

Lack of Congruence between European Citizen Perspectives and Policies on Circular Economy

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Abstract

The concept of circular economy has become a catchphrase for describing redesign of economies and industries towards better sustainability. The consideration of consumers holds a prominent role in the concept, yet consumers' concerns and hopes are not well accounted for. This article takes a forward-looking approach to the relationship between consumers and policies on circular economy. It analyses an extensive and systematically collected corpus of European citizen visions on desirable and sustainable futures from this perspective, and compares the outcomes to newly adopted circular economy policies in Europe. The article argues that European policies on circular economy should increasingly connect to energy and climate issues as well as social topics, if they are to build congruence between citizen and policy understandings, and thereby raise public acceptance for the concept.

Keywords: circular economy, policy congruence, consumers, citizen visions, sustainability, topic modelling.

1. Introduction

Circular economy has become a concept that encompasses a number of environmental issues of interest such as restoration and regeneration of economy, rethinking of production and consumption, and reduction of waste (Ellen MacArthur Foundation 2015; World Economic Forum 2014). In Europe, the concept has gained growing policy interest with the leadership of the European Commission and its circular economy package (European Commission 2015). Forerunner countries such as Finland, the Netherlands, Scotland and the UK, in turn, have adopted and applied national-level policies explicitly framed as circular.

Consumers are considered to play an integral part in circular economy, yet their role is not prominent in these European policies. While consumers are considered as a part of the economy and as users of products, they are not seen as goal-setters nor even as domesticators of new opportunities. For consumers to become integrated in policy planning as active players in the realm of circular economy, it is of particular importance to identify how they respond to key elements of circular economy and, if possible, to identify potential gaps between the understandings of consumers and policy-makers.

In this article we compare how citizens in Europe in a collection of visions on desirable and sustainable futures address the concept of circular economy with how it is conceived in leading European and national-level policies. This is particularly important if there exists a lack of congruence, as it seems in our analysis, between citizen perspectives and public policy. If the theme of circular economy were to become politicized amongst the

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wider public, policies which have been formulated for it could be challenged, and people act as agents for new developments (Warwick 2015; Cazabat 2016). Congruence would provide momentum for achieving policy goals while a lack of it could signal either needs to revise policy programs or attempts by governments to implement unpopular programs (Achen and Bartels 2016; Clawson and Oxley 2013). The concepts of citizens and consumers are used in this paper interchangeably, reflecting that the obtained insights originate from lay people in these two roles of an individual in contrast to those coming from policy professionals or experts (Trentmann 2007; cf. Hirschman 1970; Font et al. 2015).

We first identify the connections between circular economy and consumers as discussed in literature: shared use of products, incentivised return, product design, waste reduction, and sustainable food production. These criteria are used to identify a forward-looking European citizen centred view on circular economy through topic modelling, which is a methodology suitable for analysing collections of unstructured textual data. Then we review how the concept of circular economy has been used in selected European policies. Finally, a comparison of these two approaches to circular economy is carried out, highlighting that citizens consider energy and social topics to a much higher degree than European policy applications of the concept of circular economy. The concluding section discusses the relevance of this finding for the future of circular economy policies.

2. Circular Economy and Policy Congruence

Consumers are considered important in the concept of circular economy, yet their roles appear multiple and relate more to the end-use of products rather than its preceding design stages. The following sections elaborate on how consumers are acknowledged in discussions on circular economy and identify key consumer insights examined in this article. We then proceed to the policy dimension of circular economy and argue that congruence between consumer and citizen views on circular economy and its policy applications is a prerequisite for acceptance of the policy field and accomplishment of its targets.

2.1 Consumer perspectives on circular economy

‘Circular economy’ as a concept is used to describe change from current so-called linear take-use-dispose economies towards more ecologically and economically sustainable circular flows of natural resources, while reducing resource and energy usage of economic output (Ghisellini et al. 2016, Murray et al. 2015). This requires new industrial designs and an improved use of materials, for instance by transforming waste into resources for other industries (World Economic Forum 2014). Indeed, the concept of circular economy is being applied as a new source for best practices (Ezzat 2016) and business models (Linder et al. 2016).

While the concept of circular economy focuses much on industry and the supply side, consumers are an important part of the equation (Hobson and Lynch 2016). Examples of consumer applications attributed to circular economy include shared use of assets (car-sharing, for instance) and results-oriented services (lighting rather than light bulbs) (Tukker 2015). Also, diverse repair and refurbishing services are seen as a central

opportunity to prolong product life and to reduce the use of materials in economy (Riisgaard et al. 2016). Such innovative services offer opportunities for sustainable growth, and jobs alike (Murray et al. 2015).

Empirical consumer studies in the field of circular economy include reviews of consumer attitudes towards repaired, second hand electronic devices or parts (Matsumoto et al. 2016, Zhang et al. 2011). Willingness to buy and use second hand devices has also been of interest, and in what ways prior knowledge, experiences and pricing affect willingness to use (Hazen et al. 2016; Mashhadi et al. 2016; van Weelden et al. 2016; Yang and Wang 2011). The development of consumer repair services of mobile devices has also been analysed (Riisgaard et al. 2016; Kissling et.al. 2013; Ongondo et al. 2013). At the same time, however, there remains a shortage of studies from the perspective of circular economy that would review new products or services, which enable leasing, renting and access (car-sharing, etc.) or desired outcomes rather than products (for example installed lighting, clean clothes). Commercial or peer-to-peer sharing is neither looked at from the perspective of circular economy nor different take-back and recycling schemes. Studies on such topics are indeed prevalent but connect either to existing research domains such as those of waste management and sustainable consumption or a parallel field such as sharing economy.

