

Article

Towards a Circular Economy: Using Stakeholder Subjectivity to Identify Priorities, Consensus, and Conflict in the Irish EPS/XPS Market

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Received: 9 October 2019; Accepted: 26 November 2019; Published: 2 December 2019



Abstract: In European Seas, plastic litter from fishing activities, river transport, and poor waste management is one of the fastest growing threats to the health of the marine environment. Extruded polystyrene (XPS) and expanded polystyrene (EPS), specifically, have become some of the most prominent types of marine litter found around Europe's coastlines. To combat this problem, the European Commission has ratified a series of regulations and policies, including the Single-Use Plastics Directive and the EU Action Plan for the Circular Economy. However, in order to ensure that the benefits of such regulations and policies are realized at a scale that can adequately address the scope of the problem, decision-makers will need to integrate the opinions, values, and priorities of relevant stakeholders who operate across the EPS/XPS product lifecycle. In this study, we apply a 35-statement Q-methodology to identify the priorities of stakeholders as they relate to the Irish EPS/XPS market and the wider societal transition to a circular economy. Based on the responses of nineteen individuals representing industry, policy-makers, and community leaders, we identified three distinct perspectives: System Overhaul; Incremental Upgrade; and Market Innovation. The results demonstrate that the type and format of policy interventions linked to Ireland's EPS/XPS circular economy are heavily contested, which presents significant challenges for driving the debate forward. These results provide valuable information on viewpoints that can be used by different stakeholders at national and EU levels to address areas of conflict, ultimately fostering the development of more effective, broadly supported co-developed policies.

Keywords: circular economy; stakeholder; marine litter; polystyrene; Ireland; Q-methodology

1. Introduction

1.1. Marine Plastic Pollution

Plastics constitute the largest proportion of anthropogenic marine litter and have significant and widespread impacts on the marine environment [1,2]. In particular, the lengthy degradation time of petrochemical plastic polymers, which form about 80% of total global plastic usage, has created a growing waste disposal problem and increases in the accumulation of plastic waste in the global oceans [3,4]. The impacts and consequences of marine plastic pollution span ecological [5], social, and economic dimensions [6,7]. Considerable efforts are now underway to mitigate and reduce the negative impacts of plastic pollution, with international and national actions covering regulatory and market measures across different scales [8].

In Europe, the issue of plastics pollution is being addressed through transnational measures. EC Member States, such as Ireland, cooperate to meet the legal requirements of the Marine

Strategy Framework Directive under Descriptor 10—Marine Litter [9] and at the regional seas level through programs under the OSPAR, HELCOM, and Barcelona Conventions [10]. Given the complex, interconnected nature of the sources, pathways, and impacts of marine plastics [11], it is increasingly recognized that this issue should be addressed within a wider context, such as through the implementation of circular and bio-based economies and sustainability-focused agendas. Thus, tackling the problem of marine plastics pollution will include actions that will have implications for numerous sectors (e.g., food, waste management, packaging, tourism) from local to international scales. Similarly, a multi-actor approach should be employed to ensure all stakeholders linked to different segments of the value chain (e.g., producers, users, and recyclers) are engaged to support the implementation of mitigation measures and ensure that the complexities of governance are considered [12].

1.2. Expanded Plastics

Extruded polystyrene insulation (XPS) and expanded polystyrene insulation (EPS), both commonly used petrochemical plastics, have a variety of applications including disposable packaging, fast food containers, construction material used on land [13], and EPS buoys deployed at sea [14]. EPS has been identified as a common type of marine litter that spans the British Isles [15] to South Korea [14], and is linked to sea-based sources of marine litter such as fishing and aquaculture.

Both EPS and XPS materials have high production and consumption rates which continue to increase over time. The global demand for polystyrene (PS) in 2010 was roughly 14.9 million tons, with an estimated demand growth rate of 5.5% during 2010–2020 [16]. In turn, high production and consumption, combined with lacking or inefficient waste management practices [17], have made EPS and XPS a substantial part of marine litter worldwide [13]. Subsequently, EPS/XPS have been identified for specific action due to their prevalence within monitoring programs for beach and marine litter in Europe's North Atlantic waters [18]. Most recently, the Single-Use Plastics Directive (Directive (EU) 2019/904) sets out to phase-out single-use EPS products.

Within circular economy models, recycling and re-use of materials should be maximized to not only minimize waste [15], but also to reduce the need to use virgin materials for products. However, current recycling practices are considered “uncontrolled” [13,15] and require urgent attention. The latter is emphasized through studies in Asian, UK, and Irish coastal and marine areas, which demonstrated an accumulation of carcinogenic additives such as hexabromocyclododecane in recycled EPS that subsequently became marine litter [13,15]. An examination of EPS/XPS products within a circular economy can provide opportunities to rectify current detrimental pathways.

1.3. Plastic Waste and the Circular Economy: A Way Forward for Ireland and the EU?

In the case of Ireland, national responses to tackling marine plastic pollution and implementing circular economy approaches are both shaped by EU policy and legislation [19,20]. For the former, Ireland as an EC Member State is required to take measures to address marine litter when implementing the MSFD. Similarly, Ireland is a contracting party to the OSPAR Convention, and engages in measures to address marine pollution at a regional level [19]. At a national level, initiatives spearheaded by Bord Iascaigh Mhara (Ireland's Sea Fisheries Board) and An Taisce (Ireland's National Trust) have focused on removing and recycling plastic from marine waters and coastal areas (e.g., Two Minute Beach Clean, Clean Oceans Initiative). With regard to the Circular Economy, Ireland does not yet have a dedicated national strategy for implementation, but the principles of CE are contained in a range of national policies linked to spatial planning, waste management, and development of the bioeconomy [20]. The EU Circular Economy Package and the EU Strategy for Plastics in the Circular Economy will influence national level measures taken by Ireland to transition to a CE.

The circular economy (CE) is a complex and emergent idea comprised of barriers and enablers which dictate its implementation. CE is an economic system that decouples natural resource extraction from economic growth and is a shift away from linear neoclassical models that currently dominate the world's production practices. In theory, CE models present an approach to maintaining the delivery of

valuable goods and services, while decreasing resource consumption and the economy's impact on the environment. Ref. [21] developed a comprehensive definition of CE, summarized by [22] (p. 264):

A [CE] describes an economic system that is based on business models which replace the “end-of-life” concept with reducing, alternatively reusing, [and] recycling [. . .] materials in production/distribution and consumption processes, [. . .], with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.

Work is ongoing in the context of circularity and plastics [23]. Circularity provides an opportunity to address the problems of marine plastics through the adoption of full life-cycle assessments, while also integrating technical and non-technical measures [23,24] and mobilizing multiple stakeholders in the co-design of solutions [25]. In exploring options for transitioning to CE, [26] emphasize the important role of stakeholders as drivers and enablers to deliver the required systemic changes, while [27] highlight the value of multi-stakeholder approaches to implement circularity and address marine plastic pollution. The latter findings are critical if the information, expertise, and knowledge from policy, science, industry, and consumer communities is to be integrated to produce effective solutions for implementation of CE.

