

Circular economy and public policies in the face of the new normality

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Received: 21/03/2022, Accepted: 27/09/2022, Available online: 07/10/2022

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<https://doi.org/10.30955/gnj.004312>

Graphical abstract



Abstract

The paradigm of Circular Economy within the framework of sustainable development has been consolidated in recent years. Nowadays, and given the urgency to adopt policies that allow to relaunch the economic activity after the crisis caused by the CoVid-19 pandemic, it is relevant to synthesise the challenges and opportunities that Circular Economy offers, making them affordable for the policymakers. An overview of systematic reviews has enabled to retrieve and summarise the results of the most relevant research in this field. Twenty-five articles have been selected from the main scientific databases. The main findings of their qualitative analysis highlight the role of the government developing adequate regulations, implementing financial initiatives, dynamizing collaborations, performing an effective leadership through management performance and setting a good example for the rest of stakeholders and for society. From them, eleven recommendations that could have a wide and rapid impact in the new scenario are synthesised.

Keywords: circular economy, overview of reviews, sustainable development, environmental policymaking

1. INTRODUCTION

From the seminal research by Pearce and Turner explaining the feasibility of considering environmental

awareness in economic flows by closing industrial loops (Pearce and Turner, 1990), there is no commonly accepted definition of Circular Economy (CE) (Yuan and Moriguchi, 2006). Homrich *et al.* (2018) proposed, as a synthesis of the definitions they analysed, that CE is a new strategy or a path for promoting sustainable development, reducing environmental harm, and facing the challenge of resource scarcity.

The concept of CE was popularised in China in the 1990s and today it has been adopted across the world, promoted, among others, by the European Community and by organisations such as the Ellen MacArthur Foundation. Laws have already been introduced to stimulate a transition towards CE (McDowall *et al.*, 2017). Even if it evolved differently in the light of diverse cultural, social and political systems, there is, for example, evidence that the consumer's demand and the market for reused and recycled products are increasing (Winans *et al.*, 2017).

Circular strategies are related to materials' sourcing, design, manufacturing, distribution and sales, consumption and use, collection and disposal, recycling, and recovery, and remanufacture (Kalmykova *et al.*, 2018). In particular, the designing process plays a key role: prolonging and extending useful lifetime by preserving embedded economic value is the most effective way to preserve resources. It requires designs focused on product integrity, to extend the lifespan of the product, classifying it as resisting, and so postponing or reversing its obsolescence (Den Hollander *et al.*, 2017). By designing long-lasting goods and increasing the product's life, CE contributes to slowly close resource loops (Bocken *et al.*, 2016).

There are some important reasons for pursuing CE (Van Buren *et al.*, 2016), a model that promises to overcome the contradiction between economic and environmental prosperity (Pomponi and Moncaster, 2017). Firstly, a

region able to implement CE becomes less dependent on the import of raw materials; secondly, CE has a great potential to generate new employment (Rizos *et al.*, 2016) and can be promoted and supported by the creation of new and innovative business models, embedding principles into their value proposals throughout value chains (Manninen *et al.*, 2018); finally, it allows a significant reduction of the deterioration of the environment. For companies, shifting towards a circular model offers great opportunities, including cost savings through waste reduction, an improvement in the supply chain management, lower sensitivity to resource price volatility, and better relationships with customers (Lahti *et al.*, 2018).

It seems that it is time to synthesise the challenges and opportunities that arise under the “umbrella” (Homrich *et al.*, 2018) of CE. Companies, which show different decision-making methods (Urbinati *et al.*, 2017) and policymakers (Milios, 2018), influence governments and intergovernmental agencies decisions at the local, regional, national, and international levels (Geissdoerfer *et al.*, 2017). Therefore, the increasing rate of scientific production in CE and the high specialisation of the subjects cause a perverse side effect makes it difficult to identify and understand the relevant results for those who have to make decisions that affect the life of companies and people. This fact is even more evident at this time, given the pandemic caused by SARS COV2. And it is in the current situation when social science must take a step forward, since one of its basic tasks lies in devising and applying solutions to economic, political, and social problems.

Therefore, the main objective of this article is to provide for those who must make decisions with a general and sufficiently concise knowledge of the real applications of CE, so that all relevant specialised investigations collected come together in a single document. Achieving this objective requires identifying recommendations proposed to policymakers by academic studies based on methods and techniques of social research and, specially, those that have a broad and rapid impact for their application to the current situation. Therefore, the purpose, aligned with classic overview functions (Ballard and Montgomery, 2017), is to identify and contrast the challenges and opportunities related to CE already identified in systematic reviews from this field, validated by experts, and focused on policymakers. Two research questions will be elucidated:

RQ1: To identify main topics in circular economics and policy makers.

RQ2: To identify recommendations of broad and rapid impacts

In circumstances where urgent decisions are required, governments, stakeholders in the health system, international organisations and the civil society demand rapid reviews (Tricco *et al.*, 2017). Thus, the publication of this kind of studies has become commonplace in a wide variety of areas in recent years (Plüddemann *et al.*, 2018).

