communications sustainability

Article

A Nature Portfolio journal

https://doi.org/10.1038/s44458-026-00038-6

A global typology for assessing socioeconomic impacts of the circular economy

G. Foster[1] ✉, M. Calisto Friant[2], B. Leiputė[3], T. King[3], T. B. Fischer[4,5], S. Gaušas[3], E. Langham[3], A. Švedkauskienė[3] & R. Marschinski[1]

Governments worldwide have embraced the circular economy and are translating it into policies, environmental laws, and regulations. However, the socioeconomic impacts of these policies are less understood due to a lack of systematic assessment. Here, we conduct a systematic review and analysis of 128 studies to develop a typology that identifies the most likely positive and negative socioeconomic impacts of different types of CE policies. The typology guides the development of more effective and balanced policies. We identified 12 key areas of impact and further divided them into 44 sub-topics. These areas cover how the circular economy affects industries, regions, and products, as well as describe effects on workers, employees, and communities. Most circular economy policies aim to transform waste into usable resources. The literature is practice-based, dominated by regulations and reporting, and financial incentives. Consumer products and plastics are in the spotlight. Employment is the most studied socioeconomic impact. Overall, the proposed typology can be used for any country, region or city to help policymakers and researchers better understand the socioeconomic impacts of circular economy policies.

At the global level and in the European Union (EU), public policy is the driving force for the growing role of circularity. Circular Economy (CE) legislation and regulations directly impact businesses and citizens. For example, China legislated its CE ambition in 2009 with its Circular Economy Promotion Law. EU examples of CE law and regulation are the revisions to the Waste Framework Directive and other directives after the first Circular Economy Action Plan of 2015. Correspondingly, there has been an exponential increase in public policy research meant to inform and evaluate CE policy in the last decade.

CE public policy research investigates resource savings, pollution reduction, jobs, and costs in the macro context of market failures leading to society bearing the costs of externalities (e.g. pollution). Nevertheless, the socioeconomic lens is underdeveloped in many CE studies and a deeper understanding is needed[1–4]. As a result, policy assessment work is currently impeded by an absence of systematic knowledge on the most likely socioeconomic impacts of different types of CE policies. Therefore, the authors investigated the key features of current research in the field and developed a typology to answer the question, "What are the socioeconomic impacts of circular economy policies?"

With the goal of better integrating research into policymaking, the detailed findings of the literature review of public policy research are presented here. Previously, the authors applied the typology of socioeconomic impacts to evaluate European Union (EU) CE policy documents and recommend improvements to policymaking in the EU, demonstrating its usefulness[5]. The findings and typology can be used to inform CE policy evaluation vis-à-vis socioeconomic disparities for any country, region or city to promote equitable, sustainable development.

Results

A dataset that embodies circular economy public policy between 2012 and 2023

The authors conducted a systematic literature review and inductive thematic analysis of 128 English-language documents, analysing the socioeconomic impacts of CE public policies. These included 106 (83%) peer-reviewed publications and 22 (17%) grey literature publications (see 'Methods', and Supplementary Fig. 1 PRISMA chart for record screening results). Figure 1 below provides an overview of the dates of publications in

[1]B5 Circular Economy and Sustainable Industry, European Commission Joint Research Centre, Seville, Spain. [2]Institute of Interdisciplinary Studies, University of Amsterdam, Amsterdam, the Netherlands. [3]Visionary Analytics, Vilnius, Lithuania. [4]Environmental Assessment and Management Research Centre, School of Environmental Sciences, University of Liverpool, Liverpool, UK. [5]Research Unit for Environmental Sciences and Management, North West University, Potchefstroom, South Africa. ✉e-mail: gillian.foster@ec.europa.eu

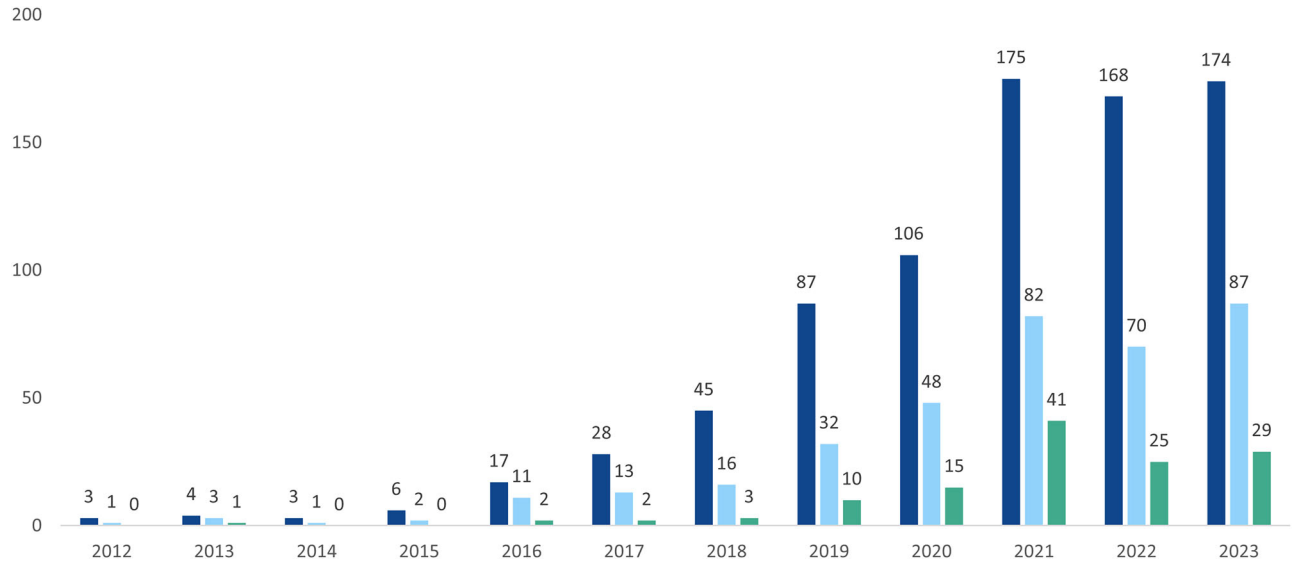
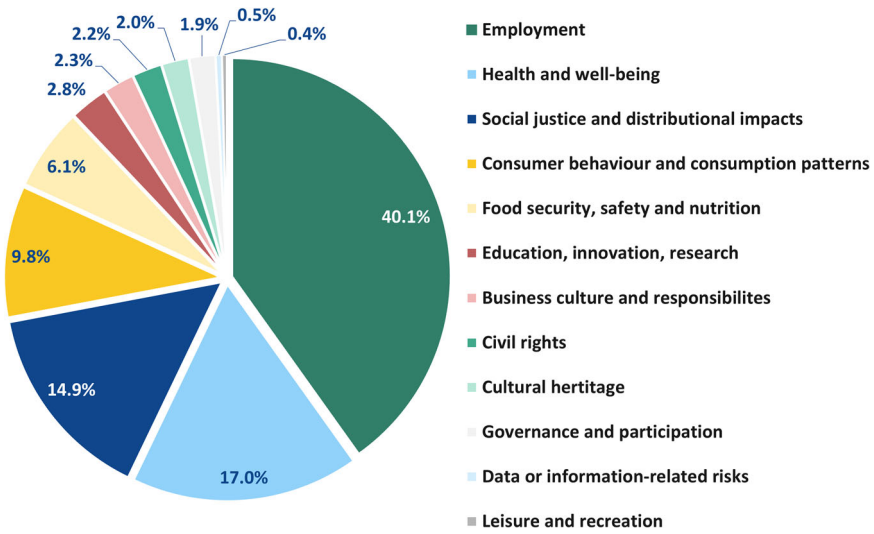


Fig. 1 | Number of publications per year at the literature screening stage. Dark blue colour bars represent all records of literature uploaded for abstract screening, after filtering duplicates and non-English records. Light blue bars represent all records of literature uploaded for the full-text screening, including records that were not retrieved. All publication data are available in Supplementary Table 2.