1.4. Facilitating a Just Transition

For CE to contribute to long-term sustainability initiatives, its emphasis on technical solutions to maximize resource efficiency, like eco-innovation, must be complemented by a commitment to ensuring that the move away from traditional economic tenets constitutes a just transition. As [28] point out, addressing persistent problems, e.g., wasteful and destructive economies, requires large-scale structural changes in societal institutions—especially systems of governance—that lead to fundamentally new sectorial identities, thus reinventing both the structure of the system and the relationship between its participants. This process model of societal regime change is commonly referred to as transition management [29]. The conceptual underpinnings of what makes a transition just, however, are in development [30,31]; scholars are working to bridge research in climate, energy, and environmental justice to offer a holistic framework for justice scholarship and transition management to realize a low-waste, low-carbon economy. Utilizing the theoretical contribution of [31], we employ the concept of a “just transition” in the context of plastics and CE as one that espouses fairness and equity as fundamental pillars of the necessary systemic structural changes across domains, actors, and scales—referring in this case to the co-evolution of the production habits of industry and the consumption habits of consumers. The work of [32] elucidates this concept further by recognizing the ways in which businesses prepare for and respond to major, often unpredictable, societal changes. By operating within a transition framework which champions a de-centralized decision making process, businesses and their stakeholders have the power to cooperate to re-define market structures, principles of business, and find a new economic purpose within a changing social context. What follows is a new societal regime with the capacity to deliver a more equitable economy for its citizens, as opposed to the current dominant neo-classical approaches to policy-development and economics [32].

As argued here, explicitly recognizing that CE constitutes a societal regime shift positions it within the theoretical paradigm of transition management [29]. As such, steering the CE's changes in the societal system requires direction from agents, structures, and practices that have a unique and intimate understanding of the system because they operate within it [28,29,33]. Ref. [29] (p. 168) argues that this process of “learning about different actor perspectives and a variety of options (which requires a wide playing field) is a necessary precondition for change.” Therefore, in order to ensure a just transition and, by extension, the long-term viability of a CE regime shift, participation from and interaction between stakeholders across sectors, is imperative. For these reasons, it is vital that decision-makers pay careful consideration to stakeholders' priorities, perspectives, and discourses throughout the transition from linear economic models to CE models [26]. In addition, because stakeholders operate within unique

spheres at different capacities, their respective opinions on a given topic, in this case transitioning to CE business models, will inevitably vary. Having an understanding of how stakeholder groups think and feel about an issue enables decision-makers to identify areas of agreement that can help drive policy implementation forward [28]. Therefore, there is a genuine need to understand how stakeholder groups comprehend and view CE in order to ensure subsequent policy measures acknowledge those relative values and facilitate synergies between stakeholders to foster a just transition.

For this study, we applied Q-methodology [34] to engage with a range of stakeholders in Ireland to identify interventions which facilitate the transition of the EPS/XPS value chain into a circular economy, and in turn reduce the negative impacts of EPS/XPS on the marine environment. We employ Q-methodology in this circumstance because “it is almost a perfect technique for the initial stages of environmental policy analysis [35].” Ref. [36] point out that the heterogeneity among stakeholder perspectives is multifaceted, stemming “from the way [stakeholders] view themselves, their resources and capabilities (or lack thereof), their expectations of the future and technology development, and their (normative) evaluation of the proper role of formal government (e.g., a port authority) in relation to the market.” Ref. [37] (p. 565) describes the purpose of Q as a means “to reveal subjective structures, attitudes, and perspectives from the standpoint of the person or persons being observed.” As such, Q’s measure of individual subjectivity is consistent with objectives in qualitative research [37–39], where subjectivity is the “human lived experience and the physical, political, and historical context of that experience [40].” Furthermore, the method’s development of sortable items representing the communications about a topic is qualitative in design [41]. The methodology’s ability to elicit the multidimensionality of stakeholders’ perspectives makes it a powerful tool for aiding policy discussions [42].

2. Methodology

2.1. Q-Methodology

In recent years, Q-methodology (here on referred to as “Q”) has gained traction as an effective way to capture the discourses surrounding an environmental problem from a group of stakeholders while shedding light on shared perspectives and opinions. Researchers have applied Q to identify stakeholder priorities for policy development, assess place-based vulnerability and adaptation, determine cultural ecosystem values, and resolve inter-stakeholder conflict [42,43]. A recent study employed Q to investigate stakeholder perceptions of marine plastic management in the United Kingdom [44]. Q enabled the authors to extrapolate four distinct perspectives, as well as the consensus across stakeholder groups, from NGOs and government agencies, to local retailers and citizen representatives, that governments should propose more radical and targeted measures to mitigate marine plastic. Stakeholders expressed the need to move beyond reactive policy initiatives such as single-product taxes and towards a more holistic and systemic societal transition to sustainability, e.g., CE principles. Q has also been used to garner perspectives from scholarly experts on priorities for advancements in sustainability concepts, including CE, green, and bioeconomy [45]. Using a 36 statement Q-set, the authors found that stakeholders preferred a combined circular green solutions approach towards degrowth. Notably, the authors highlighted the need to further explore potential synergies between economic policies that ultimately re-direct global value chains away from intrinsic growth models. Studies such as [44,45] demonstrate the applicability of Q for understanding stakeholder perspectives towards marine plastic litter and priorities for a transition to a circular economy.

Nevertheless, Q has both strengths and weaknesses inherent in its methodological design. The greatest strength of Q concerns its ability to effectively combine qualitative and quantitative dimensions into a robust mixed methods approach. In Q, the perspectives of respondents are analyzed with respect to a set of predefined viewpoints, rather than investigating the level of support for those viewpoints among the population, as is the case in other social research methods such as questionnaires and interviews [46–49]. Through the application of factor analysis, Q quantitatively assesses the patterns

surrounding how participants load onto the identified dominant discourses. From this, researchers can systematically and rigorously study human subjectivities related to complex topics. This makes Q, described in detail by [50], one of the most robust techniques for measuring attitudes and subjective opinion. That being said, Q inevitably maintains limitations, specifically with regards to its use of a predefined list of viewpoints [50,51] and its forced quasi-normal distribution [49,51]. It is argued that predefining the number of viewpoints that respondents engage with ultimately restricts the number of accounts that can be expressed, and therefore does not accurately represent the entirety of a subjective position. This limitation can be mitigated by ensuring that the predefined viewpoints are derived using diverse sources, e.g., interviews and workshops, in addition to researcher discretion. Further criticism has been levelled at Q for forcing respondents to sort their viewpoints within a normal distribution, arguing that this ultimately distorts the expression of respondents' subjectivity. However, counterarguments demonstrate that the shape of the sorting exercise makes no measurable impact on the statistical outcome. In addition, [51] argue that forcing respondents to rank statements along a normal distribution necessitates a deeper engagement with the sorting exercise, therefore promoting more salient results with regards to stakeholder values, attitudes, and priorities.

Here, Q is used to understand areas of thematic consensus, conflict, and priority present in Ireland surrounding EPS/XPS and the circular economy. Developing and administering a Q study is an involved process that requires five steps. These are:

- (i) Generating a concourse from which a final set of statements are selected—The “Q-set”;
- (ii) selecting theoretically appropriate participants—The “P-set”;
- (iii) sorting the statements in a quasi-normal distribution—The “Q-sort”;
- (iv) applying Principal Component Analysis (PCA) to identify dominant discourses—The “factor groups”; and
- (v) interpreting the factor groups to identify patterns in social perspectives.

