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# Co-creation in partnerships contributing to the sustainability of food systems: insights from 52 case studies in Europe

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Institutions worldwide call for joint actions of multiple actors in partnerships to accelerate the transitions towards sustainable food systems and reach food security for everybody, allways. This requires insights into co-creating processes. Here, 52 European food system cases are analyzed. A methodology based on the game structure is used that permits standardizing data collection and extracting generic and cases-specific findings. Game building blocks correspond with key elements of co-creation processes, like defining mutually accepted objectives, engaging in types of activities, and efficient use of resources, boundary conditions, timings, and scales of operations. Results further indicate that different types of inclusive partnerships emerge, in which especially innovative private, including smallholders, and academic actors co-create value, all contributing to sustainability. The public and civil society actors emerge as important initiators, enablers, and organizers of scales of interaction, allowing generating snowball effects. Findings lead to an adapted concept for co-creating partnerships in food systems and recommendations for the European Partnership on sustainable food systems.

## KEYWORDS

sustainability, food system, partnership, co-creation, case studies, Europe and multi-scales, transitions

## Highlights

- Different types of inclusive, co-creating, partnerships contribute jointly to sustainability.
- The public and civil society actors emerge as initiators, enablers, and organizers of scales of interaction.
- A novel co-creation partnership concept guides the future Partnership on Sustainable Food Systems.
- A game structure-based methodology allows standardizing data collection of 52 food system cases.

## 1 Introduction

Since the early seventies, mankind started to realize that there are limits to growth as underlined by the Club of Rome (Meadows et al., 1972), just preceded by the publication of the entropy law and economic process (Georgescu-Roegen, 1971). This was also the period in which the Earth Overshoot Day was established, marking the date when humanity would exhaust its nature's budget for the year: a detrimental evolution to food security. This date is the 2<sup>nd</sup> of August 2023 (Footprintnetwork, 2023). These alarming data may have triggered the Brundtland committee to publish its report on sustainable development in 1987 (WCED, 1987), followed by the Sustainability Development Goals (SDGs) at the global level (UN, 2015) and the Green Deal in Europe (EC, 2019). These political ambitions are debated and the focus of today's main concern about how to transform our systems. This includes changing food systems – describing interconnected systems and processes that influence food security, community development, and agriculture –, in such a way that the outcomes will be sustainable, which means that they will not negatively impact on future generations (WCED, 1987; Erickson, 2008; Herrero et al., 2020). Globally, the United Nations Food Systems Summit 2021, whose procedural justice has been questioned (Tanzer et al., 2022), pleaded for change via participatory trajectories (UN FSS, 2021). European Union's institutions and political entities are also among those at the forefront of such pledges, as shown in different ambitious policy strategies expressing political willingness to promote transitions towards sustainable food systems (EC, 2020; SAPEA, 2020; Bock et al., 2022; Miles and Hoy, 2023; SCAR, 2023).

Today, the major challenge for agrifood systems is to increase their positive and decrease their negative impacts on the environment, societies, and economies. On one hand, agrifood systems are capturing CO<sub>2</sub>, recycling organic matter, potentially connecting production and ecology, and maintaining diversity in resources, activities, actors, and their preferences as well as cultural heritage (Gascuel-Oudoux et al., 2022; SCAR, 2023). On the other hand, they contribute to greenhouse gas emissions (IPCC, 2023), inefficient usage of resources (UNEP, 2016), mass and over-consumption in fulfilling personal preferences (Wind and Rangaswamy, 2001) food insecurity, and unhealthy diets (Willett et al., 2019). Since the 1970s, agri-food systems have lost their balancing capacities in terms of positive and negative impacts; they show endless growth patterns (de Vries et al., 2021) for many system indicators (Rockström et al., 2009; Springmann et al., 2018). These are for example the increasing earth's surface temperatures (Vermeulen et al., 2012; IPCC, 2023), loss of biodiversity (IPBES, 2019), shrinking freshwater resources (UN, 2022), food and health insecurity (Gillespie and van den Bold, 2017; FAO, 2022), and increasing food prices. Today, the steep rise in inflation rates results in a 40% price index change compared to 2015–2020 (Eurostat, 2023), directly threatening food security. In addition, they may be connected to injustice, inequity, unequal income distribution, poor working conditions and even disregarding food as a right or common good for citizens (Clapp, 2021; Jackson et al., 2021).