Fig. 2 | The 12-dimension Typology of Socio-economic Impacts of Circular Economy Policies, based on the text references analysed in the dataset of 128 CE policy documents between 2012 and 2023. The pie chart shows the relative research available on each of the impact dimensions.



the dataset, showing that academic interest in the socioeconomic impacts of CE public policy is growing rapidly.

Analysis of circular economy policy analyses from 2012 to 2023 and a 12-dimensional typology of socioeconomic impacts of global circular economy policies

The main goal of the literature review is to harvest the global literature on the socioeconomic impacts of CE policies over the last decade to inform future research and policy development. The results describe the key features of CE policy analyses today. In addition, the thematic analysis yielded the 12 dimensions of the typology. The typology synthesises the broad range of policy outcomes, from wage impacts to social and community relationships. Supplementary Table 3 provides the numerical data for the share of records for each dimension identified (following Foster et al.[5]), whilst Fig. 2 and Fig. 3 graphically summarise the typology's dimensions.

The prevalence of the dimensions as shown in Fig. 2 indicates that employment impacts/number of jobs are the main concern of the literature overall (40%), followed by health outcomes (17%), social justice and distributional effects (15%), and consumer behaviour (10%). These top four dimensions explain how people interact with CE policy in daily life.

Figure 3 shows the prevalence of the 44 subtopics in the 12 dimensions, presenting them vertically within each dimension. Some dimensions of the typology present distinct subtopics in the literature (e.g. employment and health). Other dimensions have fewer subtopics. This may be a function of the number of studies in a dimension, or simply because the dimension is narrowly defined, such as data- or information-related risks. Also, the typology flags less researched topics such as data privacy, good governance, and tourism on the right side of the horizontal axis. The approach offers a nuanced framework that enables a multifaceted analysis of the CE policy literature that reveals underlying dynamics across diverse categories, sectors and policy instrument themes.

To digest the policies and identify patterns and relationships, the CE policies in the dataset are divided into six functional groups for further analysis: (1) policy instrument themes (e.g. incentives, taxes and caps); (2) documents that advanced CE theory; (3) policy objectives (e.g. waste reduction, resource recovery, technological development and consumer

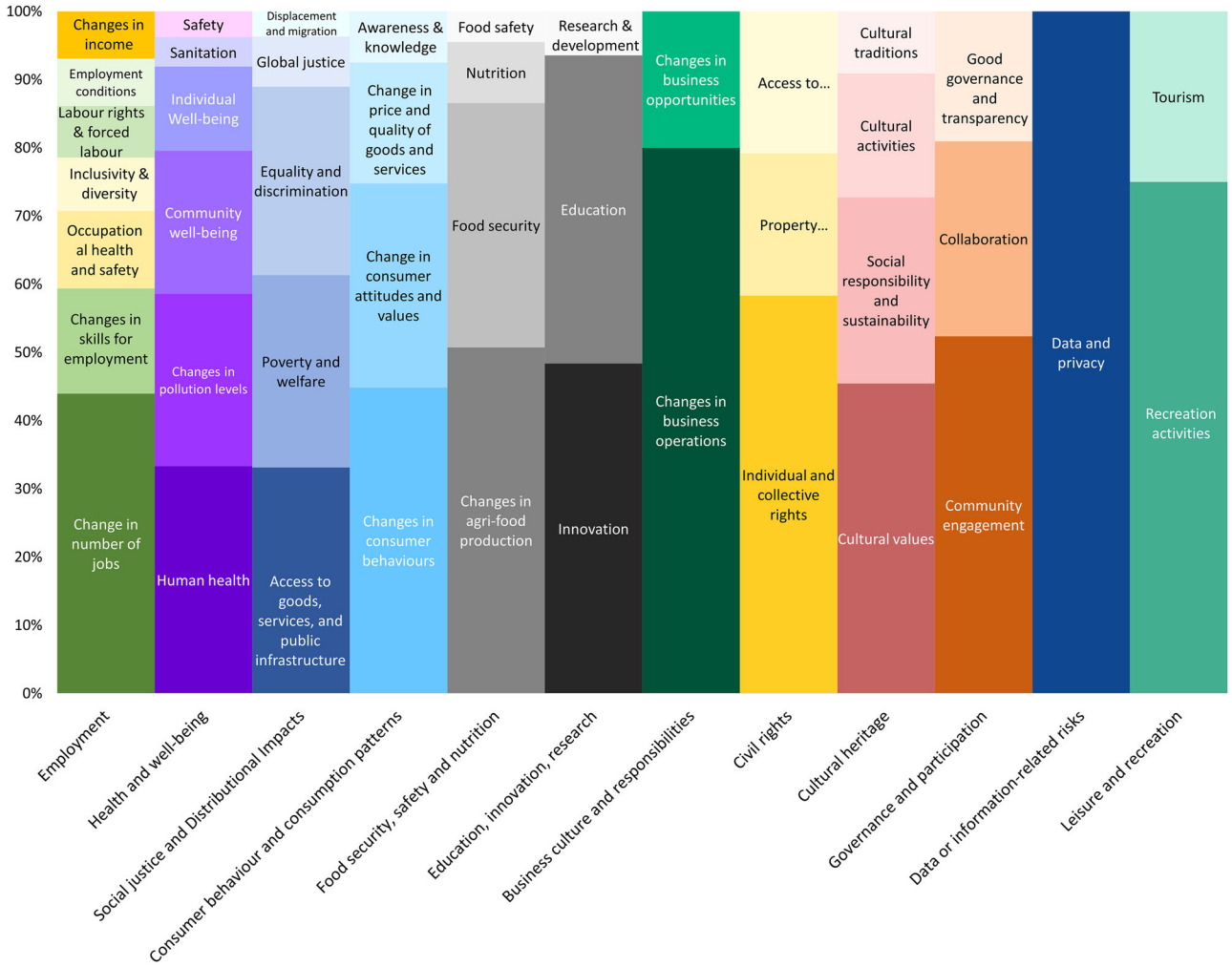


Fig. 3 | Typology of socioeconomic impacts, including 12 dimensions and 44 subtopics of socioeconomic impacts found in the dataset of 128 documents (Foster et al., 2024). This is based on the analysis of the dataset of publicly available CE policy analyses between 2012 and 2023. The graphic is read vertically; the vertical axis is relevant within each dimension, not across dimensions.

awareness); (4) economic sectors; (5) products and (6) geographic centre. The categorisation enables comparison of policies across different groups. The following sections quantify the research interests within each of these groups, capturing the key features, topics, and industries.

