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1. Introduction

The ExPliCit project seeks to explore alternative circular futures in order to subsequently understand how supply chains can be configured in such scenarios. As part of work package 1 (WP1), the project aims to construct circular futures and investigate their key determinants and dynamics. In this context, WP1 includes the development of three knowledge co-production workshops in which previously designed scenarios have been explored by different stakeholders.

Based on an extensive literature review and an iterative co-creation process, the project team has designed four circular economy (CE) scenarios based on the intersection of two dimensions: the governance model (*bottom-up, decentralised* or *top-down, centralised*) and the focus on prioritising economic growth (*growth-based society* or *limits to-growth society based on ecological boundaries*). The details of the scenarios can be found in deliverables 1.2 and 1.3 and are also summarised in section 2.2. of this deliverable.

To better understand these scenarios, the project utilises the Scenario Exploration System (SES), a tool combining multiple Techniques of Futuring (ToFs) (Hajer & Pelzer, 2018), including *interactive scenarios* and *role playing*. A comprehensive review of existing ToFs was conducted in Deliverable 1.1 (Pinyol Alberich et al., 2023), while Deliverable 1.2 (Suárez-Eiroa et al., 2024) analysed how the different ToFs can be applied in the context of the CE. The project team adapted the SES tool developed by the European Commission's Join Research Centre (Bontoux et al., 2016) to the circular economy context. This new edition of the SES was used in two workshops (one in Brussels, Belgium and one in Pontevedra, Spain) to explore the previously designed scenarios with different stakeholders.

This report presents the results of the workshops. Section 2 present the scenarios that emerged in the ExPliCit project and that are used in the Circular Economy version of the SES. Section 3 describes the SES tool. Section 4 details the organisation of the workshops. Section 5 presents the findings from the two workshops in relation to each scenario, while Section 6 presents the findings in relation to each of the roles that the different stakeholders took on during the workshops. Section 7 and section 8 present a joint analysis of the findings, first reflecting on the game and then leading to a number of policy implications.

2 Overview of the scenarios

In this section, the four CE scenarios developed by the ExPliCit project (and embedded in the *Circular Economy* SES) are briefly described. For more information on the background and development process, please refer to the ExPliCit Deliverable D1.3 (Haluskova et al., 2024). The following figure (Fig. 1) offers a visual representation of the four identified scenarios.

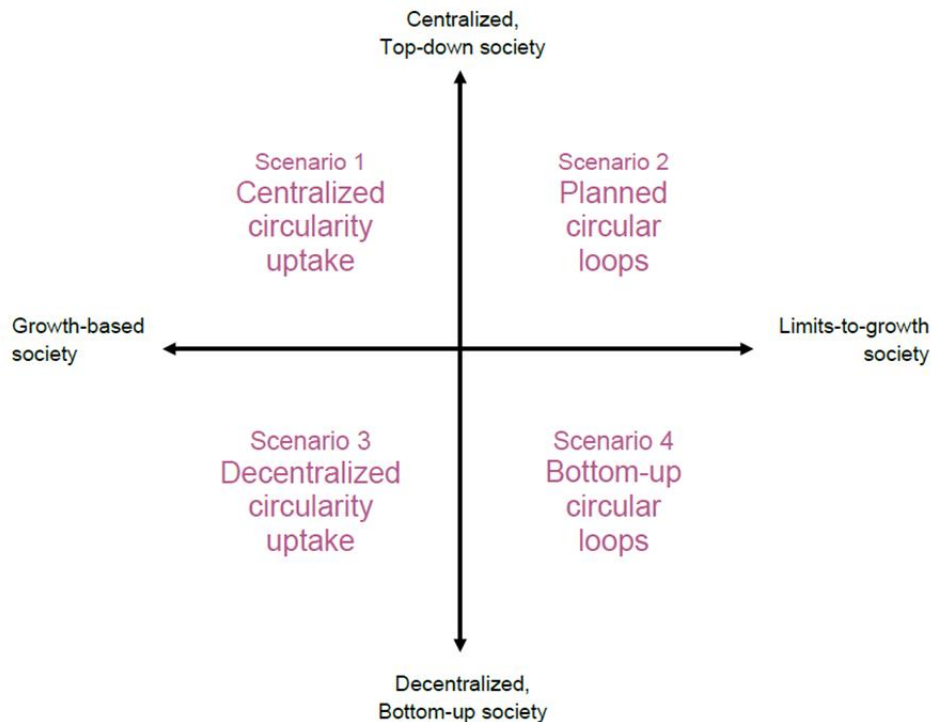


Fig. 1. Circular Economy Scenarios (source: constructed by authors)

2.1 Scenario 1: Centralised circular uptake

In this scenario, the state and large companies form a coalition to promote circular innovations and technical solutions for linear production and consumption systems. Through these corrections, they aim to increase economic growth and at the same time try to decouple it from environmental impacts, but only from certain elements (mainly greenhouse gas emissions). Most decisions are made at a large-scale level, as economic activity is concentrated on a few actors: the state and large companies. These few actors control certain strategic resources (e.g. critical raw materials for green technologies, Artificial Intelligence-based infrastructure driving global logistics flows) and control and plan products and material flows. This leads to some geopolitical conflicts between different countries defending the interests of their national corporations. Due to the influence of large corporations, governments only demand compensation mechanism for some negative externalities and do not impose strict restrictions on fossil fuels or environmentally harmful products. Furthermore, governments, not companies, are making the major investments needed in recycling and energy recovery infrastructure. The type of CE that is being promoted preserves the status quo within the economic system and is mainly based on improving efficiency through massive recycling and energy recovery facilities and the use of recycled materials instead of primary materials. Companies are using AI bots and personalised advertising to encourage citizens to consume ever greater quantities of environmentally friendly and recyclable goods for newly created needs. Global supply chains deliver products very quickly and are constantly optimised by a very advanced technological infrastructure that also deals with the recycling of products at the end of their short life to optimise “circular” but unsustainable supply chains. There is no control over planned obsolescence, which is in fact used as a tool to promote economic growth.

Although greenhouse gas emissions are partially decoupled from economic growth, most other impacts and environmental limits are not. As a result, the effects of ecological crises that threaten human existence are worsening.

2.2 Scenario 2: Planned circular loops

In this scenario, cooperation between states, large corporations and the UN leads to the establishment of a society in which limits to growth are acknowledged. The system is based on the right to throughput and aims to ensure that human activities remain within safe ecological limits and that no one is left behind. This change is gradual and with an authoritarian approach that prioritises ecological limits and equity over private profits. Over time, traditional markets give way to a more technocratic and scientifically orientated economic framework that focuses on socially desirable throughput (authoritarian ecologism). The CE is an integral part of this paradigm shift and is leading to a radical rethink of production and consumption. Product-as-a-service models and the sharing economy are spreading. Products reach their end of life in local areas that are controlled by decentralised departments of large companies. This decentralised control helps to save resources. The large companies retain ownership of the products but rent them out to consumers, generating revenue through user fees. Citizens do not own smartphones, computers, cars and household appliances and develop a new form of dependency on the large companies that provide these essential goods. Strategic materials that are central to these products are becoming a new form of capital for these companies and nations. As a result of these evolving strategies, supply chains are changing and shifting towards more localised structures due to the escalating costs associated with global supply chains. A notable feature of this system is the imposition of high taxes. These taxes serve a dual purpose: firstly, to fund a universal basic income and secondly to steer consumers towards non-harmful products and services. The result is a society that is less free, has more constraints, but is fairer.

2.3 Scenario 3: Decentralised circularity uptake

In this scenario, ecological limits are recognised, but there are no strict constraints on throughput or ecologically responsible restrictions on economic activity. The state opts for lenient regulations aimed at changing demand through measures such as subsidies and eco-taxes in the hope that businesses will develop cleaner and more circular innovations and technologies. The CE is interpreted as a system that leaves essential materials and energy in their economic domain and is motivated by a concern for security of supply and social efficiency that takes into account the cost of waste and the direct impacts of pollution on various stakeholders. Societies are increasingly resisting the dominance of large corporations that received an inordinate share of the economic benefits and profits and have also managed to evade taxes over a long period of time using offshore tax havens. Social movements are reclaiming ownership of personal data that tech companies have used to expand their power. Following the implementation of targeted economic measures aimed at restoring competition at local level and counteracting the dominance of large corporations, economic activity in society is becoming much more distributed and decentralised. This moves away from the hegemony of large corporations not only restores more market freedom, but also strengthens the innovative capacity of the entire economy. Although they are confronted with considerable organisational transaction costs, small players play a central role in promoting change. The processes of commercialisation continue to open up new avenues for economic growth. CE

business models are becoming more prevalent and are often supported by government incentives. However, smaller organisations often do not have the economies of scale that larger companies enjoy, resulting in lower efficiency. There are still coordination problems, especially with larger circular initiatives. In the long term, this system struggles to prevent environmental degradation, which has a negative impact on overall human wellbeing. Many negative externalities remain untouched as low-cost transport favours long, global supply chains with many actors.

2.4 Scenario 4: Bottom-up circular loops

In this scenario, citizens are becoming increasingly aware that growing consumption is the source of many current and future problems and does not lead to happiness. They therefore call for the establishment of a sufficiency-based system that ensures that economic activity remains within the limits of the ecosystem while providing sufficient living conditions for all. Gross domestic product is no longer a measure of progress, but initiates a reverse process of commodification aimed at promoting a more convivial society. Economic activity is widely dispersed, and the agents of change are small players and new local communities that emerge as autonomous organisations and ensure a sufficient level of sufficiency and environmental and social respect. These organisations decide autonomously what they produce and use the CE as a tool to achieve sufficiency, prioritising strategies such as 'discard, reduce and rethink' over recycling strategies. Local jurisdictions are self-organising and setting their own maximum resource use (for each limited resource) through a fair share calculation supported by academics and youth organisations. Furthermore, the CE is not only understood in terms of energy and materials, but also includes biogeochemical cycles in conjunction with economy-based cycles as well as care cycles (people caring for each other and valuing care in society) or power cycles (through the distribution of power, i.e. the committee) and wealth, income and capital cycles. Supply chains are shortened and located close to the point of consumption. Production systems adapt in the long term to the resources available nearby. Circuits are built from the micro and especially the meso level, implying a greater need for self-structuring (figuring out how to recognise CE opportunities, how to make functional agreements, how to share resources and with whom, how to make and enforce agreements). After initial difficulties where coordination problems led to waste and unemployment, there is a prevailing trend towards federalism and democratic practises leading to the proliferation of models and alliances rather than hierarchical scaling-up organisations. These developments emphasise collaborative efforts over market-driven transactions, shaping a transformative landscape based on sufficiency and ecological harmony. Some CE committees (meso-level governance structures) are assuming responsibility for these functions at the regional level.

3 The Scenario Exploration System

The SES is a serious gaming and foresight tool developed to facilitate the practical application of scenarios from foresight studies. In this sense, the SES was found to be instrumental in pursuing the ExPliCit project aim to reconsider and reconstruct the vision and implementation of CE. As a platform to explore scenarios in a quick and interactive process, the SES was used to facilitate a series of stakeholder workshops within the project. This section provides an overview on the SES tool, the version adapted to CE and description of the game and rules.

3.1 The SES tool

The SES is a serious gaming and foresight tool developed by the Joint Research Centre (JRC) of the European Commission originally geared to policymakers with the aim to foster a strategic, future-oriented and anticipatory culture in the EU policymaking process. The participants of the game explore future scenarios and their different pathways in a quick and interactive process that facilitates the practical use of foresight studies and simplifies the application of foresight to policymaking. Over recent years, the SES has proved to have a broad range of applications that appeal to diverse audiences across the world, including policy, business and academic communities.

