is the research question correctly formulated?
Question 2	Were the research objectives clearly defined?
Question 3	Were adequate research methods selected?
Question 4	Is the research concept coherent?
Question 5	Was the selection and collection of data logically planned?
Question 6	Was the data analysis conducted in a rigorous manner to ensure the acquisition of high-quality data?
Question 7	Did the study discuss research results in light of the most recent literature?
Question 8	Were the analysis results presented in an understandable manner?
Question 9	Are the research recommendations/conclusions linked to the results obtained from the analytical process?
Question 10	Are the sources used in the study closely linked to its purpose?

Table 2. CASP method research questions.

Questions	Evaluation Questions
Question 1	Are the results clearly related to the research questions?
Question 2	Is the literature closely aligned with the research topic?
Question 3	Does the literature review incorporate the most significant scientific reports relevant to the research problem?
Question 4	Was the quality of the research appropriately assessed?
Question 5	Are the research findings from peer-reviewed research presented critically and objectively?
Question 6	Are the study conclusions clearly linked to the analytical results obtained?
Question 7	How significant are the obtained research results?
Question 8	Is the data analysis presented in a manner that ensures a clear understanding of the research results?
Question 9	Are the results reliable (statistically significant)?
Question 10	In which scientific database was the discussed research published?

Table 3. Publications included in the evaluation.

Publication/Questions	1	2	3	4	5	6	7	8	9	10	Evaluation	Decision
Bahn-Walkowiak and Wilts, 2017 [38]	1	1	1	1	1	1	1	1	1	1	10	Included
Milios et al., 2018 [39]	1	1	1	1	1	1	1	1	1	1	10	Included
Millios et al., 2018 [40]	1	1	1	1	1	1	1	1	1	1	10	Included
Flachenecker, 2018 [41]	1	1	1	1	1	1	1	1	1	1	10	Included
Tantau et al., 2018 [42]	1	1	1	1	1	1	1	1	1	1	10	Included
Vuţă et al., 2018 [43]	1	1	1	1	1	1	0	1	0	1	8	Excluded
Ghenţa and Matei, 2018 [44]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Jacobi et al., 2018 [45]	1	1	1	1	1	1	1	1	1	1	10	Included
Kirchherr et al., 2018 [46]	1	1	1	1	1	1	1	1	1	1	10	Included
Botezat et al., 2018 [47]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Faraca et al., 2019 [48]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Zielińska, 2019 [49]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Moraga et al., 2019 [50]	1	1	1	1	1	1	0.5	1	0.5	1	9	Excluded
Busu and Trica, 2019 [51]	1	1	1	1	0.5	0.5	0	1	1	1	8	Excluded
Busu, 2019 [52]	1	1	1	1	0.5	1	0	1	0	1	7.5	Excluded
Trica et al., 2019 [53]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Taušová et al., 2019 [54]	1	1	1	1	1	1	1	1	1	1	10	Included
Pineiro-Villaverde and García-álvarez, 2020 [55]	1	1	1	1	1	1	1	1	1	1	10	Included
Jora et al., 2020 [56]	1	1	1	1	1	1	1	1	1	1	10	Included
Llorente-González and Vence, 2020 [57]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Hartley et al., 2020 [58]	1	1	1	1	1	1	1	1	1	1	10	Included
Sánchez-Ortiz et al., 2020 [59]	1	1	1	0	1	1	0	1	1	1	9	Excluded
Bassi and Guidolin 2021 [60]	1	1	1	1	1	1	1	1	1	1	10	Included
Zarbà et al., 2021 [61]	1	1	1	0.5	1	1	1	1	1	1	9.5	Excluded
Bayar et.al., 2021 [62]	1	1	1	1	1	1	1	1	1	1	10	Included
Calisto Friant et al., 2021 [63]	1	1	1	1	1	1	1	1	1	1	10	Included
Vanhamäki et al., 2021 [64]	1	1	1	1	1	1	1	1	1	1	10	Included
Garrido-Prada et al., 2021 [17]	1	1	1	1	1	1	1	1	1	1	10	Included
Mazur-Wierzbicka, 2021 [65]	1	1	1	1	1	1	1	1	1	1	10	Included
Dagiliene et al., 2022 [66]	1	1	1	1	1	1	1	1	1	1	10	Included
Sabău-Popa et al., 2022 [67]	1	1	1	1	1	1	1	1	1	1	10	Included
Pietrulla, 2022 [68]	1	1	1	1	1	1	1	1	1	1	10	Included
de Lange et al., 2022 [69]	1	1	1	1	1	1	1	1	1	1	10	Included
Roleders et al., 2022 [70]	1	1	1	1	1	1	1	1	1	1	10	Included
Joltreau, 2022 [71]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Dobre-Baron et al., 2022 [72]	1	1	1	1	1	1	1	1	0	1	9	Excluded
Jakubelskas and Skvarciany, 2022 [73]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Arru et al., 2022 [74]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Pinyol Alberich, 2022 [75]	1	1	1	1	1	1	0.5	1	1	1	9.5	Excluded
Bucea-Manea-Ţoniș and Zecheru, 2022 [18]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Arion et al., 2023 [76]	1	1	1	1	1	1	1	1	1	1	10	Included
Topliceanu et al., 2023 [77]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Kafel and Nowicki, 2023 [78]	1	1	1	0.5	1	1	1	1	1	1	9.5	Excluded
Marco-Fondevila et al., 2023 [79]	1	1	1	1	1	1	1	1	1	1	10	Included
Terra dos Santos et al., 2023 [80]	1	1	1	0.5	1	1	1	1	1	1	9.5	Excluded
Nowaczek et al., 2023 [81]	1	1	1	0.5	1	1	0	1	1	1	9.5	Excluded
Litvak and Litvak, 2023 [82]	1	1	1	0	1	1	0	1	1	1	8	Excluded
Chioatto and Sospiro, 2023 [83]	1	1	1	1	1	1	0	1	0	1	8	Excluded
Azwardi et al., 2023 [84]	1	1	1	1	1	1	0	1	1	1	9	Excluded
Huttmanová et al., 2023 [85]	1	1	1	0	1	1	0	1	1	1	8	Excluded
Alivojvodic and Kokalj, 2024 [86]	1	1	1	1	1	1	0	1	0	1	8	Excluded