Helping to determine what policies, decisions and measures based on scientific studies have been proposed and are currently in force around CE, with special attention to those of prompt execution in view of the current pandemic, is, subsequently, a research problem of evident scientific and social relevance. This is the research gap that our study fulfils.

The manuscript presented is structured as follows: identification of a relevant research problem from a review of literature focused on CE and its importance to address the dares of 21st century society; detailed explanation of the methodology used; presentation of results; and, finally, discussion based on the results of the study and its limitations and implications for future studies.

2. Materials and methods

Our manuscript provides a broad overview of the recommendations about CE made by academic literature over the last five years. We use the term ‘overview’ within our manuscript to describe a systematic summary of systematic review evidence, in line with the most used terminology (Hunt *et al.*, 2018). The goal of producing overviews is to help decision makers (Thomson *et al.*, 2010), as overviews can provide a broad and often comprehensive summary of the main aspects of a discipline (Grant and Booth, 2009) and direct the reader to more fine-grained materials contained in systematic reviews and primary studies (Worswick *et al.*, 2013). Overviews are most frequently used where, as it is our case, multiple systematic reviews already exist on similar or related topics (Hunt *et al.*, 2018).

Overviews of reviews are a relatively new method of evidence synthesis which attempts to systematically retrieve and summarise the results of multiple systematic reviews (Lunny *et al.*, 2016). Its aim is not to repeat the searches assessing study eligibility and risking bias from included studies, but rather to provide an overall picture of findings (Blackwood, 2016).

Overviews are especially helpful for policymakers when a holistic synopsis of a research field is the desired product (Lunny *et al.*, 2016). This approach allows greater applicability for policymakers (Hunt *et al.*, 2018). Given their objective of synthesising extensive data in a user-friendly format, overviews of reviews have been gaining momentum as a valuable knowledge synthesis product to facilitate the decision-making process and application of knowledge (Pollock *et al.*, 2016). Otherwise, the mismatch between the time constraints of policy and research is such that overviews may sometimes be the only means by which research evidence for broad policy questions may be mediated at speed (Caird *et al.*, 2015).

Overviews aim to use explicit, replicable, and systematic methods to search for, identify, and extract outcome data from original reviews (Pollock *et al.*, 2016). Our overview of reviews has been carried out based on the Aromataris *et al.* proposal (2015), employing: an a priori peer-reviewed protocol with detailed inclusion and exclusion criteria, and search strategies and methods for data

extraction and appraisal, followed by replicable methods for synthesising and summarising selected data.

Inclusion and exclusion criteria were specified in advance and documented. English reviews published in scientific journals between 2016 and 2020 were included; official literature and other secondary data analysis were excluded.

Table 1. Search

General databases	Scopus (www.scopus.com)
	Web of Science (https://apps.webofknowledge.com/)
	ProQuest (https://www.proquest.com/)
Descriptors	Circular Economy and review
Search strategies	"Circular Economy" AND review in Title and keywords
Filters	Document type in general databases: articles
	Period: 2016–2020

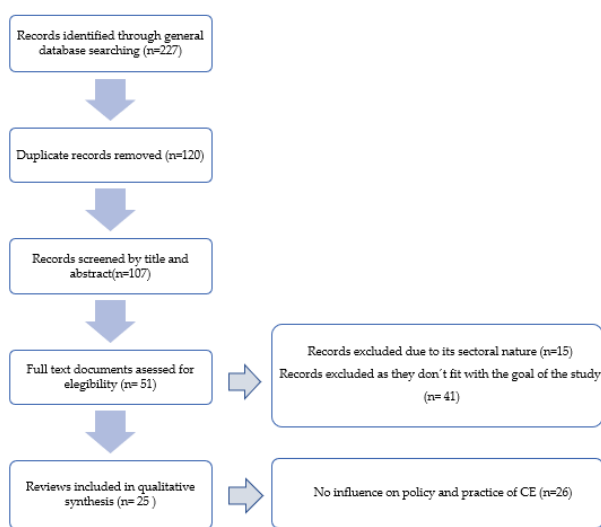


Figure 1. Inclusion decision flow.

Once the inclusion and exclusion criteria were applied, searching for literature resulted in 227 references. The final searching results were exported into EndNote, where 120 duplicate references were removed, remaining 107. Evidence screening was later carried out based on title and abstract examination. After screening, 56 articles were eliminated due to their sectoral nature and/or their inability to provide substantial information on public policies to increase the possibilities of taking advantage of the opportunities offered by CE. Following the recommendations of King *et al.* (2017) this selection was carried out by two authors independently, AJGM and MAGM, to minimise the risk of selection bias that would lead to inappropriate exclusion of relevant studies. Disagreements between reviewers were discussed until reaching an agreement. Ultimately, an evaluation of the degree of interest of the 51 selected documents was made based on the originality of their contributions and potential influence on CE policy and practice (Mikton and But, 2009). According to Levac *et al.* (2010), the reviewers met in the initial, intermediate, and final stages of the evaluation process to clarify any uncertainty related to the selection of documents. In conclusion, 26 were

To guarantee the effectiveness of the overview (Thomson *et al.*, 2010), we have only included updated systematic reviews, in particular studies published between 2016 and 2020. Literature of official origin was not taken into consideration following the purpose of identifying and analysing proposals based on scientific studies. An exhaustive search was carried out in October 2020, as described in Table 1.

excluded on full-text review and, subsequently, 25 documents were included in the qualitative synthesis (Appendix 1).