The tool enables participants to engage in systemic thinking, develop a long-term perspective and consider the vision and strategies of different stakeholders, including policymakers at various governance levels, business and civil society representatives, consumers and the general public. By taking on the roles of different societal actors, participants are encouraged to have forward-looking discussions, develop strategies to meet long-term objectives, learn to understand and cooperate with other stakeholders and experiment how they can plan actions to shape a better future - individually and collectively.

As an engagement platform, the SES helps to imagine plausible futures, to understand what opportunities and challenges lie ahead and what they could mean for individuals and organizations. Ultimately it encourages to think and experiment with what decisions need to be taken to shape the future we desire and what actions need to be taken to achieve this.

The SES tool can be used to pursue the following goals (Bontoux et al., 2020):

- **Forward-looking and strategic reflections:** thanks to the prompts and the game dynamics, the tool helps the players engage in strategic thinking without necessarily realising it;
- **Engagement:** with diverse stakeholders to discuss the dimensions of a broad issue in an open and structured way, to try to reach solutions; with a targeted public representing specific groups of stakeholders on a specific issue to elicit ideas for implementation at policy or industry level; with a specific chain of (local) actors to make them work together better to solve a very practical (but as yet intractable) issue;
- **Education:** the tool can be used to help students and professionals at different levels develop skills including negotiation, adaptation, futures literacy, communication and emotional intelligence.

Several variations of the game have been developed by the JRC and other organizations on topics such as Bioeconomy, City Greening, Food Safety, Mobility, Migration etc. The SES is available to any interested party under a Creative Commons licence (CC-BY-SA) that lets users employ it and transform it according to their own needs.

The ExPliCit consortium adapted the tool and developed a **Circular Economy edition of the SES**, which provides a future-oriented experience with insights and inspiration that can challenge dominant ways of thinking and bring about transformative action for CE. It is based on the four scenarios developed by the project and outlined in 2.2 and was deployed in the two workshops described in section 4. Before diving into the aims and organizational aspects of the workshops, the following section describes key characteristics and dynamics of the tool.

3.2 Description of the game and rules

The SES operates as a board game and engages 5 to 7 participants who take up roles and chart their own courses of action in different scenarios. Specifically, in the Circular Economy SES, 6 roles are represented:

- Policymaker
- Established Business
- Small and Medium-sized Enterprise (SME)
- Non-Governmental Organization (NGO)
- Consumer Organisation
- Public Opinion

The first five, also called scenario explorers, play the game by taking a series of actions to reach the long-term objective they set for their role, in accordance with a chosen set of values.

The **Public Opinion** does not take actions, but rather assesses the actions of the five scenario explorers and serves as a feedback system throughout the game. The Public Opinion assigns its resources (also called impact tokens) to the actions that they support most, amplifying or reducing their impact. The SES games are guided by a **facilitator**, who supports the participants throughout the game by explaining the rules and keeping the time, setting the scene, explaining the specificities of each scenario and stimulating discussions among the participants.

While the role allocation process can differ depending on a few factors (types of participants, access to their contact details, timing etc.), all participants are assigned a role to play beforehand and have the freedom to craft and specify it with more details. At the start of the workshop, the participants have 10 minutes of dedicated time to define their area of activity, long-term objectives in 30 years' time and their guiding values, and to present them to the other players within the group. Participants also have a limited number of resources (tokens) that they must invest in all actions taken to signal their importance and weight during the scenario exploration.

In around three hours, the participants explore two opposing scenarios, each comprising three rounds corresponding to three time horizons (10, 20, 30 years), and take actions one by one in response to the scenario situations, allocating a chosen amount of resources. Once all five scenario explorers have taken an action, each of them reacts by assigning its own tokens to each action showcasing its support or criticism according to their judgement about possible impacts.

As most board games, the Circular Economy SES also incorporates a scoring system, and it is up to the facilitator to keep track of the points. While gaining most points is not the goal of the game, it opens reflections for the debrief phase on the responsibility and power of different actors across scenarios and the form and impact of collaboration, among the others. The score per round is calculated by multiplying the resources the explorers allocated to each action by the number of tokens assigned by the Public Opinion to support their actions. Moreover, for the second and third round, collaboration among the explorers is possible. The participants benefit from receiving as well as offering collaboration by assigning resources to the other

stakeholders' actions. This is accounted for in the final calculation, which sums up the scores of the three rounds. For more detailed information on scoring, please refer to the ExPliCit deliverable D1.3

The printed version of the Circular Economy SES game consists of:

- A scenario exploration board.
- Scenario cards, summarising the scenario title and characteristics.
- Scenario detail cards outlining a sequence of events at three-time horizons leading to each scenario.
- Action cards, which are role-specific cards assigned to each explorer.
- Megatrend cards, presenting strong driving forces that affect all scenarios.
- Variable driver cards, describing shorter-term phenomena expected to impact a 10 years period and can be therefore changed each round.
- Exploration sheets for explorers and Public Opinion.
- Resources for each explorer.
- Impact Tokens for Public Opinion.
- A dice.

Access to printable materials is available in the ExPliCit deliverable D1.3.

In addition to the features already mentioned, for the purpose of project workshops, the role of a note-taker was added to each group. A “Record of play form for note-takers” was also discussed and created to record the explanations of the players' actions, discussions and debrief and was used as a basis for harvesting the outcomes of the workshop and creating this report. By capturing the dynamics of the groups that participated in the sessions, the research team was able to report on the actions and perspectives gained from the discussions.

4 The workshops

In this section, we dive deeper into the aims and the organisational aspects of the ExPliCit stakeholder workshops.

The primary objective of the workshops described in this report was to encourage key stakeholders to explore the conditions and pathways of specific future realities in which CE is achieved and develop strategic reflections. This took place in a context where participants were assigned and took on specific stakeholder roles with considerable similarity to what they do in their actual, professional lives. The secondary objective of the workshops was to capture the dynamics of the groups participating in the sessions and to report on the actions and perspectives harvested from the discussions to inform the scholarly and policy debate on CE. The exercise also provided the opportunity to collect useful feedback from the participants on the game dynamics and overall workshop organisation.

Two workshops that took place in spring 2024:

- Workshop 1 was held on 17 April 2024 in Brussels, Belgium, with 20 participants, organised by ABIS - The Academy of Business in Society
- Workshop 2 was held on 18 June 2024 in Pontevedra, Spain, as a side event of the European Society of Ecological Economics (ESEE) conference, with 20 participants, organised by the University of Vigo

In the first workshop, the participants represented a wide range of stakeholders from: a) international businesses as well as local SMEs, such as representatives from Umicore, Triodos Bank, Agrolinera, Accenture, ISS Facility Services; b) federations and civil society organisations such as SMEUnited, European Sustainable Business Federation, and the European State Forest Organizations; c) Policymakers from the European Commission and the government of Flanders; and d) academic institutions such as Maastricht University, Ghent University and more.

The second workshop welcomed more local actors from the region of Galicia, including a) local foundations and industry such as CETMAR, FUNDAMAR, FEUGA and the Official Mining Chamber of Galicia; b) local businesses such as JEALSA, Revertia and Koopera and c) scholars from local universities and research institutions such as P2P Lab, University of Porto and University of Santiago de Compostela.

While the workshop in Brussels aimed to address the European context and perspectives, the workshop in Pontevedra aimed to focus on the regional context of Galicia.



Fig. 2. Pictures from the workshops

A third workshop will be organized with further tailoring of the SES with the configurations to supply chains at University of Sheffield in late 2024/ early 2025.

4.1 Organisational aspects of the workshops

The two stakeholder workshops had a duration of 5 hours each and shared the same agenda:

- Welcome and registration
- Introduction to the ExPliCit project
- Short description of scenarios
- Introduction on SES origins and aims
- Introduction to the SES game
- Exploring the first scenario
- Exploring the second scenario
- Debrief discussion (in group + plenary)
- Conclusions

The workshops were structured in two parts. The first part took place in plenary, with the purpose of informing the participants about the ExPliCit project, the importance of foresight and the work that led to the development of the four futures of CE, and then diving into the rules and dynamics of the SES tool the participants would be engaging with. In the second part, the participants were divided into their respective tables and took part in two scenario explorations guided by facilitators and observed by note-takers.

The workshops were moderated by professional SES facilitators from ABIS – The Academy of Business in Society and the partners from the ExPliCit project that received the facilitator training prior to the workshop¹. At each table, the insights were harvested by note-takers, a role adopted by experts from the Post-growth Innovation Lab of the University of Vigo and the University of Sevilla to capture the dynamics and insights from the discussion in real time.

In each workshop, in the second part organizers and participants were divided in groups and allocated to different tables. Each group consisting of a facilitator, a note-taker, a Public Opinion representative and 4-5 scenario explorers (the number varied due to last-minute cancellations and no-shows) dove into an interactive play, exploring two opposing scenarios within 2,5 hours.

In total, across the workshops 4 groups explored scenarios “Centralised Circularity Uptake” and “*Bottom-up circular loops*”, while 3 groups explored scenarios “Planned Circular Loops” and “Decentralised Circularity Uptake”

In order to ensure a balanced, knowledgeable and dynamic set of players, each participant was carefully assigned to a specific group based on a set of predefined criteria:

- Specific expertise according to the role to be played;
- Place of residence as proxy for geographical scope (the European Union for the Brussels workshop and Galicia for the workshop in Pontevedra) and
- Gender balance.

After the active play, facilitated by the physical board game elements, the participants were invited to reflect and discuss in a debriefing session on their experience, take-aways and

¹ The SES facilitator training for the ExPliCit consortium partners was organized by ABIS in March 2024. It consisted of two 2,5 online meetings: the SES game workshop in which participants experienced the new Circular Economy SES as players, and then a training session on running SES workshops as facilitators.

implications for current and future implementation of CE policies and processes. The discussions, guided by the facilitators, were structured around the following questions:

- *Who managed to attract most support? Who attracted the least?*
- *Did you achieve your objective/vision? Did you act true to your values?*
- *What role do businesses, Policymakers, not-for-profits and consumers play in the deployment of a CE? (OR: How did your role contribute to the CE in 2054? Were your actions contributing to or resisting to the scenario?)*
- *Do you think all stakeholders equally committed to contributing to the scenario and addressing its challenges, reaching toward the CE?*
- *Which set of actions best promote a more sustainable CE?*
- *How the dynamics in the different scenarios influence the behaviour of the various types of stakeholders?*

After this 15 minute debrief, the participants were led back to the plenary room to discuss, compare and contrast experiences among the different groups. These reflections helped the participants to get a glimpse of the scenarios they did not play, the dynamics in other groups and the resulting learnings and insights on different futures of CE and the roles that different stakeholders can play.

4.2 The background of the workshops

The SES tool is characterised as an exploratory tool. This means that the aim of the game is not to achieve a certain score or to perform better than other stakeholders, but to explore different strategies and actions that might arise in the scenarios in which the game is played. It is important to emphasise that while the outcomes of the game can be useful in any case, they are highly conditioned by the context in which the game is played, the profile of the participants and the groups' dynamics.

For this reason, we used a survey to collect data from the participants. All data was stored securely in compliance with European data protection regulations, and all responses to the post-game and post-workshop evaluation were anonymised. The pre-workshop surveys allowed us to get to know the profiles of the participants and distribute the roles so that they were as close as possible to the real-life profile of each participant. Below we present some of the data that we consider relevant and that we have taken into account when interpreting the results.

