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ORIGINAL PAPER

Stakeholder Perspectives in Transitioning to a Local Circular Economy: a Case Study in Spain

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Abstract
The circular economy (CE) is now more imperative than ever due to several shortcomings humanity faces due to global economic disruptions. The CE might help initiate a virtuous circle whereby waste materials would be turned into resources for other companies to create closed-loop systems. However, the CE remains a niche paradigm embraced by only a small number of companies in some areas of the world. Some authors have argued that it is essential to encourage stakeholders at different implementation levels of a CE to increase the uptake of this new model among companies, and stakeholders may provide the required framework for the shift towards a circular model. Therefore, the purpose of this study is to answer the following research question: how can the transition towards the CE be accelerated from a 'stakeholders' perspective? The study was undertaken in the Spanish region of Basque Country, where a CE strategy is already in place at the regional level, and some companies are already delivering circular solutions. This approach was selected to help understand the lack of widespread adoption of CE initiatives in a local system despite having a regional CE strategy. Data were collected from respondents from various stakeholders and also from desk research to ensure their reliability. The results showed the relevance of understanding how stakeholders can help speed up the transition by proactively exploring new ways to create novel conditions to work together with a broad pool of stakeholders to deepen and scale up the CE implementation.

Keywords Circular economy · Stakeholders · Industrial symbiosis · Transitions

Introduction

Industrialised economies face multiple threats in their current linear business model, either because they may encounter resource depletion in their operations or because they are vulnerable to other risks that could disrupt their production and supply networks [1]. In

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such scenarios, the circular economy (CE) seeks to deal with this issue by closing energy and material loops through a restorative and regenerative system [2]. The CE has risen as a challenger to this traditional linear economy approach by initiating a virtuous circle, whereby materials that would be otherwise converted into waste at the end of their lifespan are transformed into resources for other companies [3] or processes [4] to create closed-loop systems [5]. In this sense, the CE has either inspired or taken inspiration from various waste and resource management frameworks such as industrial symbiosis (IS) that provide orientation for collective action developed by stakeholders [6, 7]. These frameworks help to support the transformative potential for transitioning towards the CE by creating different alternatives for used materials, components or energy flows [2, 8, 9].

As such, IS has been inspired by how industrial systems resemble natural ecosystems, and thus, it may create a network of materials, energy and information flows continuously recirculating [10]. Hence, the IS at its core refers to exchanging waste converted into resources with a focus on industrial facilities that deal with managers and other stakeholders within the value chain [7, 11]. Moreover, IS entails a common characteristic during implementation: the collaboration between different industrial sectors and the value creation that might emerge across various businesses in which the concept of waste is eliminated [12, 13]. This characteristic means that IS in the CE may be seen as a business model innovation [13] based on technical innovations by (a) exchanging waste, resources and energy [14]; (b) collaborating with stakeholders to implement it; and (c) operating a local CE system [15], and a sustainable business model innovation to gain value from turning waste into valuable resources [15, 16].

However, CE implementation through IS remains a niche paradigm, embraced by only a small number of companies within a limited number of industries in some areas of the world [17–19], and such a low level of implementation is a drawback to the advancement of the CE at a global scale [20]. One key factor that is claimed to be crucial for allowing the transformation from the linear model to a circular model through IS is a cooperation between stakeholders [21], insofar as some authors have argued that it is essential to encourage different stakeholders to increase uptake of this new model among companies [22]. Abreu and Ceglia [23] argue that implementing the CE through IS initiatives is vital to encourage business and non-business actors to collaborate to ensure complex synergies. CE-based strategies from an IS perspective can be facilitated by the collaboration between stakeholders such as companies, policymakers and institutions to ensure transition towards a CE [24].

Stakeholders are relevant in creating a fruitful social network through which IS initiatives may be taken swiftly to pursue a long-term vision. Thus, stakeholder participation plays an essential role in strengthening cooperation and communication among other stakeholders [23]. By doing so, businesses could be helped to make advances in transitioning to a CE, whereby resources are exchanged through IS networks that may benefit regional economies and natural capital [9].

Hence, a shift towards the widespread implementation of the CE will require the growth of stakeholder collaboration to create a dynamic waste-to-exchange network wherein this sort of IS initiative may be adopted [25]. Integration and coordination of various stakeholders also involve understanding their needs and operations and considering their role in the entire circular system by considering different contextual conditions [26]. Currently, it seems the research on the implementation of local CE systems and the roles played by stakeholders in developing such systems is lacking [22], and this has been partially explained by an absence of empirical studies that research these issues [27].

One reason for lagging behind in transitioning towards a CE system is the lack of timely information about the key stakeholders involved in its implementation [22]. However, a stakeholder-based strategy may help place the required actions in context according to their role [28] to enhance their involvement in the critical transition towards a CE [23]. Therefore, the purpose of this study is to answer the following research question: how can the transition towards the CE be accelerated from a stakeholders' perspective? The aim of this research question is to understand how stakeholders can help speed up the transition by proactively exploring new ways to create novel conditions to work together. This study involved carrying out a case study in the Basque Country, Spain, by conducting interviews and desk research to gain insights about implementing local CE systems.

The paper is structured as follows: the remaining part of this section offers a theoretical background on the origins of the stakeholder concept and its relevance in the evolution of the CE concept based on an IS approach. 'Methods' explains the methodology used to review the current literature on stakeholder perspectives regarding the CE and the methods used for the case study selected for this research. 'Results and discussion' discusses the results obtained in the literature review, which are compared against the specific features of the case study. Lastly, 'Conclusions' delivers some conclusions concerning stakeholder perspectives in this study and further research.

Theoretical Background

To date, the CE has been heavily conceptualised in different regions and countries, resulting in a clear understanding of the term and its potential opportunities [2, 6, 11, 28]. However, fully operationalising the concept into a smooth transition to a circular system has been difficult to undertake due to its complexity in real scenarios [12]. One approach that is often used to guarantee a CE implementation requires different stakeholders to create value through networks which have also been recognised in the literature on IS [22]. Furthermore, IS has been identified as essential for implementing the CE in manufacturing activities to accelerate circularity [23, 24]. Thus, this study considers IS as a business model that eliminates the concept of waste to create and deliver value that entails transforming all production systems [13, 23] that guide implementation towards a circular system.

In this sense, IS urges the distribution of materials, energy, and information flows [10]. The proximity of companies is regarded as a critical component, as it facilitates the sharing of supplies and a reduction in transportation costs, waste generation, and greenhouse gas emissions [29]. The most widely known definition of IS is a system that gathers distinct industries in a joint approach to gain a competitive advantage by linking the physical exchanges of resources in a context where cooperation among stakeholders needs to be significant [30]. Moreover, IS has been conceptualised within the CE paradigm to deliver value and economic and environmental benefits via a waste-to-resource exchange, with the collaboration of stakeholders to ensure successful implementation [13, 14].