Figure 1 shows the flow with the steps of the review decision process (identification, screening, eligibility, and inclusion) according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standard (Moher *et al.*, 2009).

Data were collected from all included articles using a pretested form. These data were added in a charting table with all the relevant evidence to inform the overview objectives: Basic information about systematic reviews e.g., title; first author; year of publication; number of studies included in the systematic review (full references are presented in the bibliography); outcomes; additional information (e.g., author's comments, systematic reviews' limitations, and methodological quality/risk of bias).

3. Results

The outcome data from the chosen reviews has been summarised and analysed; it has been considered appropriate to include the results of all relevant systematic reviews, as they were presented in the underlying systematic reviews (Pollock *et al.*, 2016).

The main academic contributions have been grouped into five large topics related to the strategies that facilitate the implementation of CE: public policies and their importance as regulatory entities in the transition from linear to CE.

3.1. Circular economy and public policies

The concept of CE has dramatically spread since it was introduced into the policies of China and the European Union as a mean of mitigating damage to the environment and closing the product life cycle (Prieto-Sandoval *et al.*, 2018). Governments have an important role and a high impact regarding the implementation of CE (Govindan and Hasanagic, 2018) and thus must assume their role as regulators of the transition to CE (Ogunmakind, 2019).

The current transitional state of waste management across the world requires the development of a further

government policy, planning a change of behaviour (Thorley *et al.*, 2019). It is important that an effective communication and leadership exist to achieve CE goals, in addition to effective tools or methods, as catalysers, for incorporating sustainability principles into new business models (Ogunmakind, 2019). Reim *et al.* (2019) highlights that one of the challenges in the change towards new business models based on CE is the ambiguity in the roles and the lack of clarity in the position occupied by the actors that should orchestrate the new ecosystem. It states that policymakers are key because the necessary long-term investments depend on the stable support of policymakers. Critical questions about who controls CE technologies and patents, and how the economic costs and benefits should be distributed both within and across countries, have not been addressed yet (Friant *et al.*, 2020). While incentives of the governments or mandatory regulations can enable some degree of transition towards CE, the speed of a more comprehensive shift will depend on whether decision-makers in companies believe that this will improve competitiveness (Masi *et al.*, 2017).

While businesses and governments are recognising this need for change, there is confusion on what needs to be changed and how to accomplish these changes in the best way (De Jesus *et al.*, 2018): policies need to be well defined and unambiguous to ensure enforceability. To foster the generation of sustainable and competitive benefits, governments certainly aim to stop thinking linearly to shift towards a circular approach that considers the eco-design of products, waste prevention, reuse, and recovering and the exploitation of renewable energy resources (Suzanne *et al.*, 2020).

The current CE debate catalyses the emergence of top-down initiatives aimed at redirecting production and consumption patterns, acting in the domains of waste management and the adoption of secondary raw materials, and stimulating the development of innovative technologies and organisational structures (Borrello *et al.*, 2020). In the meantime, governments in different countries have made laws to promote a cleaner production, responsible consumption, and end-of-life management to secure resources, health, and safety, also motivated by potentiality of CE to generate jobs and revitalize local and regional economies together with a positive impact on climate change (Friant *et al.*, 2020; Klein *et al.*, 2020; Masi *et al.*, 2017). These policies could help breaking the vicious poverty circle that makes people prioritise their immediate needs over long-term considerations and so may cause an environmental degradation which, in return, would lead to the reduction of income opportunities and the increase of poverty and vulnerability of local populations (Lüdeke-Freund *et al.*, 2019). Limiting the use of material resources has critical geopolitical dimensions and requires an essential reconsideration of normative questions regarding global justice, the welfare state, and the redistribution of global wealth (Friant *et al.*, 2020). In these times of social change, it is more important than ever that policymakers manage to include aspects related to gender equality,

peace, justice, and strong institutions in the CE agenda, which will undoubtedly strengthen the concept (Borrello *et al.*, 2020).

There is consensus among authors that the current regulative environment propitiates linear economy and thus prevents the development of CE (Masi *et al.*, 2017). Govindan and Hasamagic (2018) highlighted as main governmental issues the lack of standard systems on performance assessment, the inefficiency of recycling policies, and some legislative problems such as new laws, insufficient coordination and existing laws that do not support CE.

Diverse policy mixes, counting regulations, economic instruments (e.g., environmental taxes) or voluntary measures aimed to fully internalise the externalities (e.g., producers' responsibility) into the price of products, services, or activities. They have been designed to encourage a better use and conservation of resources, mitigating the environmental load as well as promoting the transition to CE patterns (Ghisellini *et al.*, 2016). Laws have been introduced by, for example, the European Union (EU) and the Chinese Government to stimulate a transition towards CE (Lahti *et al.*, 2018).