2.2. Developing the Concourse and Q-Set

A concourse of statements known as the “Q-set” is developed to encapsulate every possible subjective viewpoint of the topic in question. Typically, studies generate a concourse of statements using a variety of sources, such as interviews, focus groups, and peer-reviewed literature. The statements seek to reflect “ordinary conversation, commentary and discourse of everyday life [37] (p. 94).” In the case of this study, we sought to understand the discourse patterns within and across stakeholders associated with EPS/XPS use, recycling, marine litter, and the circular economy in order to inform future policy initiatives. Interviews and focus groups are the preferred method to elicit the relevant perspectives of stakeholders [51], especially for studies gauging public opinions across particular segments of society [37].

Based on this line of reasoning, statements were primarily developed from information obtained during a stakeholder workshop of 20 experts in May 2019, titled, “How can expanded plastics fit into the Circular Economy?” Stakeholders were invited based on their knowledge of the study topic and represented a range of sectors, including industry (n = 13), academia (n = 2), and policy-makers (n = 4). During the workshop, participants engaged in several activities that identified individual views and beliefs with respect to the EPS/XPS value chain, marine litter, and the circular economy. The participatory workshop lasted one full day and drew heavily from the World Café method [52]. Specifically, the workshop was facilitated as a set of focused, collaborative group sessions that asked participants to work together to set long-term goals and individual and group priorities for a CE transition in Ireland's EPS/XPS market.

In addition to those obtained from the stakeholder workshop, some statements were generated from an extensive review of existing policy documents, grey literature, and peer-reviewed literature. This ensured that the concourse broadly represented the “relevant opinion domain,” capturing additional priorities and viewpoints that were not identified in the workshop [39] (p. 75). The initial

concourse consisted of 66 statements. Following [53], the concourse was reduced to a more concise and manageable set of statements by discarding or combining sentimentally repetitive statements. Pilot testing of the initial Q-statements with seven experts in marine governance further aided the refinement of the concourse. Pilot tests are commonly used in Q to reduce the number of statements from the concourse to achieve clarity, balance, simplicity, and applicability in the final Q-set [50]. Marine governance experts provided relevant and constructive feedback that enabled the authors to build a robust Q-set. This resulted in a final Q-set of 35 statements that fell into five broad categories, which were created inductively from the concourse, as well as by referring to the social-ecological framework [51,54]. These categories are: Technical Priorities; Economic Priorities; Regulatory Priorities; Social Priorities; and Environmental Priorities.

2.3. Identifying the P-Set

Developing the P-set, i.e., the participants taking part in the Q-sort exercise, requires identifying a diverse group of stakeholders who are “theoretically relevant to the problem under consideration” [47] (p. 6). Ideally, participants in a Q-study are knowledgeable, have well-formed opinions about the topic in question, and represent the full range of opinions present in the predefined concourse [51]. This study employed purposive sampling [53], resulting in a non-random P-set [47]. Our initial stakeholder list drew from the individuals that took part in the one-day workshop. Next, we consulted experts that represented a range of organizations, including local and federal government, NGOs, academia, waste management companies, and industry, to identify critical stakeholders. From this, 27 critical stakeholders were identified, of which 11 completed the Q-sort. Eight additional responses were garnered through snowball-sampling [55], which asked critical stakeholders to recruit other participants relevant to the study topic [42,56–58].

The final P-set consisted of 19 individuals from various sectors and organizations. One benefit of using Q is its ability to return a vast amount of information from a small sample size [59]. For example, [60] produced salient results on stakeholder perceptions on marine biodiversity from 11 key informants. Indeed, Q does not require large numbers of participants [39]. Instead, “all that is required are enough subjects to establish the existence of a factor for purposes of comparing one factor with another [61] (p. 192).” Q is an exploratory technique rather than a hypothetico-deductive method, and therefore it is impossible to presuppose the narrative structure of a Q-study. However, to ensure maximum salience, previous research suggests having 4–6 participants load on to any one factor, i.e., each distinct viewpoint present in the study topic [39,51]. Ultimately our sample-size of 19 individuals provided salient results and met the standard methodological requirements.

2.4. Q-Sorting Exercise and Exit Interview

The “Q-sort” exercise is “the technical means whereby data are obtained for factoring [61] (p. 17),” and asks participants to rank-order each Q-set statement along a gridded quasi-normal distribution (Figure 1). Q-sorts are traditionally administered in face-to-face interview settings. However, in-person interviews can be incredibly costly for both the interviewer and the interviewee, especially when the theoretically relevant sample is geographically diverse [47]. For this study, critical stakeholders came from organizations located throughout Ireland. Therefore, the Q-sort exercise and the exit interview was administered using the customizable online platform, QsorTouch (<https://qsortouch.com>). An open-source demo of the software is available on the website’s homepage [62], and previous studies [44,63–65] have demonstrated that using an online Q-sort platform is a reliable way to obtain data.

The QsorTouch platform enables the online Q-sort to maintain a near identical structure to sorting paper statements offline, including physical drag-and-drop options for sorting. An introductory page provided participants with a brief overview of the research objective, along with the guiding sort instruction, which asked: “What are your priorities for transitioning the EPS/XPS market to a circular economy?” The first task asked participants to sort the 35 statements, shown one at a time, into one of three virtual piles: Low Priority; Medium Priority; and High Priority. This “pre-sort” was not analyzed

or recorded, and was used solely to help respondents organize their thoughts before conducting the final Q-sort. Upon completion of this step, participants were provided with detailed instructions and a guiding image to rank-order the 35 Q-statements into a quasi-normal distribution. The distribution ran from “Lowest Priority (−4)” to “Highest Priority (+4)”.

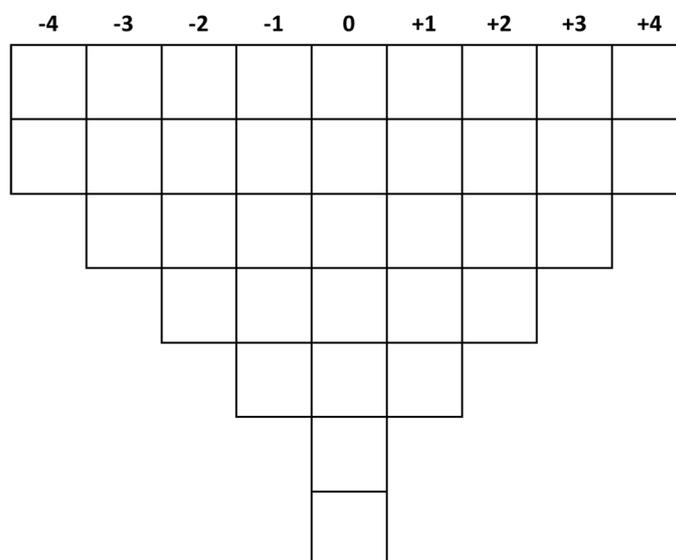


Figure 1. Q-sort grid design ranging from −4, lowest priority, to +4, highest priority. Participants sorted statements using the QsorTouch platform.