Concerning consumers, particular focus in circular economy is on a number of activities, which are examined in this article:

- waste reduction (retaking materials into industrial processes) (Gregson et al. 2015; Accenture 2014; World Economic Forum 2014)
- incentivised return or deposit and refund systems (similar take-back schemes such as those for used car tires and plastic beverage bottles) (Jurgilevich et al. 2016; Hennlock et al. 2014; Ellen MacArthur Foundation 2013)
- product design (making products better repairable and recyclable) (Andrews 2015; Ellen MacArthur Foundation 2015; World Economic Forum 2014; Ellen MacArthur Foundation 2013)
- sustainable food production (material flows in biological processes) (Jurgilevich et al. 2016; Ellen MacArthur Foundation 2013)
- shared use of products (access over ownership, for instance car-sharing, outcome oriented services) (Hobson and Lynch 2016; Tukker 2015; World Economic Forum 2014)

Public policies concerning circular economy echo similar overall targets, motivations and descriptions that are evident in the general concept, and their relationship to consumers is equally positive yet distant. What makes public policies on circular economy of particular interest is that they represent prioritizations of what should be targeted in defined areas. Hence, they further redefine the key policy elements of the concept of circular economy.

2.2 Congruence for more efficient implementation of policy

In policy analysis research, scholars have long been aware of the attitude, opinion, and knowledge gaps, i.e., lack of congruence, that exist between citizens and policy-makers (Morgan 1973). These differences are often theorized as a question of political responsiveness (Arnold and Franklin 2012), yet in the present context they very

much relate to differences in conceptualizations. Circular economy is a relatively new concept that has only recently caught the attention of policy-makers. Thus, it is to be expected that both the level of knowledge and the way circular economy is understood will differ between consumers and policy-makers who are almost by definition closer to the sources of knowledge than consumers at large. Policy-makers are expected to have a professional interest in the area, whereas consumers' orientations towards circular economy are likely to be much more varied and based more on personal and perhaps also incidental life experiences than systematic attention to the output of a professional community.

This implies that policy-makers' orientation towards circular economy is structurally rather than strategically determined and therefore the differences between policy-makers and consumers in this area cannot be taken primarily as a sign of policy-makers being non-responsive to 'public opinion' as is often the case in the congruence studies. Instead, the case speaks for specialization and professionalism as the source of differences because policies related to circular economy are in many a case born in the circles of government officials and only later earn the approval of top politicians, thus maintaining what Marier (2008) calls 'traditional' epistemic community.

What is more, circular economy as a new policy issue is hardly a key element in top politicians' ambitions to maintain their positions of power. Of course, circular economy can become important also in the struggle for power if it gains more public visibility or conflicts with established interests. It is true that circular economy has become a policy priority in many countries, which implies that policy-makers' may adopt a strategic attitude towards it. This, in turn, often results in attempts to influence public opinion rather than simply being responsive to it (Jacobs and Shapiro 2000). However, despite some recent attempts to integrate consumer attitudes and public policy (e.g., Krick 2017), it seems that we are not yet in a situation where political fortunes rise and fall as a result of campaigning for circular economy or some aspect of it. An effective citizen connection has not yet become political capital on equal standing with, say, pollution control or subsidized energy. In other words, circular economy as a policy issue is still rather weakly institutionalized (see Radaelli 1995) and much uncertainty prevails as to its potential and applicability. In policy-making, this means that top politicians are still likely to adjust their thinking to what is prevalent in expert discourses, and policies for circular economy will continue to be based on views that largely ignore what consumers think is important (see Botcheva 2001; Peters 1987).

Even though, as indicated above, there is a relative lack of direct democratic dimension here, the problem of congruence is not without importance. If circular economy is something the world should be moving towards, it is crucial that there exists some consensus about the conception of circular economy between consumers and policy-makers. Also top politicians should be encouraged to consider wider perspectives when they make decisions on government priorities. A potential lack of congruence may otherwise contribute to low public acceptance and thereby hinder or at least slow down the accomplishment of policy targets for circular economy.

3. Topic Modelling Circular Economy from Citizen Visions

Citizen visions on desirable and sustainable futures form the corpus of this article. A selection of visions addressing elements of circular economy are in this section analysed through topic modelling, which contributes to the identification of ten future oriented topics for circular economy. The methodology is suitable for identifying underlying topics in the set of visions, and its results provide a good focal point for comparison with policy data (see Pomeda et al. 2016; Repo et al. 2017).

3.1 From citizen visions to circular economy topics

The analysed data has been collected from a set of 179 citizen visions on desirable and sustainable futures extending to the year 2050. These visions were developed across 30 European countries in the Cimulact project and involved more than 1.000 citizens between November 2015 and January 2016 (Jørgensen and Schøning 2016). The visions were developed as group work during separate one-day workshops in which a systematic procedure ensured that participants discussed and jointly reflected on their work. The visions are all structured so that they consist of a title and a description of the content of the vision as well as of how this differs from today and how it is desirable. In terms of content, each vision may present a number of topics apart from circular economy. Example 1, for instance, considers education alongside the topics of recycling, materials and waste, which are typically attributed to circular economy.

Society without plastics

In 2050, children will be educated at school as well as at home in ecological behaviour.

Global shortage of crude oil has led to the necessity to consistently recycle existing plastics - these are gradually being replaced by alternative materials which are 100% recyclable. Research and innovation offer sufficient outputs for the efficient use of existing sources as well as of new materials. Recycling and economy with a minimising production of waste is a common part of life in the European Union.