Table 4. CASP—evaluation report on included publications.

Publication/Questions	1	2	3	4	5	6	7	8	9	10
Bahn-Walkowiak and Wilts, 2017 [38]	1	1	1	0.5	0	1	1	1	0.5	WOS
Milios et al., 2018 [40]	1	1	0.5	1	1	1	1	1	1	WOS
Flachenecker, 2018 [41]	1	1	1	0.5	0	1	1	1	0	WOS
Tantau et al., 2018 [42]	1	1	1	1	1	1	1	1	1	WOS
Jacobi et al., 2018 [45]	1	1	1	1	1	1	1	1	1	SCOPUS
Kirchherr et al., 2018 [46]	1	1	1	1	1	1	0.5	1	1	SCOPUS
Milios, 2018 [39]	1	1	1	1	1	1	1	1	1	WOS
Taušová et al., 2019 [54]	1	1	1	0.5	0.5	1	1	1	0.5	WOS
Hartley et al., 2020 [58]	1	1	1	1	1	1	1	1	1	SCOPUS
Jora et al., 2020 [56]	1	1	1	1	1	1	1	1	1	WOS
Pineiro-Villaverde and García-álvarez, 2020 [55]	1	1	1	1	1	1	1	1	1	WOS
Bassi and Guidolin, 2021 [60]	1	1	1	1	1	1	1	1	1	WOS
Vanhamäki et al., 2021 [64]	1	1	1	1	1	1	1	1	1	WOS
Bayar et al., 2021 [62]	1	1	1	1	1	1	1	1	1	WOS
Calisto Friant et al., 2021 [63]	1	1	1	1	1	1	1	1	1	WOS
Garrido-Prada et al., 2021 [17]	1	1	1	1	1	1	1	1	0.5	SCOPUS
Mazur-Wierzbicka, 2021 [65]	1	1	1	1	1	1	1	1	1	WOS
Dagiliene et al., 2022 [66]	1	1	1	1	1	1	1	1	1	WOS
Sabău-Popa et al., 2022 [67]	1	1	1	1	1	1	1	1	1	WOS
Pietrulla, 2022 [68]	1	1	1	1	1	1	1	1	1	WOS
de Lange et al., 2022 [69]	1	1	1	1	1	1	0.5	1	0.5	SCOPUS
Roleders et al., 2022 [70]	1	1	0.5	0	1	1	0.5	0.5	1	WOS
Arion et al., 2023 [76]	1	1	1	1	1	1	1	1	1	WOS
Marco-Fondevila et al., 2023 [79]	1	1	1	1	1	1	1	1	1	WOS