CE is the manifestation of a paradigm shift, and it will require changes in the way that society legislates, produces, and consumes innovations, while also using nature as inspiration to respond to social and environmental needs. Eco-innovations in the market and new business models circle back and motivate determinant changes in the regulation and policy in an iterative process (Prieto-Sandoval *et al.*, 2018). It's necessary to keep in mind the importance of experimentation and the ongoing 'learning by doing' process for CE-oriented new business models (Pieroni *et al.*, 2019). In this sense, through its five-year plans, the Chinese Government has been concerned about establishing a relevant regulatory system and improving the main role of the CE plan, under a strategic approach. The Chinese Government supported pilot projects, such as the comprehensive use of resources, the recycling of industrial parks, the industrialisation of remanufacturing, the recycling system for renewable resources, and the urban minerals; pilot cities, such as Suzhou and Guangzhou; and pilot enterprises, industrial parks, and other key CE projects. Through these pilot project demos, the concept of CE was widely disseminated, the level of technical equipment was significantly upgraded, and mechanisms were continuously improved to develop CE in all the industries, fields, and levels.

3.2. Implementing financial initiatives

Existing taxation systems as well as financial incentives are unusually aligned with the adoption of the paradigm of CE. For instance, to promote CE, non-renewable resources like carbon-based fuels should have taxation levels higher than renewable ones such as labour, but frequently this does not occur. Authors propose taxes, pollution abatement and emission-trading, as well as fines and charges to polluters to internalise externalities as part of

the “polluter pays” approaches; this would increase costs for polluting or inefficient firms and therefore incentivise firms to make investments in operations more environmentally friendly (Masi *et al.*, 2017). Perhaps, in order to accelerate the transition to a CE, political leaders and economists should recognise the need to move the tax from labour to levy a tax on non-renewable resource extraction (Thorley *et al.*, 2019); undoubtedly, it seems unless necessary to open the debate on laws and policies to introduce environmental taxes and charges, tax benefits and/or recycling requirements that make it more feasible for companies to adopt CE (Kühl *et al.*, 2019).

Regulation and policy deterrents should support the development of innovative solutions for waste collection, economic incentives for cleaner production, the reduction of political barriers like inefficient consumption taxes, and low-interest loans. The lack of financial support from governments through banks, tax reductions and incentives hinder the interest of implementing CE through eco-efficient strategies (Govindan and Hasanagic, 2018). Although some authors claimed that policymakers tend to promote economic aspects instead of public awareness and financial support, it has been shown that successful economic incentives may drive environmental and public health improvements (Prieto-Sandoval *et al.*, 2018).

Developed countries have adopted several economic incentives and other supporting measures to develop the recycling industry chain (Cui and Zhang, 2018). Particularly, in relation to the recycling sector in China, the main governmental means to promote CE are tax incentives capable to encourage innovation and development, as well as its regulation (Ferreira-Gregorio *et al.*, 2018). Current regulatory frameworks usually focus on recycling rather than on reusing, thus not following the hierarchy among CE activities that would preserve most of the intrinsic product value (Bressanelli *et al.*, 2019).

The adoption of CE in Small and Medium Enterprises (SMEs) must face many barriers: the lack of government support together with an effective legislation are among the most relevant (Salvador *et al.*, 2020). Larger firms may have advantages in setting the contractual agenda and may participate in the most significant parts of the shift towards a circular business model. Compared to smaller firms, they are better positioned to orchestrate the activities required to attain changes in the systems’ levels, make adequate investments in research and development, and influence policymakers to support the transition to a circular system through financial support and regulative measures (Lahti *et al.*, 2018). The dichotomy between the more advanced and those lagging furthest behind poses a double challenge for policymaking: supporting the laggards to catch up and challenging the frontrunners to make next steps to fully closing loops and moving towards shorter loop R-imperatives (Reike *et al.*, 2018).

3.3. Dynamizing collaborations

The field of CE is characterised by a complex network of interdependent but independent actors (stakeholders) (da

Costa Fernandes *et al.*, 2020). The systemic essence of models of CE requires a broad and cross-sectional approach, involving all the actors of the economic and social sphere. The governance and political considerations of CE deserve greater attention and study. Power plays a key role in the future of a transition towards CE, as it determines who controls the discourse, who takes decisions and who will benefit from them. If society is about to realistically take CE as the transformative agenda that it seeks to be, ‘deeply embedded’ social issues of overconsumption and consumerism (Lofthouse and Prendeville, 2018) must be addressed.

It is key to establish a democratic and deliberative governance system for CE to ensure that everyone is involved in its construction and that its benefits reach those more vulnerable. Yet, those political considerations are rarely considered by literature about CE, which has mostly dealt with design, technological, managerial, or business-led solutions (Ferreira Gregorio *et al.*, 2018). Collaboration is key to achieve success in the planning and implementation of CE models (Borrello *et al.*, 2020), and it has adopted different approaches around the world, even if some authors decried the inadequate integration of both market-based solutions and public involvement in the whole plan of CE (Ogunmakinde, 2019). Governments may have coordinator’s roles in the movement towards a “clean congruence” at cross-sectoral and cross-regional levels, i.e., by avoiding wasteful lock-ins and mismatches that may lead to system failures and barriers to transition along broadly interdependent constituencies and value chains (De Jesus *et al.*, 2018).