Example 1. Excerpt from citizen vision on society without plastics, Czech Republic (Jørgensen and Schøning 2016)

The authors selected visions relating to circular economy according to the five criteria emerging from literature on consumers and circular economy: shared use of products, incentivised return together with deposit and refund systems, product design, waste reduction, and sustainable food production (Jurgilevich et al. 2016; Tukker 2015; Accenture 2014; World Economic Forum 2014; Ellen MacArthur Foundation 2013). All 179 visions were reviewed accordingly by two authors and evaluated with three criteria for selection: 'yes', 'perhaps', 'no'. In the following stage, those visions which had received differing evaluations of which one was 'yes', were returned to and checked if their review remained valid. Only those visions, which subsequently received two 'yes'-reviews were included in the analysis. This led to the analysis of 62 visions on desirable and sustainable futures, each of which include a section corresponding to circular economy and other issues which citizens consider in that connection. Hence, analysis not only looks at the specific citizen formulations of circular economy but also at the

contexts in which it is considered.

The selected visions were analysed by topic modelling with latent Dirichlet allocation, which is a technique suitable for unstructured data (Blei et al. 2003). Patterns in the vision data were examined using the MALLET machine learning toolkit for natural languages (McCallum 2002). Topics, i.e. probabilistic clusters of words, were identified in the data and provide integrating similarities across visions.

Observed topics relate to the corpus of the 62 visions, which consists of the full texts of the selected visions. Stop words such as 'a', 'and', 'the', and special characters have been removed from the corpus to improve analysis, and capital letters have been replaced with lower case letters for the same reason. Topic modelling requires setting a number of topics to be identified. The analysis was carried out with 10 topics, which was considered to provide sufficient descriptive variety to be compared with policy priorities while also describing the data well. Modelling was carried out with the optimisation interval of 20 to examine differences in weight between the observed topics. The result of the topic modelling indicates in which future contexts citizens consider circular economy.

3.2 Ten citizen topics for circular economy

The conducted modelling of citizen visions with circular economy themes provides 10 topics, which are presented in Table 1. Modelling also provides key words appearing in a topic and its Dirichlet parameter, which indicates the weight of that topic in the corpus. The naming of the topics is performed by the authors and relates to the clusters of keywords. The topics in the order of weight are the following: energy for society, awareness of differences, cultural and ecological progress, healthier humanity, holistic choices, equal possibilities, climate threats, policy mission, universal accessibility, and clean systems.

Table 1. Ten citizen topics for circular economy

Topic	Dirichlet parameter	Key words in topic
1. Energy for society	29,001	energy people life food community society education production work resources environment vision green nature social time consumption ecological local water
2. Awareness of differences	3,767	level accordance rural city workers conscious pierino members secure leisure meat story common standard sustainable active vehicle triple healthcare mix
3. Cultural and ecological progress	3,736	eat great consequences supporting cultural progress days built interests alternatives group child replacing fair public case gardening species polluters doubts
4. Healthier humanity	3,698	healthier higher global costs restrictions citizen professions problems reduced large stylish humanity cohesive embedded ethics heart end satisfaction set person
5. Holistic choices	3,620	modern children concern relation cars supported plastic walls holistic volunteering close cultural favour squares codes civil developing choices sense experiences
6. Equal possibilities	3,548	perspective possibilities ideas everyones equally sick ecologically lead climate milk add herbs grandparents regional holders house racists wanted auto accept

7. Climate threats	3,543	oil rooftop fish learning climate principle measures employment ensure money generation town consumer scale customers actively meeting programme start science
8. Policy mission	3,439	give balanced nowadays regions policy bodies dwelling technical heritage quantum reserves mission typical democracy operating find models differences valued benefit
9. Universal accessibility	3,381	accessible universal educated remote farmers opportunities efficient part main building people fruits corporate earlier lawn playing seas cleaner wellbeing shower
10. Clean systems	3,048	part systems relationships clean adapted resist burden simple cleaner interest virtuous success cradle street involvement integrate dialogue immaterial wishes due

The topic of *Energy for society* has a substantially more weight than the other nine topics. Thereby, it should be considered an overarching facilitative topic, which connects to a number of activities and issues such as energy, people, life, food, community, society, education, production and work. Even when piloting the modelling with five and fifteen topics, energy for society emerged as the same key topic while the other topics were more varied. The finding can be considered specific for circular economy also because education performs that same overarching role when analysing all 179 visions of which the 62 visions are a subset (Repo et al. 2017).

Another key observation is that all but two of the topics incorporate a clear social dimension. This comes forth through key words such as society, humanity, and universal. In contrast, the topic of *Climate threats* is ecologically oriented and addresses resources and impacts of their use. *Clean systems*, in turn, is techno-economical to its character as it considers relationships between parts of a system, adaptation and resistance and cleanliness, of course. Overall, economic or industrial issues are not prominent in the data.

The topics of *Climate threat* and *Energy for society* are the only topics in which consumption and consumers are directly addressed in key words. Interestingly, neither overall sustainability nor energy were amongst the criteria for selecting vision data for the analysed corpus, which further highlights the importance of these topics in the future of consumption.

The remaining topics relate to a range of social dimensions. *Awareness of differences* relates to finding appropriate solutions between differing contexts such as rural areas and cities, and work and leisure. *Cultural and ecological progress* deals with eating, interests, alternatives and fairness while considering doubts about biodiversity. *Healthier humanity* considers health in terms of costs, restrictions, professions and problems. *Holistic choices* responds to a variety of forward-looking selections having to do with people's concerns and activities. *Equal possibilities* takes inclusion into account, pointing at everyone, acceptance and racism in relation to ecology and climate. *Policy mission* pays attention to regions, institutional bodies, mission, democracy and finding operating models. *Universal accessibility* relates to accessibility, universality, education and opportunities with a slight emphasis in the material world through farmers, fruits, lawns and seas.