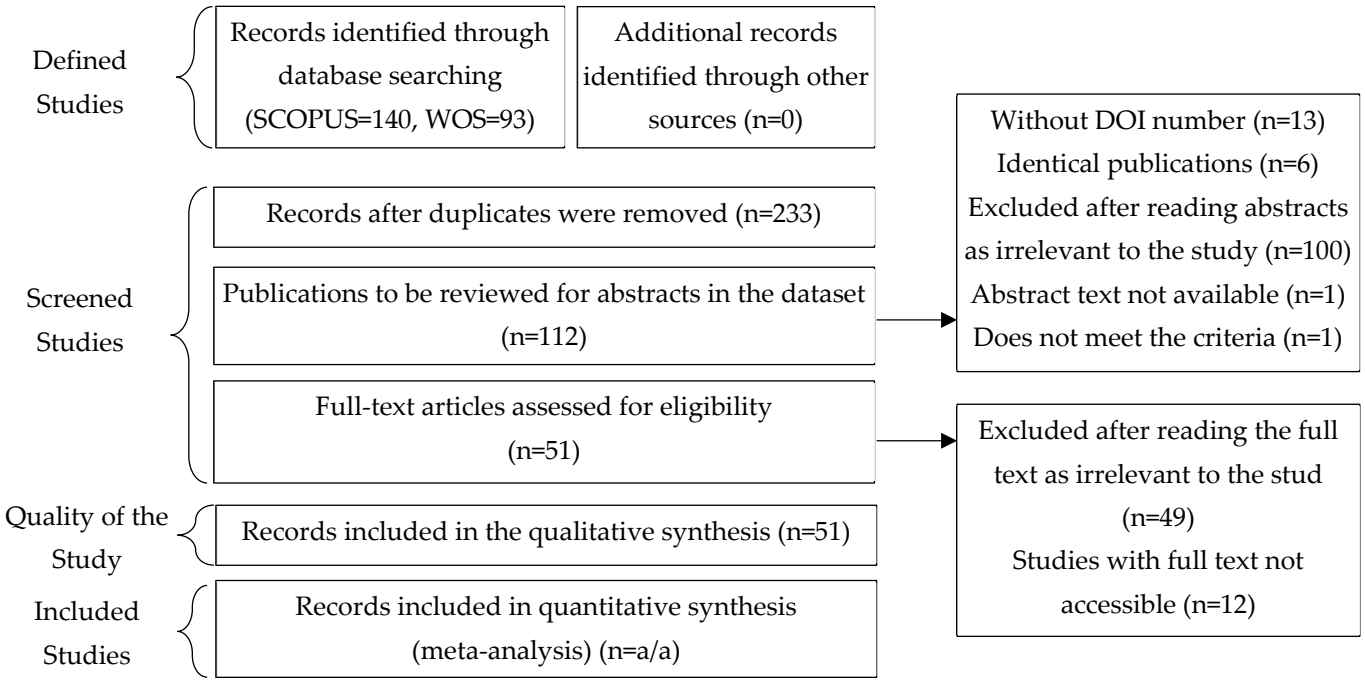


Figure 3. PRISMA (2015) flow diagram.

2.2. Identification of the Dataset

In this study, the first step of the analysis method, the PRISMA (2015) flow diagram, was used for evaluation. The evaluation was based on research by Moher [33] and was conducted following the PRISMA (2015) flow diagram, as shown in Figure 3.

Note 1. Publications that did not include the terms "European Union" and "Circular Economy" in the publications evaluated by taking into account the studies in the economics literature using the PRISMA (2015) approach were excluded from the dataset (Appendix A). To accurately identify publications relevant to the purpose of the research, full texts were also evaluated within the framework of the research questions. In this context, publications that are not related to the economics literature or do not address at least one of the research questions were excluded from the dataset. The publications obtained as a result of this evaluation were included in the CAPS approach.
Note 2. In the dataset prepared for evaluation using the PRISMA (2015) approach, DOI numbers were used to avoid confusion of authors with the same name or publications with the same title on the subject, and the dataset source was organized accordingly.
Note 3. Publications without DOI numbers and same publications were excluded to create the dataset to be used in the PRISMA (2015) approach. Within this scope, the number of publications included in the dataset for evaluation was determined to be 214.

Based on the research questions considered by the authors, articles and book chapters appropriate to the structure of the study were evaluated using the criteria established for the data analysis. As a result of these criteria, a total of 233 publications related to the topic were identified in the SCOPUS and WOS databases. Before evaluating the identified publications, duplicate publications and those without DOI numbers were identified. In this context, by considering the DOI numbers, the authors identified that six publications in the SCOPUS database and eight publications in the WOS database did not have DOI numbers. In total, 13 publications were removed from the dataset. Additionally, the authors identified six publications common to both databases, and these publications were excluded from the dataset. As a result, in the first phase of the research conducted by the authors, a total of 19 publications were removed from the dataset. In the next stage, the abstracts of the publications were read, and it was determined that 100 publications were not relevant to the topic. Additionally, one publication was excluded because it did not meet the criteria, and one publication was removed from the dataset due to the inability to access its abstract. Secondly, the full texts of 112 publications that met the necessary criteria were read. After this reading, a total of 49 publications were excluded because they were not related to the topic, and 12 publications were removed as their full texts were inaccessible. The lack of availability of full texts, due to the limitations resulting from the inability to use open access, forced us to exclude 12 works from further analyses. In the final stage, 51 publications were obtained for evaluation using the CASP approach.

As a result of the evaluation conducted using the PRISMA (2015) approach, considering the criteria used in the dataset identification process, a total of 51 publications remained for evaluation using the CASP approach. These publications were initially evaluated based on the questions in Table 1, which were used to include or exclude publications according to the approach proposed by Long [37] and Nzama and Tasdoken [21]. During the evaluation, the publications were assessed according to the ten criteria established [19,35]. In the evaluation, the responses were scored as yes = 1, no = 0, and unsure = 0.5.

Considering the publications included in the evaluation (Appendix B, Table A2), many of the publications were not included in the assessment due to the question, 'Does the study discuss its contribution to the relevant literature?' In other words, while the research question or objective of the research in publications related to the circular economy is clearly stated, the contribution of the publication to the literature is not mentioned.

The publications in the dataset were reviewed by the authors based on the evaluation questions. As a result of the evaluation conducted by the authors, publications with a research quality score of less than ten were excluded from the final analysis. Consequently,

only publications addressing all research questions were included in the evaluation. Following this review, 27 publications were excluded from the dataset for not meeting the required criteria within the scope of the evaluation questions. A total of 24 publications remained in the dataset. In this context, the questions outlined in Table 2 were used to evaluate the remaining 24 publications.

3. Empirical Findings

This section evaluates 24 publications obtained using the PRISMA (2015) approach and the CASP approach. The questions used in the evaluation are presented in Table 2, and the evaluation results are shown in Table 4. The evaluation of the publications is based on the ten questions set for the assessment [21,37]. In the evaluation, yes = 1, no = 0, and not sure = 0.5.

As a result of the evaluation, it can be stated that the results obtained from the publications are definitive and applicable. In this context, considering the studies conducted, investments in the circular economy contribute to the economy in the long term. Within this framework, it can be said that investing in the circular economy, especially in EU countries, as well as in developing countries, will also contribute to the economic development of these countries.