In Europe, CE mainly seems to be occurring as a bottom-up approach, e.g., from the initiatives of environmental organisations, civil society, NGOs, etc. In Japan, a comprehensive and close collaboration among the civil society, the public sector and manufacturers characterise transition to CE. The Japanese Government developed an all-inclusive legal framework for transition towards a CE society, which later became a national living pattern. Important steps taken by the Japanese Government to ensure circularity in all sectors include creation of educational courses on awareness of environmental issues in schools, companies, and communities, which is the foundation for the development of CE; supply of recycling laboratories in schools; provision of circular trading markets of enterprises; disposal of incentives; enhancing public collaboration; and creating customer-friendly collection of old appliances (Ogunmakinde, 2019). The vertical approach in China implies the shift of CE from the low level of analysis (company or single consumer level) to the higher hierarchical levels (eco-industrial parks, cities, provinces, and regions) while the horizontal dimension implies a link between “industries, urban infrastructures, cultural environment, and the social consumption system” (Ghisellini *et al.*, 2016).

The collaboration between supply chain actors is also a key issue. Integration of CE principles within sustainable supply chain management can provide clear advantages from an environmental point of view (Roos Lindgreen *et al.*

al., 2020). Politics, together with the social environment, are two of the five external factors highlighted by Kühl *et al.* (2019) to facilitate the implementation of the circularity of the supply chain. Bottom-up initiatives at a supply chain level might be incentivised through top-down governmental support (Roos Lindgreen *et al.*, 2020). CE is contingent on adopting a systemic approach to eco-innovation that encompasses value and supply chains in their entirety, and engages all actors involved in them (De Jesus *et al.*, 2018). Involvement and cooperation among provider, customers and other stakeholders are essential for a reciprocal relationship from the early stages of design. The involvement of stakeholders and customers can be combined based on the identification and prioritization of their needs and problems to be addressed in a co-creation process involving both parties (da Costa Fernandes, 2020).

The regulation and policy determinants build the legal framework of CE, that supports supply side actions such as cleaner production, development of industrial metabolisms and sustainable business models (Prieto-Sandoval *et al.*, 2018). Governmental regulations are crucial for CE in supply chains, and several laws and policies serve as the foundation for critical practices. Up to this point, the government's focus was mainly on the single entity (focal company) of the supply chain, and it generally ignored elements of the whole supply chain. To govern, the whole supply chain is vital, including two and three-tier suppliers involved in the supply chain and to make the supply chain transparent is a key issue (Govindan and Hasanagic, 2018).

3.4. Serving as an example

It is important to keep in mind that successful CE implementation requires a combination of top-down (ie efforts by public institutions) and bottom-up (ie efforts by industries) approaches (Bresannelli, 2019). Given the significance and potentiality of the public sector in the implementation of CE, it is imperative that the public sector embraces the principles of CE into its management of resources at the organisational level. The public sector has a significant sustainability-related impact on environmental, social, and economic issues that need to be managed and must serve as an example of good practice, boosting the integration of CE principles and ideas into strategic elements of public administration, such as statements showing the mission, vision, and objectives, as well as strategic plans and programs (Klein *et al.*, 2020).

With their own practices, administrations can prevent the concept from becoming blurred and confused with the generic "sustainability" (Betancourt and Sossa, 2020). CE's transition requires that policy and professional agendas gravitate around ideas that clearly distinguish and improve CE from previous eco-efficiency approaches to environmental sustainability (Borello *et al.*, 2020).

Klein *et al.* (2020) identified various successful experiences using CE principles to help public services contribute to more sustainable management and

performance of their sector, such as the potential reuse of pruning waste collected on public lands the use of buses fueled with biogas obtained from biowaste from wastewater treatment. Green consumption in the public sector is another important policy tool, stimulating the uptake of products and services more environmentally friendly. It can be introduced by setting and including "green" requirements before awarding public contracts (Ghisellini *et al.*, 2016). The administration must make society aware of the circular economy so that it is attractive to buy remanufactured products for both suppliers and final consumers (Govindan and Hasanagic, 2018), and what better way than to start using these good practices itself. Otherwise, eco-labels are considered a key tool informing the public procurers in the design of public tenders where eco-labelled products represent the guarantee that the product has the associated environmental or circular requirements (Klein *et al.*, 2020) and allows traceability throughout the whole supply chain.

Local governments should collect the exact status of their provinces with concerning CE and these data should be further transferred to central governments for policymaking. Currently, such practices and relationships do not exist between local and central governments (Govindan and Hasanagic, 2018). Because of trade-offs among policies, an integrated political approach (that could be built around CE) is required to address persistent and systemic environmental challenges (Ghisellini *et al.*, 2016).