As far as the workshop in Brussels is concerned, most participants were male (67%) and aged between 25 to 34 years old (52%). 71% of them have a Master's degree as their higher level of studies. The area in which most participants studied is economics and business management (40%), followed by engineering (30%), social sciences and humanities (20%) and natural sciences (10%). In terms of their field of work, participants most frequently worked in an association (19%), in the financial sector (19%) or in professions related to political activities (19%); other sectors were: education and research (14%), consultancy (14%), industry (10%) and facility services (5%).

At the workshop in Pontevedra, the participation of men and women was more equally distributed (52% and 48% respectively). There was a wide range of ages, with the highest

shares of participants aged between 25 to 34 (38%) and between 35 to 44 (33%). Their higher level of study was more often a Master's degree (48%). With the same percentage (37%), economics and business management, and social sciences and humanities were the fields in which most participants studied; the remaining participants studied natural sciences (20%) and engineering (6%). In this workshop, education and research was the field in which most participants work (52%), followed by the marine sector (29%), associations (9%), politicians (5%) and industry (5%).

Looking at the two workshops together, 60% of the participants were male. The most represented age range among participants was 25 to 34 years old (45%). The highest level of study was most often a master's degree (61%). The area in which most participants studied is economics and business management (39%), followed by social sciences and humanities (28%), engineering (19%) and natural sciences (14%). There was a lot of variation between the individual fields of work, with education and research being the most common (33%). The other participants worked in the marine sector (14%), in an association (14%), as a politician (12%), in the financial sector (10%), in industry (7%), in a consultancy (7%) and in facility services (3%).

The survey also included questions aimed at understanding participants' perspectives on the CE. When asked to choose one of four different definitions of the CE before the game, 52% chose a definition of the CE as "a regenerative economic model that aims to keep the extraction of resources and the generation of waste and emissions within natural limits and prioritises cooperation, care, community and solidarity over profit". Just over half of the participants thus gravitated towards an understanding of the CE that is compatible with degrowth and post-growth. The rest of the participants chose a definition of the CE model as "an economic model that aims to create economic value by keeping materials and resources in circulation for as long as possible and minimising the generation of waste and emissions" (24%); or as "an economic model that aims to use resources efficiently, paying particular attention to waste recycling in order to strike a balance between the economic, environmental and social spheres" (24%).

After the workshops, the participants were asked for their opinion on the current situation compared to the scenarios explored. The majority rated the current system as growth-oriented and characterised by centralised governance. It is worth noting that the participants at the workshop in Pontevedra on average rated the system as more centralised than those in Brussels. When asked about the contribution of societal actors to promoting the CE and overcoming the associated challenges, the vast majority of participants felt that this contribution is unequally distributed due to the different allocation of power and resources, with the Policymaker being seen as the one with most influence.

Regarding the future, overall participants shared a hopeful outlook. Most participants believe that the system will be able to move beyond "business as usual". Spanish stakeholders were slightly more sceptical about this possibility.

5. Insights from the workshops by scenario

All four scenarios described in Section 2 were explored in the workshops. In the Brussels workshop, two groups played Scenarios 1 (Centralised circularity uptake) and 4 (Bottom-up circular loops), and two groups played Scenarios 2 (Planned circular loops) and 3 (Decentralised circularity uptake). In the Pontevedra workshop, two groups played Scenarios 1 (Centralised circularity uptake) and 4 (Bottom-up circular loops), and one group played Scenarios 2 (Planned circular loops) and 3 (Decentralised circularity uptake).

The most important findings for each scenario are presented below. It is important to highlight that the insights are based on the dynamics and the scoring system of the SES, in which the action scores depend on a role's own investment, the support/collaboration from other roles and the support received from the public opinion.

5.1 Scenario 1: Centralised circularity uptake

In the *Centralised Circularity Uptake* scenario, the state and Established Businesses dominate the transition to a CE in which technology and innovation play a central role in sustaining economic growth while attempting to limit some environmental impacts. Decisions are in the hands of a small number of actors, leaving little room for participation of smaller organisations or civil society. Fig. 3 provides an overview of numerical data for the actions taken, resources used, and collaboration generated across the workshops in this scenario, while a more detailed account is given below.

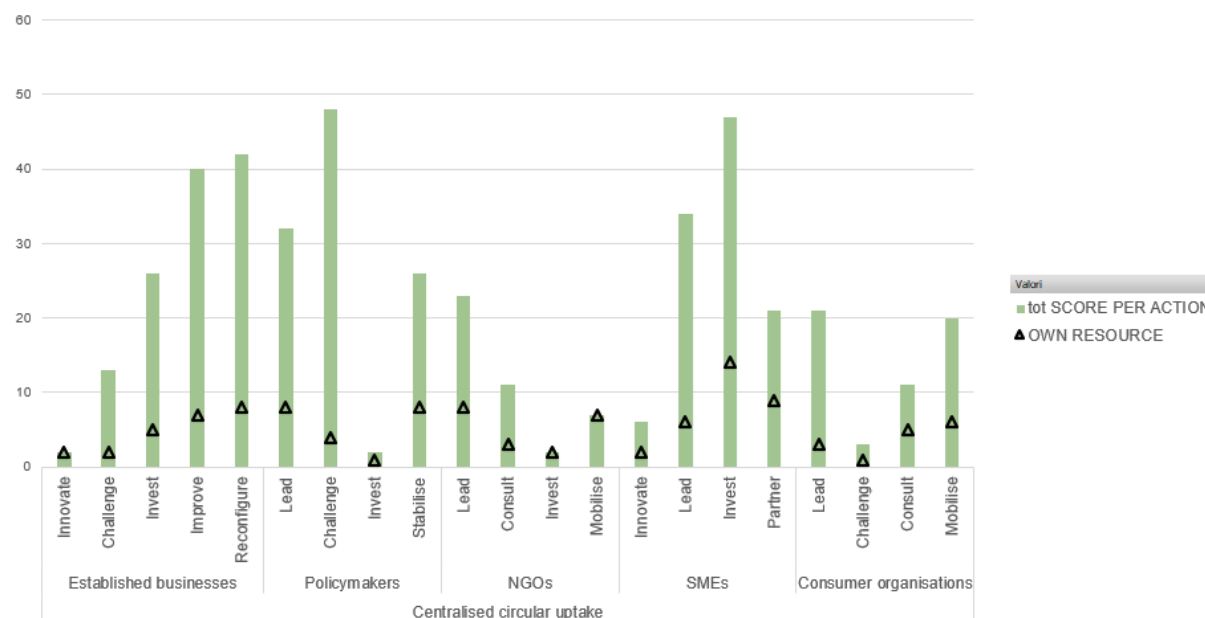


Fig. 3. Interaction role-action in the Centralised Circular Uptake scenario

In this scenario, Policymakers have a crucial role to play as decision-making and governance are centralised. They played an active role and advocated for incremental changes towards a circular economy, e.g. for repair activities, and often supported these changes through regulation. However, throughout the workshops their approach was not to simply follow the top-down approach to CE envisioned in the scenario. Many of the Policymakers opted for

disruptive actions, reflecting an attempt to counteract the negative situations and consequences of the scenario. The highest scoring actions were “Challenge” and “Lead”, through which they pushed for fairer and more balanced regulations and focused on stabilising and mitigating negative impacts, particularly in relation to labour rights and social justice.

Established Businesses were key players in this scenario. As they have control over the infrastructure and strategic decisions, their main focus was on improving the efficiency of their operations, which is reflected in the highest scores for actions “Reconfigure” and “Improve”. Established Businesses focused on adapting and optimising their processes for the CE, but in a way that maintained their competitive advantage. Although they did invest in infrastructure and human capital, the scenario favoured their actions aimed at reconfiguring their business models by making calculated decisions to maximise their profits.

SMEs faced a major challenge in this scenario, as key decisions were out of their control and power concentrated among Established Businesses and Policymakers. Although it was initially thought that their role would be limited to survival strategies and collaboration, the results of the game revealed a much more active behaviour. The most successful actions for SMEs were “Lead” and “Invest”. SMEs sought to lead innovation and build strategic partnerships, particularly to capitalise on opportunities in emerging markets in the context of the CE. However, their investment efforts were often not sufficiently recognised by other actors, which limited their overall influence.

In this scenario, NGOs opted for actions that often went against the centralised dynamics. They led initiatives to protect social and environmental rights and scored highest in “Lead”. Their disruptive role allowed them to challenge the practices and actions of Established Business and Policymakers by trying to strike a balance between concentrated power and action in favour of social justice. They were also involved in actions to “Mobilise” support for issues such as social justice and environmental protection.

Consumer Organisations had limited influence due to the centralisation of power in the hands of government and big business. Despite their lack of comparative power, they scored well on “Lead”, reflecting their role as advocates for the disadvantaged and promoters of social change accessible to all. Their ability to “Mobilise” was limited by the structure of the scenario, but they found ways to influence key actors through awareness-raising and education campaigns.

In summary, the scenario clearly favoured actors with greater structural power, such as large companies and Policymakers, who could use their dominant position to steer the transition to a CE. SMEs and NGOs, although less favoured by the environment, showed a high degree of resilience and innovation. SMEs in particular were characterised by a strong ability to innovate and seek new business opportunities despite the structural constraints.

Although the scenario was designed to promote the CE on a large scale, the actions within the game showcased the tendency of actors to resist the negative consequences of centralised control and strive for a fairer and more equitable power balance. Policymakers played a key role in attempting to stabilise the system and mitigate its most damaging effects, while large companies focused on improving the efficiency of their processes within the circular system. NGOs and consumer associations sought to influence the process from below, albeit with less decision-making power. This scenario also emphasised the importance

of collaboration between stakeholders: Policymakers and Established Businesses that chose to work with SMEs and NGOs achieved more balanced outcomes and were better valued by the public.

5.2 Scenario 2: Planned circular loops

The *Planned Circular Loops* scenario describes a society in which governments, large companies and international organisations such as the UN work together to set clear limits to economic growth in order to conserve natural resources and ensure social justice. This system is based on a technocratic and centralised approach that aims to keep human activity within ecological limits. Although justice is prioritised, this control also leads to a dependency of citizens and smaller organizations on big corporations and governments. Fig. 4 offers an overview of the numerical data for the actions, resource use, and collaboration across the workshops in scenario 2 and is complemented with a qualitative analysis below.