Since systems that are revealing endless growth patterns are ending in chaos (Prigogine and Stengers, 1985), urgent transformative and food system approaches (Egal and Berry, 2020; Scaramuzzi et al., 2023) are now requested. Today, patterns are not any more sustainable in terms of social, economic, and environmental impact, so there is a widespread agreement about a need to change. This holds for changes

from local to global scales and across scales (Béné et al., 2019), using comprehensive sustainability assessment methods (Hebinck et al., 2021).

Understanding specifically the diversity and cooperation between multiple food system actors in complex food systems and their willingness to collaborate and co-create sustainable value in different contexts and scales is very important. However, only recently it is a subject of research (Sacchi et al., 2018; Contini et al., 2020). This article contributes to existing literature by investigating 52 cases from different European countries, collected in the framework of the Horizon Europe project FOODPathS.<sup>1</sup> A common template for all case studies was used to elucidate generic and case-specific insights.

The main research question is: how does multi-actor cooperation take place and contribute to transitions towards sustainable food systems? The concept of 'co-creation' originating from business theory is used to analyze the diversity and complexity of possible cooperation arrangements for sustainable food systems, considered as a joint and collaborative process of producing new value (Galvagno and Dalli, 2014). The article aims to unravel the variety of configurations for multiple value co-creation in food systems, to understand how actors collaborate to reach common objectives, and to develop a concept for researching partnerships in real life, targeting the transitions towards sustainable food systems. Also, this study contributes to informing policies, as well as research and innovation projects, aiming at supporting co-creation and collaboration in food systems striving for sustainable outcomes.

## 2 The concept of co-creation in multi-actor arrangements

Multi-actor arrangements for cooperation in food systems have been analyzed in scientific literature through diverse theoretical concepts. In particular, researchers have employed the concepts of value chains (e.g., Gereffi and Lee, 2012), networks (e.g., Goodman et al., 2012), clusters (e.g., Asheim and Coenen, 2005) or collective action (e.g., Markelova et al., 2009) to study cooperative dynamics and outcomes.

Here, we propose to use the concept of 'co-creation' which allows capturing systemic approaches including interactions and interrelations between various actors, i.e., policy-makers, producers, and users, from different sectors relevant to food systems, i.e., production of products, policies, and innovation.

Co-creation is not a new concept but has significantly expanded in the last 20 years. Early work that focused on customer participation in producing goods and services and its benefits for firms, e.g., in terms of increased productivity has been traced back to the late 1970s (Bendapudi and Leone, 2003). The concept has especially become popular through the work of Prahalad and Ramaswamy (2004) and Vargo and Lusch (2004) who consider co-creation as a joint collaborative value-creation process by the company and the customers/consumers. This is then an open process of interactions between the actors for the design and development of new goods and services, in a wide range of sectors. The potential benefits of co-creation are bilateral: more customer satisfaction and loyalty on the

<sup>1</sup> <https://www.foodpaths.eu/>

one hand, but also a richer value proposition for the customer and thereby added value and competitive advantage for the business, leading to a win-win situation. Later, different stakeholders were included in such dynamic co-creation processes, such as policymakers, financial and business partners, and employees (Agrawal et al., 2015).

Furthermore, the concept has spread in time to refer to a broad set of social innovations that are not necessarily connected to the production of new goods and services but rather to institutional innovation within the public sector and civil society. Here the end-users are citizens, and the objective is to address societal challenges through an open innovation process between politicians and citizens (Voorberg et al., 2015; Torfing et al., 2019).

Next, co-creation also refers to processes of co-design and open innovation (Ind and Coates, 2013). The focus is then on collaborative and open (product) innovation processes involving companies and end-users (Chesbrough, 2003; Von Hippel, 2006). This latter perspective on co-creation has more recently been used in the context of open and participatory research, where researchers step out of their laboratories to meet 'real-life problems' and interact with multiple stakeholders to co-create knowledge (Jull et al., 2017). Such co-creation processes are facilitated in platforms and environments increasingly referred to as Living Labs, designed for meetings and interactions between researchers and non-researchers (Leminen et al., 2012; Gamache et al., 2020). Still, the concept of co-creation may be difficult to grasp.

In this article, we, therefore, propose to bridge the different strands of co-creation literature discussed above and to use the definition of co-creation elaborated by Ramaswamy and Ozcan (2018, p. 200), expressed as the "enactment of interactional creation across interactive system-environments (afforded by interactive platforms), entailing agencing engagements and structuring organizations." This definition allows us to explore cooperation and co-creation by diverse actors in food systems and their wider environments. In particular, we address the (i) diversity of actors in the collaboration initiatives, (ii) types of interactions between actors in these initiatives and their operating scales, (iii) joint objectives and employment of a variety of strategies to reach them, and (iv) contribution to the sustainability of food systems. The latter point is not expressed in the co-creation definition above but is crucial for considering the sustainability impact of co-created value by diverse actors in a well-defined food system.