3.5. Performance management

The development of evaluation and control mechanisms with their corresponding clear indicators is a complex issue that must be resolved to guarantee the ecological benefits of circular initiatives. However, research on indicators and methodologies to measure the level of application of CE strategies is in its earliest stage (Thorley *et al.*, 2019), and only a small number of published studies design or discuss CE indicators (Ghisellini, 2016). It is a complex issue that must be resolved (Friant *et al.*, 2020). In fact, most of the existing micro and macro indicators, such as the gross domestic product (GDP) or the turnover of the company, were built under the paradigms of the linear economy, with the aim of maximizing sales and profit (Bressanelli *et al.*, 2017): it's said that current progress indicators are misconstruing human progress, with GDP as the most prominent example (Masi *et al.*, 2017). Current circularity metrics do not meet the validity requirements (Roos-Lindgreen *et al.*, 2020) and there is currently not a single accepted CE indicator system (Masi *et al.*, 2017). This lack of metrics can be overcome by adopting the right indicators, backed by education and training in their use (Bressanelli *et al.*, 2017).

Although there are CE impact studies in China and Europe, it is necessary to develop clear indicators and evaluation mechanisms to measure circularity. Ghisellini *et al.* (2016) collect the example of China being the first country to publish CE indicators focused at the national level so that objective and credible information on the state of CE

implementation can be recognized. It has been the first country to use indicators, a revision has been proposed to include a symbiosis between the social and the commercial, together with prevention-oriented indicators (Ferreira-Gregorio *et al.* 2018; Masi *et al.*, 2017).

So, it is mandatory to construct proper systems to redefine the performance and practices through corresponding indicators (Govindan and Hasanagic, 2018). The first step to make stakeholders aware of the need for a change is measuring the current level of circularity to improve the predictiveness of future actions (Betancourt-Morales and Zartha Sossa, 2020). The details of the methodology used to measure resource efficiency will define, to a great extent, both the direction that the economy will take, and the speed and economic efficiency

of this change. Particularly, value-based indicators will play an important role in increasing resource efficiency, allowing policymakers to identify scarce resources and to formulate, monitor and assess policies and strategies (Roos-Lindgreen *et al.*, 2020).

The next step for governments is to propose indicators through which assessing the implementation and performance of CE throughout a supply chain. These good indicators are an effective tool to measure the status of implementation, allowing decision makers to propose new guidelines and development plans (Table 2). New sets of indicators that correspond to the type and level of applications, such as geography, industry, size of the firm and so on, are needed (Govindan and Hasanagic, 2018).

Table 2. Main findings and consequences for policy

Topics	Main findings	Consequences for policy
Circular economy (CE) and public policies.	Governments are responsible for implementing CE policies.	Need for laws and regulations.
	New business models are needed to implement CE.	A top-down approach.
		Include social and governance aspects in CE agenda.
		Reconcile mandatory regulations and the competitiveness of companies.
		Consider transition periods.
		Promote pilot project demos.
Implementing financial initiatives.	It is very convenient to adopt a fiscal approach to CE.	Learning by doing as a strategic tool to CE expansion.
	A public debate about environmental taxes should be encouraged.	Reusing rather than recycling.
		Incorporate economic incentives to stimulate companies.
		Agree environmental taxes with the participation of companies.
		Promote tax benefits for the implementation of CE measures
Dynamizing collaborations.	CE requires involve all the actors of the economic and social sphere.	Approve direct financial aids to SMEs.
	CE requires the collaboration between all supply chain actors with a global vision.	Governments encourage and lead a democratic public debate.
		A social bottom-up approach to inspire the regulatory top-down approach.
		Overconsumption and consumerism must be addressed.
		Promote the involvement of companies, stakeholders and customers.
Serving as an example.	Public sector embraces the principles of CE into its management of public resources.	Integration of CE principles and ideas into strategic public programs.
	CE requires an integrated political approach to address environmental challenges.	Implement green consumption in the public sector.
		Include green requirements in public contracts.
Performance management.	Evaluation and control mechanisms must be designed.	CE involves all administrative levels.
		Propose indicators and metrics to measure circularity.
		Develop policies and strategies based on indicators.

4. Recommendations for policymakers

Considering the limitations of our research, that will be discussed later, and the results described on Section 3, the answers to the two research questions must be addressed. First, the following recommendations can be proposed to policymakers, understanding that these are

aspects that will help decision-makers in political matters for their driving and centralizing role in CE:

R1. Governments must support the adoption of CE in small and medium-sized companies (SMEs).

R2. Governments must include aspects related to gender equality, peace, justice, and solid institutions in the CE

agenda, needing the reconsideration of normative questions about global justice, well-being, and the redistribution of global wealth.

R3. Regulatory frameworks must focus on reusing rather than recycling.

R4. Policymakers must count on the participation of the parties interested in the elaboration of the new laws related to CE. A debate on laws and policies to introduce environmental taxes and charges and tax benefits that make it more feasible for companies to adopt CE must be opened.

R5. Governments must boost Eco-innovation and new business models based on CE.

R6. Promoting pilot projects at the macro level (regions, cities) and micro level (industrial parks).

R7. Policymakers must promote initiatives from the administration to overcome the social problem of consumerism.

Regarding the specific recommendations that can have a broad and rapid impact, essential in the current pandemic situation, the following ideas stand out from the qualitative analysis carried out among the selected sources, if there is a political will to carry them out:

R1. Exercising leadership from the administration through effective communication that encourages the active participation of interested parties and supports “from above” the initiatives adopted “from below”.

R2. Aligning tax systems and financial incentives with the adoption of the paradigm of CE. Internalising externalities as part of the “polluter pays” approach.