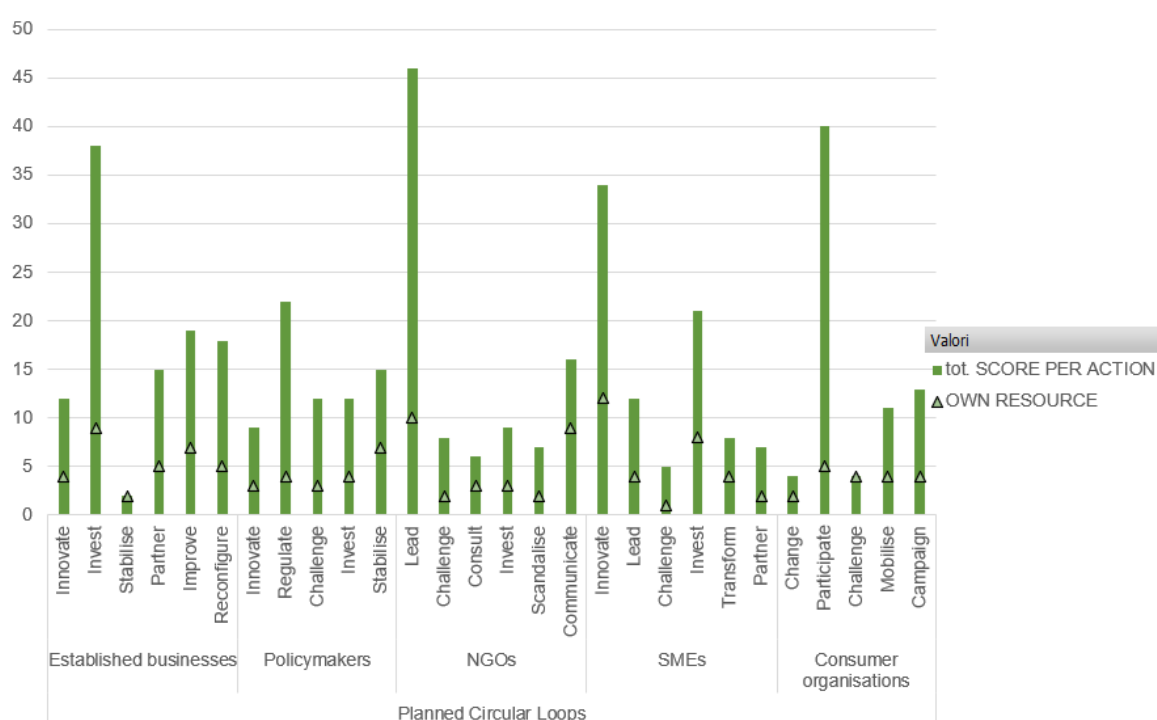


Fig. 4. Interaction role-action in the Planned Circular Loops scenario

In this scenario, Policymakers were responsible for by setting clear boundaries to protect environmental resources while also ensuring equity. In the games, they chose to “Stabilise” and “Regulate”: in particular, Policymakers acted as stabilisers of the system by setting economic incentives and also intervened to regulate in order to protect the most vulnerable in the face of major technological changes. These actions were fairly well received by most of the other actors. Despite the power granted by the scenario, among the participants representing Policymakers there was a strong internal resistance to a fully authoritarian approach and top-down imposition of limits to growth based on ecological boundaries; instead, many Policymakers focussed on fair and balanced regulation.

Despite the restrictions imposed by Policymakers in this scenario, Established Businesses utilised their financial and operational capacity to adapt and thrive in the new economic

paradigm. They scored highest on “Invest” and “Improve”: large companies managed to invest in research and development and adapt their operations to a CE within established ecological limits and taking into account social justice. In this context, they also demonstrated social responsibility, which enabled them to gain support from other key stakeholders such as NGOs and Consumer Organizations.

SMEs faced difficulties in this scenario, where large corporations and governments dominated the economic decision-making. However, SMEs were characterised by their ability to innovate and adapt to the new measures for a CE within ecological limits. They scored highest on “Innovate” and “Invest”, reflecting their crucial role in developing new products and services within the CE. SMEs managed to attract resources and collaboration through their ability to innovate, although they often needed more support from the system to have a greater impact.

NGOs positioned themselves as a balancing force against the excesses of centralised control in this scenario. The highest scores were awarded for “Lead” and “Communicate”, reflecting their focus on leading campaigns and communication strategies to ensure that social and environmental needs are prioritised in the transition to a CE. NGOs were successful in gaining the support of the public and other stakeholders, particularly when advocating for changes that engage communities and ensure that limits to growth do not harm the most vulnerable.

Consumer Organisations played an active role in this scenario, primarily acting as protectors of consumer rights in the face of new regulations and restrictions. Their most successful action was “Participate”, suggesting that they made an important contribution by participating in decisions that directly affect consumers, such as the introduction of new technologies and circular services. Consumer organisations also engaged in campaigns to educate the public about the benefits of the CE and were actively involved in promoting fair solutions.

As expected, in this scenario the most powerful actors (Policymakers and Established Businesses) played a prominent role in setting the rules of the game. Policymakers took the lead in creating strict legal frameworks to ensure that the circular system stays within environmental boundaries. At the same time, large companies used their financial power to invest in technologies and practises that allowed them to adapt to the new system. Despite the centralised constraints, SMEs found plenty of room for innovation and stood out for their creativity in adapting to the new demands of the circular market. Their influence though was limited by their reduced ability to take decisions on a large scale. Both NGOs and Consumer Organisations played social buffering functions and key roles in protecting social rights and promoting a just transition to the CE by advocating for more inclusion and equity in this process.

An interesting dynamic that could be observed in this scenario was the combination of adaptation and resistance on the part of the actors. While some, such as big businesses, took advantage of the favourable conditions of the scenario to invest in more circular processes, others, such as NGOs and consumer organisations, acted as a counterweight to centralised power and pushed for a more humane, democratic and equitable approach. Collaboration was key in this scenario, and those actors who managed to form strategic alliances, particularly between SMEs and NGOs, were able to have more impact on society.

5.3 Scenario 3: Decentralised circularity uptake

In the *Decentralised Circularity Uptake* scenario, ecological limits are acknowledged, but no strict restrictions on economic activities are imposed. This scenario emphasises the development of a CE model based on innovation and the involvement of many local actors. The state adopts more flexible regulations and incentivises businesses and citizens to develop more circular technologies and practises. Governance and economic activity are more decentralised, allowing small businesses and local actors to play a greater role. Fig. 5 provides an overview of the numerical data for the actions taken, resources used, and collaboration generated across the workshops in this scenario, which are further described in the following paragraphs.

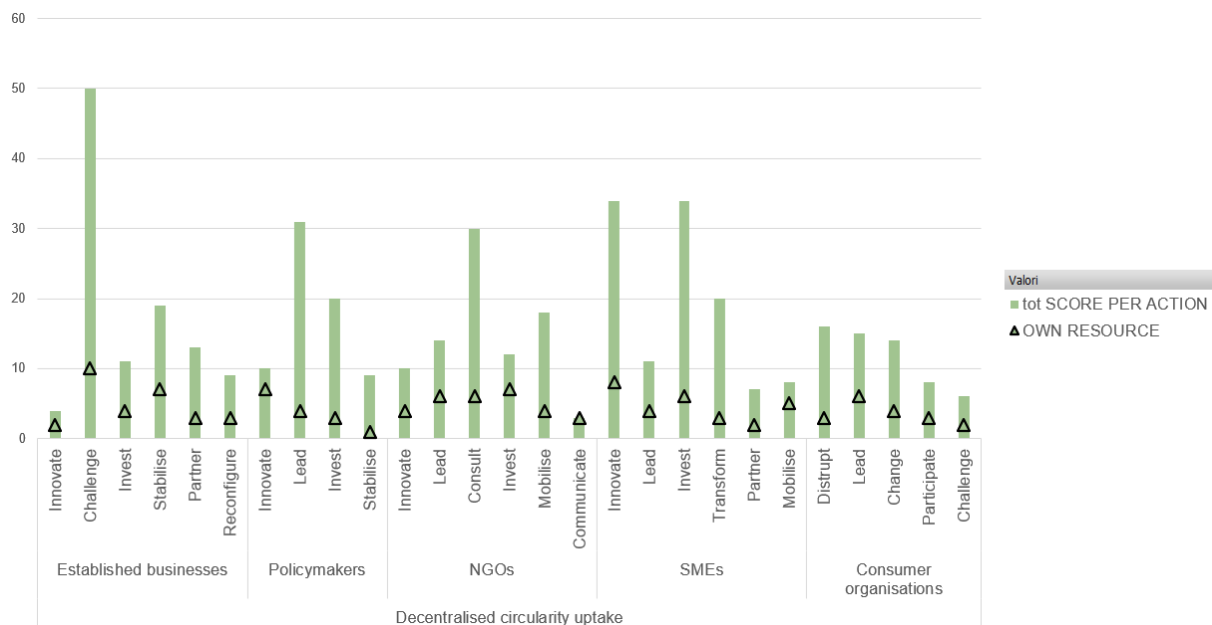


Fig. 5. Interaction role-action in the Decentralised Circular Uptake scenario

In this scenario, Policymakers played a less controlling role compared to other scenarios, allowing them to focus on facilitating local innovation and investment. The highest rated actions were “Lead” and “Invest”. Policymakers chose to lead on new environmental policies, funding and promoting sustainable innovation and working closely with other stakeholders to ensure that economic incentives reached local circular initiatives. The role of the state was not so much that of strict regulation, but rather that of a facilitator and coordinator of actions between different actors in society.

Established Businesses were neither strengthened nor directly penalised in this scenario. Although they enjoyed the benefits of the centralised power they had in other scenarios, they were able to adapt to the decentralised conditions. Their most successful action was “Challenge”, which shows that they had to question the market dynamics and their own organizational structures, while innovating and collaborating with other players to remain competitive. Large companies took advantage of the less regulated environment to challenge traditional practises and seek new opportunities in the CE, often collaborating with small companies to develop innovative solutions.

SMEs were among the actors that benefited most from this scenario. Without the hegemony of large companies and with a more flexible regulatory framework, SMEs had the opportunity to stand out through innovation and investment into developing circular business models and new forms of collaboration and exchange. The highest rated actions were “Innovate” and “Invest”, reflecting their ability to attract resources and implement circular solutions. In this decentralised environment, SMEs adapted quickly to new CE market opportunities enabled them to collaborate and gain the support of public opinion and other stakeholders.

NGOs also thrived in this scenario, mostly acting as advisors and facilitators of social and environmental projects. Their most successful actions were “Consult” and “Mobilise”, reflecting their role in advising other organisations on the integration of sustainable practises and activating human and social resources in circular initiatives. NGOs used the decentralised environment to drive local CE projects at community level and working with businesses and government actors. Their focus ensured that the transition to a CE was also fair and equitable. In this sense, they contributed to the further development of the scenario.

Consumer Organisations had a lesser impact compared to other actors in this scenario. However, they did stand out with actions such as “Disrupt” and “Lead”, reflecting their focus on leading disruptive change for the benefit of consumers. Rather than adapting to the dynamics of the scenario, these organisations sought to break established norms and advocated for greater control of consumer data and protection of consumer rights against large corporations.

In summary, the *Decentralised Circularity Uptake* scenario favoured the participation of a wide range of actors and encouraged innovation and experimentation within a more decentralised CE. In contrast to more centralised scenarios, this model allowed both SMEs and NGOs to play a key role by leading innovative projects and ensuring that the CE progressed in a more inclusive way. While large companies were not directly favoured, they found ways to remain relevant through innovation and collaboration with other smaller players. They demonstrated ability to challenge the status quo and adapt to new opportunities, even if their influence was balanced by that of SMEs and NGOs. Policymakers took a more flexible approach in this scenario, investing in new technologies and localized strategies that fostered innovation. Their role focused on facilitating collaboration between different actors and ensuring that circular growth was not monopolised by large companies. NGOs and consumer organisations found fertile ground for action, with the former spearheading sustainability projects at local level and the latter advocating for consumer rights in the context of the CE.

5.4 Scenario 4: Bottom-up circular loops

In the *Bottom-up circular loops* scenario, society is organised through local and decentralised structures in which the CE emerge at the grassroots level and limits to economic growth are set through co-creation. This scenario emphasises self-sufficiency, reduced consumption and respect for ecological limits. Decision-making is distributed among small organisations and local communities, prioritising collaboration over market dynamics. Supply chains become shorter and the CE is based on reuse and reduction rather than large-scale recycling.