4. Conclusions and Recommendations

In this study, a literature review was conducted using the keywords 'Circular Economy' and 'European Union Countries' in the SCOPUS and WOS databases, focusing on EU countries, up to 12 March 2024, covering the period from 2004 to 2024. Both qualitative and quantitative studies published on the circular economy in EU countries were included. The dataset was determined based on the criteria set during the evaluation of the publications. The selected dataset was first evaluated using the PRISMA (2015) approach, and then the publications obtained were evaluated using the CASP approach.

As a result of the evaluations, it can be said that the findings obtained from the study represent a synthesis of all evidence published on circular economy in EU countries. Therefore, while a single publication may address certain issues or evaluate practices related to the topic, evaluating all publications on the circular economy presents a holistic approach to the results. However, despite the vast literature due to numerous studies published in various scientific fields, it can be stated that in the economics literature, there are few studies on the implementation of circular economy in EU countries, and there is a greater focus on regulations and laws. Furthermore, considering the studies on the circular economy in EU countries, it is essential to make the necessary regulations to address the financial, social, technological, and regulatory barriers faced by countries during the transition to a circular economy, covering all EU countries. One of the biggest barriers in the transition process to the circular economy in EU countries is the differences in the implementation of legislation and regulations. Therefore, conducting projects or implementations aimed at the application of circular economy in EU countries is important not only for the development of the field but also as an example for other countries working on this topic, highlighting the need for more publications. It is also crucial to consider the role of establishing international standards, which ensure the harmonization of approaches across countries, enhance regulatory efficiency, and facilitate the adoption of sustainable practices in the global economy. These standards can influence the development of public policies, including fiscal support measures for companies adopting circular economy principles [87].

The findings obtained through the CASP approach can be summarized as follows:

- During the process of reviewing the studies in the literature, reading the full texts revealed that many of the articles were not related to the circular economy. This situation makes it difficult for authors conducting research on circular economy to access the correct articles. Therefore, determining relevant keywords in publications related to the topic will facilitate researchers' work and reduce existing access issues to publications;
- Considering the studies conducted, it is observed that there are insufficient studies using econometric models related to the circular economy. This result indicates a gap in empirical research in the field of circular economy and highlights the issue of data scarcity;
- Although there are many studies on the topic, the majority of the studies focus on the implementation of circular economy regulations and laws;
- It can be stated that there are few publications on circular economy in EU countries in the economics literature;
- In general, the contributions of the publications to the relevant literature are not mentioned. Therefore, it will be helpful for future researchers to discuss their contributions to the literature in their works, as it will serve as a guide for authors conducting research on the topic.

The majority of publications related to the circular economy are found in journals published in the WOS database. Therefore, researchers should consider publications in the WOS database during their literature review, as it will contribute to the literature research.

There are no studies on literature reviews related to circular economy in EU countries using meta-synthesis methods. Therefore, the findings obtained from this study are expected to fill the gap in the relevant literature and serve as a guide for both academics conducting research on the topic and policymakers.

The first limitation of this research is that only studies obtained from the WOS and SCOPUS databases were used to identify the literature on the topic. In this regard, studies could also be conducted using other article databases. Secondly, theses, short reports and conference papers were excluded from the dataset used in this study.

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Data Availability Statement: The data for this study were obtained from two primary sources: Scopus (https://www.scopus.com/search/form.uri?display=basic#basic, accessed on 21 December 2024) and the Web of Science Core Collection (https://www.webofscience.com/wos/woscc/basic-search).

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Abbreviations

The following abbreviations are used in this manuscript:

GHGs	Greenhouse Gas Emissions
UNEP	The United Nations Environment Program
IRP	The International Resource Panel
PRISMA	The Preferred Reporting Items for Systematic Reviews and Meta-Analyses
CASP	The Critical Appraisal Skills Program
SRs	Systematic Reviews
MS	Meta-Synthesis Analyses

Appendix A

Table A1. PRISMA (2015) dataset.

Articles Number	DOI Number	EU Countries	Circular Economics	Publications Excluded from the Dataset After Reading the Abstract (yes/no)	Results of Publications Deemed Irrelevant to the Topic After Reading the Full Text and Evaluating at Least One of the Research Questions (yes/no)	Publications Used in the CASP Approach
1	10.3390/land12091749	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
2	10.3390/su151712781	Yes	Yes	no	no	This article has been eliminated
3	10.3390/environments10070106	Yes	Yes	no	no	This article has been eliminated
4	10.3390/su15054538	Yes	Yes	no	no	This article has been eliminated
5	10.1186/s12302-022-00671-7	Yes	Yes	no	no	This article has been eliminated
6	10.3390/su142315777	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
7	10.1016/j.jenvman.2022.116249	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
8	10.3390/recycling7050073	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
9	10.3390/su141912362	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
10	10.3390/su141811474	Yes	Yes	no	yes	yes
11	10.3390/su141610352	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
12	10.3390/su141610133	Yes	Yes	no	no	This article has been eliminated
13	10.3390/resources10120129	Yes	Yes	no	no	This article has been eliminated
14	10.3390/su132413911	Yes	Yes	no	no	This article has been eliminated
15	10.3390/su131910715	Yes	Yes	no	no	This article has been eliminated
16	10.3390/su13179661	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
17	10.1016/j.scitotenv.2020.143726	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
18	10.3390/su13041899	Yes	Yes	no	no	This article has been eliminated
19	10.3390/su13031148	yes	yes	no	no	This article has been eliminated
20	10.3390/su13020656	Yes	Yes	no	yes	yes
21	10.1016/j.scitotenv.2020.140876	Yes	Yes	no	no	This article has been eliminated
22	10.3390/su12218760	Yes	Yes	no	yes	yes
23	10.1007/s12649-019-00724-8	Yes	Yes	no	no	This article has been eliminated
24	10.3390/su12145629	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated

Table A1. *Cont.*

Articles Number	DOI Number	EU Countries	Circular Economics	Publications Excluded from the Dataset After Reading the Abstract (yes/no)	Results of Publications Deemed Irrelevant to the Topic After Reading the Full Text and Evaluating at Least One of the Research Questions (yes/no)	Publications Used in the CASP Approach
25	10.3390/land9070231	Yes	Yes	no	no	This article has been eliminated
26	10.3390/resources9050055	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
27	10.1016/j.resourpol.2019.04.006	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
28	10.3390/recyding4020014	Yes	Yes	no	no	This article has been eliminated
29	10.3390/su11113198	Yes	Yes	no	no	This article has been eliminated
30	10.3390/su11092518	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
31	10.3390/su11092475	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
32	10.1016/j.scitotenv.2018.10.136	Yes	no	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
32	10.14207/ejsd.2019.v8n2p289	yes	no	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
34	10.1007/s11356-018-1703-1	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
35	10.2478/mmcks-2018-0023	Yes	no	yes	This article has been eliminated	This article has been eliminated
36	10.3390/recycling3030033	Yes	Yes	no	yes	yes
37	10.3390/su10093193	Yes	no	yes	This article has been eliminated	This article has been eliminated
38	10.1080/09593330.2017.1319879	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
39	10.30638/eemj.2017.049	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
40	10.1016/j.jbusres.2023.114259	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
41	10.3390/recycling8040055	Yes	yes	yes	This article has been eliminated	This article has been eliminated
42	10.3390/recycling8020029	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
43	10.3390/su15086502	Yes	Yes	no	yes	yes
44	10.3390/resources12020024	Yes	Yes	no	yes	yes
45	10.3390/su15010496	Yes	Yes	no	yes	yes
46	10.30525/2256-0742/2023-9-2-146-156	Yes	Yes	no	yes	yes
47	10.3390/su15021731	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
48	10.3390/su142215031	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
49	10.3390/su142012963	Yes	yes	no	no	This article has been eliminated
50	10.2478/mmcks-2022-0008	Yes	yes	no	no	This article has been eliminated
51	10.3390/su14095324	Yes	Yes	no	yes	yes
52	10.3390/su14095327	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
53	10.3390/su14095270	Yes	yes	no	no	This article has been eliminated
54	10.3390/su14073845	Yes	No	yes	This article has been eliminated	This article has been eliminated
55	10.18778/1508-2008.25.05	Yes	yes	no	no	This article has been eliminated
56	10.3390/su132413525	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated

Table A1. *Cont.*

Articles Number	DOI Number	EU Countries	Circular Economics	Publications Excluded from the Dataset After Reading the Abstract (yes/no)	Results of Publications Deemed Irrelevant to the Topic After Reading the Full Text and Evaluating at Least One of the Research Questions (yes/no)	Publications Used in the CASP Approach
57	10.3390/su132112136	Yes	Yes	no	yes	yes
58	10.3390/su132212563	no	Yes	yes	This article has been eliminated	This article has been eliminated
59	10.3390/resources10090091	Yes	Yes	no	no	This article has been eliminated
60	10.3390/su13158350	Yes	Yes	no	yes	yes
61	10.3390/su13116043	Yes	Yes	no	no	This article has been eliminated
62	10.3390/su13126838	Yes	No	yes	This article has been eliminated	This article has been eliminated
63	10.3390/su13052984	NO	yes	yes	This article has been eliminated	This article has been eliminated
64	10.3390/jrfm14020080	Yes	No	yes	This article has been eliminated	This article has been eliminated
65	10.3390/su13031518	Yes	Yes	no	yes	yes
66	10.14207/ejsd.2021.v10n3p39	Yes	No	yes	This article has been eliminated	This article has been eliminated
67	10.14512/gaia.30.4.8	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
68	10.3390/resources10010005	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
69	10.3390/su12229440	Yes	Yes	no	yes	yes
70	10.3390/su12114483	Yes	Yes	no	yes	yes
71	10.3390/su12114561	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
72	10.3390/su12093686	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
73	10.12775/EiP.2020.001	Yes	Yes	no	no	This article has been eliminated
74	10.1016/j.landusepol.2019.104375	Yes	no	yes	This article has been eliminated	This article has been eliminated
75	10.1016/j.jenvman.2019.109756	Yes	no	yes	This article has been eliminated	This article has been eliminated
76	10.1016/j.jenvman.2019.06.092	Yes	no	yes	This article has been eliminated	This article has been eliminated
77	10.3390/resources8020059	Yes	Yes	no	no	This article has been eliminated
78	10.3390/su11102904	Yes	Yes	no	yes	yes
79	10.3390/su11030925	Yes	Yes	no	no	This article has been eliminated
80	10.1016/j.jenvman.2018.09.095	Yes	Yes	no	no	This article has been eliminated
81	10.14207/ejsd.2019.v8n5p409	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
82	10.30955/gnj.002623	no	yes	yes	This article has been eliminated	This article has been eliminated
83	10.1007/s12649-017-9942-9	Yes	Yes	no	no	This article has been eliminated
84	10.3390/su10093191	Yes	Yes	no	yes	yes
85	10.1007/s10018-016-0180-3	Yes	Yes	no	yes	yes
86	10.1016/j.erss.2017.09.021	Yes	Yes	no	yes	yes
87	10.3390/su16031317	Yes	yes	no	yes	yes
88	10.3390/su152416883	Yes	Yes	no	yes	yes
89	10.3390/su152014727	Yes	Yes	no	no	This article has been eliminated
90	10.3390/su151612110	Yes	no	yes	This article has been eliminated	This article has been eliminated
91	10.14207/ejsd.2023.v12n3p139	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
92	10.1504/IJESD.2023.127425	Yes	Yes	no	yes	yes
93	10.14207/ejsd.2023.v12n4p366	Yes	Yes	no	yes	yes
94	10.6018/rcsar.576251	Yes	Yes	no	yes	yes
95	10.3390/su15010333	Yes	Yes	no	yes	yes
96	10.1080/23311886.2022.2147265	Yes	Yes	no	no	This article has been eliminated
97	10.3390/su142315872	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
98	10.3390/su142013018	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated

Table A1. *Cont.*

Articles Number	DOI Number	EU Countries	Circular Economics	Publications Excluded from the Dataset After Reading the Abstract (yes/no)	Results of Publications Deemed Irrelevant to the Topic After Reading the Full Text and Evaluating at Least One of the Research Questions (yes/no)	Publications Used in the CASP Approach
99	10.3390/su141711087	Yes	Yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
100	10.3390/su14169932	Yes	Yes	no	yes	yes
101	10.3390/su14138158	Yes	Yes	no	no	This article has been eliminated
102	10.3390/su14148427	Yes	Yes	no	yes	yes
103	10.15544/mts.2022.18	Yes	Yes	no	yes	yes
104	10.33119/GN/151796	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
105	10.15244/pjoes/143491	Yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
106	10.1186/s12302-021-00549-0	Yes	Yes	no	no	This article has been eliminated
107	10.1016/j.spc.2020.11.001	Yes	Yes	no	yes	yes
108	10.3390/resources10050049	Yes	Yes	no	yes	yes
109	10.1007/978-3-031-23543-6_6	no	yes	yes	This article has been eliminated	This article has been eliminated
110	10.1016/j.resconrec.2022.106488	no	yes	yes	This article has been eliminated	This article has been eliminated
111	10.1515/cer-2016-0013	yes	no	yes	This article has been eliminated	This article has been eliminated
112	10.24818/EA/2022/61/664	yes	no	yes	This article has been eliminated	This article has been eliminated
113	10.1016/j.resconrec.2019.03.045	yes	yes	no	yes	yes
114	10.1080/21606544.2024.2318385	yes	No	yes	This article has been eliminated	This article has been eliminated
115	10.1016/j.ecolecon.2023.108031	yes	No	yes	This article has been eliminated	This article has been eliminated
116	10.1016/j.resconrec.2019.104634	yes	yes	no	yes	yes
117	10.2478/foli-2022-0026	yes	yes	no	yes	yes
118	10.1007/978-3-031-31937-2_6	yes	yes	no	no	This article has been eliminated
119	10.1007/978-3-030-99468-6_3	yes	no	yes	This article has been eliminated	This article has been eliminated
120	10.9770/jesi.2020.8.2(32)	yes	yes	no	no	This article has been eliminated
121	10.3389/fenrg.2022.919415	yes	yes	no	This article has been eliminated	This article has been eliminated
122	10.1016/j.resconrec.2020.105207	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
123	10.1016/B978-0-12-822897-5.00014-6	yes	no	yes	This article has been eliminated	This article has been eliminated
124	10.1007/978-3-319-68152-8_3	yes	yes	yes	This article has been eliminated	This article has been eliminated
125	10.1016/j.resconrec.2016.01.014	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
126	10.1016/j.ecolecon.2020.106884	yes	yes	no	yes	yes
127	10.1016/j.rcradv.2022.200081	yes	yes	no	yes	yes
128	10.1007/s10098-021-02087-y	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
129	10.4018/978-1-7998-8856-7.ch016	yes	yes	no	This article has been eliminated	This article has been eliminated
130	10.14207/ejsd.2020.v9n2p501	yes	yes	no	no	This article has been eliminated
131	10.1007/978-3-319-50088-1_11	yes	yes	no	no	This article has been eliminated
132	10.2478/jec-2023-0009	yes	no	yes	This article has been eliminated	This article has been eliminated
133	10.13128/aestim-10004	no	no	yes	This article has been eliminated	This article has been eliminated
134	10.24818/EA/2018/48/248	yes	yes	no	yes	yes
135	10.3917/jie.pr1.0125	yes	yes	no	yes	yes
136	10.1007/978-3-031-07742-5_5	no	no	yes	This article has been eliminated	This article has been eliminated
137	10.1016/j.resconrec.2023.107290	no	yes	yes	This article has been eliminated	This article has been eliminated
138	10.1007/s13132-023-01524-1	yes	yes	no	This article has been eliminated	This article has been eliminated