### 3 Methodology

To address the above-stated aims, data from 52 cases of multi-actor collaboration have been collected between 2022 and 2023 in the framework of the Horizon Europe project FOODPathS (2023). These cases are listed in the Appendix. The FOODPathS consortium unites 17 organizations representing 19 multi-stakeholder networks, including actors of the public, private, academic, and civil society (including philanthropic foundations) sectors. The common objective is to develop a prototype European Partnership on Sustainable Food Systems, in particular its governance model(s), systemic ways of operating, funding mechanisms, sustainability charter, and exemplary case studies; the latter may trigger others, hence generating a snowball effect. During this project, the partners have participated in mapping different co-creation cases.

To co-perform the case studies and data collection with different actors, the researchers have employed a framework designed earlier

by de Vries et al. (2022) with seven building blocks. These are easily recognizable and understandable by diverse stakeholders, including global citizens, since these are the bricks of a game:

- (i) the time: the history and duration of FS activities like innovation trajectories or settling policy measures, subvention schemes, or developing sustainability charts;
- (ii) a playing field: the food-actors context or environment, not only geographically but also culturally or socially;
- (iii) the players: diversity of food system actors, like farmers and manufacturers, or academics, policymakers, and investors, as well as multi-actor clusters;
- (iv) the pieces: type of products like agri- and aqua-resources, food and drinks, services, reports, guidelines, curricula...;
- (v) the moves: activities like producing, transforming, distributing, consuming, recycling, or project managing, participatory approaches or debating;
- (vi) the rules: boundary conditions for calls, regulations, subventions, code of conduct, etc.;
- (vii) the outcomes, that are generally expressed as 'win' or 'loose'; for food systems, this means 'sustainable' or 'unsustainable', respectively.

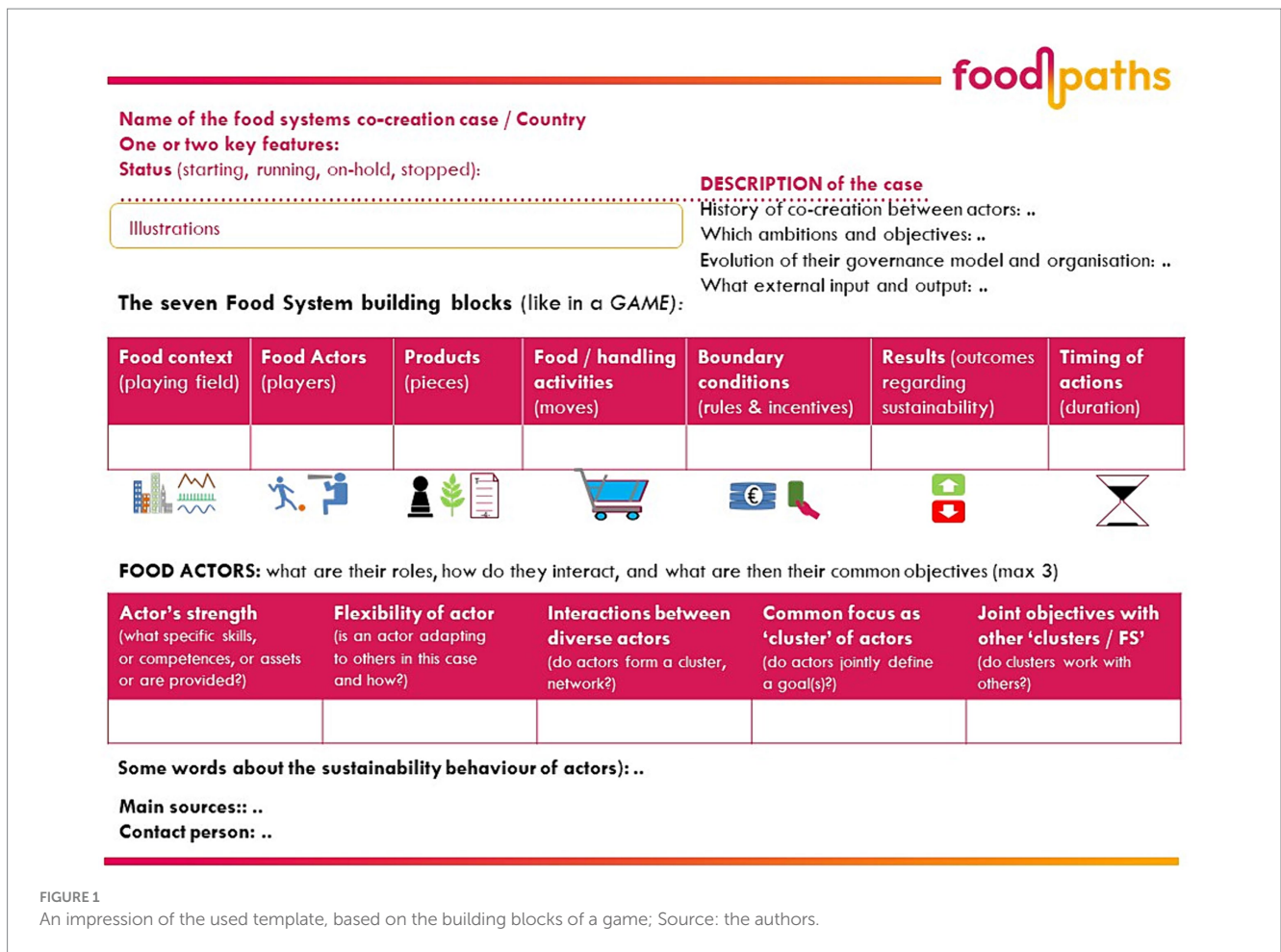
For this study, the partners of the FOODPathS project were asked to identify and describe representative cases of co-creation in food systems in Europe, in particular including the involvement of private sector actors. These cases should be well-known by them, described in the literature or publicly available websites, cover different scales (from local to global), and provide data for all seven building blocks. Also, the cases should reveal information about interactions among actors, as well as their history. The study aimed to search cases that could activate as many different actors as possible, involved in a multi-actor co-creation exercise, that seeks to reach impact in their local, regional, national, European, or global contexts. The exact categories and questions used in the cases are illustrated in Figure 1; it presents the template used for all case studies. Data from the 52 cases have mainly been analyzed qualitatively and quantitatively, as discussed below.