Lastly, respondents completed an exit interview. Individuals were invited to elaborate on their viewpoints, with special respect to their highest and lower priorities. In addition, we asked respondents to highlight any further viewpoints that they believed were not captured in the Q-set, along with general demographic data, e.g., age, education, and sector affiliation. On average, respondents spent roughly 40 min completing the survey, which is typical of most Q-studies [51,60].

2.5. Data Analysis, Factor Groups, and Interpretation

The final step of Q involves factor analysis of the Q-sorts. This was done using R software and the package “qmethod” [66]: A dedicated, user-friendly tool that mathematically reveals underlying patterns in Q-sort data. The R package facilitated data input and interpretation, which made identifying the number and structure of “factor groups” straightforward and robust.

Using correlations and by-person factor analysis, patterns and commonalities between individual Q-sorts were flagged and grouped [39]. Factor groups were identified as a significant cluster of individual Q-sort configurations that, while not necessarily identical, represented rank-ordered items in a very similar way. The corresponding factor array is often referred to as an “idealized” sort, and is understood as the average Q-sort for respondents that loaded onto that particular factor. Following previous studies [53,60,67], factors were extracted using Principle Component Analysis (PCA), and factor rotations were calculated using the varimax procedure [39].

3. Results and Discussion

Nineteen individuals completed the online Q-sort survey and exit interview. As demonstrated in Table 1, respondents were mostly between the ages of 30–50 years ($n = 14$, 74%). Over half had obtained advanced degrees ($n = 12$, 63%), and participants were predominantly female ($n = 11$, 58%). Respondents had a high-level of formal education, with the majority having completed postgraduate degrees ($n = 12$, 63%). To ensure a high degree of anonymity, respondents could choose to opt out of disclosing their employment affiliation ($n = 3$); this information was recorded for those who did

agree to disclose it (n = 16). In order to collect standardized demographic affiliation across the sample, an additional question was added that asked respondents to identify their primary sector of work, i.e., industry, community leaders, research, or policy/regulation. Industry (n = 8, 42%) was most well represented in the surveys, followed by Community Leaders (n = 4, 21%) and Policy/Regulation (n = 4, 21%), then Research (n = 3, 16%).

Table 1. Survey demographics (n = 19) including PCA results.

	Factor			Total
	1	2	3	
Age				
<30 years	0	0	2	2
30–50 years	8	4	2	14
>50 years	3	0	0	3
Gender				
Male	4	2	2	8
Female	8	1	2	11
Other	0	0	0	0
Prefer not to answer	0	0	0	0
Education				
≤ 3rd Level Degree	5	1	1	7
≥ Postgraduate Degree	6	3	3	12
Sector				
Industry	2	3	3	8
Community Leaders	4	0	0	4
Research	2	1	0	3
Policy/Regulation	3	0	1	4
Eigenvalues	5.2	3.1	2.1	-

Using PCA, we identified three significant factor loadings. The final 3-factor solution was selected based on the standard criteria established by [61], which states that interpretable factors must have an Eigenvalue greater than 1 and at least two Q-sorts that load significantly ($p < 0.05$) upon it alone [39]. Cumulatively, this solution explained 55% of the variance in the Q-sort data, and resulted in Eigenvalues of 5.2, 3.1, and 2.1, respectively (Table 2). All respondents loaded significantly onto a single factor; eleven respondents loaded onto factor 1, four loaded onto factor 2, and four onto factor 3. This 3-factor solution represents stakeholders' dominant perspectives concerning the transition of Ireland's EPS/XPS market to a CE. A comprehensive interpretation of respondents' exit interviews allowed us to elaborate on and summarize each of the three perspectives, which we labelled:

1. "System Overhaul"
2. "Incremental Upgrade"
3. "Market Innovation"

These labels broadly characterize the dominant themes represented by the priorities of each factor group. Interpretations were based on highly ranked and distinguishing statements, as well as demographic information. Furthermore, the inductively constructed categories of statements helped identify which topical areas factor groups tended to prioritize. Table 3 presents the idealized Q-sorts for each factor, while Figure 2 is a visual representation of this same data in a quasi-normal distribution, color-coded by topic.

Table 2. Dominant factor loadings and groups calculated using Varimax rotation. * = significant factor loading at $p < 0.05$.

Respondent No. and Sector	Factor 1	Factor 2	Factor 3
1. Research	0.215	0.809 *	-0.213
2. Industry	0.390 *	-0.336	0.154
3. Policy/Regulation	0.216	0.428	0.735 *
4. Industry	0.094	-0.307	0.575 *
5. Industry	0.157	-0.117	0.713 *
6. Industry	0.366	-0.691 *	0.309
7. Community Leader	0.498 *	-0.380	0.180
8. Community Leader	0.821 *	0.202	0.104
9. Policy/Regulation	0.832 *	-0.145	0.034
10. Research	0.676 *	0.252	-0.001
11. Community Leader	0.596 *	-0.075	0.112
12. Industry	0.695 *	-0.143	0.059
13. Research	0.715 *	-0.201	0.068
14. Community Leader	0.656 *	0.093	-0.198
15. Policy/Regulation	0.630 *	0.562	0.174
16. Industry	0.260	0.101	-0.352 *
17. Industry	0.128	0.626 *	0.420
18. Industry	-0.119	0.724 *	-0.054
19. Policy/Regulation	0.695 *	0.068	0.379
% Explained Variance	28	16	11
No. of defining sorts	11	4	4
Average reliability coefficient	0.8	0.8	0.8
Composite reliability	0.98	0.94	0.94
S.E. of Factor Z-scores	0.15	0.24	0.24

Table 3. Bolded values represent distinguishing statements at or below the $p < 0.05$ statistical threshold.

Statement	Factor Scores		
	1	2	3
Technical			
1. Reusing materials already in the value chain is a priority.	2	2	-1
2. Developing new technical skills for industry and business to adopt the circular economy is a priority.	0	-1	1
3. Developing circular economy best practices is a priority.	1	0	-2
4. Ensuring alternatives to EPS(expanded polystyrene)/XPS (extruded polystyrene) packaging do not compromise product quality is a priority.	-3	1	4
5. Ensuring EPS/XPS products are made with the intention to be re-used and recycled is a priority.	2	1	1
6. Reducing the amount of waste produced by industry is a priority.	4	0	2
7. Expanding the accessibility of recycling in Ireland is a priority.	0	2	1
8. Developing life-cycle assessments of alternative materials is a priority.	1	-1	0
9. Increasing the use of biodegradable alternatives to EPS/XPS products is a priority.	2	-4	3
Economic			
10. Maintaining global supply chain networks is a priority.	-3	0	-4
11. Reducing the cost of alternative EPS/XPS materials is a priority.	-1	-3	2
12. Developing a market for recycled EPS/XPS materials is a priority.	-3	3	0
13. Developing financial incentives for businesses to adopt circular economic business models is a priority.	-2	-4	1
14. Developing incentives for recycling companies to collect EPS/XPS materials is a priority.	-2	0	2
15. Reducing the costs of implementing circular economic business models is a priority.	-1	0	-2
16. Developing a circular economy certification scheme for businesses is a priority.	-1	-3	-4
17. Maintaining economic growth is a priority.	-4	-2	-1
Institutional/Regulatory			
18. Expanding the role of industry in the transition to a circular economy is a priority.	2	-1	-2
19. Expanding the regulatory role of local communities over waste management is a priority.	0	0	-3
20. Expanding a regulatory role for EPS/XPS manufacturers over waste management is a priority.	-2	-1	-1
21. Expanding cooperation between businesses throughout the EPS/XPS value chain is a priority.	-1	1	0

Table 3. Cont.