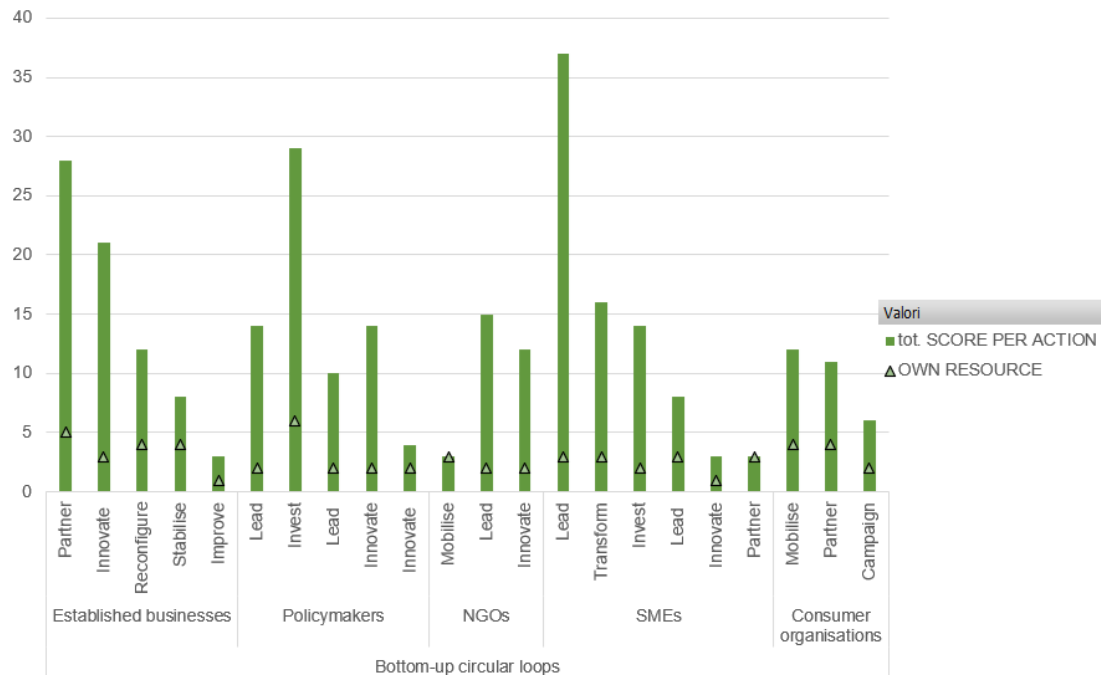


Fig. 6. Interaction role-action in the Bottom-up circular loops scenario

Fig. 6 presents the numerical data for the actions taken, resources used, and collaboration that occurred during the workshops in scenario 4, which are described more in details below.

In this scenario, Policymakers focussed on empowering people and local communities to manage their own resources in a new economic model. The highest scoring actions were “Invest” and “Innovate”, indicating their main focus on investing in local infrastructure and new ways to support the sufficiency-based CE. While they did regulate for more responsible production and a for just distribution of environmental rights and responsibilities, Policymakers engaged in social innovation and embraced more participatory and decentralisation models.

This scenario was the most challenging one for Established Businesses, as local structures and decentralisation did not allow them to operate in the traditional way. Nevertheless, some companies managed to adapt by focussing on ways to “Innovate” and “Partner” and slowly developing new business models more in line with principles of CE and local sufficiency. In many cases, however, the focus on sufficiency was new to the participants acting as Established Businesses and they struggled to fully understand how to implement it. They found that by building partnerships with local actors, including NGOs and CE committees, they were able to remain relevant and adapt to an environment that favoured smaller, more collaborative economic structures.

SMEs were the actors that benefited the most in this scenario, as the local and decentralised environment allowed them to flourish. They scored high on “Lead”, “Transform” and “Invest”, reflecting their role in the implementation of small-scale CE and their ability to lead local initiatives. SMEs pursued innovative and transformative strategies experimenting with principles of sufficiency and consumption reduction. In addition, they have been able to attract resources and support from other actors, which has enabled them to lead projects in their communities and promote a truly participatory CE.

NGOs were the most successful actors in this scenario and led many of the community CE initiatives. The most successful actions were “Lead” and “Innovate”, reflecting their ability to mobilise communities, youth and scientists to advocate for a more just distribution of environmental rights and responsibilities and to promote innovative circular practises. NGOs played a crucial role in fostering local collaboration and ensuring that the CE focuses not only on materials, but also on social justice and community wellbeing. Notably, they were also the most vocal actor calling for more measures to address overconsumption.

Consumer organisations focused on actions “Mobilise” and “Partner”, but proved to be very creative in this scenario. As local economic structures gained prominence, consumer organisations worked to educate citizens about new forms of responsible consumption and to ensure they had access to the necessary products and services. Although their influence was modest compared to other actors, their focus on mobilising local communities and collaborating with other stakeholders allowed them to play an active role in the transition to a sufficiency-based CE.

The *Bottom-up circular loops* scenario enabled local communities and smaller actors such as SMEs and NGOs to lead the transition to a CE. This scenario favoured the development of initiatives at the local level, where collaboration and sufficiency were the main principles. SMEs were the actors that benefited most and led many of the CE initiatives at local level. Their ability to innovate and reshape their business models to align with the principles of sufficiency was crucial to their success. By working with NGOs and Policymakers, SMEs were able to make a significant impact in their communities and promote CE practises that focus on reducing consumption and respecting environmental limits.

Large companies, on the other hand, were confronted with a more difficult environment. Their ability to operate centrally was limited, and while some managed to adapt through innovation and strategic alliances, their role in this scenario was less dominant. Those that did manage to integrate into the local dynamics did so mainly by collaborating with smaller players and exploring new forms of business. NGOs and Consumer Organisations played a key role in mobilising local communities and promoting circular practises focused on social justice and sustainability. NGOs in particular led many of the initiatives to ensure that the CE is inclusive and that peoples wellbeing is at the centre of the CE. This scenario highlighted the importance of collaboration at a local level and the crucial role that small actors play in creating a sustainable and fair CE. Social innovation and community empowerment were recurring themes, and those actors who were able to foster collaboration and ownership within their communities were the most successful in this decentralised environment.

6. Insights from the workshops by role

In this section we present the results by role. In contrast to the previous section, here we offer a picture of the different courses of action that the same role assumed depending on the scenario. It is important not only to emphasise the difference between the actions of each stakeholder in each scenario, but also to reflect on the power that each stakeholder has, which is crucial to interpret the results and to conduct a rigorous analysis.

6.1 Policymakers' actions and discourses

Policymakers played a fundamental role in all scenarios, though their approaches and levels of influence varied significantly. Generally, they acted as key regulators and facilitators, although their ability to lead and transform the transition towards a CE was shaped by the power and governance framework in each scenario. Below is an analysis of their role according to the different scenario explored, starting from Fig. 7 which provides a numerical breakdown of the actions, own resource use, and public opinion support (future impact).

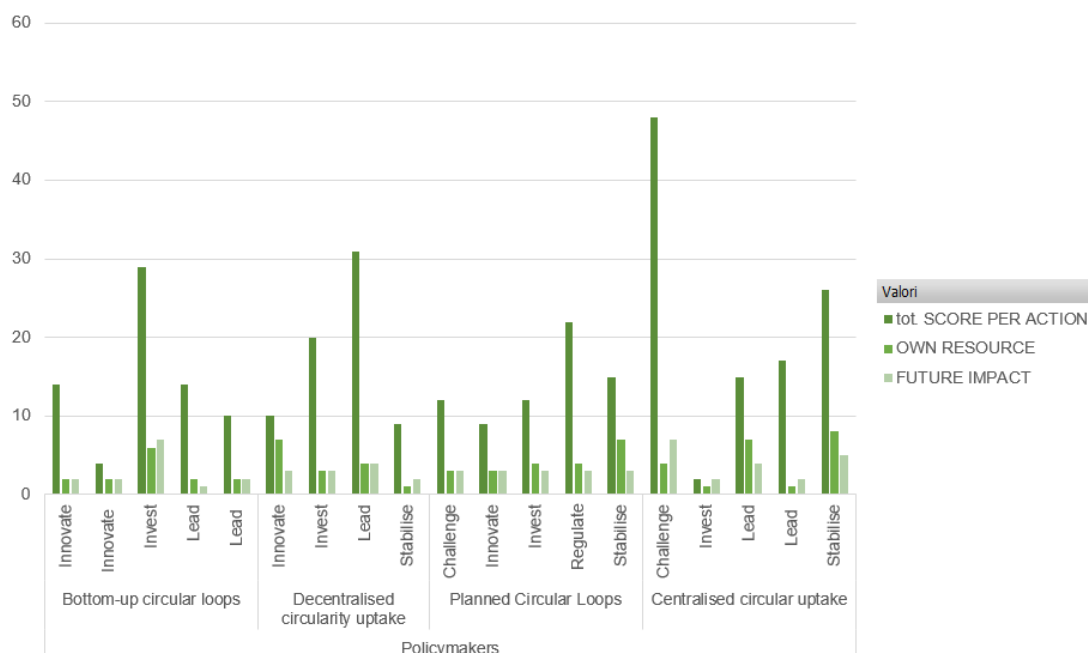


Fig. 7. Interaction scenario-action for Policymakers

In the *Centralised Circularity Uptake* scenario, Policymakers held a predominant role due to the centralised type of governance and decision-making. Decisions regarding infrastructure, investments, and regulation were mainly in their hands, allowing them to directly influence the transition to a CE. Despite being in a position of power, many Policymakers adopted a more nuanced approach, seeking to mitigate the negative consequences of centralised control. The most successful actions of Policymakers in this scenario were "Challenge" and "Stabilize", by which they attempted to counteract the negative effects of decisions and situations favouring large corporations. They acted to balance power, ensuring that regulations favoured greater social equity and environmental justice, rather than simply promoting growth at any cost. While some Policymakers acted to incrementally push forward the CE, the general approach was to challenge policies that prioritised corporate interests over general welfare.

In the *Planned Circular Loops* scenario, Policymakers acted as the main regulators of the system, focusing on ensuring that economic activities remained within ecological limits. Their role was clearly centralised and regulatory, with key actions such as "Regulate" and "Stabilise". Policymakers were essential in imposing high taxes and other regulatory measures aimed at fostering a fairer and more sustainable economy. Despite their power, Policymakers did not simply impose restrictions in an authoritarian manner. Many sought ways to stabilise

the economy and ensure that new technologies and circular systems did not negatively affect the most vulnerable. This shows that, while they operated in a centralised context, their approach was not exclusively restrictive, but also protective and supportive of long-term sustainability and communities.

In the *Decentralised Circularity Uptake* scenario, Policymakers took on a less dominant role compared to more centralised scenarios. Instead of imposing strict regulations, they acted as facilitators, supporting innovation and collaboration among multiple actors. The highest-rated actions were "Lead" and "Invest", reflecting a leadership approach in promoting environmental policies and supporting local businesses and smaller players. Here, Policymakers led the implementation of policies that encouraged circular innovation, but in a more distributed manner. Rather than directly controlling the process, they helped create better conditions for other actors, such as SMEs and NGOs, to thrive. This facilitator role allowed the transition to circularity to happen in a more distributed way, less reliant on centralised decisions.

In the *Bottom-up circular loops* scenario, Policymakers experienced a significant transformation in their traditional role by adopted a more supportive and investment-based approach in community initiatives. The most successful actions in this scenario were "Invest" and "Innovate", by which they helped empower communities to lead their own CE projects. Policymakers in this scenario primarily invested in local infrastructures and in creating environments conducive to community self-organisation. This decentralised approach also involved greater participation in social innovations and promoting circular practices aligned with principles of sufficiency and equity. Policymakers had a significant impact by facilitating the growth of local projects and promoting collaboration among actors.