R3. Proposing indicators to evaluate the implementation and performance of CE throughout the supply chain. Ensuring that private actors and local administrations collect accurate information and that circulates to the central administration for policy formulation.

R4. Serving as an example of good practices, implementing, for example, generalised green consumption policies in the public sector.

5. Conclusions, limitations and further research

Given the great challenges that the pandemic generated by the SARS COV2 virus poses for the world economy, this work highlights the great importance of CE in mitigating its effects soon. The consequences generated by an unprecedented situation make that those who govern public affairs find themselves with high uncertainty when making courageous decisions based on scientific facts that allow economic reactivation. Policy making is a complex process that requires many aspects to be examined to create an effective scientific model that can solve environmental problems, ensuring sustainability (Almannaei *et al.*, 2020). For all these reasons, this work offers a series of practical and transversal conclusions on fundamental aspects of CE that can be applied internationally regardless of the ideology of each government.

Regarding the limitations, the overview will have most of the limitations of the included studies: systematic reviews have their own methodological limitations, which are not going to be discussed on this paper, and which obviously also apply to overviews (Møller *et al.*, 2018), and the process of producing an overview of reviews may magnify biases already present in the underlying reviews (Thomson *et al.*, 2010). Otherwise, overviews cannot capture nascent concepts within literature, nor those topics unamenable to review methodology (Caird *et al.*, 2015).

Finally, from the main findings and gaps identified, two lines of research are proposed: first, the identification and consensus about the key performance indicators (KPI,s) that allow analysing the implementation of CE; and second, based on these KPI,s, the evaluation of the effectiveness and efficiency of the national and regional public policies adopted in the last decade to implement CE is proposed as a line of research in the medium-term.

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Appendix A. Charting table. Documents included in qualitative synthesis

Title	Author	Year	Nº studies	Outcomes	Additional information
Circular economy in Latin America: A Systematic Literature Review	Betancourt, C.M.	2020	128	In practice or implementation, the Circular Economy concept blurs and confuses the recipient	The review highlights the importance of achieving a simplification of the concept so that its dissemination and understanding are lowered to all social levels through education, and thus the transition to CE is faster and more efficient
Three Propositions to Unify Circular Economy Research: A Review	Borrello, M.	2020	-	The study introduces three propositions to summarize CE's potential, ambitions, and conceptual tools.	Not systematic review
Challenges in supply chain redesign for the Circular Economy: a literature review and a multiple case study	Bressanelli, G.	2019	63	The paper identifies and systematizes 24 challenges that may hamper a supply chain redesigned for Circular Economy, grouped into seven categories, namely: Economic and financial viability, Market and competition, Product characteristics, Standards and regulation, Supply chain management, Technology, and Users' behavior.	The study contributes to provide an improved managerial understanding of Circular Economy implications and risks
Bibliometric and review of the research on circular economy through the evolution of Chinese public policy	Cui, T.	2018	248	Results show evident interactive feedback between public policy and academic research.	The internal laws of public government policies and market mechanisms for the development of circular economy still require in-depth research.
Towards product-service system oriented to circular economy: A systematic review of value proposition design approaches	da Costa, S	2020	46	The article proposes guiding principles that can support effective development of value propositions of circular product-service system at the early stages of the business modeling	Non-peer reviewed publications, which do not follow a scientific rigor, were included in the review
Eco-innovation in the transition to a circular economy: An analytical literature review (65)	de Jesús, A.	2018	141	CE emerges as a multidisciplinary concept.	A better understanding from Circular Economy and Eco-innovation perspectives is needed in order to get better tailor strategies and policies
				Governance and public policies have a central role in supporting and promoting CE.	
				Resource efficiency and waste management are particular concerns.	
				Eco-innovation appears to be an enabler of the	

transition to a CE.					
A Systematic Literature Review of Bio, Green and Circular Economy Trends in Publications in the Field of Economics and Business Management	Ferreira-Gregorio, V.	2018	449	The existing literature is rich in studies and analyses of implemented policies related to countries where the strategies have been published, in particular in China and in member states of the European Union.	Only one database – Scopus- has been utilized. Coordination between all stakeholders is essential. For this reason, another line of research could be to find the most appropriate way to disseminate the theoretical knowledge and to promote the exchange of information
A typology of circular economy discourses: Navigating the diverse visions of a contested paradigm	Friant, W.C.	2020	107	Challenges and limitations of the circular economy. Timeline of circularity thinking. Circularity discourse typology	Critical literature review, with inherent subjectivity in the selection of literature
A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems	Ghisellini, P.	2016	155	In China Circular Economy is promoted as a top-down national political objective while in other areas and countries as European Union, Japan, and USA it is a tool to design bottom-up environmental and waste management policies.	The implementation of CE worldwide still seems in the early stages, mainly focused on recycle rather than reuse. Only a limited number of countries have taken preliminary actions towards CE and a stronger commitment is still required.
A systematic review on drivers, barriers, and practices towards circular economy: a supply chain perspective	Govindan, K.	2018	60	From the review, 13 drivers, 34 practices and 39 barriers were identified. After correlating stakeholders' perspectives of CE with drivers, barriers, and practices, a multi-perspective framework is proposed	The government has an important role regarding implementation of the circular economy in supply chain due to high upfront investment costs. impacts.
Circular Economy Practices and Strategies in Public Sector Organizations: An Integrative Review	Klein, N.	2020	34	An organizational Circular Economy framework of a Public Sector Organizations (PSO) is proposed, providing a holistic view of a PSO as a system with organizational dimensions relevant for the examination and analysis of the integration process of Circular Economy practices and strategies.	It will be necessary to investigate the different types of barriers and drivers pertaining to the different parts of the framework to incorporate Circular Economy practices and strategies in PSOs.
How does servitisation affect supply chain circularity? – A systematic literature review	Kühl, C.	2019	67	The review identifies six contextual factors affecting the implementation of Supply Chain Circularity	The study draws on a body of literature still nascent and currently emerging.
A Definition and Theoretical Review of the Circular Economy, Value Creation, and Sustainable Business Models: Where Are We	Lahti, T.	2018	-	Companies that enter circular economy with innovative business models to address sustainability concerns face a highly uncertain environment	Not systematic review.