Statement	Factor Scores		
	1	2	3
22. Implementing a policy framework to govern the life-cycle management of EPS/XPS is a priority.	0	-2	1
23. Maintaining a privatized waste management sector in Ireland is a priority.	-4	1	-3
24. Expanding industry’s responsibility for the waste resulting from their practices is a priority.	4	2	-3
25. Implementing a return and deposit scheme for EPS/XPS materials is a priority.	1	-2	-2
Social/Cultural			
26. Improving consumers’ understanding of recycling labels is a priority.	-1	4	-1
27. Increasing the rate of recycling in Ireland is a priority.	1	4	3
28. Expanding awareness of the benefits of the circular economy is a priority.	0	-2	-1
29. Developing more intuitive recycling labels is a priority.	-2	2	0
30. Expanding awareness that EPS/XPS is 100% recyclable is a priority.	0	3	0
31. Reducing the use of EPS/XPS products is a priority.	3	-3	3
32. Developing a culture of ‘green business’ in Ireland is a priority.	3	1	0
33. Expanding the role of consumers in preventing EPS/XPS marine litter is a priority.	3	-1	4
34. Expanding awareness of the impact of EPS/XPS on the marine environment is a priority.	1	0	0
Environmental			
35. Reducing the amount of EPS/XPS that becomes marine litter is a priority.	0	3	2

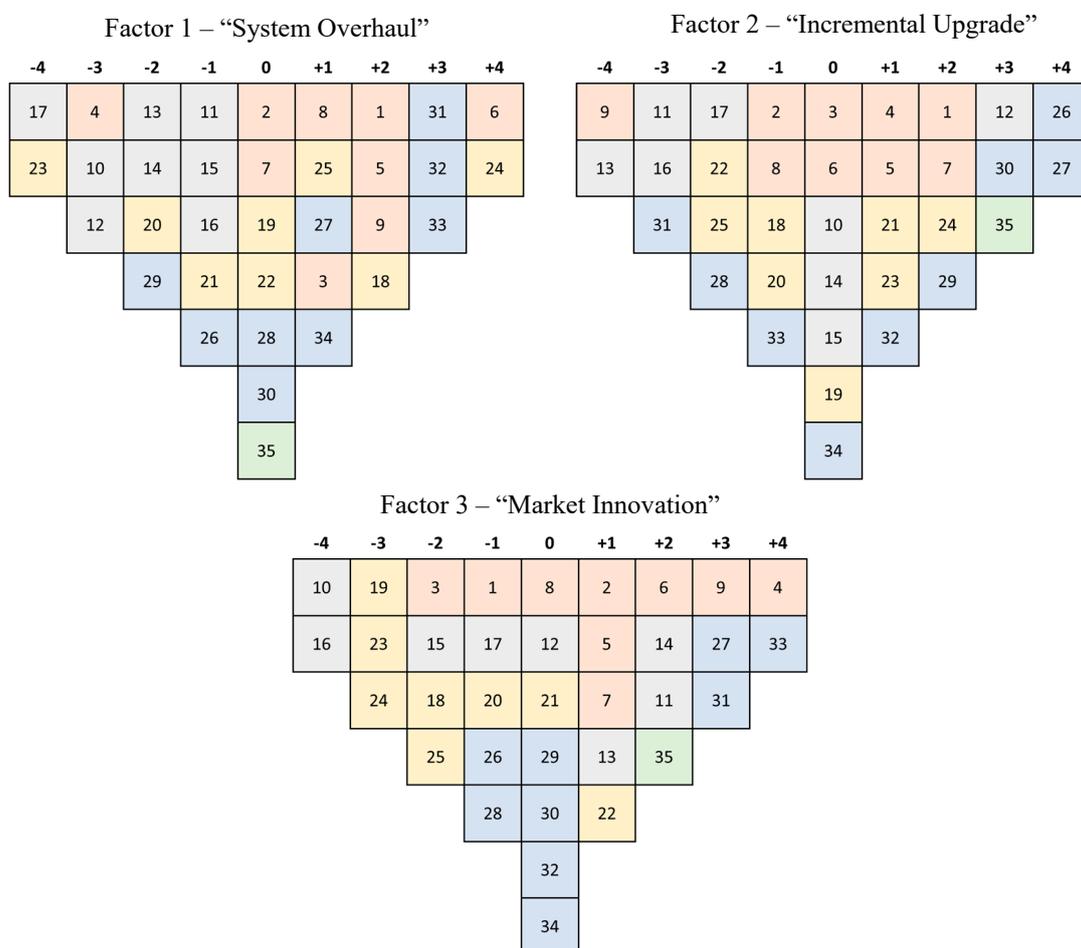


Figure 2. Idealized Q-sort in a quasi-normal distribution for the three factors. Colors correspond to one of the five inductively categorized topics: Technical (pink), Economic (grey), Institutional/Regulatory (yellow), Social/Cultural (blue), and Environmental (green).

3.1. Factor 1—“System Overhaul”

Perspective 1 is shared among eleven individuals representing all four identified sectors—individuals from NGOs, the Irish seafood sector, fisheries policy experts, local government, and EPS/XPS packaging companies. Individuals in this factor expressed the need for large-scale changes to the current socio-economic system and the EPS/XPS supply chain. Thus, perspective 1 was labelled “System Overhaul” to capture the fundamental desire to promote a large-scale, societal transition away from the current market structure. The quotes collected during the exit interview further demonstrate this perspective’s concern towards instilling a collective responsibility to reducing waste.

System Overhaul highly prioritizes the role and responsibility of industry to reduce waste (statement #6, #24). From this perspective, a lack of endorsement from industry presents a significant barrier to society’s transition to more sustainable economic practices. Respondent 7 remarked that “convincing industry that the initial costs of transitioning to a circular economy will be overcome” will be a significant challenge, and that it is important to show that the CE “in the long-term [is] better for the environment.” Moreover, System Overhaul respondents believe that systemic, long-term social changes that extend across the value chain are necessary for the circular economy to be an effective tool for reducing waste and realizing a more sustainable economy. This is highlighted by the overall prioritization of Social/Cultural topical statements (#31, #32, #33). Perspective 1 expresses the need to reduce consumption by acknowledging “that our planet’s resources are not infinite” (Respondent 9), establish an overall culture of green business instead of “leaving the semblance of the responsibility for change with the consumer” (Respondent 8), and improve the public’s understanding of the impact of EPS/XPS on the environment.