4. European Policies on Circular Economy

Europe has together with China been one of the forerunners of policies on circular economy. The European Union adopted its so called Circular Economy Package in 2015 and policies on circular economy have been adopted in a number of its Member States after that. This section provides an introduction to and a summary of those policies, which will later be used as reference points when comparing consumer topics with policy priorities.

4.1 Manifestations of European policies

Key targets and actions in policies on circular economy can be observed at the European and national levels. The policies of the European Union look at waste and plastics and exhibit, of course, a level of their own, as they influence national level policies and affect business practices also outside the Union. EU programs indeed look beyond sectoral activities and emphasize cross-sector co-operation (European Commission 2015, Repo et al. 2015). The EU's circular economy package, in particular, aims to frame the field and steer actions for national policies. It also positions circular economy in relation to other community regulation on waste management, use of chemicals and eco-design, for instance.

While the European Union aims to steer policies on circular economy, the policy field is, nevertheless, varied at the national level due to differences in the scopes of policies. For instance, the UK policy has a wider reach and broader character than the Scottish policy. National policies further attempt to sustain or enhance fields which are considered to be in the national interest. Established forerunners in circular economy policies all seem to have industries which are of their particular concern: Finland looks at bio-economy (Government of Finland 2015), the Netherlands at food-processing (Government of Netherlands 2016), Scotland at whisky (Government of Scotland 2016), and the UK at financial instruments (House of Commons 2015). The particular focuses of the national policies on circular economy indicate that common systemic solutions are still sought for.

For this article, we did a careful search of policy packages and programs in Europe. In addition to the EU package (European Commission 2015), four national policy programs were identified (Finland, the Netherlands, Scotland and the UK). These policy reports form either binding frameworks, action plans and programs reaching for circular economy or provide a set of policy recommendations that the government needs to respond to (United Kingdom). Reports that were to their character more reviews than coherent programs or action plans were omitted because they did not constitute policies. Similarly, policies from leading European economies such as France and Germany were not included, because they do not have a focused government package or program namely on circular economy. For example, Germany has a strong environmental legislation as well as waste legislation including elements of circularity, but these do not form a coherent program. Similarly, circular economy actions are prevalent in France, but take place at regional, municipal or industry levels rather than at the national level.

4.2 Key European policy targets and actions

Policies in Europe target circularity in selected priority areas, while supporting innovation and emphasizing market driven solutions. Five overarching priority targets for circular economy can be identified in policies of the European Union and the four examined nations: waste as a resource, new waste management, bio-economy, resource efficient eco-design and manufacturing, and financial instruments (Table 2). The table was summarized by two of this article's authors who first independently reviewed the examined policy targets.

Two of the policy priorities focus on waste. The first considers *waste as a resource*, one of the key ideas in circularity. Plastics and raw materials are considered at the EU level as well as in the Netherlands. Other national level aims focus on increased recycling of household waste (Finland), plastics recycling (the Netherlands), and recycling of demolition waste together with reuse of materials from energy platforms (Scotland).

New waste management, in turn, deals with improving waste management regulation and making it better fit the concept of circular economy. At the EU level, it focuses on creating adequate waste management for construction and demolition waste, and ways to recover valuable resources from it. National level policies are of a different, yet coherent character. Finland moderates, i.e. reformulates, the decree of wastewater, recycling, and the Municipal Waste Act, while abolishing landfills by 2025. Waste is substantially reduced in the Netherlands, and water reduction addressed in Scotland. The UK adopts a more standardized approach to recycling amongst the local authorities.

Bio-economy is present both at the European and the national levels. The EU focuses on food waste management and an efficient use of bio-based resources. At the national level, the Dutch and Scottish policies are in line with these priorities, bringing together the broader bio-economy with food and drink industries as well as waste reduction. In Scotland, particular attention is given to the renown whisky industry and in the Netherlands to agroindustry, with Netherlands being the second largest exporter of food after United States (Netherlands Enterprise Agency 2017). Policy specificities also exist as the Netherlands focuses on bio-based plastics and Finland on nutrients from agriculture.

Table 2: Circular economy priority areas in the European Union (EU) and selected countries.

Policy priority areas	Targets and actions
Waste as resource	<ul style="list-style-type: none"> - Plastics: recyclability, biodegradability, presence of hazardous substances, marine litter (EU), - Recovery of critical raw materials (EU) - Increased recycling of municipal waste (Finland) - Plastics recyclability (the Netherlands) - Increased recycling of demolition waste (Scotland) - Reuse of equipment from wind turbines and decommissioned oil and gas platforms (Scotland)
New waste management	<ul style="list-style-type: none"> - Recovery of valuable resources and adequate waste management in construction and demolition (EU) - Moderating the decree of wastewater (Finland) - Moderating recycling regulation (Finland) - No landfilling by 2025 (Finland) - Moderating the Municipal Waste Act (Finland), - Household waste reduced radically (the Netherlands)