Now and Where Should Research Move in the Future?					
Human-Centered Design of Products and Services for the Circular Economy – A Review	Lofthouse, V.	2018	85	Include reflections on implications of framings of circular economy narratives on design ethics, perspectives, and activity. Proposes that changing the way that the circular economy is framed so that it is more inclusive for people and their behaviors would open up a broader debate on the role of design within a multitude of possible circular economy futures	Suggests as future research how service design can utilize digital technologies, data, and user feedback/responsiveness, in facilitating human-centered approaches to circular economy innovation.
A Review and Typology of Circular Economy Business Model Patterns	Lüdeke-Freund, F.	2018	-	The manuscript proposes six major Circular Economy Business Models patterns with the potential to support the closing of resource flows: repair and maintenance; reuse and redistribution; refurbishment and remanufacturing; recycling; cascading and repurposing; and organic feedstock business model patterns.	Not systematic review. Customer preferences for different ways of using and owning products and goods are mostly not considered as significant parameters of Circular Economy Business Models design, although a differentiated reflection on this issue would allow conclusions as to how effectively these business models actually reach their performance targets.
Supply Chain Configurations in the Circular Economy: A Systematic Literature Review	Masi, D.	2017	77	The article highlights that researches must consider the wider social and institutional environment to solve current CE challenges. Integrating the different Supply Chain configurations into a truly CE in the absence of strong government support remains difficult in theory and practice	Disregarding the importance of product design and commercial strategy would have weakened the findings of this manuscript.
A Review of Circular Economy Development Models in China, Germany, and Japan	Ogunmakinde, O.E.	2019	>100	Enabling policies and regulations as well as collaboration and support from all stakeholders, especially consumers, are essential for the successful implementation of the Circular Economy	Not systematic review.
Business model innovation for circular economy and sustainability: A review of approaches	Pieroni, M.P.P.	2019	94	Identification and systematization of economy-oriented and sustainability-oriented business model innovation	Most of the analyzed approaches are still being validated/refined, therefore their usefulness has not yet been confirmed.
Towards a consensus on	Prieto-Sandoval, V.	2018	162	Knowledge map of the	Search for articles was

the circular economy				circular economy. Analysis of the main notions of the concept, principles, and determinants of a circular economy	carried out in only one database (WOS)
The circular economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options	Reike, D.	2018	69	The review concludes that policymakers and businesses should focus their efforts on the realization of the more desirable, shorter loop retention options, like remanufacturing, refurbishing, and repurposing — yet with a view on feasibility and overall system effects.	Critical literature review, with inherent subjectivity in the selection of literature
Circular Business Models for the Bioeconomy: A Review and New Directions for Future Research	Reim, W.	2019	42	The review highlights the need for alignment among the elements of a business model as a key condition for its successful implementation in a bioeconomy	Quantitative studies are needed on the customers' demands and their readiness to align the developed technologies with the demand in the market.
A Critical Review of Academic Approaches, Methods and Tools to Assess Circular Economy at the Micro Level	Roos Lindgren, E.	2020	74	74 Circular Economy evaluation approaches at micro level are discussed according to four dimensions: General attributes, methodological attributes, normative perspective, and prescriptive perspective.	Further research on the assessment of CE could potentially employ a more transdisciplinary research strategy to establish valuable insights
Circular business models: Current aspects that influence implementation and unaddressed subjects	Salvador, R.	2020	77	Identification of main aspects of current concern on circular business model investigation	Social implications of product, use and result-oriented CE businesses must be investigated and compared in future research
Towards circular economy in production planning: Challenges and opportunities	Suzanne, E.	2020	160	Emphasis on mid-term production planning under discrete time settings	The human well-being and ergonomics in production systems remain to be explored.
The circular economy impact on small to medium enterprises	Thorley, J.	2019	21	There is a lack of appetite from SMEs, in terms of business leaders and owners thinking about the economic benefits of CE, which will require a paradigm shift in business thinking at the SME level.	Further research is needed to identify new skills, resources, approaches, and business models to enable subject matter experts (SMEs) to adopt a circular practice