So far, the development of CE in China and Europe, which together group the most case studies, has shown different scopes. China's CE development is based on solid policies to create an extensive supply chain through regional industrial parks which are targeted for CE development [14, 31]. On the other hand, in the European Union, the scope of the CE is focused on creating secondary materials markets to reduce the dependence on virgin materials, which has boosted the spread of IS initiatives in some countries [32, 33]. Although IS studies are not abundant in Spain, with only three cases of potential

IS reported in the literature, there are still many opportunities for developing new IS initiatives [34]. Nevertheless, implementing IS initiatives globally is still a niche strategy that faces multiple regulatory, financial, and inter-organisational issues [9]. Thus, implementing IS as one of the core strategies to manage resources and waste will need collaboration between stakeholders to achieve a local CE system [12, 24].

The definition of stakeholders dates back to the strategic management literature of the 1980s, in which authors describe the term to refer to any person or group of people who can either be affected or influence any firm's goals [35]. The concept is also meant to analyse any relationship or factor that may assist in developing strategies that change the kind of relationship with a specific stakeholder and its further implications for firm-level competitive advantage [36]. This concept was later described as involving the organisation's actions, policies, practices, and objectives regarding reaching agreements according to how interesting or important they are considered [37].

In terms of conceptual perspectives between IS and CE, both are complementary in creating a cooperative network to exchange resources in an industrial cluster [13, 38]. However, while the CE perspective works from the business standpoint in the operating phase, the IS perspective explains its expansion over time and its impacts on cleaner production. Thus, several stakeholders collaborate on technical innovations with a significant focus on the circular business model to guarantee its viability [13, 39]. Nevertheless, various perspectives that cover all stakeholders involved in ensuring a transition towards a CE remain a subject of study [23, 40].

A distinction has been drawn between some forms of collaboration by actors with a stake in a symbiosis. Mainly, two differences have been made: collaboration by actors directly involved in a resource exchange and those who are not partners but remain a relevant actor in the symbiosis [41, 42]. Such actors vital for a potential IS are defined as stakeholders, and how they can create, maintain, and extend the symbiosis through a network has tended to be less studied [43]. Table 1 highlights the stakeholders claimed in IS literature as being relevant concerning their roles.

As shown in Table 1, regardless of the description given in the literature, the stakeholder's roles differ depending on the research's objective. In some cases, studies have been conducted into how stakeholder roles are crucial in managing essential resources that are also influenced through economic and social exchanges, which confers them specific roles based on this context [43, 48]. In other cases, some authors [46] have described the role of stakeholders as to an engagement in organisational and individual capacities by focusing on humanistic connections based on trust and community embeddedness to make advances in IS projects [49]. However, some studies have given a high relevance to local governments to organize, plan, and implement IS initiatives through better governance [50, 51]. In that sense, the literature has recently been reporting adopting a system perspective rather than firm perspectives to implement IS business models focused on the system's governance and the stakeholders involved that made up that particular system

Table 1 Stakeholders and their primary roles according to the IS literature

Stakeholders	The focus of the roles
Local authorities, local community, companies, suppliers [43–45]	Resource-dependent power of stakeholders
Local authorities, local community, companies [43, 46, 47]	'Stakeholders' engagement
Local authorities, companies, entrepreneurs [13–15]	Innovative collaboration projects

[14]. This focus on a system perspective helps to understand how IS firms are incentivised, motivated, or forced to change through the various mechanisms and how different stakeholders' interest needs to be studied in future research within their context [51].

Methods

This paper is based on a literature review complemented by a case study in the Basque Country, Spain (Fig. 1). This section describes the methods pursued to analyse stakeholder perspectives in transforming a CE system. The paper's methods combine a theoretical and a practical approach, including a literature review and a case study analysis.

Literature Review

A systematic literature review was carried out to gather information about the stakeholders and their roles when implementing the local CE system through an IS approach. The literature review was selected as it follows a methodological rigour while also highlighting opportunities for further research [52, 53]. The first step involved a search in the scientific literature database Web of Science Core Collection (WOS), the most commonly used and robust source for literature review [54] to carry this analysis. WOS's Cited Reference Search tool was used as a starting point for selecting relevant publications. This step allowed it to generate a list of 529 records that mentioned the keywords 'circular economy', 'industrial symbiosis', and 'stakeholders'. This step was done to avoid misinterpretations about stakeholders working in a CE not closely related to a waste-to-resource approach (e.g. IS) [55]. Likewise, the search was limited to peer-reviewed journal articles and review articles (all published in English) as this is the dominant mechanism for quality control in conducting unbiased knowledge synthesis in most scientific disciplines [56]. This step led to an output of 423 relevant publications.

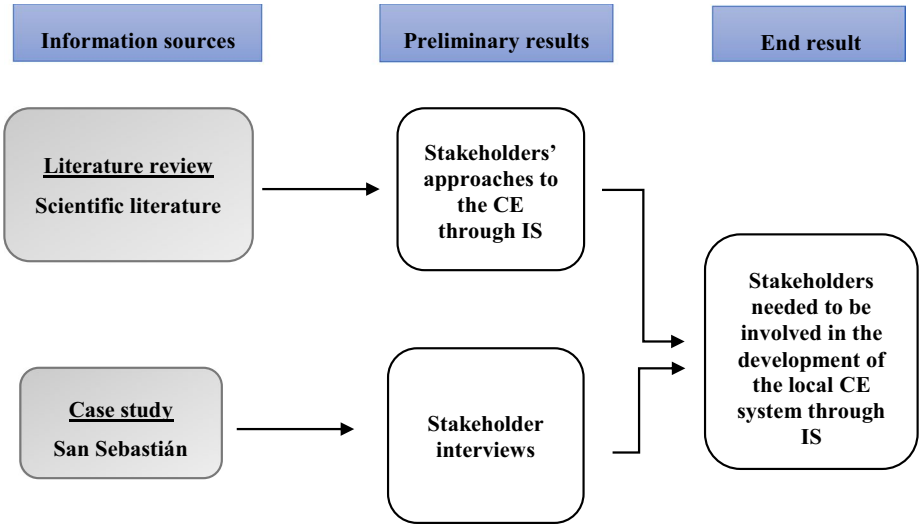

Fig. 1 Research design

Then, in order to select literature in the final sample, the publications were assessed to meet three criteria of eligibility [57]: (i) the study addresses a phenomenon related to stakeholders working in a CE; (ii) the study adopts an empirical approach; and (iii) their research questions aim at understanding the relationship between CE and IS. After excluding literature that did not meet the criteria, a full selection of 23 studies was selected. The studies in the sample were published between 2009 and the end of 2020.

However, the keyword 'circular economy' in the database search might cut some valuable studies out, considering that the role of stakeholders in IS has been extensively researched before the CE concept was coined in recent literature [2]. Hence, the 'snowball' technique was also applied. This snowball technique is a data collection method that helped determine the sample of research articles that would initially be studied to obtain a representative sample [58]. During the snowballing technique process, the references of the 23 studies resulting from the eligibility criteria were analysed in search of new inputs that may lead to new insights. Thus, 16 additional studies were selected to be part of the systematic review as they mentioned the role of stakeholders in IS initiatives. This process led to the final output of 39 papers that were then used in the bibliometric analysis.

A bibliometric analysis refers to a quantitative analytical method for evaluating different research fields [59], and the software tool Bibliometrix was used to perform comprehensive bibliometric analysis for this study. This open-source software follows a standard workflow for science mapping that ensures reliability, as it delivers objective results built on statistical measurements from scientific literature [60]. Hence, the 39 documents resulting from the systematic review were used in the bibliometric analysis. Nevertheless, the researcher undertakes the interpretation stage to explain findings based on previous in-depth knowledge that complements the structure of the bibliometric analysis [61]. A complete review and evaluation of stakeholder perspectives in a CE can thus be obtained (Fig. 2).