	<ul style="list-style-type: none"> - Halving of volume of residual waste from companies, organisations, and governments that is comparable to household residual waste (the Netherlands) - Water reduction targets (Scotland) - More standard approach in recycling amongst local authorities (United Kingdom)
Bio-economy	<ul style="list-style-type: none"> - Food waste management (EU) - Efficient use of bio-based resources (EU) - Increased recovery of nutrients (Finland) - Optimising use of biomass and food by closing loops (the Netherlands) - Bio based plastics (the Netherlands) - Food and drink, and the broader bio-economy (Scotland)
Resource efficient eco-design and manufacturing	<ul style="list-style-type: none"> - Shift from critical raw materials such as metals and minerals to generally available raw materials (the Netherlands) - Minimising use of construction materials (the Netherlands) - Encouraging manufacturing firms to adopt circular practices, including remanufacture (Scotland) - Increasing resource efficiency in construction and built environment (Scotland) - Eco-design standards across a range of products (United Kingdom)
Financial instruments	<ul style="list-style-type: none"> - Targeted outreach to help the development of circular economy projects for various sources of EU funding (EU) - Financing innovative technologies to support a circular economy (United Kingdom) - Introduction of differential VAT rates based on life-cycle analysis of the environmental impact or recycled content of products, and tax allowances for businesses that repair (United Kingdom) - Remove trade barriers for remanufactured goods through trade negotiations, including pushing for them to be treated in the same way as new products (United Kingdom)

Resource efficient eco-design and manufacturing forms the fourth priority area, and shifts attention from waste to product design and more resource efficient manufacturing. A systematic approach to circular economy can be identified in eco-design and manufacturing. This accentuates the notion that to achieve the goals of circular economy, the resource base for manufacturing must be changed from rare non-renewables to common renewables in the Netherlands. The priority area also promotes eco-design standards in the United Kingdom and circular business practices in Scotland. Alongside, more conventional resource efficiency practices are advanced in construction and built environment in the Netherlands and in Scotland.

While resource efficient eco-design and manufacturing indeed forms a policy priority area, it is not explicated in the European package on circular economy nor in the Finnish policy. At the European level, this might be explained by the fact that eco-design is addressed in a separate directive (European Commission 2009), albeit that directive in its current form focuses on energy issues. In Finnish policy, innovations are targeted outside the concept of circular economy, namely in the domains of carbon neutrality and cleantech, development of wood based bio-economy and food produce.

Systemic thinking is perhaps most evident in *financial instruments* for creating incentives

and resources for businesses to implement the principles of circular economy. This future oriented priority area comes forth in the EU package and in the UK policies. It highlights EU funding as well as UK finances to innovative technologies, differentiated VAT base and removal of international trade barriers for remanufactures goods.

The five priority areas evident in examined European and national policies provide a good reference against which to compare consumer topics of circular economy. They are of similar character (priority area vs. topic) and are few in number, indicating that the prerequisites for finding parallels are good.

5. Few Parallels between Citizen Topics and Policy Priority Areas

A comparison between citizen topics on circular economy and European and national policy priority areas shows that there are parallels between the two, but they are few. This may partly relate to that citizen visions depict desirable and sustainable futures, while policy programs represent more focused and practically oriented action plans for building futures. Perhaps due to the novelty of the topic, it turned out that our procedure of using forward-looking data created by citizens did not contribute to a high number of parallels. On the other hand, it is likely that the relatively low number of policy priority areas increased the likelihood of observing parallels.

Examining the parallels indicates where there is congruence between citizen perspectives and circular economy policies. Correspondingly, topics and priority areas without parallels indicate a lack of congruence. Figure 1 depicts the parallels between the citizen topics and policy priority areas. Two close parallels can be found and a number of more distant parallels between the compared topics and areas. At the same time, a half of the citizen topics do not find parallels in policy priority areas. The upcoming sections discuss these findings and their implications on congruence in greater detail.

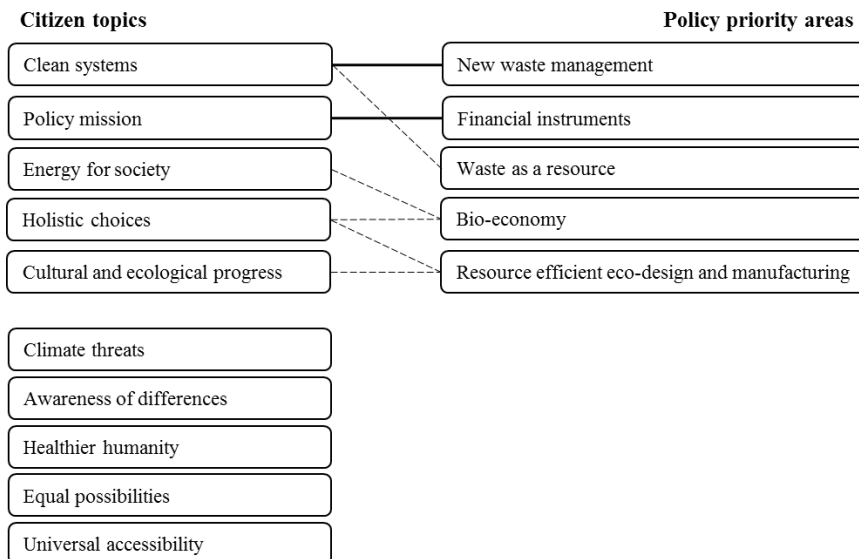


Figure 1: Parallels between citizen topics and policy priority areas on circular economy.

The citizen topic of *Clean systems* finds a close parallel with the policy priority area *New waste management* and a distant parallel with *Waste as a resource*. The other close parallel emerges between the topic *Policy mission* and the priority area *Financial instruments*. These two direct parallels indicate that citizens are aware of waste issues and are concerned about them when imagining sustainable futures. They also indicate that citizens appreciate policy focus on waste issues and accept that policy should be concerned with promoting this particular area of circular economy.