Discussion

Key features of socioeconomic studies of circular economy policy

Focus on practice, not theory. Most of the literature is practice-based rather than theoretical and is dominated by regulations and reporting (40%) and financial incentives (25%). Fiscal policies are highlighted (both tax breaks as an incentive and new taxes as a disincentive) across various sectors, including on plastics[6], landfill[7] and carbon emissions[8], among others. The policies are wide-ranging, including regulations mandating new labelling, packaging regulations, new standards and guidelines, and new internationally agreed targets and goals. For example, separate eco-labelling schemes for waste electronic products[9]. In addition, education and awareness are a CE strategy noted in the literature.

The relative share of policy types in the literature that are focused on theory, such as ethics or philosophy, is 4.3%. Two-thirds of these mentioned the[10] theoretical discourse types (ranging from optimistic to sceptical and holistic to segmented). Authors discussed the underlying purpose of CE policy, as ways to extend current production and consumption patterns (efficiency), or actively decrease consumption (sufficiency)[11]. Furthermore, the methods applied in the analyses described in the documents are varied: 34% are qualitative; 18% are quantitative; 41% are mixed methods and 7% are theoretical. Frequently used methods include literature reviews, narrative reviews, and surveys (of both stakeholders and the public). The presented case studies are from national or regional levels.

Focus on waste as a resource and the longevity of materials and products

Nine stated policy objectives were recorded as shown in Fig. 4, which shows the number of references to types of policy instruments and policy objectives in the dataset. Most policies analysed in the dataset aim to transform waste into a usable resource and to achieve longevity of materials and products. These two goals, accounting for 60%, far outweigh attention to other objectives such as resource efficiency or resource security. Notably, studies with the objective of resource security have the fewest mentions of socioeconomic impacts (Fig. 4). The third most prevalent objective is making use of finite resources at 13%. These top three policy objectives correspond to the well-known R strategies R2–R9[12,13]. The present study's "waste as a resource" encompasses: R6-Remanufacture, R7-Repurpose, R8-Recycle and R9-Recover. The present study's "longevity of materials and products" corresponds to R3-Reuse, R4-Repair and R5 Refurbish. "Resource efficiency", which aligns with R0-Refuse and R1-Rethink impacts linked with socio-economic impacts, is not well researched, with only 2% of papers addressing it. These findings are in line with other CE literature reviews that apply the

	Policy instruments					Policy objectives								
	Caps, limits, bans	Education, awareness campaigns	Financial incentives	Regulations, reporting, targets	Research and development	Collaboration and cooperation	Consumer behaviour	Longevity and regeneration of materials and products	Make use of finite resources	Recapture waste as a resource	Reduce environmental impacts, emissions, and pollution	Resource efficiency	Resource security	Sustainable infrastructure, capacity-building, and innovation
Employment (40%)	49	75	121	199	26	50	13	206	118	250	59	19	2	51
Health and well-being (17%)	35	46	99	131	31	22	16	85	60	129	52	10	7	47
Social justice and Distributional Impacts (15%)	42	36	102	129	40	40	33	104	70	127	46	21	2	38
Consumer behaviour and consumption patterns (10%)	30	56	76	139	27	36	28	75	70	116	27	16	0	39
Food security, safety and nutrition (6%)	7	8	36	48	8	10	7	34	20	40	14	0	2	9
Education, innovation, research (3%)	0	20	18	25	3	6	2	19	16	22	11	0	0	12
Business culture and responsibilities (2%)	20	18	40	83	17	22	12	38	36	52	9	2	2	6
Civil rights (2%)	10	8	28	35	7	7	10	25	13	35	2	2	0	8
Cultural heritage (2%)	0	2	16	20	5	8	0	10	10	11	15	2	0	8
Governance and participation (2)	0	6	12	12	6	0	0	5	11	17	6	0	0	4
Data or information-related practices (>1%)	0	0	2	2	0	0	0	4	4	7	0	0	0	2
Leisure and recreation (>1%)	0	2	0	2	0	0	0	0	0	0	5	0	0	0

Fig. 4 | Typology of socioeconomic impact dimensions intersecting with policy instruments and objectives. The blue shading shows the highest number of intersections.

well-known R strategy ladder concepts of Potting et al.[12] in literature reviews[2,4,14].

Focus on plastics, nearly all consumer product groups and intermediate products—27 sectors

The reviewed literature contains 17 product groups. Nearly every aisle in the supermarket and common consumer services are referenced. Consumer products are the main topic of research, ranging from electronics[15,16] to household goods[17,18]. Several intermediate, business-to-business products such as packaging materials, fertilisers, and pesticides are included. Figure 5a presents a variety of product groups.

As shown in Fig. 5a, plastic products are the majority, with a focus on bioplastics, plastic cups and plastic straws[19]. Electronics are the second most researched product group. In addition to physical products, the dataset includes service products, such as accommodation[20]. Despite plastic products being in the majority, fewer socioeconomic impacts are present in the dataset for this product group (Fig. 5b). Fertilisers and pesticides, which are key inputs to food provisioning, have the most occurrences for related socioeconomic dimensions. This finding means that this is an important topic in the field (6% of the literature discussed food security, safety and nutrition). By cross-referencing the number of mentions of product groups with the typology's socioeconomic dimensions, the following is observed:

- Employment is mentioned in every product group. Employment is most discussed for: (1) raw materials; (2) paper and cardboard; (3) fertilisers and pesticides; and (4) clothing and textiles.
- Consumer choice is closely linked to plastic products in the research.
- Socioeconomic impacts that are documented in the literature, employment, health and well-being, social justice, consumer behaviour and food security, are closely linked to food provisioning and food waste.

In addition to the product groups, 27 industrial sectors are referenced in the literature. The top five sectors are: energy (17%), waste (16%), construction (6%), recycling and repair (6%) and food (6%). The waste and energy sectors constitute roughly a third of the industries and, as shown in Fig. 5c, also have the highest mentions of socioeconomic impacts overall, particularly employment. However, the intersection of the most prevalent industries with the typology of socioeconomic impacts shows that construction, transportation and storage services and manufacturing are important economic sectors with recognised socioeconomic impacts (Fig. 5c).

Focus on Europe

From a geographical perspective, 60% of all publications stated a country or region as the centre point of their analysis. Of the publications with geographical indicators, 54 (42%) mentioned a European country or group of countries. The most mentions in the dataset go to Italy (14.8%), the Netherlands (11.7%), Spain (10.1%), France (9.4%) and Germany (9.4%). Only 23 (18%) were about single or multiple countries outside Europe. Figure 6 presents the concentration of mentions in the dataset for Europe. Moreover, most countries are mentioned within a group rather than as single entities, which points to a high interest in cross-country and comparative studies.