Case Study

The case study method was selected as a research strategy used to gain significant insight into one particular process that is restrained in time and space, and it is characterised as focusing on depth rather than breadth in a relatively small number of research units or cases following a strategic sample to extract information from these cases through interviews [62]. Consequently, the region of the Basque Country in Spain was used to carry out the interviews with the stakeholders. Furthermore, the region was selected because several studies have been undertaken that focus on its opportunities for achieving circularity [9, 63], its potential for transforming linear systems to circular systems through IS [64], and an assessment of its companies to make advances towards a CE model [65] compared to regions where non-existing CE initiatives have been set in place [66–69].

Therefore, a semi-structured interview was chosen as a qualitative research method for this study to gather and analyse data concerning the possibilities for transitioning towards a CE system research topic [70]. This type of interview aims to gain information about the experiences of individuals, thereby revealing 'interviewees' standpoints, intentions, and actions to understand the reality within a particular context [71]. This methodology allowed us to collect in-depth information about the real possibilities of developing a CE system with the involvement of different stakeholders.

As the CE development through an IS perspective in the region is still in its infancy, this study follows a strategic sample of interviewees as recommended for this type of research [62].

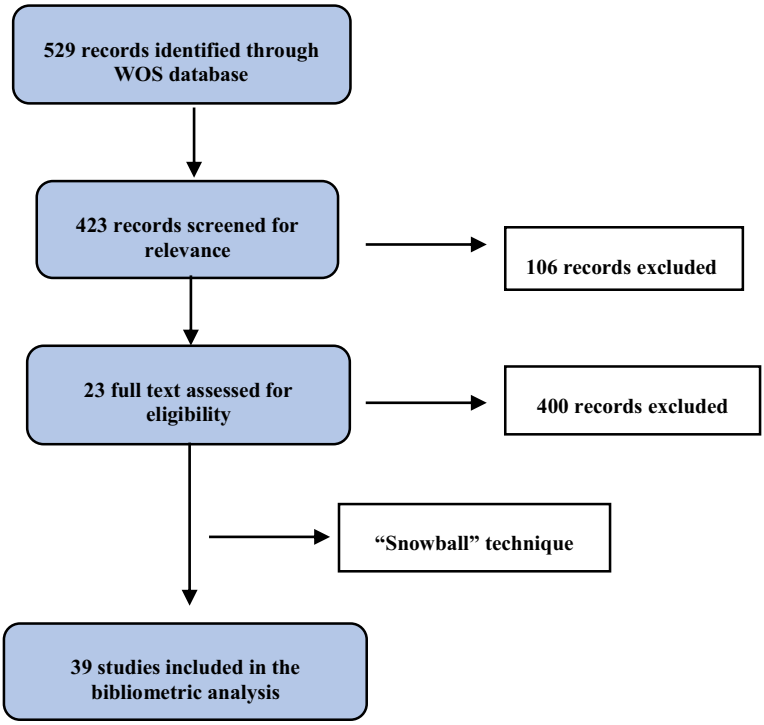

Fig. 2 Systematic review and bibliometric analysis process

The selection of stakeholders was carried out by searching and defining companies that control resources, delivering value propositions around eliminating waste, and promoting tangible and intangible value exchanges between stakeholders, defined as a value network [43]. In addition, the stakeholders selected are known for carrying out some IS initiatives to promote a CE, such as public bodies and private organisations [46]. A total of 6 interviews were done with stakeholders known for having executive roles in their organisations, making them more aware of setting CE strategies and holding relationships with internal and external stakeholders.

The profiles of the different stakeholders are as follows: Stakeholder one is a regional administration leading the CE strategy of the Basque Country 2030. The interviewee is responsible for leading the CE strategy 2030 in the Basque Country. Stakeholder two is a private organisation known for being a frontrunner in developing a CE business model based on recovering secondary materials and using them as the primary input in its manufacturing process to deliver finished products. The interviewee is the general manager and a shareholder of the company responsible for shifting the company's business model from a linear to a circular one almost 20 years ago. Stakeholder three is a foundation involved in different parts of the CE value chain as a coordinator, manufacturer, and innovator to create partnerships through waste-to-resource exchanges with other organisations. The interviewee is the executive director of this foundation and has led the organisation in finding waste-to-resource exchange opportunities many years before the term was part of the European Commission's CE Action Plan. Stakeholder four is a company that designs and

manufactures fixed installations and mobile groups for the crushing of construction and demolition waste and the fragmentation of metal scrap. The interviewee is a sales executive responsible for representing the organisation in the recycling cluster. Stakeholder five is a research institution working closely with public administrations on CE activities such as material recovery, reuse, and recycling. The interviewee is the head researcher of reverse logistics and has been researching the topic since the mid-2000s. Stakeholder six is a company that provides consultancy services to companies interested in finding symbiotic opportunities. The interviewee is the founder and director of the firm with over 20 years of experience working in the synergistic management of waste as resources, waste-to-energy facilities, biomass-biogas networks, and agro-industrial symbiosis. The aspects covered during the interviews included awareness of a waste-to-resource strategy relevance, drivers, key agents, motivations for the generation of IS initiatives, and the elements that influence it.

To guarantee the reliability of the interviews in this study, these were audio-recorded and later transcribed. First, annotations were made on the standard concepts found among the transcripts. Next, the interview transcripts were reviewed and independently coded. Then, the codes were arranged and organised and resulted in a list of core categories related to transitioning to a CE system through IS.

Results and Discussion

This section presents the results of the research question raised earlier regarding how the transition towards the CE can be accelerated from a stakeholders' perspective. Insights from literature and the case study analysis allow identifying and analysing aspects that stakeholders may help speed up the transition to a CE.

Literature Review

The conceptual relationship of the most important and recent issues within the research field of CE, being the keywords 'circular economy', 'industrial symbiosis', and 'stakeholder', is displayed in Fig. 3. The co-occurrence network graph displays the number of appearances of these keywords via a co-word analysis [60]. As can be observed in the figure, there are four clusters, CE, IS, stakeholders, and environment, which are the most representative because of their number of citations and strength of relationships (links).

Words such as 'analysis' and 'framework' are closely linked to the word 'stakeholders' because of several authors claiming a connection in practice between those terms (e.g., label 'case') [27]. Some studies pointed out collective change as a recipe to promote CE following a waste and resource management framework in which IS plays a proactive role and, depending on whether collective change is designed or guided, there is a leading role for government, industries, or intermediaries [7, 8]. The development of an IS system requires effective networks with some stakeholders embedded in this relationship for value creation and value capture adopting systemic business models for CE implementation [14].