Lastly, the System Overhaul perspective showed a negative perception of market-based solutions (e.g., statements #4, #12); every statement under the “Economic” topic was ranked ≤ -1 . Respondents that loaded on this perspective were of the opinion that society must “reuse what we produce” and expressed the need to “simply produce less” (Respondent #9). Most notably, this perspective strongly argues against the prioritization of economic growth (statement #17), reiterating a desire to transition away from the profit-based neoclassic economic systems that underpin the dominant model of linear production.

3.2. Factor 2—“Incremental Upgrade”

In contrast to perspective 1, perspective 2 is far more concerned with utilizing the solutions and institutions already in place, specifically recycling technologies. Three of the individuals that loaded onto this factor were from industry, e.g., chemical manufacturing companies and waste management companies, while the other was from a sustainable research consultancy. Overall, the Q-sorts and quotes representing this perspective are concerned with the feasibility of a societal transition towards a CE and argue the need for a more pragmatic approach. As a result, perspective 2 was labelled “Incremental Upgrade.”

Respondents sharing the Incremental Upgrade perspective are largely concerned with promoting the overall role of recycling in improving sustainable practices, as well as the importance of consumer use and disposal habits. This viewpoint places a central role on consumers in ensuring that products are recycled at high rates (statement #27, #7), buttressed by an improved understanding of recycling labels (statement #26). Comments made by Respondent 1 capture this belief well: “Companies, regulators, governments and NGOs can only do so much. Society as a whole, and individuals need to understand that changes in their behaviors are needed if there is to be a successful transition to the circular economy.” Furthermore, Incremental Upgrade endorses not only the disposal and waste management benefits of recycling, but also the potential economic opportunities presented by a market for recycled EPS/XPS materials (statement #12).

While reducing the impact of littered EPS/XPS on the marine environment is a concern (statement #35), stakeholders associated with Incremental Upgrade do not see alternatives, i.e., biodegradable materials, as a viable solution (statement #9, #13). Instead, this perspective is more concerned with

reusing materials already in the value chain (statement #1), and sees EPS/XPS as a valuable material (statement #31). Overall, this perspective demonstrates a desire to move towards more sustainable practices, e.g., widespread recycling, however there is skepticism as to the economic feasibility of a full transition to circular business models. For example, Respondent 6 commented:

“Beyond the question of achievability is the notion of desirability for business. In the current situation, trying to reach a 100% recyclability rate might prove counterproductive, if for instance, the price of recovery remains higher than the value of the materials recovered. Lack of incentives in the existing regulatory landscape does not necessarily make it desirable for all to pursue a circular economy objective”.

As a result, the Incremental Upgrade perspective views the circular economy as requiring significant capital investment that, without full buy in from all sectors across the value chain, is not a viable model of sustainable business.

3.3. Factor 3—“Market Innovation”

Perspective 3 is defined by four Q-sorts and includes individuals from a marine policy state organization, chemical manufacturing companies, and EPS/XPS retailers. The Q-sorts and exit interviews that make up perspective 3 prioritize technological innovation within a competitive market place and are augmented by an underlying uncertainty regarding top-down regulatory approaches. Therefore, perspective 3 was labelled “Market Innovation,” corresponding to the high value placed on alternatives to EPS/XPS materials and economic incentives to drive a transition to sustainable business without solely relying on regulatory forces.

Respondents aligning with the Market Innovation perspective express a need to reduce the amount of EPS/XPS in the market (statement #31) and replace it with products that present a lower environmental burden (statement #9). To realize the circular economy, a technical transition away from EPS/XPS materials needs to be coupled with a “huge culture change (Respondent 4)”, with consumers recognizing their role in preventing EPS/XPS litter (statement #33) alongside an overall increase in recycling (statement #27). Reducing the economy’s impact on the environment is a priority from this perspective (statement #6, #35); however, so is product quality (statement #4) and profitability. Respondent 4 described, “the key challenge is to convince the whole value chain that we can grow and remain profitable in a circular economy.” Building from these priorities, the Market Innovation perspective places value on providing economic incentives to spur advancements in material technologies, and to expand the scope of operations for key sectors throughout the product lifecycle (statement #14). Respondent 5 reiterated the need for economic incentives, stating, “businesses will require funding and technical supports to make the transition to the circular economy.”

Notably, respondents associated with the Market Innovation perspective have an overall negative perception of institutional/regulatory-based initiatives. While this perspective acknowledges a prominent gap in the current policy paradigm, it also highlights a strong aversion to increasing the sectors’ regulatory role over waste management, as well as increasing their role in the transition to a circular economy (e.g., statements #19, #20). In addition, Market Innovation does not prioritize the implementation of theoretically popular market mechanisms, including CE business certification schemes (statement #16) or return and deposit schemes (statement #25). However, Market Innovation respondents do acknowledge that, without “proper implementation” and a “clear regulatory and policy framework,” a CE transition presents an uncertain future for the commercial viability of business across sectors (Respondent 16). Respondent 16 noted that their biggest concern with regards to the CE is “that the proper framework won’t be put in place to create an actual circular economy,” and that it won’t be “correctly enforced across each industry; rather pin pointed at certain areas.” The latter could indicate a lack of trust in existing institutional/regulatory structures ability to implement CE in practice as it is intended in theory, reflected in perspective 3’s somewhat juxtaposing viewpoints. On the one hand, perspective 3 acknowledges that appropriate realization of CE requires adequate regulatory and

policy frameworks, while on the other hand, they do not deem an increase of associated regulation is favorable.

This is further demonstrated by the perspective's polarized views towards industry and waste; participants recognize the need to reduce the amount of waste produced by industry (statement #6), yet do not believe industry should bear the responsibility for that waste (statement #24). This highlights that although the Market Innovation perspective does not support a system overhaul per se, as demonstrated in perspective 1, it points to certain aspects in the existing system that are perceived to require transformation, with particular emphasis on shared responsibilities concerning the cost of any such transformation. These views substantiate the earlier findings regarding the role and importance of consumers and product innovators in reducing waste, either through increased recycling rates or the use of alternative, environmentally benign materials. Factor 3 recognizes the need for industry to reduce their waste production—a reflexive position, considering this perspective is dominated by industry members. As such, the Market Innovation perspective sees the transition to a CE as a collective effort that requires stringent action from a range of stakeholders, from consumers, industry, to law-makers.

3.4. Consensus and Distinguishing All Statements

The CE is an emerging and complex policy issue which inevitably elicits an assortment of stakeholder opinions related to future concerns and opportunities. As such, a complete understanding of the subjective landscape surround CE requires a deep examination of the areas in which discourses interrelate, both positively and negatively. Earlier sections of this paper identified the principal narratives of the three perspectives based on dominant parts of the respective discourses. In the proceeding sections, we delve deeper into the CE policy space in Ireland's EPS/XPS market by highlighting existing areas of consensus and conflict as related to the Q-sorts.

3.5. Points of Consensus

Consensus statements are identified by comparing the z-scores of factor groups and isolating statements where comparisons are not significant [68]. Furthermore, the overall compatibility of the perspectives can be assessed by checking the degree of correlation between the three factors [36], which is shown in Table 4. Consensus statements are pivotal issues for building a common policy direction for transitioning Ireland's EPS/XPS market to a CE because they represent discourses that all three perspectives find either mutually acceptable or unacceptable [57]. These discourses can ultimately be used to drive the CE debate forward.