Across the four scenarios, Policymakers easily adapted to the different conditions and governance structures and responded to the needs of each context. Their role was more dominant in centralised scenarios, where they had the power to regulate and lead; in decentralised scenarios, they took a more facilitative and supportive approach, allowing other actors to take responsibility for driving the shift towards circularity. A key aspect was their ability to balance the need for regulations with the necessary flexibility to foster innovation. In scenarios where they faced stricter constraints, such as in Planned Circular Loops, Policymakers excelled in regulating fairly and equitably. In more decentralised scenarios, their ability to lead without imposing was crucial to ensuring that local initiatives succeeded.

6.2 Established Businesses' actions and discourses

The actions and strategies of Established Businesses varied significantly depending on the degree of centralisation or decentralisation in the CE of each scenario. Large corporations leveraged their influence to adapt to the new demands of the CE, but they experienced varying levels of success depending on the context in which they operated. Below is an analysis of their performance by scenario. Fig. 8 provides a numerical breakdown of the actions, own resource use, and public opinion impact (future impact) of the Established Business across scenarios.

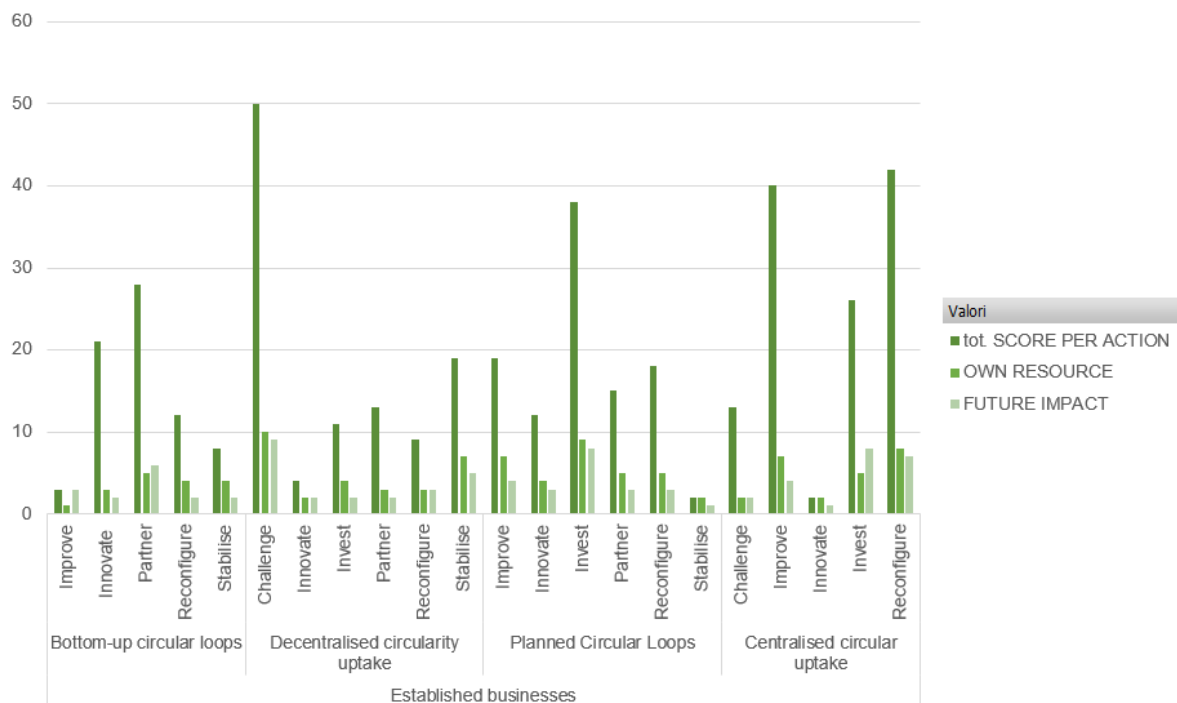


Fig. 8. Interaction scenario-action for Established Businesses

In the *Centralised Circularity Uptake* scenario, large corporations were clearly favoured by the centralised governance and decision-making. This allowed them to dominate the market and steer the transitions towards the CE with a focus on economic efficiency over other values. The most successful actions were "Reconfigure" and "Improve", reflecting their ability to quickly adapt and improve their internal operations to align with circularity principles. In this context, large corporations primarily invested in technologies and systems that optimised their processes and products while reconfiguring their supply chains to seize opportunities offered by the CE. Although they took steps to become more sustainable, they did so from a profit-maximisation perspective. Remarkably, these companies also received significant support from both policymakers and the public.

In the *Planned Circular Loops* scenario, Established Business faced more significant restrictions to economic growth imposed by Policymakers. However, they managed to adapt easily, utilising their financial capacity and infrastructure to invest in the transition. Their highest scoring actions were "Invest" and "Improve", reflecting their focus on investing in circular technologies and incrementally improving their processes to meet the environmental regulations. Despite increased state intervention, large corporations continued to benefit from their size and resources, adopting a strategy of compliance with regulations while leveraging their capacity to innovate for sustainability. In some cases, they demonstrated social responsibility, allowing them to maintain a positive relationship with key actors such as NGOs and consumer organisations. At times though, there was underlying tension between large corporations and regulators, as the former sought ways to grow within the imposed limits.

In the *Decentralised Circularity Uptake* scenario, large corporations faced a more challenging environment, as the decentralisation of power and the lack of strict regulations meant they could not operate with the same level of control as in other scenarios. They often took actions to "Challenge" by which they questioned and reformed their business models to align with the

demands of a more circular and distributed economy. The large corporations that thrived in this scenario were those that managed to innovate and collaborate with smaller actors, such as SMEs and NGOs. Through strategic partnerships, they were able to remain competitive in an environment where innovation and flexibility were key. However, in many cases, large corporations found this scenario very challenging, as the decentralised approach limited their ability to control large market segments. Instead of leading the change, they were often forced to adapt and collaborate more than in other scenarios.

The *Bottom-up circular loops* scenario was the most challenging for large corporations, as this model prioritised limits-to-growth, local self-sufficiency, and community collaboration, leaving little room for the traditional strategies of large corporations. The most successful actions were "Partner" and "Innovate", indicating that the large corporations that succeeded were those that partnered with local actors and developed new business models aligned with the principles of the local CE. However, in most cases, large corporations struggled to adapt to this environment, as the dynamics of power were in the hands of local and community actors. The corporations that adapted best opted to form alliances with CE committees and NGOs to co-develop solutions that benefited local communities. Although they managed to remain relevant in some cases, their influence was much smaller than in more centralised scenarios.

Across the four scenarios, Established Businesses demonstrated a notable capacity to adapt to the different dynamics. In more centralised scenarios, these companies leveraged their power and resources to lead the transition to circular models, investing in innovative technologies and improving their internal processes. In more decentralised scenarios, they were forced to adopt a more collaborative approach, working alongside smaller actors and adjusting their business models to align with local demands. A key lesson from the workshops was that large corporations cannot always rely on their power and infrastructure to lead the shift towards a CE. In scenarios where power was more distributed, these companies found that innovation and collaboration were essential to remain competitive. Furthermore, in scenarios more favourable to sufficiency and local collaboration, the corporations that adapted best were those that understood the importance of partnering with community actors and adjusting their operations to support more inclusive circular practices.

6.3 SMEs' actions and discourses

SMEs demonstrated a strong capacity for innovation and flexibility in adapting to the dynamics of the four scenarios. Overall, SMEs stood out as resilient and proactive actors, particularly in decentralised scenarios where large corporations and the government exerted less control. Although they faced challenges in more centralised scenarios, their ability to innovate and collaborate allowed them to thrive in more flexible environments. Below is an analysis of their performance across the different scenarios, including a numerical breakdown of the SMEs' actions, own resource use, and public opinion impact (Fig. 9).

In the *Centralised Circularity Uptake* scenario, SMEs faced a difficult environment as power was concentrated in the hands of large corporations and the government. Despite this, they managed to act proactively through innovation and collaboration with other actors. The most successful actions were "Invest" and "Lead", reflecting their focus on leading the adaptation of their businesses to the new realities of the CE. Although SMEs did not enjoy the same level of influence as large corporations or policymakers, they found opportunities to thrive by

investing in new technologies and circular practices, opting for strategic partnerships and exploring new market niches where they could lead in innovation. However, their impact was often limited due to the centralised structure of power versus their small scale in this scenario.

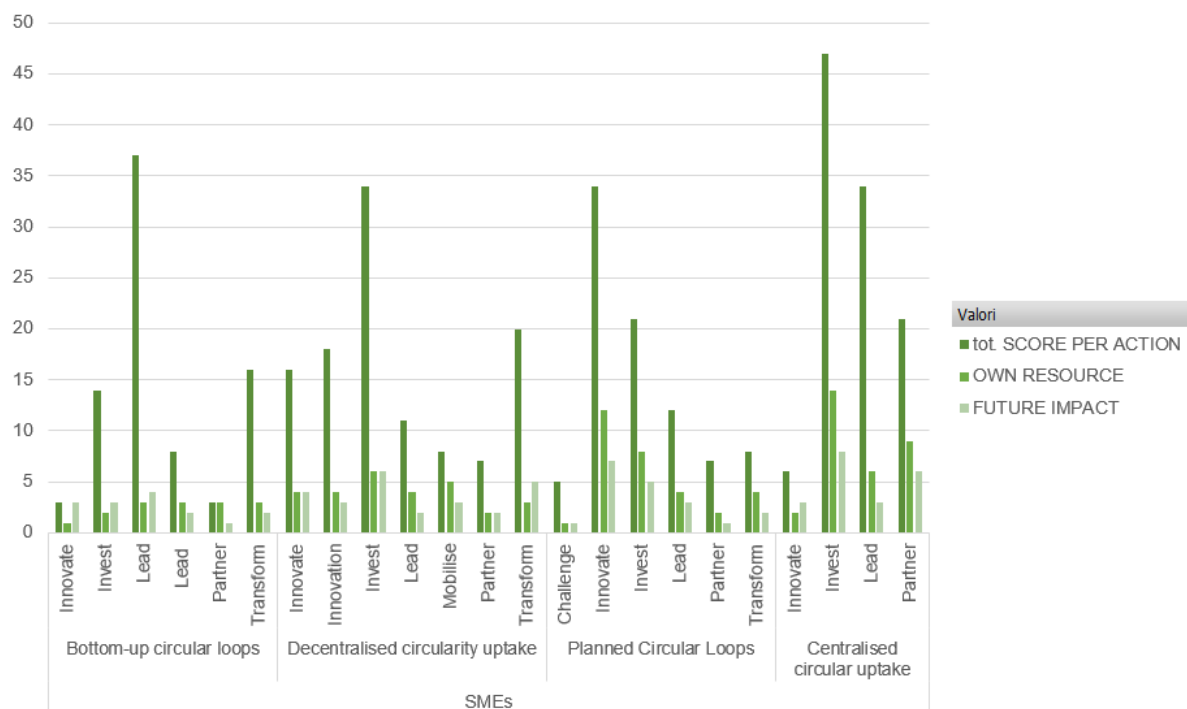


Fig. 9. Interaction scenario-action for SMEs

In the *Planned Circular Loops* scenario, SMEs faced similar challenges but were better positioned to make the best of the new regulations and production constraints fostering a CE within ecological limits. Their most successful actions were "Innovate" and "Invest", indicating that SMEs focused on adapting their businesses to the regulations imposed by policymakers while also investing in innovative solutions to remain competitive. Although SMEs did not hold as much power as the larger actors, they took advantage of the flexibility that their size afforded them to explore new forms of collaboration and innovation within the state-imposed limits to economic growth. In this scenario, SMEs found opportunities in emerging markets for circular products and services, and their capacity for innovation enabled them to gain a certain level of support from the public and other key actors, including policymakers and NGOs.