As IS is progressively recognised as a strategic tool for implementing CE, some factors such as setting up formal governance with public bodies, business organisations, and associations might be critical when organising IS's emergence process [46]. A comprehensive review of more than 584 scientific articles of IS concludes that working with local authorities, industrial associations, and other associations that coordinate IS might foster

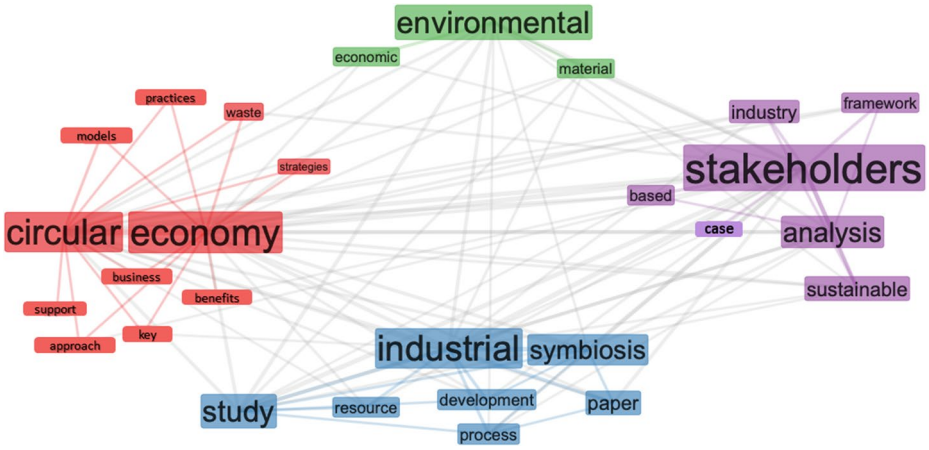

Fig. 3 Graphic visualisation of potential relationships between concepts resulting from the systematic review and bibliometric analysis process

new synergies [72]. Thus, the stakeholder participation schemes aim at ensuring efficient management [26] or networking facilitation to promote trust among stakeholders to gain mutual competitive advantages [25]. In that sense, each stakeholder may accelerate the CE implementation by contributing to the IS cluster's business models [13].

As such, the involvement of stakeholders beyond companies to implement CE through IS can be accelerated by the help of increasing the capabilities of institutional actors such as the National Industrial Symbiosis Programme in the UK in the form of enriching the networks for waste exchanging initiatives [23]. In this respect, understanding and initiating resource partnerships for waste-to-resource innovations without government funds to facilitate IS is still limited and needs to be promoted by public and private partners [4]. Some authors [73] have emphasised hands-on management of the system by referring to collective stakeholders acting as one unified group or reinforcing the stakeholder involvement approach to support the transition towards a CE through IS as part of an effective management tactic [74].

However, at a local level, the role of stakeholders in a transitioning process remains imprecise [22]. This lack of a clear role for the stakeholder could be explained by scarce empirical research on the role of stakeholders interacting favouring the development of a local CE system [27], including perspectives that embrace all stakeholders involved [40]. Although it is well known that a successful transition to a CE will need to rely on cooperation at the group level [75], there is no consensus as to how all stakeholders can be equally incorporated to ensure such a transition [40]. Moreover, although the role of stakeholders in the CE may differ according to the definition given by several authors [55], this study narrows down the role played by them to subjects related to IS, as shown in Table 2. Some of the 'stakeholders' role in transforming recovered materials into reusable resources to implement the CE has been summarised in Table 2.

Kunz et al. [76] conclude that minimising downcycling of materials and increasing the share of reused resources in product manufacture could be achieved if a coordination framework facilitates access to waste to ensure extended producer responsibility is harmonised. Brown and Bajada [19] argue that cooperation and collaboration of multiple stakeholders in CE implementation includes activities involving the reusability of waste, such as a culture of recycling and investment in technology, intending to lessen dependency on the supply of virgin material. Kerdlap et al. [77] also debate that stakeholders should collaborate by sharing information on waste volume, type, and cost from waste producers and recyclers that support countries in their transition to a CE.

Table 2 Stakeholders and their role in CE implementation through IS resulting from the literature review

Stakeholders	The focus of the roles
Private organisations, waste operators, local and regional administrations, business associations, clearinghouses [76]	Facilitating a coordination framework between bodies to access waste
Private organisations, financier, national government, private organisations [19]	Collaboration to coordinate activities around recycling materials in a circular supply chain
Private organisations (e.g. converters, generators, collectors) [77]	Implementation of technologies in the waste value network
Private organisations (e.g. IS promoter, companies), local government agencies, research institutions, media, social organisations (e.g. NGOs) [23]	Public and private partnerships to strengthen institutional capacities
Local government, coordinator, financier, private organisations [13]	Contributors to create, capture, and deliver value from waste
Local government, industry, and research institutions [66]	Regional systematic cooperation developing policy actions and practice-based business

Doing so would facilitate potential waste to resource matches and exchanges within the waste value chain. Although Abreu and Ceglia [23] listed several stakeholders in their study, they classify them into two actors: business and non-business, whose interaction is a type of public-private partnership created to favour institutional capacities and business opportunities. Some authors seem to agree about the stakeholders and their roles in developing such circular systems.

This constraint regarding collaboration may be due to the non-inclusion of a variety of perspectives that covers all stakeholders involved, such as policymakers, governmental bodies, manufacturing industries, business associations, social organisations, research institutions, foundations, and so on if an implementation strategy is to be considered viable [22, 40]. Industrial stakeholders, local government, and some operators and coordinators must also collaborate to generate social, environmental, and economic benefits to ensure continuous success through IS implementation [13, 66]. Yakovleva et al. [26] suggest that a stakeholder participation scheme could help to ensure efficient management in implementing IS initiatives by providing a framework with a holistic consideration of their roles for a swift transition towards the CE [73]. Networks could thus open to broader collaboration that facilitates effective exchange. The stakeholders may help speed up the transition by working and collaborating on projects that cross organisational boundaries to strengthen the networks [78].

Case Study

As stated throughout this study, there have been limited empirical studies on the development of local CE systems [27], although IS offers background into how to implement and ensure a resource-efficient system [23]. Stakeholders also play a crucial part in this transition, as a collaboration between them is essential to gain a long-term vision of cycling materials. This section addresses how the transition towards the CE can be accelerated from a 'stakeholders' perspective. The first part of the case study involves performing an in-depth analysis of the political and socioeconomic context. The second part then gathers information from the stakeholder interviews.

The Basque Country region is amongst the most industrialised areas in Spain [9]. The regional government has launched a strategic CE vision aligned with the CE action plan set by the European Commission [79]. Thus, some assessment to help companies make advances in terms of the CE has been undertaken to test the application and progress of circular business models [65]. Overall, the public administration has gathered companies and academia in two separate industrial clusters with the scope of promoting the transition to a CE in a textile cluster and a recycling cluster. Table 3 summarises the objectives set by the public administration to transform a local CE system [6]. One of the main objectives of these clusters is to extend collaborations to other companies in the recycling and textile sector so that all industrial sectors with direct influence on waste management and garments may stimulate the creation of a CE system with the collaboration of all stakeholders engaged.