Focus on the national governance level

National governance comprises half of all publications. Only 18% cover the EU level. Literature at the European level often evaluates the successes and failures of EU CE policies (for example ref. 15). Analyses at the global scale are just 8% of the literature. The national and local governance scope corresponds to the institutional level at which many CE topics are carried out, for example national waste management plans and municipal waste management.

Circular economy impacts workers and employers

Employment is the most studied socioeconomic impact in the literature. A wide range of employment topics is debated, in addition to job creation and job loss. These debates reflect broader societal discussions, such as women in the workforce, migration, changing worker skillsets, work in rural communities and global and EU workers in waste management. This section summarises key findings about employment-related topics framed by the literature.

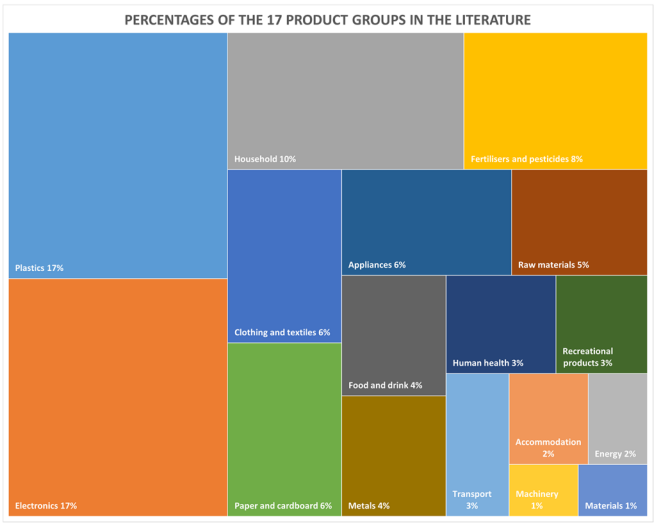
Circular economy policy creates shifts in employment between sectors

An increase in the number of jobs is often reported[21–23]. Similarly, CE waste management systems are reported to have increased the employment rate for people with disabilities[6]. Studies presented an increase in jobs in labour-intensive sectors such as the service industry[24,25] and the waste management sector[21,26,27]. Overall, studies indicated job creation, but decreases in some sectors were theorised or recorded. A decrease in jobs is described for material-intensive industries such as mining and manufacturing. Theoretically, a decrease in consumption and a shift from primary materials demand to secondary materials demand could result in a decrease in jobs, notably in manufacturing[28,29] and mining sectors[21,25,30].

The literature links circular economy policy with job creation in rural areas

Authors consider the context of climate change, demographic trends, ageing within the farming population, and a decline in the number of farms[22]. Echave et al.[31] conclude that CE-related projects in the Mediterranean region of Europe promote rural development and encourage

5 (a)



5 (b)

Product group

Socioeconomic impact dimensions	Accommodation	Appliances	Clothing and textiles	Electronics	Energy	Fertilisers and pesticides	Food and drink	Household	Human health	Machinery	Materials	Metals	Paper and cardboard	Plastics	Raw materials	Recreational products	Transport
Employment (40%)	3	21	38	33	0	46	25	19	12	10	3	21	60	16	65	13	17
Health and well-being (17%)	6	9	5	13	4	31	19	7	15	0	0	2	2	23	6	8	2
Social justice and Distributional Impacts (15%)	9	7	8	12	0	34	13	9	3	3	2	10	8	19	9	3	7
Consumer behaviour and consumption patterns (10%)	4	8	20	15	0	21	6	16	4	2	2	2	28	45	7	2	2
Food security, safety and nutrition (6%)	0	0	0	0	0	39	9	0	4	0	0	0	2	2	0	0	0
Education, innovation, research (3%)	0	0	2	0	0	3	4	0	0	0	0	0	0	0	0	0	0
Business culture and responsibilities (2%)	2	4	12	8	0	4	2	13	4	2	2	0	9	20	2	5	2
Civil rights (2%)	4	0	2	0	0	10	0	0	0	0	0	0	0	0	2	0	0
Cultural heritage (2%)	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Governance and participation (2)	0	0	4	0	0	2	2	0	0	0	0	0	0	5	0	0	0
Data or information-related practices (>1%)	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Leisure and recreation (>1%)	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0

5 (c)

Economic Sector

Socioeconomic impact dimensions	A: Accommodation and housing	B: Administration	C: Agriculture	D: Chemicals	E: Construction	F: Design	G: Digital	H: Economics	I: Education	J: Energy sector	K: Engineering	L: Extraction	M: Fashion	N: Food	O: Healthcare sector	P: Manufacturing	Q: Metals industry	R: Military	S: Plastics industry	T: Recreational activities	U: Recycling and repair	V: Retail	W: Services	X: Tourism	Y: Transportation and storage services	Z: Waste	AA: Water supply
Employment (40%)	52	63	74	86	126	11	53	0	0	184	10	105	58	99	48	135	11	4	46	48	92	77	89	11	102	226	91
Health and well-being (17%)	3	0	26	7	28	3	2	0	0	94	0	2	0	23	3	15	2	0	8	0	8	3	2	4	31	80	14
Social justice and Distributional Impacts (15%)	0	2	27	10	34	4	3	0	0	91	3	12	4	19	0	25	3	0	13	0	15	8	8	3	46	79	15
Consumer behaviour and consumption patterns (10%)	5	4	14	9	32	0	6	0	0	56	0	13	5	16	3	16	5	2	30	3	7	7	10	3	26	74	23
Food security, safety and nutrition (6%)	0	0	30	4	7	0	0	2	0	35	0	0	0	15	0	10	0	0	2	0	0	7	0	0	9	13	21
Education, innovation, research (3%)	0	0	5	4	14	0	4	0	0	23	0	2	0	2	0	7	2	0	4	0	0	2	2	0	11	15	5
Business culture and responsibilities (2%)	0	0	8	4	14	0	0	0	0	18	0	2	0	10	0	6	0	0	12	0	0	4	4	0	2	31	5
Civil rights (2%)	0	0	7	4	10	2	0	0	0	24	0	0	0	4	0	2	0	0	0	0	0	3	0	0	5	14	6
Cultural heritage (2%)	0	0	4	0	5	3	0	0	0	13	0	2	0	8	0	6	2	0	2	0	0	4	0	0	0	2	0
Governance and participation (2)	0	0	0	0	4	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	11	5
Data or information-related practices (>1%)	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Leisure and recreation (>1%)	0	0	2	0	3	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	2	0
Number of references to typology impacts	60	69	197	128	277	23	68	2	0	555	13	138	67	196	54	225	25	6	117	51	122	115	115	21	237	553	185

Fig. 5 | Results of product group and economic sector analysis. a Percentages of the product groups referenced in the literature of CE policy analyses between 2012 and 2023. **b** Typology of socioeconomic impact dimensions intersect with product groups. **c** Typology of socioeconomic impact dimensions intersect with economic sectors.

job creation. Additionally, Unay-Gailhard and Bojnec[23] show that CE policies in Slovenia influence labour demand due to the reconstruction of farm infrastructure, reorganisation of work sequences to meet policy requirements and additional labour to meet animal welfare requirements.