Table A1. *Cont.*

Articles Number	DOI Number	EU Countries	Circular Economics	Publications Excluded from the Dataset After Reading the Abstract (yes/no)	Results of Publications Deemed Irrelevant to the Topic After Reading the Full Text and Evaluating at Least One of the Research Questions (yes/no)	Publications Used in the CASP Approach
139	10.34659/2021/1/7	yes	no	no	This article has been eliminated	This article has been eliminated
140	10.37394/23207.2023.20.220	yes	no	yes	This article has been eliminated	This article has been eliminated
141	10.1007/s10668-021-02050-3	yes	yes	no	yes	yes
142	10.1016/j.resconrec.2016.07.007	yes	yes	no	no	This article has been eliminated
143	10.1016/j.resconrec.2023.107245	no	no	yes	This article has been eliminated	This article has been eliminated
144	10.1016/j.ecolecon.2018.04.028	yes	yes	no	yes	yes
145	10.1007/978-3-030-97008-6_4	yes	yes	no	This article has been eliminated	This article has been eliminated
146	10.1016/j.resconrec.2018.05.022	yes	yes	no	yes	yes
147	10.1016/j.ecolecon.2021.107155	yes	no	yes	This article has been eliminated	This article has been eliminated
148	10.1016/j.resconrec.2020.105108	yes	no	yes	This article has been eliminated	This article has been eliminated
149	10.1016/j.resconrec.2020.105033	yes	yes	no	yes	yes
150	10.1430/92510	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
151	10.1016/j.resconrec.2016.09.014	yes	no	yes	This article has been eliminated	This article has been eliminated
152	10.1016/j.resconrec.2024.107459	yes	no	yes	This article has been eliminated	This article has been eliminated
153	10.14512/gaia.30.4.8	yes	no	yes	This article has been eliminated	This article has been eliminated
154	10.1016/j.resconrec.2023.107388	yes	no	yes	This article has been eliminated	This article has been eliminated
155	10.2478/jec-2023-0005	no	yes	yes	This article has been eliminated	This article has been eliminated
156	10.1016/j.resconrec.2023.106881	yes	no	yes	This article has been eliminated	This article has been eliminated
157	10.1016/j.resourpol.2019.04.006	yes	no	yes	This article has been eliminated	This article has been eliminated
158	10.3917/jie.pr1.0107	yes	yes	no	This article has been eliminated	This article has been eliminated
159	10.1007/s10784-021-09553-4	yes	yes	no	no	This article has been eliminated
160	10.4018/978-1-6684-8879-9.ch017	yes	yes	no	This article has been eliminated	This article has been eliminated
161	10.1016/j.eap.2023.01.001	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
162	10.1016/j.resconrec.2017.10.010	yes	no	yes	This article has been eliminated	This article has been eliminated
163	10.1108/978-1-83982-544-620221012	yes	yes	no	This article has been eliminated	This article has been eliminated
164	10.1007/s10098-019-01677-1	yes	no	yes	This article has been eliminated	This article has been eliminated
165	10.1007/978-3-031-24942-6_18	no	yes	yes	This article has been eliminated	This article has been eliminated
166	10.1016/j.resconrec.2020.105120	yes	no	yes	This article has been eliminated	This article has been eliminated
167	10.1016/j.resconrec.2019.01.014	yes	yes	no	yes	yes
168	10.4018/978-1-7998-9152-9.ch071	no	yes	yes	This article has been eliminated	This article has been eliminated
169	10.24818/EA/2023/62/80	yes	yes	no	This article has been eliminated	This article has been eliminated
170	10.32479/ijeep.13667	yes	yes	no	yes	yes
171	10.1007/978-981-13-1181-9_8	yes	yes	no	no	This article has been eliminated
172	10.1016/j.resconrec.2017.06.017	yes	yes	no	no	This article has been eliminated
173	10.24818/EA/2022/60/410	no	no	yes	This article has been eliminated	This article has been eliminated
174	10.1016/j.resconrec.2018.01.021	yes	no	yes	This article has been eliminated	This article has been eliminated
175	10.1016/j.resconrec.2022.106486	yes	no	yes	This article has been eliminated	This article has been eliminated
176	10.1016/j.resconrec.2022.106279	yes	yes	no	no	This article has been eliminated
177	10.24818/EA/2018/48/294	yes	yes	no	yes	yes
178	10.18778/1508-2008.25.05	yes	no	yes	This article has been eliminated	This article has been eliminated