As stated above, the regional government has issued a CE strategy for the region, and this strategy is primarily focused on industrial clusters to ensure added value and benefits are delivered among their members through continuous cooperation. This strategy makes it feasible to integrate IS [13]. However, despite the involvement of different stakeholders that play a crucial role in creating cooperation and communication among companies and other stakeholders (Table 3), there are still some shortcomings in speeding up a CE system [64]. This shortcoming inhibits the entire deployment and implementation of IS in the region, such as SMEs [64], despite being highly industrialised and the greater awareness

Table 3 Features of the two clusters created to promote a CE strategy in the Basque Country

	Recycling cluster	Textile cluster
Members	Companies, research centres and universities, foundations, and environmental consulting firms	Fashion brands, accessory brands, and R+D bodies
Main objectives	Promote the reuse and creation of new recycled products and efficient consumption of materials through research and development (R+D) Explore new employment niches in reuse and recycling, enhancing the importance of the circular economy Promotion of symbiosis through innovation	Support environmentally friendly policies and creation, design, and marketing processes to ensure sustainable fashion Foster innovation, entrepreneurship, and the creation of new products Serve as a nexus for communication and participation between the different agents within the sector and a collaboration platform

of such opportunities [63, 65]. Therefore, the following part develops an analysis based on the interviewees' responses to understand how the stakeholders may help speed up the transition.

Stakeholder one is a regional administration that promotes sustainable policies in the Basque Country in collaboration with other public administrations, companies, and citizens. In addition, this stakeholder promotes networking and local and international collaboration networks for the effective deployment of the Basque Country's CE strategy. Its strategy aims to create demand for CE by involving the economic sectors with the most significant potential to carry out this transformation, considering its contribution to the Basque economy, the use they make of raw materials, the volume of waste generation throughout its activities, and the capacity for the reincorporation of secondary raw materials. They do so by financing, advising, and disseminating knowledge within business networks and local administrations in critical sectors such as energy, built environment, metals, plastics, and electronics. Nonetheless, less than 2% of the GDP comes from CE activities in this region. This stakeholder's role in promoting CE is crucial as it has been reported in the literature that while organising new synergies, the role of public bodies in funding and providing support for innovative processes is critical to enhancing collaborative partnerships [46].

The interviewee has asserted that it is constantly mapping initiatives and needs among companies to search for value creation from eliminating the concept of waste. However, the positive interaction between public-private parties relies on a government-funded solid support which might have some implications for continuing this practice if the publicly funded facilitators suddenly stop promoting this sort of partnerships due to tensions between conventional ways of doing business or on how public-private partnerships can promote business innovations [4, 20].

Stakeholder two is a member of the recycling cluster, which recycles plastic bottles and transforms them into different high-end products. It was one of the first companies in the region to use the term CE. They opted for a large-scale project in which they collaborated with universities, technology centres, and companies in the area. This close collaboration with these stakeholders also gave rise to spinoff projects. Stakeholder two also owns a recycling plant, a processing plant for the waste they generate in their processes, and one cogeneration plant, which allows them to develop their thermal and electrical energy, which is also sold to the grid. Stakeholder two is proactive in leveraging symbiosis opportunities and has a proven key role in fostering a CE. However, their perception is that they can still thrive without government aid.

This statement proved what other studies have claimed about expanding the understanding of collaborative value creation networks within market-based environments and the strategic relevance of carrying out a transition led by the private sector without the role of a government-funded promoter [4, 80]. In particular, the specific knowledge of this stakeholder by creating these networks highlights the relevance of having several capacities to capture value from IS initiatives to support a transition towards a CE [22]. Moreover, reshaping the market and re-structuring themselves by interacting with their stakeholders in the context they operate has helped transform this stakeholder into a frontrunner in a transition strategy with such a complex network [81].

Stakeholder three is fully committed to supporting symbiosis opportunities by serving as the waste collector and creating a value proposition by eliminating the concept of waste within the textile sector. Stakeholder three is involved in different projects; one of them uses different materials in defective chairs to manufacture other products, which are then sold to other companies. This process enables a second use for these materials that otherwise would have been discarded. In the second collaboration, they partner with a company that supplies 'waste' to the stakeholder, turning it into covers to protect vehicle seats. The third project is a collaboration with three companies from the furniture sector in which they supply waste to the stakeholder to create new furniture that is then sold to the regular customers.

When asked about interest on the part of stakeholder three in pursuing these projects, they responded that it is a matter of gaining specific experience with IS, serving as a frontrunner, and, above all, raising awareness among companies and society about such benefits. They also responded that the financial aspect is still essential to maintain the operation and pay salaries to the employees who work for the stakeholder. Therefore, in all these collaborations, there is financial compensation. Another relevant issue for this stakeholder is that local government assistance in funding these projects is fundamental; such a grant is awarded to this stakeholder from the provincial council to carry out CE-related tasks. Stakeholder three seems to play a critical role in promoting symbiotic opportunities defined as a transition broker. This sort of actor mediates both the process and content in building circular initiatives. This type of stakeholder approaches other stakeholders, notably local government and other business stakeholders [18], as part of a system [82].

Stakeholder four perceives its strategic relevance in promoting a waste-to-resource strategy as it manufactures machinery to treat aggregates and minerals. This strategy might create opportunities for its customers to sell their waste as by-products. Nevertheless, private customers set their manufacturing process, which might not be aligned with public targets of reaching circularity. This business-to-business relationship that stakeholder four develops may lack a collaborative aspect at a system level; as the interviewee stated, *"the interest is economic and not collaborative."* Despite manufacturing machines capable of cleaning and giving a second use to different materials such as aggregates, scrap metal, and car waste, having a competitive relationship rather than collaborative may limit transitioning to a CE [83]. Furthermore, the organisational transition towards a circular business model innovation through an IS perspective might help advance the CE [13, 80].

On the other hand, stakeholder five researches on reverse logistics covering recovery processes, life cycle, market entry, reuse, and recycling of the product, components, or the material of which the products are made. As part of CE 2030, this stakeholder aims to reach industries and civil society to close the loop. This stakeholder serves as a bridge for public administrations and businesses and accompanies the public administration in awarding grants based on the degree of CE of the applicant. The stakeholder five also tends to look for companies since they use them as an experimentation centre to see if there is any beneficial effect, emission reduction, or added value to their businesses.

In particular, the interviewee mentions a collaboration with a steel company that developed a recycling system for their products and by-products to serve as suppliers for companies in the same holding. One of the outcomes was that the packaging could be reused, and the waste generated in the process was reduced. However, the interviewee declares that companies do not usually have a very vivid interest in research activity; they seek help from the administration. So that, a factor that may influence the generation of IS initiatives is the lack of strategic planning for companies that sometimes see it as a requirement to access aid instead of seeing it as a competitive advantage [3].

Finally, stakeholder six is a consultancy company that reaches the industry with IS projects but supported by the administrations, as seen in other countries [72, 84]. This stakeholder serves as an intermediary agent seeking collaboration between companies with the same problems or synergies. Some of the drivers identified by this stakeholder are the opportunities to produce new materials for new use, extend the life of resources, or obtain high-value recycling products. The administrations and town councils have been critical to helping them carry out these projects with companies, especially when IS initiatives require much knowledge to explore new synergies. According to the interviewee, one factor that may speed up the generation of these initiatives is a total European Union commitment to resource use. However, they claim that more waste-to-resource exchanges need several actors at stake in the value chain, not only the producer but also the suppliers, consumers, or even the carriers.