There are also other distant parallels between citizen topics and policy priority areas, which form a network of connections. *Energy for society*, the most prominent citizen topic, relates to the policy priority *Bio-economy*, which in turn also relates to the topic of *Holistic choices*. Further, *Holistic choices*, connects also to the priority *Resource efficient eco-design and manufacturing*, which is parallel to *Cultural and ecological progress*.

This network of connections highlights two key concerns for policies on circular economy. Firstly, considering energy issues as an integral part of contemporary society (i.e. *Energy for society*) is a key topic for citizens and should therefore be addressed comprehensively to contribute to congruence between citizen and policy understandings of the concept of circular economy. The European policy priority area on *Bio-economy* partly accomplishes this, but would require an additional and significant integration of societal dimensions such as health, equality and universality in its core. Secondly, consumer choice (i.e. *Holistic choices*) especially concerning new materials and services is to be addressed comprehensively as it binds together the productive aspects of circular economy from the consumer perspective.

Five consumer topics on circular economy do not find parallels in policy priority areas. There is no counterpart to *Climate threats* in the policy priority areas which focus on economy, manufacturing, finances and waste. This observation challenges the apparent practice of addressing climate issues in other domains than that of circular economy, and thereby contributes to a lack of congruence between citizen and policy understandings. Similarly, the remaining four citizen topics (*Awareness of differences*, *Healthier humanity*, *Equal possibilities*, *Universal accessibility*) are all of social character, which is a dimension lacking in the policy priority areas. If citizen expectations on circular economy were to be met to a greater extent, it would therefore be useful to incorporate social dimensions in policy formulation and implementation. This would also help to translate policies on circular economy from expert domains of production and business to larger perspectives that are accepted by citizens.

In conclusion, the comparison of topics and priority areas provides a number of insights on the congruence between citizen perspectives and policy understanding of circular economy:

- Focus on waste and acceptance for adopting policy measures supports congruence
- Strengthening the importance of energy issues and seeing consumer choice to perform an integrative role in policy would provide readily adoptable opportunities for better congruence
- Positioning circular economy policies in the realm of climate change would provide better congruence
- Neglecting the social dimension of circular economy is a source for continued lack of congruence

These findings reflect on their part the limited scope of the concept of circular economy in the policy formulations of the European Union and in the examined European forerunner countries. While waste and production practices are important issues in contemporary society, they are not the top concerns of citizens or consumers. The importance of consumers is indeed considered when formulating the concept of circular economy, but their role is, nevertheless, limited to acting as part of a system rather than designing it (see Ellen MacArthur Foundation 2015, for instance). The emphasis on economic and ecological dimensions in circular economy at the expense of social dimensions has been observed before (Murray et al. 2015; Hobson and Lynch 2016), and is evident also in European policy settings. Considering social dimensions could well be the most powerful way to support congruence between citizen and policy understandings of circular economy.

6. Discussion

This article has examined how citizens conceive the concept of circular economy and how this compares to policies in the field in Europe. Particular attention has been given to the potential lack of congruence between the two, because this is likely to have an impact on the successes of the policies. Congruence provides acceptance and momentum for policy while a lack of it could provide a challenge (Warwick 2015).

There is a lack of empirical and consumer-centred studies on circular economy (see Murray et al. 2015; Hobson and Lynch 2016). This article has responded to that knowledge gap by reviewing how European citizen visions on desirable and sustainable futures relate to the concept of circular economy. Citizen perspectives on circular economy were examined according to the following content criteria: shared use of products, incentivised return, product design, waste reduction, and sustainable food production.

Two direct parallels reflecting congruence between citizen perspectives and policy priority areas could be identified. Citizens consider waste an important topic in this context and accept that policies should be adopted to develop circular economy. Other, more distant parallels between the citizen topics and policy priority areas could also be observed, yet probably more interesting from the perspective of policy formulation is that some citizen topics are not accounted for in the policies at all. One consumer-centred key finding which challenges existing policies is that people consider circular economy in the context of energy issues. Similarly, social aspects and dimensions such as humanity, equality, diversity and universality are prevalent when people think of the future opportunities of circular economy. Furthermore, the findings indicate that also climate issues are connected to people's minds when they think of circular economy.

These findings suggest that circular economy as a policy area is still largely dominated by perspectives born and sustained in the circles of specialist administrators. Earlier, we referred to this as a traditional epistemic community (Marier 2008), which consists mainly of professionals of a given area. With the data available for this study it is not possible to establish whether there exists close links between academic research, think tanks and policy makers, but it is quite clear that there is a gap between lay and professional understandings of circular economy. Policy positions tend to stay clear of

the main concerns of the general populace. This is also an indication that circular economy has remained – despite its media visibility – in political margins and certainly there is not a ‘political’ epistemic community built around circular economy. Following Marier (2008), we would assume that if this was the case, citizen concerns would have informed the policy positions analysed here (see also Font et al. 2015).

In terms of congruence between consumer perspectives and policy priority areas, it would accordingly seem worthwhile to highlight the topics of energy, social sustainability and climate change. This could be accomplished by reformulating strategic policy priority areas, but that need not be the only option. Strategic alternatives include a better contextualisation of the current strategy to issues of consumer interest, and positioning the current strategy in relation to other, complementary sustainability policies. Further, current policy could be implemented so that it takes local issues into better consideration, hence making the policies more approachable to citizens and consumers.