Women are frequently discussed as impacted actors, and employment opportunities for women are an important theme across the literature

Some documents suggest that CE policies would increase employment opportunities for women[25,32,33]. Other authors suggest that CE policies may

Fig. 6 | The geography of Europe as reflected in the CE policy analyses between 2012 and 2023. Dark green shading indicates more mentions of the country than lighter green shading.

negatively impact employment opportunities for women[34,35]. Further, authors suggest that CE-related activities such as e-waste work may replicate and reinforce gender pay gaps through precarious employment opportunities and unequal pay[4,36]. Authors found in remanufacturing "pronounced pay gaps between male and female workers in three countries [India, Spain and the Netherlands]"[4]. Nevertheless, there is little consensus on the ultimate impact of CE employment for women across the reviewed literature.

Circular economy policy changes the workforce skills needed

Perhaps surprising to some readers, CE requires more high-skilled jobs and an increase in problem-solving and communication skillsets[21,26]. For instance, growth in managerial jobs in the construction sector[21]. This finding appears aligned with other themes that emerge from the literature, such as the shift to changing employment[23,26] and the increase in demand for formal education, job training, and workplace training programmes[27,37]. The results of the literature review suggest that CE policies would require a shift towards workers with advanced skills, which could have implications for the labour markets in the industries studied and may displace low-skilled workers.

Waste management work is central to the circular economy

The cross-section of the most reported sector and most prominent theme is waste management workers. Research on employment in the waste management sector links formal and informal work and the EU and global waste management supply chains. Waste workers are frequently discussed in the context of informal activities and the electrical waste (e-waste) recycling sector. Informal waste work refers to tasks (e.g. collecting, sorting and recycling) conducted by individuals or groups outside formal employment structures. These roles may be carried out without legal authorisation or regulation and result in rights violations such as the exploitation of migrants and children within e-waste recycling[36]. Perhaps counterintuitively, Gusheva et al. suggest that the formalisation of the waste sector in North Macedonia could decrease the income of informal workers, exacerbating their financial vulnerability[38]. In general, e-waste workers face relevant health and safety risks due to the toxic materials they handle[9,35,39], including chronic illnesses, respiratory issues and pregnancy complications[36].

Waste management links high-income and medium- to low-income countries

The literature underscores risks to workers and communities in low-GDP countries from waste processing of wastes imported from medium to high-GDP countries due to inadequate waste management practices[32,34,36]. Waste management work is reported to provide income and employment opportunities for marginalised social groups in various countries, including Ghana, Nigeria and Brazil[36,40]. Waste processing jobs can have occupational hazards for workers[35,36]. Some studies report threats to the health and well-being of nearby residents[39,41].

Overall, the literature highlights the impacts of exporting/importing waste on working conditions, living conditions and environmental standards. Moreover, the impact of CE policies on trade relations, while potentially reducing dependence on virgin materials and waste exports, remains ambiguous[30,34]. Imported waste's impacts on workers in low-to medium-income countries due to high-income country exports continues to be a fraught issue in the literature.

In summary, the literature highlights that CE policies have the *potential* to:

- create jobs in the service industry and waste management sectors;
- reduce employment in mining and manufacturing if demand for primary materials and products from them is reduced;

- stress waste trade linking high-income and medium- to low-income countries and exports risks;
- increase women's role in the CE workforce, which is important, and existing employment-related inequalities may persist; and
- shift employment towards workers with advanced skills;
- create opportunities and risks for waste management workers.

Circular economy impacts on communities and consumers

The second most prevalent socioeconomic theme in the literature, after employment, is health and well-being. This topic is analysed at both the community and individual levels. CE policies were reported to have positive effects on individual well-being, access to clean water and sanitation. Authors raised conceptual improvements to community-level health due to a reduction in pollution levels for people living near landfill mining activities in Belgium[42]. Additionally, a tree restoration project in Spain reduced local air pollution[43]. Communities' health benefits from improved access to clean water[44] and reduced unmanaged waste[45] resulted in better sanitation and hygiene. In addition to health, community- and individual-level findings were varied, reflecting authors' interests, for example impacts on education, cultural heritage, and civil rights, which made up only about 2% of the references.

Circular economy policies may lead to less poverty and more social justice

Both positive and negative outcomes are discussed in the literature for quality of life and improvements in living conditions[33,46]. Potential negative impacts on community cohesion and social conflicts were also identified. For example, the risk that monetising the sharing of resources through sharing platforms undermines genuine social connections[47]. A few references were made to the impact of CE policies on indigenous communities[48–51]. Only one source referred to ethnic/racial equality[52]. Lower-income households are frequently discussed in relation to social justice, including CE policies' potential to improve the affordability of CE services and products. As reported in Foster et al.[5], the authors suggest that CE policies could result in a decrease in poverty[11,30] and improvements to social justice[1,32]. The development of community infrastructure resulting from CE policies is also discussed, including access to green spaces[53], healthcare and public transport[52,54].

Circular economy policy effects on consumer behaviour and consumption patterns are highlighted in the literature, represented in 10% of the dataset

Increases and decreases in consumption are found in roughly equal proportions. For example, increases in consumption are recorded[47,55,56]. Consumption decreases are also noted[57–59]. The lack of consensus suggests a need for further research, including into the longer-term, unintended, rebound effects of CE policies[60].

Another theme is expanding consumer access to goods, services and public infrastructure. For example, opening markets for refurbished and reused products, such as electrical and electronic equipment (EEE), like mobile phones. In this case, CE policies could improve access to high-quality EEE for people with low incomes[16]. EEE is the subject of multi-faceted studies in the literature, discussing consumers and workers in the sector. The degree to which CE policies change consumers' access to new products is anecdotal; therefore, it remains difficult to generalise for all product groups.

A large subset of the literature discusses consumer behaviour changes related to waste management[17,61,62]. For example, residents' willingness to separate waste at source is highlighted[8,61]. Smart waste management (e.g. sensor-equipped bins) and social media's ability to raise consumer awareness and influence waste reduction are also mentioned[45]. The diversity of findings in the literature underlines the prevalence of the citizen/consumer waste management sector in CE policy research to date and its importance in future.

Most authors expect increases in product quality; however, there is no consensus in the literature on the direction of consumer prices of goods and services

Almost all documents that discussed CE policies' effects on product quality reported an increase in product quality[57,63]. Some articles describe cases where lower-quality products result from the use of recycled rather than primary materials. Çevikarslan et al.[63] suggest that introducing an incineration fee for Dutch plastic packaging could increase recycled volumes whilst reducing the quality of products. Regarding consumer prices, both increases and decreases in response to CE policy are reported, for example a reduction in utility bills[45]. In summary, no consensus on price direction is drawn, but product quality seems to increase.

For communities and citizens, the literature indicates that CE policies have the *potential* to:

- improve individual and community health outcomes related to reduced pollution;
- improve community well-being due to local CE projects;
- decrease poverty through job creation and increase access to formal jobs;
- produce high-quality products; and
- increase social justice and access to goods and services for low-income households.