Table A1. *Cont.*

Articles Number	DOI Number	EU Countries	Circular Economics	Publications Excluded from the Dataset After Reading the Abstract (yes/no)	Results of Publications Deemed Irrelevant to the Topic After Reading the Full Text and Evaluating at Least One of the Research Questions (yes/no)	Publications Used in the CASP Approach
179	10.1007/s10018-016-0180-3	yes	yes	no	no	This article has been eliminated
180	10.1016/j.resconrec.2021.105621	yes	no	yes	This article has been eliminated	This article has been eliminated
181	10.1007/s10640-022-00696-9	yes	yes	no	yes	yes
182	10.3280/ecag2022oa13245	yes	yes	no	yes	yes
183	10.14254/2071-8330.2019/12-4/22	yes	yes	no	yes	yes
184	10.3390/su11195481	yes	yes	no	yes	yes
185	10.3390/su11184898	yes	yes	no	no	This article has been eliminated
186	10.3390/socsci8050159	yes	yes	no	yes	yes
187	10.3390/su11041114	yes	yes	no	yes	yes
188	10.3390/su10072141	yes	yes	no	yes	yes
189	10.1007/s11625-017-0502-9	yes	yes	no	yes	yes
190	10.2478/zireb-2019-0019	yes	yes	no	no	This article has been eliminated
191	10.1007/978-3-319-33326-7_11	no	yes	yes	This article has been eliminated	This article has been eliminated
192	10.30858/zer/132395	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
193	10.3390/su12219155	yes	yes	no	no	This article has been eliminated
194	10.1016/j.scitotenv.2020.137375	yes	yes	no	no	This article has been eliminated
195	10.3390/su12073060	yes	yes	no	no	This article has been eliminated
196	10.3390/su12020618	yes	yes	no	no	This article has been eliminated
197	10.1007/s10163-019-00897-3	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
198	10.1108/978-1-78714-501-620171014	no	yes	yes	This article has been eliminated	This article has been eliminated
199	10.1016/j.resconrec.2021.105751	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
200	10.4324/9781003219958-6			summary text unavailable	This article has been eliminated	This article has been eliminated
201	10.1016/j.resconrec.2020.105271	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
202	10.1108/978-1-80043-972-620201003	yes	no	yes	This article has been eliminated	This article has been eliminated
203	10.1016/j.rcradv.2022.200127	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
204	10.1007/978-981-15-1052-6_11			Since the report does not meet the criteria.	This article has been eliminated	This article has been eliminated
205	10.4324/9781003193098-14	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
206	10.1007/978-3-030-58827-4_5	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
207	10.1108/S2514-175920200000004010	yes	yes	no	This article has been eliminated	This article has been eliminated
208	10.14505/jemt.v12.1(49).01	yes	yes	no	This article has been eliminated	This article has been eliminated
209	10.1007/978-981-15-1052-6_20	yes	yes	no	no	This article has been eliminated
210	10.1007/978-3-031-15531-4_20	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
211	10.3390/recyding3020018	yes	yes	no	This article has been eliminated	This article has been eliminated
212	10.3390/recycling1020242	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
213	10.1016/j.erss.2017.05.006	yes	yes	yes (publication not related to the economics literature)	This article has been eliminated	This article has been eliminated
214	10.1016/j.scitotenv.2023.165052	no	yes	yes	This article has been eliminated	This article has been eliminated

Appendix B

Table A2. Checklist of items to include when reporting a systematic review or meta-analysis.

Section/Topic	#	Checklist Item
TITLE		
Title	1	Identify the report as a systematic review, meta-analysis, or both
ABSTRACT		
Structured summary	2	Provide a structured summary, including, as applicable, the following: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results, limitations, conclusions, and implications of key findings; and systematic review registration number
INTRODUCTION		
Rationale	3	Describe the rationale for the review in the context of what is already known.
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS)
METHODS		
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., web address), and, if available, provide registration information including registration number
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched
Search	8	Present a full electronic search strategy for at least one database, including any limits used, such that it could be repeated
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis)
Data collection process	10	Describe the method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was performed at the study or outcome level), and how this information is to be used in any data synthesis
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means)
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if performed, including measures of consistency (e.g., I^2) for each meta-analysis
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies)
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if performed, indicating which were pre-specified
RESULTS		
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations
Risk of bias within studies	19	Present data on the risk of bias of each study and, if available, any outcome-level assessment (Item 12)
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot
Synthesis of results	21	Present results of each meta-analysis performed, including confidence intervals and measures of consistency
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (Item 15)
Additional analysis	23	Give results of additional analyses, if performed (e.g., sensitivity or subgroup analyses, meta-regression (Item 16))
DISCUSSION		
Summary of evidence	24	Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers)
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias)
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research
FUNDING		
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review

Table A3. Substantive specific changes between the QUOROM checklist and the PRISMA checklist (a tick indicates the presence of the topic in QUOROM or PRISMA) (Source: [33]).

Section/Topic	Item	QUOROM	PRISMA	Comment
Abstract		!	!	QUOROM and PRISMA ask authors to report an abstract. However, PRISMA is not specific about format
Introduction	Objective		!	This new item (4) addresses the explicit question the re-view addresses using the PICO reporting system (which describes the participants, interventions, comparisons, and outcome(s) of the systematic review), together with the specification of the type of study design (PICOS); the item is linked to Items 6, 11, and 18 of the checklist
Methods	Protocol		!	This new item (5) asks authors to report whether the review has a protocol and if so, how it can be accessed
Methods	Search	!	!	Although reporting the search is present in both QUOROM and PRISMA checklists, PRISMA asks authors to provide a full description of at least one electronic search strategy (Item 8). Without such information it is impossible to repeat the authors' search
Methods	Assessment of risk of bias in included studies	!	!	Renamed from "quality assessment" in QUOROM. This item (12) is linked with reporting this information in the results (Item 19). The new concept of "outcome-level" assessment has been introduced
Methods	Assessment of risk of bias across studies		!	This new item (15) asks authors to describe any assessment of risk of bias in the review, such as selective re-porting within the included studies. This item is linked with reporting this information in the results (Item 22)
Discussion		!	!	Although both QUOROM and PRISMA checklists address the discussion section, PRISMA devotes three items (24–26) to the discussion. In PRISMA the main types of limitations are explicitly stated and their discussion required
Funding			!	This new item (27) asks authors to provide information on any sources of funding for the systematic review

Sign ! means it is present, no '!' sign means it is not present.

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