The formulation of priority areas at the European level and in a number of European countries has been a significant step in the implementation of policies to support activities relating to circular economy. Yet, it can be argued that the prioritised areas represent the obvious starting point (e.g. waste management), have particular value for national economies (e.g. whisky in Scotland and food processing in the Netherlands), or are issues that need to be solved anyway (water management in Finland). As the transition from linear to circular economy is more systemic to its character, novel priorities are also sought for. Additional focus on energy issues, social topics and closer embedding with climate change policies would create congruence between citizen perspectives and policy priorities, and thus stimulate the acceptance and take-up of circular economy in Europe.

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References

- Accenture (2014). *Circular Advantage - Innovative Business Models and Technologies to Create Value in a World without Limits to Growth*. Accessed 25.10.2017 at <https://thecirculars.org/documents/Accenture%20Circular%20Advantage%20Web%20Single.pdf>
- Achen, C. H. and Bartels, L. M. (2016). *Democracy for Realists: Why Elections Do Not Produce Responsive Government*. Princeton: Princeton University Press.
- Andrews, D. (2015). The circular economy, design thinking and education for sustainability. *Local Economy: The Journal of the Local Economy Policy Unit* 30(3), 305-315.
- Arnold, C. and Franklin, M. N. (2012). Introduction: Issue Congruence and Political Responsiveness. *West European Politics* 35(6), 1217-1225. Special issue *Assessing Political Representation in Europe*.
- Blei, D. M., Ng, A. Y. and Jordan, M. I. (2003). Latent Dirichlet Allocation. *Journal of Machine Learning Research* 3(Jan), 993-1022.
- Botcheva, L. (2001). Expertise and International Governance: Eastern Europe and the Adoption of European Union Environmental Legislation. *Global Governance* 7(2), 197-224.

- Cazabat, C. (2016). Integrating Civil Participation Into Sustainable Development Practice. *European Journal of Sustainable Development* 5(4), 25-32.
- Clawson, R.A. and Oxley, Z. M. (2013). *Public Opinion: Democratic Ideals, Democratic Practice*. 2nd ed. London: Sage.
- Ellen MacArthur Foundation (2015). *Growth within: A Circular Economy Vision for a Competitive Europe*. Cowes: Ellen MacArthur Foundation.
- Ellen MacArthur Foundation (2013). *Towards a Circular Economy, Vol 1: Business Rationale for an Accelerated Transition*. Cowes: Ellen MacArthur Foundation.
- European Commission (2015). Closing the loop - An EU action plan for the Circular Economy, COM (2015) 614 final, Brussels, 2.12.2015. Accessed 25.10.2017 at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>.
- European Commission (2009). EU Ecodesign Directive 2009/125/EC. *Official Journal of the European Union*, Brussels (2009) of 21 October 2009.
- Ezzat, A. M. (2016). Sustainable Development of Seaport Cities through Circular Economy: A Comparative Study with Implications to Suez Canal Corridor Project. *European Journal of Sustainable Development*, 5(4), 509-522.
- Font, J., Wojcieszak, M. and Navarro, C. J. (2015). Participation, representation and expertise: Citizen preferences for political decision-making processes. *Political Studies*, 63(S1), 153-172.
- Ghisellini P., Cialani C. and Ulgiati S. (2016). A Review on Circular Economy: The Expected transition to a Balanced Interplay of Environmental and Economic Systems. *Journal of Cleaner Production* 114, 11-32.
- Gregson, N., Crang, M., Fuller, S. and Holmes, H. (2015). Interrogating the Circular Economy: The Moral Economy of Resource Recovery in the EU. *Economy and Society* 44(2), 218-243.
- Government of Finland (2015). *Finland, a land of solutions: Strategic Programme of Prime Minister Juha Sipilä's Government*. 29 May 2015. Government Publications 12/2015. Accessed 25.10.2017 at http://valtioneuvosto.fi/documents/10184/1427398/Hallitusohjelma_27052015_final_EN.pdf/f1071fac-a933-4871-bb38-97bdfd324ee6
- Government of Netherlands (2016). *Circular Economy in Netherlands by 2050*. Accessed 25.10.2017 at <https://www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050>.
- Government of Scotland (2016). *Making Things Last - A Circular Economy Strategy for Scotland*. Accessed 25.10.2017 at <http://www.gov.scot/Resource/0049/00494471.pdf>.
- Hazen B., Mollenkopf D. and Yang Y. (2016). Remanufacturing for the Circular Economy: An Examination of Consumer Switching Behavior. *Business Strategy and the Environment* 26(4), 451-464.
- Hennlock, M., zu Castell-Rüdenhausen, M., Wahlström, W., Kjær, B., Milios, L., Veà, E., Watson, D., Jørgen Hanssen, O., Frâne, A., Stenmarck, Å and Tekie, H. (2014). *Economic Policy Instruments for Plastic Waste – A review with Nordic perspectives*. TemaNord 2014:569. <http://dx.doi.org/10.6027/IN2014-569>.
- Hirschman, A. O. (1970). *Exit, Voice and Loyalty. Responses to Decline in Firms, Organisations and States*. Cambridge, MA: Harvard University Press.
- Hobson K. and Lynch N. (2016). Diversifying and De-growing the Circular Economy: Radical Social Transformation in a Resource-Scarce World. *Futures* 82, 15-25.
- House of Commons (2015). *Growing a circular economy: Ending the throwaway society*. Third Report of Session 2014–15 Report, together with formal minutes relating to the report Ordered by the House of Commons to be printed 17 July 2014. HMS Stationary Office.
- Jurgilevich, A., Birge, T. Kentala-Lehtonen, J., Kaisa Korhonen-Kurki, K. Pietikäinen, J., Saikku, L. and Schösler, H. (2016) Transition towards Circular Economy in the Food System. *Sustainability* 8, 69; doi:10.3390/su8010069.
- Jacobs, L.R. and Shapiro, R.Y. (2000). *Politicians Don't Pander: Political Manipulation and the Loss of Democratic Responsiveness*. Chicago: University of Chicago Press.
- Jørgensen, M. L. and Schoning, S. (2016), *Vision Catalogue. Encompassing the visions from all 30 countries*. Cimulact project, Deliverable 1.3. Accessed 25.10.2017 at <http://www.cimulact.eu/wp-content/uploads/2016/06/D1.3final.pdf>
- Kissling R., Coughlan D., Fitzpatrick C., Boeni H., Luepschen C., Andrewd S. and Dickeson J. (2013). Success factors and barriers in re-use of electrical and electronic equipment. *Resources, Conservation and Recycling* 80, 21-31.