The above benefits are flagged in the literature; however, the extent to which they materialise depends on how CE policies and initiatives are implemented.

Conclusion

Is there a typical circular economy public policy analysis with typical socioeconomic impacts?

An archetypal CE public policy paper in the reviewed literature emerges as a regulatory case study of a European country that analyses post-consumer plastics recovery and recycling. Pollution reductions are achieved through recycling within the broader context of market failures and societal costs. Although the socioeconomic impacts are not usually the focus, the paper applies quantitative and qualitative methods to capture, at a minimum, how many jobs are created or destroyed by the initiative. In contrast, the in-depth analysis herein shows that in fact, CE public policy is extremely diverse.

The data from the qualitative thematic review of 128 documents globally describes at least: 5 policy instrument themes, 9 CE policy objectives, 21 products, 27 industries and 33 countries. The authors propose a common typology including the variety of socioeconomic impacts from over a decade of scholarship, applying to all levels of government. The typology is divided into 12 dimensions and 44 subtopics, which are cumulatively explored to define the major features of the field.

This analysis illuminates the human side of CE policy in daily life, work and community. Although the analysis does not assign causality between products/industries and impacts, it provides policymakers and researchers with a "roadmap" of both positive and negative socioeconomic impacts to consider during stakeholder engagement, policy development, ex-ante assessment and ex-post evaluation. For example, the typology is a tool that signals the range of impacts to include in a stakeholder survey or the data to be collected for a comprehensive impact assessment to identify and address socioeconomic disparities. The authors aim to provide individuals, businesses and communities with valuable insights into potential challenges and key areas to target, enabling them to collaborate more effectively with government to develop citizen-centric CE policies.

Methods

In line with established principles for systematic reviews in the social sciences[64], the authors employed a rigorous methodology, drawing inspiration from other work[1,2,10]. To ensure a broad coverage of existing research, the authors supplemented the academic databases (Scopus) with Google Scholar and grey literature sources. This article reports on a

systematic literature review adhering to the PRISMA guidelines[65]. See Supplementary Fig. 1 for the detailed record screening PRISMA chart.

The inclusion criteria targeted English-language studies with insights into the socioeconomic impacts of CE public policies. The criteria excluded sources only about business models or corporate policies, as the goal was to capture public policy-relevant data. The study adopted a wide interpretation of 'impacts,' including aspects such as effects, results, consequences, challenges, opportunities (both negative, positive, neutral and mixed). Also, 'policies' meant a set of principles, guidelines and decisions formulated by authorities, e.g. local, regional, national, European or other international level governments to address any specific issues, problems, allocate resources, or regulate behaviour[66]. See Supplementary Table 1 for the full inclusion and exclusion criteria.

The search strategy aligned with the research questions using the PICO framework[67], incorporating timeframes and keywords to ensure relevance. The search results were screened with the Rayyan platform, and Mendeley was used to input missing information for manually collected records. After removing duplicates and non-English literature, the study followed a two-step screening process: (1) title and abstract screening, and (2) full-text screening for eligible records. Two reviewers conducted both steps blindly, with a third team member resolving conflicts.

The time (years) was incorporated in the search string or applied as a filter, depending on the database functionality. We, therefore, developed keywords in the following way:

—Population/problem: circular economy
—Intervention: policy implementing or ensuring circularity
—Outcome: socio-economic impact
—Time: 2012 onwards.

The final search strings were as follows: Scopus: ("circular economy") AND policy AND (socioeconomic OR social OR socio-economic) AND (impact* OR implication* OR indicator*) AND PUBYEAR > 2011. Google Scholar: ("circular economy") AND policy AND (socioeconomic OR social OR socio-economic) AND (impact OR implication OR indicator).

The inductive thematic analysis approach applied a three-order analysis: (1) concept-level analysis, noting potential information; (2) theme-level analysis, integrating concepts into themes and (3) aggregate dimension-level analysis, distilling themes into categories[68,69]. The study applied four orders to formulate socio-economic impacts of CE policies: code, theme, topic and aggregate dimension. Two reviewers coded the literature using NVivo software and a shared Excel document, with a codebook prepared and piloted before coding. Each record was coded multiple times (if relevant, more than once), with codes then attributed to themes, topics, and aggregate dimensions. After completing the first-order analysis, team members discussed and grouped codes into higher-order categories. The thematic analysis resulted in 12 fourth-order aggregate dimensions—the typology of socio-economic impacts of CE policies.

Finally, a matrix coding query to display intersections between socio-economic impacts and policy types, with intersection intensity colour-coded, was carried out with NVivo. The matrix coding revealed the intersections between the socio-economic impacts and types of policies. The number of intersections found where then colour-coded to highlight the intensity of such intersections.

The authors acknowledge that the CE policy field is continually evolving, and new research may emerge that was not available at the time of this study. First, the search was limited to the contemporary term CE, without similar concepts that were prevalent in the past, such as industrial ecology. Studies lacking the term CE were not included. Second, although there are 30 national sustainable consumption and production strategies globally as of April 2024[70], this study did not privilege or statistically normalise geographical coverage. The study includes the global literature; however, 42 per cent of the documents that cited geography mentioned one or more European countries. Consequently, the typology is based solely on the literature analysed, and its content reflects only the impacts that have been studied and met the search criteria. Potentially, unreported impacts may not have been captured by the search method.

Data availability

The supplementary materials augment the methods section of this article. Supplementary Table 2 provides the list of all publications analysed in this article. Supplementary Table 3 provides the supporting data for Fig. 3.

Received: 11 August 2025; Accepted: 14 January 2026;
Published online: 03 April 2026