Based on the observations made in the case study, the stakeholders are aware of the strategic advantages of implementing a CE, especially when the purpose is to minimise downcycling of materials and increase the share of reused resources as proposed by IS to create added value. However, not a systemic level effort besides the clusters was mentioned by the stakeholders when asked about the influence of the multiple critical agents that should be more involved. As was observed in this section, a stakeholder-based approach is critical in ensuring a move towards a CE local system, mainly when it is meant to be implemented through IS. In particular, a local-level focus for CE transition is of the utmost importance since, on this scale, it proves less demanding to mobilise collective action to achieve circularity [85].

This empirical study reinforces the idea that implementing the CE from a group-level approach is still constrained by the non-inclusion of a variety of perspectives that covers all stakeholders involved, such as policymakers, governmental bodies, manufacturing industries, business associations, social organisations, research institutions, foundations, and so on, to make it viable [22]. Collaboration is the key to the transition to the CE, especially when the exchange of resources is required in symbiotic opportunities to ensure such a transition. The shift to a CE would not be possible without stakeholder involvement through a solution-focused collaboration between them to reduce the extraction of raw materials in the long term [40, 86]. Nevertheless, the particular role of multiple stakeholders in the development of a local CE system requires further assessment to more local stakeholders supporting a network value approach within a CE is lacking [22].

Conclusions

The role of multiple stakeholders in the transitioning process towards the CE remains a subject of research. Nevertheless, literature on IS offers some guidance, as networks help understand and support closing the loop on industrial products holistically. Thus, the purpose of this study was to answer the following research question: how can the transition

towards the CE be accelerated from a 'stakeholders' perspective? Based on the findings of this study, it was found that most of the stakeholders reported in the literature (industries, local government, academia, and coordinators) are aware of their relevance in promoting this change of paradigm. However, despite having a CE strategy established at the regional level and some companies already delivering circular solutions based on IS initiatives, the CE has not yet been fully deployed. Moreover, the lack of other stakeholders participating in these initiatives might be hampering the full implementation of a local CE system. Therefore, considering a broad spectre of other stakeholders contributing to the acceleration of the transition might support the process.

The results showed the importance of understanding how stakeholders may work and speed up a unified vision of circularity. We conclude that a significant focus on proactive management, such as developing inter-organisational strategies and management that considers them to be collective stakeholders of one unified group of the entire system, could help advance the CE. Also, having certain activities and experiments aim at the short term that can be practised, tried out, and showcased might take the narrative into the practice of the transition to a CE. However, this research was limited by the number of stakeholders subject to study, which might narrow down the perspectives of such stakeholders implementing circular strategies in the region. Moreover, some stakeholders not reported by the interviewees may play an essential role in engaging the different actors in developing local circular systems. Therefore, it is suggested that studies of third-party stakeholders that serve as brokers in these types of transitions could be explored in further detail.

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Declarations

Conflict of Interest The authors declare no competing interests.

References

1. Korhonen J, Honkasalo A, Seppälä J (2018) Circular economy: the concept and its limitations. Ecol Econ 143:37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041

2. Prieto-Sandoval V, Jaca C, Ormazabal M (2018) Towards a consensus on the circular economy. J Clean Prod 179:605–615. https://doi.org/10.1016/j.jclepro.2017.12.224
3. Prieto-Sandoval V, Jaca C, Santos J, Baumgartner RJ, Ormazabal M (2019) Key strategies, resources, and capabilities for implementing circular economy in industrial small and medium enterprises. Corp Soc Responsib Environ Manag 26:1473–1484. https://doi.org/10.1002/csr.1761
4. Velenturf APM (2017) Initiating resource partnerships for industrial symbiosis. Reg Stud Reg Sci 4:117–124. https://doi.org/10.1080/21681376.2017.1328285
5. Herczeg G, Akkerman R, Hauschild MZ (2018) Supply chain collaboration in industrial symbiosis networks. J Clean Prod 171:1058–1067. https://doi.org/10.1016/j.jclepro.2017.10.046
6. Winans K, Kendall A, Deng H (2017) The history and current applications of the circular economy concept. Renew Sustain Energy Rev 68:825–833. https://doi.org/10.1016/j.rser.2016.09.123
7. Blomsma F (2018) Collective 'action recipes' in a circular economy – on waste and resource management frameworks and their role in collective change. J Clean Prod 199:969–982. https://doi.org/10.1016/j.jclepro.2018.07.145
8. Blomsma F, Brennan G (2017) The emergence of circular economy: a new framing around prolonging resource productivity. J Ind Ecol 21:603–614. https://doi.org/10.1111/jiec.12603
9. Ormazabal M, Prieto-Sandoval V, Puga-Leal R, Jaca C (2018) Circular economy in Spanish SMEs: challenges and opportunities. J Clean Prod 185:157–167. https://doi.org/10.1016/j.jclepro.2018.03.031
10. Mallawaarachchi H, Sandanayake Y, Karunasena G, Liu C (2020) Unveiling the conceptual development of industrial symbiosis: bibliometric analysis. J Clean Prod 258:120618. https://doi.org/10.1016/j.jclepro.2020.120618
11. Homrich AS, Galvão G, Abadia LG, Carvalho MM (2018) The circular economy umbrella: trends and gaps on integrating pathways. J Clean Prod 175:525–543. https://doi.org/10.1016/j.jclepro.2017.11.064
12. Domenech T, Bleischwitz R, Doranova A, Panayotopoulos D, Roman L (2019) Mapping industrial symbiosis development in Europe_ typologies of networks, characteristics, performance and contribution to the circular economy. Resour Conserv Recycl 141:76–98. https://doi.org/10.1016/j.resconrec.2018.09.016
13. Baldassarre B, Schepers M, Bocken N, Cuppen E, Korevaar G, Calabretta G (2019) Industrial symbiosis: towards a design process for eco-industrial clusters by integrating circular economy and industrial ecology perspectives. J Clean Prod 216:446–460. https://doi.org/10.1016/j.jclepro.2019.01.091
14. Fraccascia L, Giannoccaro I, Albino V (2019) Business models for industrial symbiosis: a taxonomy focused on the form of governance. Resour Conserv Recycl 146:114–126. https://doi.org/10.1016/j.resconrec.2019.03.016
15. Short SW, Bocken NMP, Barlow CY, Chertow MR (2014) From refining sugar to growing tomatoes: industrial ecology and business model evolution. J Ind Ecol. 18:603–618. https://doi.org/10.1111/jiec.12171
16. Timmermans RW, Witjes S (2016) Circular business: collaborate and circulate; a bookreview. J Clean Prod. 135:699–700. https://doi.org/10.1016/j.jclepro.2016.06.066
17. de Jesus A, Mendonça S (2018) Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy. Ecol Econ 145:75–89. https://doi.org/10.1016/j.ecolecon.2017.08.001
18. Cramer JM (2020) Implementing the circular economy in the Amsterdam Metropolitan Area: the interplay between market actors mediated by transition brokers. Bus Strateg Environ 29:2857–2870. https://doi.org/10.1002/bse.2548
19. Brown PJ, Bajada C (2018) An economic model of circular supply network dynamics: toward an understanding of performance measurement in the context of multiple stakeholders. Bus Strateg Environ 27:643–655. https://doi.org/10.1002/bse.2069
20. Panwar R, Niesten E (2020) Advancing circular economy. Bus Strateg Environ 29:1–3. https://doi.org/10.1002/bse.2602
21. Xiang P, Yuan T (2019) A collaboration-driven mode for improving sustainable cooperation in smart industrial parks. Resour Conserv Recycl 141:273–283. https://doi.org/10.1016/j.resconrec.2018.10.037
22. Ghinoi S, Silvestri F, Steiner B (2020) The role of local stakeholders in disseminating knowledge for supporting the circular economy: a network analysis approach. Ecol Econ 169:106446. https://doi.org/10.1016/j.ecolecon.2019.106446
23. de Abreu MCS, Ceglia D (2018) On the implementation of a circular economy: the role of institutional capacity-building through industrial symbiosis. Resour Conserv Recycl 138:99–109. https://doi.org/10.1016/j.resconrec.2018.07.001
24. Saavedra YMB, Iritani DR, Pavan ALR, Ometto AR (2018) Theoretical contribution of industrial ecology to circular economy. J Clean Prod 170:1514–1522. https://doi.org/10.1016/j.jclepro.2017.09.260
25. Fric U, Rončević B, Uršič ED (2020) Role of computer software tools in industrial symbiotic networks and the examination of sociocultural factors. Environ Prog Sustain Energy 39:1–7. https://doi.org/10.1002/ep.13364