The *Decentralised Circularity Uptake* scenario was the most favourable for SMEs, offering an environment where flexibility and innovation were key to success. SMEs excelled with actions such as "Innovate" and "Invest", reflecting their ability to lead the shift towards a CE by innovating in products and services, as well as investing in new technologies. In this scenario, SMEs took full advantage of the decentralisation of power and the local focus to collaborate with other actors, including NGOs and consumer organisations. This environment allowed them to thrive, as they could quickly adapt to new market demands and offer innovative circular solutions. Moreover, their ability to lead local projects was recognised by other actors, granting them a high level of public support and collaboration.

The *Bottom-up circular loops* scenario was also highly favourable for SMEs, as it allowed them to take a leading role in creating local circular economies. The most notable actions were "Lead" and "Transform", reflecting their ability to lead local CE initiatives and transform their

business models to align with the principles of sufficiency and self-sufficiency. In this scenario, SMEs had the opportunity to lead the transition to circular practices at a local level, collaborating with communities and other actors such as NGOs and Consumer Organisations. Their capacity to transform and adapt to local needs was key to their success, and they had a significant impact by promoting sustainable practices that prioritised reducing consumption and using resources efficiently. This scenario allowed SMEs to take a leadership role in the CE, fostering collaboration and local growth.

Across the four scenarios, SMEs demonstrated resilience and adaptability, capitalising on the opportunities presented by the CE, even in the most challenging environments. In more centralised scenarios, SMEs faced restrictions due to the concentration of power in the hands of large corporations and the state, but they found market niches and opportunities to innovate and collaborate with other actors. In more decentralised scenarios, SMEs thrived by leading CE projects at a local level and investing in innovative solutions. Their smaller size allowed them to adapt quickly to changes. A key lesson is that while SMEs faced challenges in environments where power and governance is centralised, they had a remarkable ability to innovate and collaborate, making them key players in the transition towards a CE. In scenarios where flexibility and collaboration are essential, as in decentralised environments, SMEs proved to be natural leaders, capable of driving significant change and contributing to the creation of sustainable and inclusive circular economies.

6.4 NGOs' actions and discourses

NGOs played a crucial role in every scenario, maintaining a key position as leaders and advocates for a CE that was inclusive, fair, and environmentally sustainable. Below is an examination of their performance - starting from Fig. 10 which provides a numerical breakdown of the NGOs' actions, own resource use, and impact - in each of the scenarios.

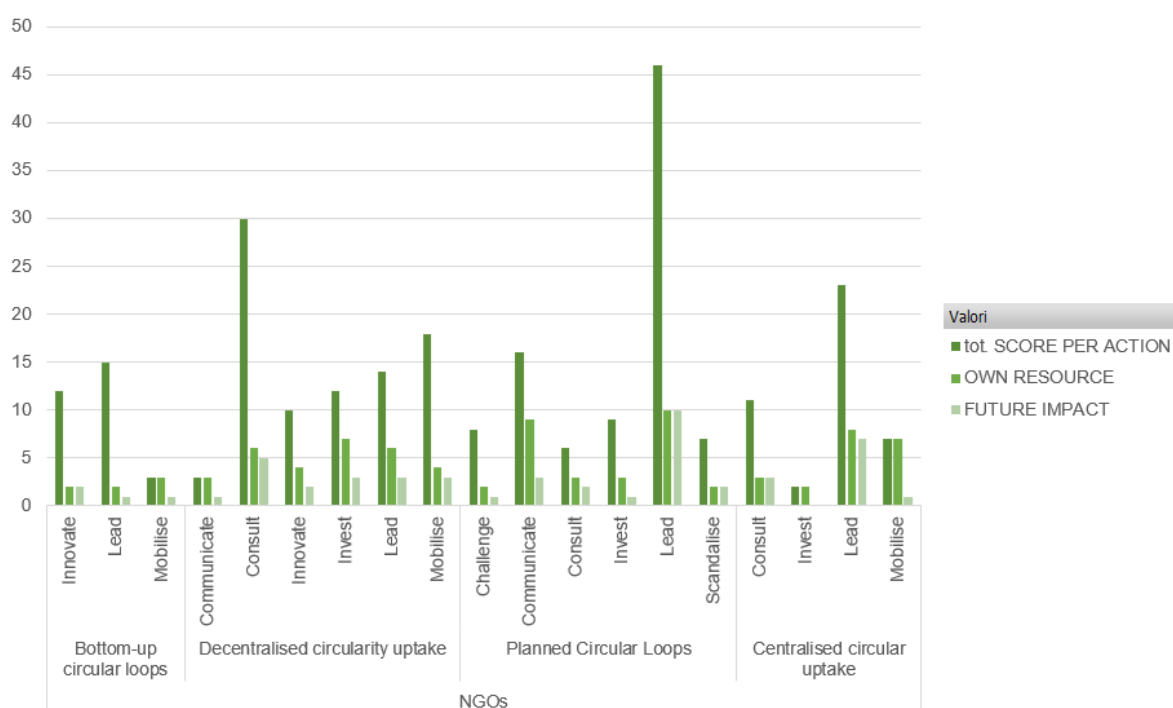


Fig. 10. Interaction scenario-action for NGOs

In the *Centralised Circularity Uptake* scenario, characterised by centralisation of power in the hands of the Policymakers and Established Businesses, NGOs assumed a very critical role. The most successful actions were "Lead" and "Mobilise", reflecting their focus on leading campaigns to counteract centralised dynamics and mobilising civil society to advocate for greater democratic control and social justice. NGOs challenged many decisions driven by large corporations, highlighting the issues arising from a highly centralised system that prioritised economic efficiency over social and environmental rights. Through their leadership and ability to mobilise resources and support, NGOs managed to influence some key debates, advocating for regulations that considered the needs of the most vulnerable communities. Although their power was limited compared to major actors, their role was essential in raising awareness of the negative consequences of the centralised model.

In the *Planned Circular Loops* scenario, NGOs took on a more collaborative yet equally critical role. With standout actions such as "Lead" and "Communicate", NGOs worked to ensure that the limits imposed on economic growth did not sacrifice social justice and equity. They acted as facilitators of a more inclusive dialogue, ensuring that the voices of vulnerable communities were heard in the implementation of circular policies. In this scenario, NGOs focused on leading educational and awareness campaigns to ensure that the restrictions imposed by policymakers and large corporations considered social realities. While they collaborated with other actors when measures were appropriate, they also took a critical stance on decisions that, although well-intentioned, did not fully take into account social or environmental implications. In this sense, NGOs balanced their role of support and resistance, ensuring that the transition to a CE was as inclusive as possible.

In the *Decentralised Circularity Uptake* scenario, NGOs played a central role in facilitating community projects and consulting for CE initiatives. The most successful actions were "Consult" and "Mobilise", highlighting their ability to act as key consultants in promoting local initiatives that considered both ecological limits and social needs. Unlike more centralised scenarios, where their role was more focused on resistance, in this decentralised environment NGOs thrived by collaborating with multiple local actors to implement innovative solutions. They promoted cooperation between SMEs, consumers, and policymakers, ensuring that transitions to a decentralised CE were inclusive and sustainable.

In the *Bottom-up circular loops* scenario, NGOs found themselves in an ideal setting. This scenario, based on local self-organisation and sufficiency, allowed NGOs to play a leading role in promoting local circular solutions. The most successful actions were "Lead" and "Innovate", reflecting their focus on leading innovative initiatives that promoted sustainability at the community level, implementation of circular practices aligned with the principles of sufficiency, reducing consumption, and collaboration with local actors from SMEs to consumer organisations, driving profound changes in economic and social structures. Their ability to innovate and lead new forms of social organisation was crucial to ensuring that transitions to a CE focused not only on recycling and efficiency, but also on responsible consumption, social equity and community well-being.

Across the four scenarios, NGOs demonstrated versatility and power in promoting social justice and environmental sustainability. In more centralised scenarios, they acted as disruptive forces, challenging authoritarian decisions and advocating for a more humane, participatory and equitable approach. In decentralised scenarios, NGOs thrived leading

community initiatives and collaborating with other actors to create sustainable solutions that aligned with local needs. In all scenarios, NGOs successfully mobilised civil society, raised awareness about social and environmental issues, and facilitated inclusive dialogues. Their ability to lead and communicate was crucial in ensuring that transitions to a CE were fair and sustainable. Furthermore, they demonstrated a remarkable capacity to adapt to changing power dynamics, adopting a collaborative approach when necessary, but also being disruptive and critical when the circumstances demanded it.

6.5 Consumer Organisations' actions and discourses

Consumer Organisations maintained its specific nature but adapted their approach across the four scenarios of the SES. Although their influence was limited in more centralised scenarios, these organisations managed to harness their ability to mobilise consumers and advocate for equity and justice in more decentralised scenarios. Their primary focus was to protect consumer rights and ensure that transitions towards a CE did not disadvantage the most vulnerable. Below is a detailed account of their performance across scenarios, including a numerical breakdown of their actions, own resource use, and future impact (Fig. 11).

In the *Centralised Circularity Uptake* scenario, Consumer Organisations had a limited role due to the concentration of power in the State and large corporations. In spite of this, they excelled in their ability to lead the defence of consumer rights. Their most successful action was in fact "Lead", reflecting their efforts to represent consumers in an environment where centralised power threatened to marginalise their interests. Consumer Organisations in this scenario primarily acted as a critical counterbalancing voice, advocating for the protection of consumer rights and ensuring that circular products and services were accessible to all. Although they did not wield as much power as other actors, their role was crucial in ensuring that policies and business decisions did not harm consumers, particularly those with fewer resources.

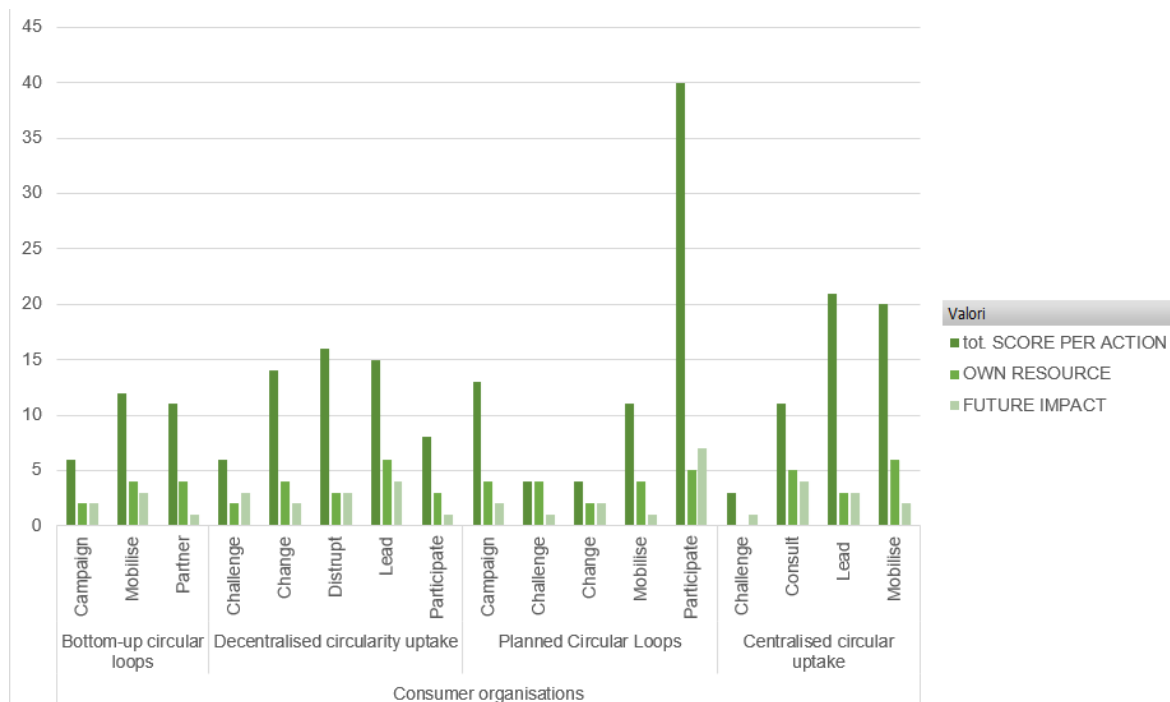


Fig. 11. Interaction scenario-action for Consumer Organisations

In the *Planned Circular Loops* scenario, Consumer Organisations found a more favourable environment for their activities. Although power remained concentrated in policymakers and large corporations, Consumer Organisations played a more active role in citizen engagement. Their most notable action was "Participate", reflecting their ability to get involved in the planning and implementation of policies that directly impacted consumers. In this scenario, Consumer Organisations focused on educating consumers about new regulations and market changes, such as the adoption of circular products. Through participation campaigns, they worked to ensure that consumers understood and benefited from the transitions to circularity, while defending their interests against the large corporations that controlled resources.