Table 4. Correlation matrix between factor scores.

	Factor 1	Factor 2	Factor 3
Factor 1	1.000	−0.001	0.289
Factor 2	−0.001	1.000	−0.043
Factor 3	0.289	−0.043	1.000

Five statements were identified that demonstrate existing areas of consensus within the CE policy space (see Table 5). That said, perspectives maintain a relatively neutral view towards these consensus statements, suggesting these discourses are not as urgent of a priority as are others. For example, the three perspectives share a neutral view on the priority of expanding the awareness of EPS/XPS's impact on the marine environment. Given the narratives of the three perspectives, it is clear that the neutral stance shown here is not apathy towards EPS/XPS marine litter. Indeed, Factors 2 and 3 highly prioritized reducing the amount of EPS/XPS marine litter, while Factor 1 highly prioritized the role of consumers in preventing EPS/XPS marine litter as well as reducing industry waste overall. Rather, this consensus shows an agreement between perspectives that collective effort must look beyond simply raising awareness and move towards solution-based initiatives.

Table 5. Consensus and Conflict statements.

Statement	Factors		
	1	2	3
Consensus Statements			
2. Developing new technical skills for industry and business to adopt the circular economy is a priority.	0	−1	1
5. Ensuring EPS/XPS products are made with the intention to be re-used and recycled is a priority.	2	1	1
8. Developing life-cycle assessments of alternative materials is a priority.	1	−1	0
20. Expanding a regulatory role for EPS/XPS manufacturers over waste management is a priority.	−2	−1	−1
33. Expanding the role of consumers in preventing EPS/XPS marine litter is a priority.	1	0	0
Conflict Statements			
4. Ensuring alternatives to EPS/XPS packaging do not compromise product quality is a priority.	−3	1	4
6. Reducing the amount of waste produced by industry is a priority.	4	0	2
11. Reducing the cost of alternative EPS/XPS materials is a priority.	−1	−3	2
12. Developing a market for recycled EPS/XPS materials is a priority.	−3	3	0
13. Developing financial incentives for businesses to adopt circular economic business models is a priority.	−2	−4	1
14. Developing incentives for recycling companies to collect EPS/XPS materials is a priority.	−2	0	2
23. Maintaining a privatized waste management sector in Ireland is a priority.	−4	1	−3
24. Expanding industry’s responsibility for the waste resulting from their practices is a priority.	4	2	−3
29. Developing more intuitive recycling labels is a priority.	−2	2	0
31. Reducing the use of EPS/XPS products is a priority.	3	−3	3
33. Expanding awareness of the impact of EPS/XPS on the marine environment is a priority.	3	−1	4

It is interesting to note that 60% of the consensus statements relate to technical measures—suggesting a realization that innovation will be key to any short-term transition to CE, and should be prioritized over regulatory and financial interventions. It could be argued that this agreement around technical measures frames the transition to a CE as a potential opportunity for new skills, which in turn may spur innovations in product and process systems. Technical interventions may be more widely accepted by multiple stakeholders, as innovation could facilitate both the current use (and re-use) of XPS/EPS and the identification of alternative products. There is a view across the board that innovation rather than regulation offers the best route to CE. Interestingly, this conclusion compliments that of [22], whose research found “technological barriers” to be the least pressing to stakeholders of all examined barriers to a CE transition.

The impact on the marine environment is also a point for consensus. This is perhaps influenced by the wider media coverage of marine litter and plastic pollution that has raised societal awareness to the point that citizens understand the implications for food, health, and environmental costs [69].

3.6. Points of Conflict

Eleven statements represent points of conflict within the discourse space (see Table 5). Points of conflict were identified by analyzing the variance across factor groups’ z-scores with respect to each statement [68]. Such statements represent contentious topics within Ireland’s CE debate in the context of EPS/XPS and demonstrate where stakeholders hold conflicting and polarized viewpoints. Furthermore, conflict statements were distinguished by either a single perspective (e.g., #23, where one factor group has a significantly different priority), or by each perspective (e.g., #4, where all factor groups have significantly different priorities). This information is key to understanding where inter-stakeholder confrontation is likely to occur within the CE transition debate [70], as well as which stakeholder groups may oppose particular aspects of transitioning Ireland’s EPS/XPS market to a CE.

Of the identified conflict statements, four of the 11 pertained to economic and financial priorities, demonstrating that the most contentious topics within the Ireland’s EPS/XPS-CE debate are economic and market-based. This mirrors conclusions drawn by previous studies that argue economic- and market-based issues hamper society’s transition towards a CE, specifically with regard to the economic viability of CE initiatives [22,71,72]. For example, there is a clear divide between perspectives as to where economic incentives should be directed, e.g., towards reducing the cost of alternatives versus promoting a market for recycled materials.

In addition to contentious economic discourses, there is also disagreement across the perspectives with regard to the future use of EPS/XPS materials, and its viability as a sustainable, environmentally benign product. Factor's 1 and 3 generally agree that reducing the use of EPS/XPS products is a major priority (Statement #31), while Factor 2 strongly disagrees with this statement and rather prioritizes the development of a market for recycled EPS/XPS. This shows a clear divide between stakeholders' viewpoints between the need to pursue alternative materials and the need to work within the current material production and supply chain. This area of conflict is unsurprising yet nontrivial; stakeholders' relationship with and dependence on EPS/XPS products varies significantly and must therefore be respected in future policy decisions and regulatory interventions.

3.7. The Perspectives in Context

In order to comply with the EU Strategy for Plastics in the Circular Economy, Ireland will have to develop and implement relevant national regulations, policies, and strategies aimed at reducing the amount and impact of EPS/XPS in the marine environment. All three perspectives discussed above support EPS/XPS mitigation efforts. As discussed previously, facilitating a just transition towards a CE in Ireland will require the participation of relevant stakeholders through the entirety of the development process to ensure that regulations, policies, and strategies are successfully implemented. Below we provide further context.

The System Overhaul perspective's focus on social dimensions and minimization of economic impacts on the environment was shared by the largest proportion of participants. This proportion of participants also represented the widest range of sectors compared to the other two perspectives. This suggests that the System Overhaul viewpoint has less to do with a respondent's economic occupation within a sector, and more to do with a general understanding that effective implementation of CE in Ireland requires a cultural and social regime shift. We find that this viewpoint sees the limited transitional capacity of industry as a significant challenge to a societal regime shift towards a CE, especially if the neo-classical system of incessant capital production and unjust distribution of wealth are maintained. To address these challenges, decision-makers should increase and promote communication and dialogue between industry and other sectors in order to develop compelling arguments for a CE transition. Such arguments should leverage the breadth of empirical evidence that supports the positive long-term environmental and societal wellbeing impacts of a transition to a low-waste, low carbon economy in an effort to juxtapose concerns about short-term economic challenges.