26. Yakovleva N, Frei R, Rama Murthy S (2019) Editorial introduction: Achieving sustainable development goals through sustainable supply chains in the post-global economy. https://doi.org/10.1007/978-3-030-15066-2_1
27. Domenech T, Bahn-Walkowiak B (2019) Transition towards a resource efficient circular economy in Europe: policy lessons from the EU and the Member States. Ecol Econ 155:7–19. https://doi.org/10.1016/j.ecolecon.2017.11.001
28. Kalmykova Y, Sadagopan M, Rosado L (2018) Circular economy – from review of theories and practices to development of implementation tools. Resour Conserv Recycl 135:190–201. https://doi.org/10.1016/j.resconrec.2017.10.034
29. Chertow EJ (2012) Organizing self-organizing systems: toward a theory of industrial symbiosis. J Ind Ecol 16:13–27. https://doi.org/10.1111/j.1530-9290.2011.00450.x
30. Chertow MR (2007) "Uncovering" industrial symbiosis. J Ind Ecol 11:11–30. https://doi.org/10.1162/jiec.2007.1110
31. Mathews JA, Tan H, Hu MC (2018) Moving to a circular economy in China: transforming industrial parks into eco-industrial parks. Calif Manage Rev 60:157–181. https://doi.org/10.1177/0008125617752692
32. Bassi F, Dias JG (2019) The use of circular economy practices in SMEs across the EU. Resour Conserv Recycl 146:523–533. https://doi.org/10.1016/j.resconrec.2019.03.019
33. Petit-Boix A, Leipold S (2018) Circular economy in cities: reviewing how environmental research aligns with local practices. J Clean Prod 195:1270–1281. https://doi.org/10.1016/j.jclepro.2018.05.281
34. Neves A, Godina R, Azevedo GS, Pimentel C, Matias COJ (2019) The potential of industrial symbiosis: case analysis and main drivers and barriers to its implementation. Sustainability 11:7095. https://doi.org/10.3390/su11247095
35. Crane B (2020) Revisiting who, when, and why stakeholders matter: trust and stakeholder connectedness. Bus Soc 59:263–286. https://doi.org/10.1177/0007650318756983
36. Verbeke A, Tung V (2013) The future of stakeholder management theory: a temporal perspective. J Bus Ethics. 112:529–543. https://doi.org/10.1007/s10551-012-1276-8
37. Heidrich O, Harvey J, Tollin N (2009) Stakeholder analysis for industrial waste management systems. Waste Manag 29:965–973. https://doi.org/10.1016/j.wasman.2008.04.013
38. Patricio J, Axelsson L, Blomé S, Rosado L (2018) Enabling industrial symbiosis collaborations between SMEs from a regional perspective. J Clean Prod 202:1120–1130. https://doi.org/10.1016/j.jclepro.2018.07.230
39. Albino V, Fraccascia L (2015) The industrial symbiosis approach: a classification of business models. Procedia Environ Sci Eng Manag. iris.uniroma1.it/retrieve/handle/11573/1244328/1052260/
40. Millar N, McLaughlin E, Börger T (2019) The circular economy: swings and roundabouts? Ecol Econ 158:11–19. https://doi.org/10.1016/j.ecolecon.2018.12.012
41. Paquin RL, Howard-Grenville J (2012) The evolution of facilitated industrial symbiosis. J Ind Ecol 16:83–93. https://doi.org/10.1111/j.1530-9290.2011.00437.x
42. Boons F, Spekkink W, Jiao W (2014) A process perspective on industrial symbiosis. J Ind Ecol. 18:341–355. https://doi.org/10.1111/jiec.12116
43. Hein AM, Jankovic M, Feng W, Farel R, Yune JH, Yannou B (2017) Stakeholder power in industrial symbioses: a stakeholder value network approach. J Clean Prod 148:923–933. https://doi.org/10.1016/j.jclepro.2017.01.136
44. Heeres RR, Vermeulen WJV, De Walle FB (2004) Eco-industrial park initiatives in the USA and the Netherlands: first lessons. J Clean Prod 12:985–995. https://doi.org/10.1016/j.jclepro.2004.02.014
45. Domenech T, Davies M (2011) Structure and morphology of industrial symbiosis networks: the case of Kalundborg. Procedia - Soc Behav Sci 10:79–89. https://doi.org/10.1016/j.sbspro.2011.01.011
46. Mortensen L, Kørnøv L (2019) Critical factors for industrial symbiosis emergence process. J Clean Prod 212:56–69. https://doi.org/10.1016/j.jclepro.2018.11.222
47. Cutaia L, Luciano A, Barberio G, Sbaffoni S, Mancuso E, Scagliarino C, La Monica M (2015) The experience of the first industrial symbiosis platform in Italy. Environ Eng Manag J 14:1521–1533 https://doi.org/hdl.handle.net/20.500.12079/3014
48. Cameron BG, Crawley EF, Feng W, Lin M (2011) Strategic decisions in complex stakeholder environments: a theory of generalized exchange. EMJ - Eng Manag J. 23:37–45. https://doi.org/10.1080/10429247.2011.11431907
49. Hewes A, Lyons DI (2008) The humanistic side of eco-industrial parks: champions and the role of trust. Reg Stud. 42:1329–1342. https://doi.org/10.1080/00343400701654079
50. Cerceau J, Mat N, Junqua G, Lin L, Laforest V, Gonzalez C (2014) Implementing industrial ecology in port cities: international overview of case studies and cross-case analysis. J Clean Prod 74:1–16. https://doi.org/10.1016/j.jclepro.2014.03.050