- Krick, E. (2017). Ensuring Social Acceptance of the Energy Transition: The German Government's "Consensus Management" Strategy. *Journal of Environmental Policy & Planning*. DOI: 10.1080/1523908X.2017.1319264.
- Linder, M., and Williander, M. (2017). Circular business model innovation: inherent uncertainties. *Business Strategy and the Environment* 26(2), 182-196.
- Marier, P. (2008). Empowering Epistemic Communities: Specialised Politicians, Policy Experts and Policy Reform. *West European Politics* 31(3), 513-533.
- Matsumoto M., Chinen K. and Endo H. (2016). Comparison of U.S. and Japanese Consumers' Perceptions of Remanufactured Auto Parts. *Journal of Industrial Ecology*. DOI: 10.1111/jiec.12478
- McCallum, A. K. (2002). MALLETT: A Machine Learning for Language Toolkit. Accessed 25.10.2017 at <http://mallet.cs.umass.edu>.
- Mashhadi A. R., Esmaelian B., Cade W., Wiens K. and Behdad S. (2016). Mining consumer experiences of repairing electronics: Product design insights and business lessons learned. *Journal of Cleaner Production* 137(November), 716-727.
- Morgan, D. R. (1973). Political Linkage and Public Policy: Attitudinal Congruence between Citizens and Officials. *Political Research Quarterly* 26(2), 209-223.
- Murray A., Skene K. and Haynes K. (2017). The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in Global Context. *Journal of Business Ethics* 140(3), 369-380.
- Ongondo F. O., Williams I. D. and Carroll C. (2013). ICT reuse in socio-economic enterprises. *Waste Management* 33(12), 2600-2606.
- Peters, B. G. (1987). Politicians and Bureaucrats in the Politics of Policy-Making. In Lane, J.-E. (Ed.) *Bureaucracy and Public Choice*. London: Sage, pp. 255-282.
- Pomeda, J. R., Aldaz, C. B., Hamón, L. S., Fernández, F. S. and de Navarrete, F. C. F. (2016). A Probabilistic Topic Model on Energy and Transportation Sustainability Perceptions Within Spanish University Students. *European Journal of Sustainable Development*, 5(4), 367-374.
- Radaelli, C.M. (1995). The Role of Knowledge in the Policy Process. *Journal of European Public Policy* 2(2), 159-183.
- Repo, P., Matschoss, K. and Timonen, P. (2017). Sustainable Futures: Comparing Methodologies for Analyzing Citizen Visions in Europe. *Sociology Study*, 7(5), 246-262.
- Repo, P., Matschoss, K., Van Eynde, S. and Ramioul, M. (2015). An Evolving European Policy Application of Circular Economy. In Damianova, Z., Kozarev, V., Chonkova, B. & Dimova, A. (Eds.) *CASI in the wider policy context*. CASI project, Deliverable 7.3. Accessed 25.10.2017 at www.casi2020.eu/app/web1/files/download/casi-d7-3-first-policy-report.pdf
- Riisgaard H., Mosgaard M. and Overgaard Zacho K. (2016). Local Circles in a Circular Economy – the Case of Smartphone Repair in Denmark. *European Journal of Sustainable Development* 5(1), 109-124.
- Netherlands Enterprise Agency (2017). *Holland Compared, Facts and Figures, 2nd edition 2017*. Accessed 25.10.2017 at <https://investinholland.com/resources-tools/>
- Trentmann, F. (2007). Citizenship and consumption. *Journal of Consumer Culture*, 7(2), 147-158.
- Tukker, A. (2015). Product services for a resource-efficient and circular economy – a review. *Journal of Cleaner Production* 97(June), 76-91.
- Warwick, P. V. (2015). Public opinion and government policy in Britain: A case of congruence, amplification or dampening? *European Journal of Political Research* 54(1), 61-80.
- van Weelden E., Mugge R. and Bakker C. (2016). Paving the way towards circular consumption: exploring consumer acceptance of refurbished mobile phones in the Dutch market. *Journal of Cleaner Production* 113(February), 743-754.
- World Economic Forum (2014). *Towards the Circular Economy: Accelerating the scale-up across global supply chains*. Prepared in collaboration with the Ellen MacArthur Foundation and McKinsey & Company. Accessed 25.10.2017 at www3.weforum.org/docs/WEF_ENV_TowardsCircularEconomy_Report_2014.pdf.
- Yang, Z. and Wang, W. (2011). The Research on Pricing Strategy for Perishable High-tech Products Based on Circular Economy. *Energy Procedia* 5, 842-1846.
- Zhang T., Chu J., Wang X., Liu X. and Cui P. (2011). Development pattern and enhancing system of automotive components remanufacturing industry in China. *Resources, Conservation and Recycling* 55(6), 613-622.