References

1. Padilla-Rivera, A., Russo-Garrido, S. & Merveille, N. Addressing the social aspects of a circular economy: A systematic literature review. *Sustainability (Switzerland)* https://doi.org/10.3390/SU12197912 (2020).
2. Vanhuyse, F., Fejzić, E., Ddiba, D. & Henrysson, M. The lack of social impact considerations in transitioning towards urban circular economies: a scoping review. *Sustain. Cities Soc.* https://doi.org/10.1016/j.scs.2021.103394 (2021).
3. Reinales, D., Zambrana-Vasquez, D. & Saez-De-Guinoa, A. Social life cycle assessment of product value chains under a circular economy approach: a case study in the plastic packaging sector. *Sustainability* **12**, 6671 (2020).
4. Suarez-Visbal, L. J., Carreón, J. R., Corona, B. & Worrell, E. The social impacts of circular strategies in the apparel value chain; a comparative study between three countries. *Circ. Econ. Sustain.* **3**, 757–790 (2023).
5. Foster, G. et al. *Towards a More Comprehensive Assessment of Socio-Economic Impacts of Circular Economy Policies* (Publications Office of the European Union, Luxembourg, 2024).
6. Sharma, H. B. et al. Circular economy approach in solid waste management system to achieve UN-SDGs: solutions for post-COVID recovery. *Sci. Total Environ.* **800**, 149605–149605 (2021).
7. Calisto Friant, M., Vermeulen, W. J. V. & Salomone, R. Analysing European Union circular economy policies: words versus actions. *Sustain. Prod. Consum.* **27**, 337–353 (2021).
8. Iacovidou, E. et al. Metrics for optimising the multi-dimensional value of resources recovered from waste in a circular economy: a critical review. *J. Clean. Prod.* **166**, 910–938 (2017).
9. Anandh, G., PrasannaVenkatesan, S., Goh, M. & Mathiyazhagan, K. Reuse assessment of WEEE: systematic review of emerging themes and research directions. *J. Environ. Manag.* **287**, 112335–112335 (2021).
10. Calisto Friant, M., Vermeulen, W. J. V. & Salomone, R. A typology of circular economy discourses: navigating the diverse visions of a contested paradigm. *Resour. Conserv. Recycling* https://doi.org/10.1016/j.resconrec.2020.104917 (2020).
11. Rask, N. An intersectional reading of circular economy policies: towards just and sufficiency-driven sustainabilities. *Local Environ.* **27**, 1287–1303 (2022).
12. Potting, J., Hekkert, M. P., Worrell, E. & Hanemaaijer, A. *Circular Economy: Measuring Innovation in the Product Chain* (PBL Publishers, 2017).
13. Kishna, M. G. P., Anne. (ed PBL Netherlands Environmental Assessment Agency) (PBL Netherlands Environmental Assessment Agency, The Hague, 2024).
14. Mhatre, P., Panchal, R., Singh, A. & Bibyan, S. A systematic literature review on the circular economy initiatives in the European Union. *Sustain. Prod. Consum.* **26**, 187–202 (2021).
15. Prieto, S., oval, Mejía-Villa, V., Ormazabal, A. & Jaca, M. C. Challenges for ecolabeling growth: lessons from the EU Ecolabel in Spain. *Int. J. Life Cycle Assess.* **25**, 856–867 (2020).

16. Bressanelli, G., Pigosso, D. C. A., Saccani, N. & Perona, M. Enablers, levers and benefits of circular economy in the electrical and electronic equipment supply chain: a literature review. *J. Clean. Prod.* **298**, 126819–126819 (2021).
17. Koszewska, M., Rahman, O. & Dyczewski, B. Circular fashion—consumers' attitudes in cross-National Study: Poland and Canada. *Autex Res. J.* **20**, 327–337 (2020).
18. Kalmykova, Y., Sadagopan, M. & Rosado, L. Circular economy— -from review of theories and practices to development of implementation tools. *Resour. Conserv. Recycling* **135**, 190–201 (2018).
19. Fadeeva, Z. & Van Berkel, R. Unlocking circular economy for prevention of marine plastic pollution: an exploration of G20 policy and initiatives. *J. Environ. Manag.* **277**, 111457 (2021).
20. Reich, R. H., Vermeyen, V., Alaerts, L. & Van Acker, K. How to measure a circular economy: a holistic method compiling policy monitors. *Resour. Conserv. Recycling* **188**, 106707–106707 (2023).
21. Cambridge Econometrics, Trinomics & ICF for European Commission, Directorate General for Environment. Impacts of circular economy policies on the labour market: final report and annexes. https://doi.org/10.2779/574719 (2018).
22. Laubinger, F., Lanzi, E. & Chateau, J. Labour market consequences of a transition to a circular economy: a review paper. https://doi.org/10.1787/e57a300a-en (2020).
23. Unay-Gailhard, İ. & Bojnec, Š. The impact of green economy measures on rural employment: green jobs in farms. *J. Clean. Prod.* **208**, 541–551 (2019).
24. Chateau, J. & Mavroeidi, E. *The Jobs Potential of a Transition Towards a Resource Efficient and Circular Economy*. OECD Environment Working Papers (OECD, 2020).
25. Wiebe, K. S., Harsdorff, M., Montt, G., Simas, M. S. & Wood, R. Global circular economy scenario in a multiregional input-output framework. *Environ. Sci. Technol.* **53**, 6362–6373 (2019).
26. Cambridge Econometrics, Trinomics & ICF for European Commission Directorate General Environment. *Impacts of Circular Economy Policies on the Labour Market* (Publications Office of the European Union, 2018).
27. Llorente-González, L. J. & Vence, X. How labour-intensive is the circular economy? A policy-orientated structural analysis of the repair, reuse and recycling activities in the European Union. *Resour. Conserv. Recycling* https://doi.org/10.1016/j.resconrec.2020.105033 (2020).
28. Cavallini, S. & Soldi, R. Europe's Circular Economy and its Pact for Skills: working together for an inclusive and job-rich transition? https://doi.org/10.2864/129975 (2021).
29. Livingstone, L., Börkey, P., Dellink, R. & Laubinger, F. Synergies and trade-offs in the transition to a resource-efficient and circular economy. https://doi.org/10.1787/e8bb5c6e-en (2022).
30. Schröder, P. *Promoting a Just Transition to an Inclusive Circular Economy* (Royal Institute of International Affairs, 2020)
31. Echave, C., Ceh, D. Boulanger, A. & Shaw-Taberlet, J. An ecosystemic approach for energy transition in the mediterranean region. In *2019 1st International Conference on Energy Transition in the Mediterranean Area* (SyNERGY MED), 1–5 (IEEE, 2019).
32. Circle Economy, International Labour Organisation, and Solutions for Youth Employment. *Decent Work in the Circular Economy: An Overview of the Existing Evidence Base* (ILO, 2023).
33. Mhatre-Shah, P., Gedam, V. & Unnikrishnan, S. Estimation of the potential changes in the social impacts of transitioning to circular economy for multiple stakeholders—a case of Indian transportation infrastructure. *Int. J. Life Cycle Assess.* https://doi.org/10.1007/s11367-023-02215-4 (2023).
34. World Bank Group. *Squaring the Circle: Policies from Europe's Circular Economy Transition* (World Bank Group, 2022).
35. Wali, M. E., Golroudbary, S. R. & Kraslawski, A. Circular economy for phosphorus supply chain and its impact on social sustainable development goals. *Sci. Total Env.* https://doi.org/10.1016/j.scitotenv.2021.146060 (2021).
36. Abalansa, S., El Mahrad, B., Icely, J. & Newton, A. Electronic waste, an environmental problem exported to developing countries: the GOOD, the BAD and the UGLY. *Sustainability* **13**, 5302–5302 (2021).
37. Obaideen, K. et al. Biogas role in achievement of the sustainable development goals: evaluation, challenges, and guidelines. *J. Taiwan Inst. Chem. Eng.* **131**, 104207–104207 (2022).
38. Gusheva, E., Gjorgievski, V., Grncarovska, T. O. & Markovska, N. How do waste climate policies contribute to sustainable development? A case study of North Macedonia. *J. Clean. Prod.* **354**, 131572–131572 (2022).
39. Bhagat-Ganguly, V. E-waste management: Challenges and opportunities in India. https://doi.org/10.4324/9780429285424 (2021).
40. Sakamoto, J. L., Silva de Souza Lima Cano, N., Faria Dionisio de Oliveira, J. & Rutkowski, E. W. How much for an inclusive and solidary selective waste collection? A Brazilian study case. *Local Env.* **26**, 985–1007 (2021).
41. Brignon, J. M. Costs and benefits of recycling PVC contaminated with the legacy hazardous plasticizer DEHP. *Waste Manag. Res.* **39**, 1185–1192 (2021).
42. Einhäupl, P., Acker, K. V., Peremans, H. & Passel, S. V. The conceptualization of societal impacts of landfill mining—a system dynamics approach. *J. Clean. Prod.* https://doi.org/10.1016/j.jclepro.2021.126351 (2021).
43. Alba-Patiño, D. et al. Social indicators of ecosystem restoration for enhancing human wellbeing. *Resour. Conserv. Recycling* https://doi.org/10.1016/j.resconrec.2021.105782 (2021).
44. Manisha, M. et al. Socio-economic impact assessment of large-scale recycling of treated municipal wastewater for indirect groundwater recharge. *Sci. Total Env.* https://doi.org/10.1016/j.scitotenv.2022.160207 (2023).
45. Stefanakis, A. & Nikolaou, I. Circular Economy and Sustainability. Circular Economy and Sustainability: Volume 1: Management and Policy, 1–674 (2021).
46. Vardopoulos, I. et al. An integrated SWOT-PESTLE-AHP model assessing sustainability in adaptive reuse projects. *Appl. Sci.* https://doi.org/10.3390/app11157134 (2021).
47. Hobson, K. & Lynch, N. Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. *Futures* **82**, 15–25 (2016).
48. Berthet, E. et al. Assessing the Social and Environmental Impacts of Critical Mineral Supply Chains for the Energy Transition in Europe. *Glob. Environ. Change*, **86**, 102841 (2024).
49. Mancini, L., Leccisi, E., Patinha Caldeira, C. & Sala, S. Proposal for a sustainability framework for energy technologies. https://doi.org/10.2760/11063 (2023).
50. Morone, P. & Cottoni, L. Biofuels: Technology, economics, and policy issues. Technology, economics, and policy issues. Handbook of Biofuels Production: Processes and Technologies: Second Edition, 61–83 (2016).
51. Shemfe, M. B., Gadkari, S. & Sadhukhan, J. Social hotspot analysis and trade policy implications of the use of bioelectrochemical systems for resource recovery from wastewater. *Sustainability (Switzerland)* https://doi.org/10.3390/su10093193 (2018).
52. Calisto Friant, M., Reid, K., Boesler, P., Vermeulen, W. J. V. & Salomone, R. Sustainable circular cities? Analysing urban circular economy policies in Amsterdam, Glasgow, and Copenhagen. *Local Environ.* **28**, 1331–1369 (2023).
53. Cerreta, M., di Girasole, E. G., Poli, G. & Regalbuto, S. Operationalizing the circular city model for Naples' city-port: a hybrid development strategy. *Sustainability (Switzerland)* https://doi.org/10.3390/su12072927 (2020).