Perspective 1's perceptions on challenges are somewhat substantiated by the Incremental Upgrade perspective (perspective 2)—a perspective largely comprised of participants who represent another Industry viewpoint. This industry-based viewpoint is primarily concerned with the feasibility and viability of any large-scale societal transition. Furthermore, perspective 2's focus on viability for sustainable business models and capital investment highlights the economic prioritization inherent their viewpoint. This indicates a preference for improving the existing system to increase reuse and recycling of EPS/XPS materials. The Incremental Upgrade perspective relies heavily on the consumer as a central agent in facilitating such an upgrade; a point reiterated by the viewpoint's prioritization of increasing accessibility to existing solutions and an overall awareness of the problem. This suggests that perspective 2 participants are in a wider context content within the existing system but want to "fix" the aspects that are perceived as not working and impacting negatively on the environment.

Similar to perspective 2, the Market Innovation perspective (perspective 3) is centered around promoting a healthy economy. However, this perspective's concerns stem not from feasibility, but rather from a desire to dictate the transition to a CE by supporting the development of new technologies and materials which reduces environmental and societal harm. The Market Innovation perspective shares one critical piece with perspective 1—both associate the technical and innovation advances with a required cultural change. However, perspective 3 also highlights the importance of increased consumer awareness, which corresponds to perspective 2. Together, these findings indicate that the Market Innovation perspective may fall somewhere between the contrasting viewpoints of perspectives

1 and 2. Perspective 3's greatest concern highlights their somewhat skeptical view with regard to the ability of the institutional/regulatory structures to support a successful transition to CE. In the absence of dedicated national strategy for CE implementation in Ireland, such viewpoints can be actively taken on board and may improve as strategies are being developed and implemented with stakeholders in Ireland. This is particularly relevant considering the early stages of discourse about CE in Ireland.

The three perspectives seem to indicate different points along the transition from the current neo-classical system to a fully circular society, which not only reflects respondents' understanding of the meaning of CE, but also highlights their concerns. In summary:

- Perspective 1 indicates a desire for an overall societal transformation, but highlights Industry perspectives as the main challenge to move forward.
- Perspective 2 aims to upgrade current structures, but is concerned with economic feasibilities.
- Perspective 3 acknowledges the need for a cultural change relating to and driven by innovation and technology advances, but lacks trust in regulatory structures and processes.

4. Conclusions

Previous studies have identified broad perspectives regarding a CE transition [22,73,74]; however, there remains a lack of information concerning CE implementation for specific sectors and business models [75]. There are few real-world examples of a fully integrated CE, thus sowing seeds of uncertainty and speculation across the conceptual and political debate. In order to promote synergies across the conceptual paradigm of transition management, CE, and sustainable development, scholars, decision-makers, and business owners need to promote solution-based initiatives that drive the policy debate forward. CE is rooted in sustainable development; it is widely recognized that current production and consumption practices, such as with plastics, present persistent problems that negatively affect the human-environment. Environmental policy has traditionally been characterized by top-down command and control efforts driven by governments rather than a multi-scale, multi-sector approach that includes the range of perspectives, concerns, and priorities needed to deliver sustainability [76].

It is here the authors wish to draw attention to the use of transition management frameworks in future research concerning the processes and mechanisms of a large-scale transition to a CE. The results of this study demonstrate the complex interconnectivity of discourses that mediate agents operating within a specific economic sector in Ireland. Furthermore, in relation to transition management, the dynamics of a system presuppose the number of directions a regime shift can take; therefore, "insight into how the system works is an essential precondition for effective management [29] (p. 167)." The results of this study provide exploratory insight into how the discourses within Ireland's EPS/XPS market maintain the dimensions of the current societal regime of an unsustainable plastics economy, as well as presuppose the identify of future regimes. Consequently, this understanding of stakeholders' dominant narratives surrounding CE and sustainable development policy measures provide decision-makers with a more nuanced understanding of how new policies will be socially received, and therefore their legislative plausibility [59]. Lastly, identifying the dominant discourses of a population provide valuable insight into the ways in which societal actors exert and direct social change—this presents valuable opportunities to leverage influential stakeholders to bolster and steer the transition to a CE from within the system itself.

To explore this gap in the literature and provide grounds for future stakeholder-based policy development, we present the first in depth analysis of the priorities of stakeholder groups with regard to the contentious transition of Ireland's EPS/XPS market to a CE. In this study, Q-methodology identified three distinct perspectives that accounted for 55% of the total variation in viewpoints. These three perspectives represent real stakeholder viewpoints towards current and future policy priorities, as well as a relative hierarchal ranking of personal values, concerns, and needs. The contrasting priorities held by the three perspectives demonstrates that the CE policy debate within the EPS/XPS market is highly contested. While there is consensus on a few priorities, e.g., #5, #20, and #33, stakeholders held largely neutral positions towards these agreed-upon statements. Regardless, consensus points

present areas of common ground that can be powerful pivot points for driving forward the CE debate, as well as possible opportunities to build synergies between stakeholders that spur co-development, problem and solution identification, and social learning [29]. From a policy perspective, identifying areas of consensus can provide advantageous starting points towards engaging diverse stakeholders to build upon mutual interest and collectively develop governance measures that are effective and implementable. Conversely, we found stakeholders' perspectives towards eleven statements to be heavily polarized, such as statements #12, #24, and #31. These topics demonstrate areas of conflict within the policy realm that present significant challenges to a CE transition. We suggest future efforts target these areas of conflict in order to reduce conceptual and operational uncertainty, foster cross-sector cooperation, reduce conflict between stakeholders, and ultimately ensure stakeholders' priorities are reflected in the development of Ireland's future policies for a circular EPS/XPS market.

Limitations

Our methodological limitations relate to the study's relatively small sample size ($n = 19$) and by extension the number of sectors represented in the P-set. Empirically speaking, the theoretical threshold that requires viable factors reach an Eigenvalue greater than 1.0 ultimately restricts the final number of possible factor groups. Therefore, a larger sample size may have resulted in a larger number of distinct factors, especially if respondents represented stakeholder groups that were not engaged in this study. Thus, the authors note that this research is an exploratory study meant to provide nuance to the complexity of discourses within Ireland's EPS/XPS market transition to a CE, and we suggest that future research build upon our study's initial factor groupings, as well as the ways in which the discourses relate to other elements of transition management, including power and network dynamics, social learning, and system innovation and experimentation.

Author Contributions: Conceptualization, J.E.B.; methodology, J.E.B.; software, J.E.B.; validation, J.E.B., K.K., C.O.; formal analysis, J.E.B.; investigation, J.E.B., K.K., C.O.; resources, J.E.B., K.K., C.O.; data curation, J.E.B., K.K., C.O.; writing—original draft preparation, J.E.B.; writing—review and editing, J.E.B., K.K., C.O.; visualization, J.E.B.; supervision, K.K., C.O.; project administration, K.K., C.O.; funding acquisition, K.K., C.O.

Funding: The authors are working in the research project OceanWise: Reducing EPS marine litter in the North East Atlantic—part funded under the Atlantic Area INTERREG programme—project code EAPA_252/2016.

Acknowledgments: We wish to give special thanks and acknowledgement to Amy Dozier for her input and assistance towards development of the final set of statements used as the Q-set that underpins this study. We would also like to show our gratitude to the survey participants for taking the time to complete survey and for sharing their views and insights. Lastly, we would like to thank the reviewers for their careful reading of our manuscript and their insightful comments and suggestions.

Conflicts of Interest: The authors declare no conflict of interest.

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