In the *Decentralised Circularity Uptake* scenario, Consumer Organisations assumed a more active and disruptive role. The most successful actions were "Disrupt" and "Lead", reflecting their willingness to challenge established norms and advocate for changes that benefited consumers. In this decentralised scenario, Consumer Organisations fought to return control to individuals over their personal data and to protect consumer rights against tech monopolies. Their ability to mobilise consumers and defend their rights as well as to advocate for greater transparency and accountability in business and government practices was crucial. While their influence was not always decisive, their role was fundamental in ensuring that consumers were not overlooked.

In the *Bottom-up circular loops* scenario, Consumer Organisations played the most creative and collaborative role. The standout actions were "Mobilise" and "Partner", reflecting their focus on mobilising local communities and collaborating with other actors to promote responsible and sustainable consumption. In a decentralised environment, Consumer Organisations worked closely with SMEs, NGOs, and other local organisations to ensure that consumers could access circular products and services equitably. In this scenario, Consumer Organisations played a key role in educating citizens about the benefits of the CE, promoting a more conscious and sustainable approach to consumption habits. Their ability to mobilise communities and collaborate with other organisations was crucial in ensuring that circular initiatives were accessible and beneficial to all.

Across the four scenarios, Consumer Organisations proved to be adaptive actors, capable of taking on leadership and mobilisation roles as required. Although their power and impact was more limited in centralised scenarios, where the State and large corporations dominated, they found ways to influence key decisions through participation, mobilisation, and consumer education. In decentralised scenarios, Consumer Organisations were more effective, acting as disruptors of the status quo and mobilising consumers in favour of greater equity and sustainability. In these environments, their ability to partner with other actors and lead educational campaigns was essential in ensuring that consumers understood and benefited from the transitions towards a CE.

6.6 The role of the Public Opinion

As described in section 3.2, the Public Opinion in the SES workshops does not take actions but assesses the actions of the five abovementioned explorers and serves as a feedback system throughout the game. Its influence was reflected in the support or resistance to the actions taken by the different actors, which amplified or reduced their impact in society. The

adoption and success of CE strategies depended, in part, on public perception and how actors communicated and aligned their actions with the priorities and views of the Public Opinion.

The Public Opinion role in the SES encompasses a broad range of powerful and active voices in the public realm. Its opinions are heard and they affect people's perceptions and the wider discourse in society. Established newspapers, radio channels, TV programs, bloggers and activists holding strong and often extreme views can all be played by the Public Opinion. Given the variability of profiles and viewpoints selected by the Public Opinion players across the seven groups, only limited, general observations can be shared about the role the Public Opinion had in the workshops.

In the *Centralised Circularity Uptake* scenario, the Public Opinion resisted policies that favoured the concentrated power of large corporations and Policymakers. Actors who challenged these dynamics and promoted a more balanced and just approach, such as some Policymakers and NGOs, garnered greater support.

In the *Planned Circular Loops* scenario, the Public Opinion positively influenced actors who promoted an equitable CE, and amplified the impact of such actions. Businesses and Policymakers that invested in fair regulations and social and environmental improvements gained public backing, while those who ignored social concerns faced resistance.

In the *Decentralised Circularity Uptake* scenario, support by the Public Opinion was key for SMEs and NGOs leading local circularity initiatives. Actions based on innovation and collaboration were well received, whereas large companies that did not align with local values encountered greater difficulties in gaining public acceptance.

In the *Bottom-up circular loops* scenario, based on community action, Public Opinion was a central driver of change. SMEs and NGOs that promoted sufficiency and collaborated with communities received strong backing, while large companies that successfully adapted to this community-driven dynamic also gained a certain level of support.

7. Reflections on the game

In this section we present some reflections on the design of the game after having conducted the workshops. Through a self-critical evaluation, we reflect on the main strengths and weaknesses so that they can be taken into account in future designs. To carry out an analysis of the strengths and weaknesses of the game, it is important to once again emphasise its nature. The SES is an exploratory tool, i.e. the aim of the game is to explore strategies, actions and decisions that emerge and unfold in different scenarios. This means that as long as strategies, actions and decisions are taken and concrete and tangible observations about the potential behaviour of actors in specific conditions emerge, the use of the SES is effective. From this starting point, we consider the following observations.

One of the key strengths of the game was its ability to encourage collaboration and challenge participants to think beyond their usual roles. The game provided a platform to consider alternative futures, try out different strategies and engage with other stakeholders to understand different perspectives on CE transitions. Participants were able to learn first-hand how decisions made today can influence the future of industry, policy and society as a whole.

However, some limitations also became apparent during the workshops. Firstly, the game design limits the extent to which the participants can change future conditions, as the events and storylines in each scenario are predetermined. While players made decisions and allocated resources, ultimately many ended up adapting to the unfolding events rather than having the power to fully shape them. This limited flexibility led to some frustration among participants, particularly when their actions had little impact. Addressing this challenge could greatly improve the overall experience, sense of change agency and outcomes of the game. A helpful approach would be managing participants' expectations by the facilitator, highlighting the nature of the SES as a scenario exploration tool and not a scenario building tool and focusing on the space for action left open beyond the key characteristics of the scenarios.

Furthermore, the equal distribution of resources among the five scenario explorers (Policymakers, Established Business, SMEs, NGOs and Consumer Organizations) in the initial phase of the game did not reflect the real differences between the various stakeholders. In scenarios where it was assumed that Established Businesses and Policymakers would have more influence, the equal distribution of resources to all participants distorted the dynamics of the scenario. This led to imbalances in the role plays and affected the accuracy of the outcomes. To improve future iterations, the game should take these resource differences into account to better reflect real-world conditions.

The SES set up is described by its creators as “a vast oversimplification of reality, but it still provides enough complexity to challenge participant in a way that is usually perceived as realistic” (Bontoux et al., 2016). Feedback from players spotlighted that the game complexity was quite challenging and affected their overall experience. Many participants shared that it was very demanding to simultaneously consider the many elements of the SES, such as the vision chosen for the role, the scenarios, the megatrends and actions to take. A further simplification of the tool might be beneficial for future uses.

On top of that, although the SES is positioned as a foresight tool facilitating participants' exploration of possible paths towards the future, it could be observed that future thinking (especially in the last time horizon corresponding to 30 years into the future) posed a big challenge for participants. What could be observed was that often participants acted as if they faced the different situations in the scenarios today, not in 10-, 20- and 30-years' time, and they tended to fall back onto existing, known and habitual strategies and ways of thinking. More could be done in the game design and through facilitation to encourage the simulation of future actions and foster more innovative and out-of-the-box thinking.

Lastly, a big limitation of the game is the dependence on facilitators, whose own skills, familiarity with the topic and even personality strongly affect the game experience. While the SES is a largely qualitative exercise and lends a good deal of creative freedom to the individuals around the table, ensuring a more consistent approach to the facilitation of the game, clearer communication of the scenario characteristics and more alignment among facilitators on managing group dynamics, expectations, and objections could ensure a more positive and consistent experience across different workshops, but also tackle many of the abovementioned limitations.

8. Policy implications

The findings from the workshops highlight several critical policy implications, particularly concerning the governance and implementation of CE strategies.

1. **Top-down governance and vulnerable social groups:** In scenarios with centralized governance structures, such as the *Centralised Circularity Uptake* scenario, citizens and consumers were often seen as vulnerable to decisions made by powerful stakeholders, including policymakers and established businesses. This imbalance suggests a need for policies that prioritize consumer and citizen welfare, particularly in centralized systems where the risk of marginalization is high. Policymakers should consider implementing safeguards that protect the public from the potential negative effects of centralized decision-making, ensuring that their interests are adequately represented in the CE transition. A particularly sensitive issue that emerged in the *Planned Circular Loops* scenario was also the need for policymakers to take into account individual freedom and privacy concerns when implementing policies and measures limiting environmental impact and resource use.
2. **Understanding postgrowth concepts:** One of the key insights from the workshops is that participants found it easier to understand and engage with scenarios focused on economic growth compared to those emphasizing limits to growth. This discrepancy reflects a broader challenge in public discourse around CE and post-growth proposals. For policymakers, this indicates a need to improve knowledge development, education and communication around post-growth and degrowth concepts (in particular around sufficiency). By fostering a better understanding of these models, governments can promote more informed debates and decision-making processes related to sustainable futures.
3. **Operationalizing postgrowth strategies:** Even when participants expressed agreement with post-growth and degrowth principles, there was a noticeable gap in translating these ideas into actionable strategies. This highlights the challenge policymakers face in moving from theory to practice. Governments can play a crucial role by leading experimentation and pilot programs that demonstrate how post-growth strategies can be implemented on the ground and how they can impact the real world. Such initiatives would not only provide practical insights but also help engage citizens and businesses in understanding and adopting degrowth practices.
4. **Empowering local and decentralised actions:** In bottom-up and decentralized governance scenarios, such as *Bottom-up circular loops* and *Decentralised Circularity Uptake*, local actions and community-driven initiatives proved to be powerful drivers of CE transitions. These scenarios emphasize the importance of supporting local actors, such as SMEs, NGOs, and consumer organizations, in leading circular initiatives. For policymakers, this suggests that fostering local governance structures, providing resources for community-driven projects, and creating flexible regulatory frameworks will be critical for achieving CE goals. Additionally, it is important to emphasize the role that NGOs and consumer organizations in particular can play in fostering the sociocultural changes increasing the readiness level and societal acceptance towards the adoption of more ambitious CE and sustainability policies and making their implementation an easier, more inclusive, integrative and transformative process.

5. Balancing long-term vision with short-term feasibility: Policymakers face the dual challenge of addressing immediate environmental and economic needs while simultaneously planning for long-term systemic changes. The workshops revealed that participants were often torn between addressing short-term concerns, such as job losses and economic instability, and pushing for transformative, long-term solutions. Governments must balance these competing priorities by crafting policies that mitigate short-term shocks while laying the groundwork for long-term CE transformations.

In conclusion, the insights derived from the SES workshops offer valuable lessons for policymakers. A successful transition to a CE requires balancing top-down governance with bottom-up initiatives, improving public understanding of post-growth strategies, and ensuring that citizens' and consumers' interests are safeguarded throughout the process. By addressing these challenges, governments can better navigate the complexities of CE transitions and foster a more sustainable and inclusive future.

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