54. Vanhuyse, F. et al. Including the social in the circular: a mapping of the consequences of a circular economy transition in the city of Umeå, Sweden. *J. Clean. Prod.* https://doi.org/10.1016/j.jclepro.2022.134893 (2022).
55. Chen, X., Memon, H. A., Wang, Y., Marriam, I. & Tebyetekerwa, M. J. M. C. E. Circular Economy and sustainability of the clothing and textile Industry. **3**, 1–9 (2021).
56. Manshoven, S. et al. Consumption and the environment in Europe's circular economy. (2023).
57. Crippa, M. et al. A circular economy for plastics: Insights from research and innovation to inform policy and funding decisions. 239 (Publications Office of the European Union: Luxembourg, 2019).
58. Bassi, A. M., Bianchi, M., Guzzetti, M. & Pallaske, G. Improving the understanding of circular economy potential at territorial level using systems thinking. *Sustain. Prod.* **27**, 128–140 (2021).
59. Fuschi, C. et al. Microplastics in the Great Lakes: environmental, Health, and Socioeconomic Implications and Future Directions. *ACS Sustain. Chem. Eng.* **10**, 14074–14091 (2022).
60. Chen, C. W. Clarifying rebound effects of the circular economy in the context of sustainable cities. *Sustain. Cities Soc.* https://doi.org/10.1016/j.scs.2020.102622 (2021).
61. Jiang, P. et al. Data analysis of resident engagement and sentiments in social media enables better household waste segregation and recycling. *J. Clean. Prod.* https://doi.org/10.1016/j.jclepro.2021.128809 (2021).
62. Liu, Y., Zou, C., Tai, J. & Che, Y. Evaluation of the household solid waste mandatory sorting policy in Shanghai: a 1-year public opinion survey. *Waste Manag. Res.* https://doi.org/10.1177/0734242X23115509 (2023).
63. Çevikarslan, S., Gelhard, C. & Henseler, J. Improving the material and financial circularity of the plastic packaging value chain in the netherlands: challenges, opportunities, and implications. *Sustainability* **14**, 7404–7404 (2022).
64. Petticrew, M. & Roberts, H. *Systematic Reviews in the Social Sciences*. (Wiley, 2006).
65. Page, M. J. et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Br. Med. J.* **372**, https://doi.org/10.1136/bmj.n71 (2021).
66. Fischer, F. & Miller, G. J. (eds) *Handbook of Public Policy Analysis* (Routledge, 2017).
67. Nishikawa-Pacher, A. Research Questions with PICO: A Universal Mnemonic. *Publications* **10**, 21 (2022).
68. Haddaway, N. R., Collins, A. M., Coughlin, D. & Kirk, S. The role of google scholar in evidence reviews and its applicability to grey literature searching. *PLoS ONE* **10**, e0138237 (2015).
69. Thomas, J. & Harden, A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med. Res. Methodol.* **8**, 45 (2008).
70. Barrie, J., Salminen, I., Schroder, P. & Stucki, J. *National Circular Economy Roadmaps: A Global Stocktake for 2024*. (United Nations Industrial Development Organization, Austria, 2024).

Author contributions

G.F. and R.M. conceived the analysis and methods, collected and analysed data, wrote, edited and supervised the work. M.C.F., B.L. and S.G. developed the workplan, analysed data, wrote, edited and supervised data collection. T.K., T.B.F., E.L. and A.S. collected and analysed data equally. The results and conclusions are those of the authors and do not necessarily represent the official position of the European Commission, Member States of the European Union, or any organisation the authors are associated with.

Competing interests

The authors Calisto Friant, M., Leiputė, B., King, T., Fischer, T.B., Gaušas, S., Langham, and Švedkauskienėwere, E. funded by the European Commission tender JRC/SVQ/2023/MVP/0232.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1038/s44458-026-00038-6.

Correspondence and requests for materials should be addressed to G. Foster.

Peer review information *Communications Sustainability* thanks Juha I. Uitto, Keith J. Baker and the other, anonymous, reviewer(s) for their contribution to the peer review of this work. Primary Handling Editors: Jiachao Peng and Martina Grecequet. [A peer review file is available].