51. Yuan ES, Wen Z, Ma M (2019) The influence of policy on industrial symbiosis from the firm's perspective: a framework. J Clean Prod 213:1172–1187. https://doi.org/10.1016/j.jclepro.2018.12.176
52. Briner RB, Denyer D (2012) Systematic review and evidence synthesis as a practice and scholarship tool. Handb evidence-based Manag Companies, classrooms Res 112–129 . https://doi.org/10.1093/oxfordhb/9780199763986.013.0007
53. Carvalho MM, Fleury A, Lopes AP (2013) An overview of the literature on technology roadmapping (TRM): contributions and trends. Technol Forecast Soc Change 80:1418–1437. https://doi.org/10.1016/j.techfore.2012.11.008
54. Kamalski J, Kirby A (2012) Bibliometrics and urban knowledge transfer. Cities 29:S3–S8. https://doi.org/10.1016/j.cities.2012.06.012
55. Kirchherr J, Reike D, Hekkert M (2017) Conceptualizing the circular economy: an analysis of 114 definitions. Resour Conserv Recycl 127:221–232. https://doi.org/10.1016/j.resconrec.2017.09.005
56. Bornmann L (2011) Scientific peer review. Annu Rev Inf Sci Technol 45:197–245. https://doi.org/10.1002/aris.2011.1440450112
57. Gottinger A, Ladu L, Quitzow R (2020) Studying the transition towards a circular bioeconomy—a systematic literature review on transition studies and existing barriers. Sustain 12:1–27. https://doi.org/10.3390/su12218990
58. Geissdoerfer M, Savaget P, Bocken NMP, Hultink EJ (2017) The circular economy – a new sustainability paradigm? J Clean Prod 143:757–768. https://doi.org/10.1016/j.jclepro.2016.12.048
59. Huang M, Wang Z, Chen T (2019) Analysis on the theory and practice of industrial symbiosis based on bibliometrics and social network analysis. J Clean Prod 213:956–967. https://doi.org/10.1016/j.jclepro.2018.12.131
60. Aria M, Cuccurullo C (2017) Bibliometrix: an R-tool for comprehensive science mapping analysis. J Informetr 11:959–975. https://doi.org/10.1016/j.joi.2017.08.007
61. Zupic I, Čater T (2014) Bibliometric methods in management and organization. Organ Res Methods 18:429–472. https://doi.org/10.1177/1094428114562629
62. Piet V, Hans D (2010) Designing a research project, Second. Eleven International Publishing, The Hague
63. Ormazabal M, Prieto-Sandoval V, Jaca C, Santos J (2016) An overview of the circular economy among SMEs in the Basque country: a multiple case study. J Ind Eng Manag 9:1047–1058 https://doi.org/hdl.handle.net/10419/188804
64. Rincon-Moreno J, Ormazabal M, Álvarez MJ, Jaca C (2020) Shortcomings of transforming a local circular economy system through industrial symbiosis : a case study in Spanish SMEs. https://doi.org/10.3390/su12208423
65. Rincón-Moreno J, Ormazábal M, Álvarez MJ, Jaca C (2021) Advancing circular economy performance indicators and their application in Spanish companies. J Clean Prod 279:123605. https://doi.org/10.1016/j.jclepro.2020.123605
66. Vanhamäki S, Virtanen M, Luste S, Manskinen K (2020) Transition towards a circular economy at a regional level: a case study on closing biological loops. Resour Conserv Recycl 156:104716. https://doi.org/10.1016/j.resconrec.2020.104716
67. Aguilar-Hernandez GA, Sigüenza-Sanchez CP, Donati F, Merciai S, Schmidt J, Rodrigues JFD, Tukker A (2019) The circularity gap of nations: a multiregional analysis of waste generation, recovery, and stock depletion in 2011. Resour Conserv Recycl 151:104452. https://doi.org/10.1016/j.resconrec.2019.104452
68. Circle Economy (2018) The circularity gap report. https://www.circle-economy.com/resources/the-circularity-gap-report-our-world-is-only-9-circular. Accessed 15 Oct 2020
69. Prendeville S, Cherim E, Bocken N (2018) Circular cities: mapping six cities in transition. Environ Innov Soc Transitions 26:171–194. https://doi.org/10.1016/j.eist.2017.03.002
70. Charmaz K, Liska L (2013) Grounded theory. Qual Res Heal Sci Methodol Methods Process 9780203777:30–55. https://doi.org/10.4324/9780203777176
71. Charmaz K (2006) Constructing grounded theory: a practical guide through qualitative analysis. Sage, London
72. Neves A, Godina R, Azevedo SG, Matias JCO (2019) A comprehensive review of industrial symbiosis. J Clean Prod 247:119113. https://doi.org/10.1016/j.jclepro.2019.119113
73. Gupta S, Chen H, Hazen BT, Kaur S, Santibañez Gonzalez EDR (2019) Circular economy and big data analytics: a stakeholder perspective. Technol Forecast Soc Change 144:466–474. https://doi.org/10.1016/j.techfore.2018.06.030
74. Genovese A, Acquaye AA, Figueroa A, Koh SCL (2017) Sustainable supply chain management and the transition towards a circular economy: evidence and some applications. Omega (United Kingdom) 66:344–357. https://doi.org/10.1016/j.omega.2015.05.015
75. Figge F, Thorpe AS, Good J (2021) Us before me : A group level approach to the circular economy. Ecol Econ 179:106838. https://doi.org/10.1016/j.ecolecon.2020.106838

76. Kunz N, Mayers K, Van Wassenhove LN (2018) Stakeholder views on extended producer responsibility and the circular economy. Calif Manage Rev 60:45–70. https://doi.org/10.1177/0008125617752694
77. Kerdlap P, Low JSC, Ramakrishna S (2019) Zero waste manufacturing: a framework and review of technology, research, and implementation barriers for enabling a circular economy transition in Singapore. Resour Conserv Recycl 151:104438. https://doi.org/10.1016/j.resconrec.2019.104438
78. Sengers F, Wieczorek AJ, Raven R (2019) Experimenting for sustainability transitions: a systematic literature review. Technol Forecast Soc Change 145:153–164. https://doi.org/10.1016/j.techfore.2016.08.031
79. European Commission (2015) Closing the loop - an EU action plan for the circular economy. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. In: Com. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614. Accessed 15 Jan 2021
80. Hofmann F, Jaeger-Erben M (2020) Organizational transition management of circular business model innovations. Bus Strateg Environ 29:2770–2788. https://doi.org/10.1002/bse.2542
81. Loorbach D, Wijsman K (2013) Business transition management: exploring a new role for business in sustainability transitions. J Clean Prod 45:20–28. https://doi.org/10.1016/j.jclepro.2012.11.002
82. Ng KS, To LS (2020) A systems thinking approach to stimulating and enhancing resource efficiency and circularity in households. J Clean Prod 275:123038. https://doi.org/10.1016/j.jclepro.2020.123038
83. Kern F, Sharp H, Hachmann S (2020) Governing the second deep transition towards a circular economy: how rules emerge, align and diffuse. Environ Innov Soc Transitions 37:171–186. https://doi.org/10.1016/j.eist.2020.08.008
84. Cervo H, Ogé S, Maqbool AS, Mendez Alva F, Lessard L, Bredimas A, Ferrasse J-H, Van Eetvelde G (2020) A case study of industrial symbiosis in the Humber region using the EPOS methodology. Sustainability
85. Graymore MLM, Sipe NG, Rickson RE (2008) Regional sustainability: How useful are current tools of sustainability assessment at the regional scale? Ecol Econ. 67:362–372. https://doi.org/10.1016/j.ecolecon.2008.06.002
86. Velenturf APM, Jopson JS (2019) Making the business case for resource recovery. Sci Total Environ 648:1031–1041. https://doi.org/10.1016/j.scitotenv.2018.08.224