## 4 Results

In this section, results are presented, starting with the diversity of actors involved (section 4.1). A diversity of actors involved in the collaboration initiatives, the types of interactions between actors and their operating scales (section 4.2). Types of interactions between actors and their operating scale, the joint objectives and strategies (section 4.3). The joint objectives and strategies, and finally the sustainability outcomes (section 4.4). The contribution to the sustainability of food systems.

### 4.1 A diversity of actors involved in the collaboration initiatives

The cases, representing collaboration initiatives, concern rather recent multi-actor collaborations with a diversity of actors, aiming for long-term operation. 34 cases have been running for more than



5 years, at the time of data collection. With a few exceptions (4 cases), most cases began after the year 2000, with 19 cases started between 2000 and 2010, 19 cases between 2010 and 2020, and 10 cases after 2020. From all cases, 6 have meanwhile stopped their activities.

An overview of actors reveals that all co-creation experiences involve actors from public, private, academic, and civil society (including philanthropic foundations) sectors. The majority of cases (27 cases) associate actors of three of these sectors and 14 cases all of the sectors, while only 11 collaboration initiatives confederate two of these actor groups.

Further analyzing the cases indicates that this varied participation is dominated by private sector actors present in 49 initiatives; this corresponds with the ambitions to have private sector actors involved. Academic and public actors are also often present, in 40 and 37 cases respectively, while civil society is less frequently associated (24 cases).

This profile is further emphasized by the number of different actors within each sector. Within the 49 cases in which actors from the private sector are associated, 41 cases show the participation of actors from more than two private sector sub-groups, for example, farmers, manufacturers, and/or financial institutions.

This variety is also found, even if less frequently, for the academic sector representation. In 30 cases, there is a participation of three or more universities or private and public research centers involved. Finally, public actors' participation reveals that only one public actor is associated with the project, either a national ministry, regional or

municipal institution. This also holds for the civil society actors. Public actors and, to a lesser extent civil society, emerge most often as enablers of the collaboration between researchers and firms within or between food systems – in technological platforms, clusters, or networking events – rather than as direct participants in the co-creation processes.

## 4.2 Types of interactions between actors and their operating scales

The cases show heterogeneous types of collaborations; in total, seven dominant partnership types have been identified as shown in Figure 2. A dominant partnership type is defined as the main orientation of a partnership. These are either networking-, policy-, entrepreneurship-, innovation-, research-, education- or observatory-oriented, and described<sup>2</sup> as follows (i) networking is the action or process of interacting with others to exchange information and develop professional or social contacts; (ii) policy is a law, regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions; (iii) entrepreneurship is the

<sup>2</sup> Using the Oxford Dictionary as basis: <https://www.oed.com/dictionary/>.

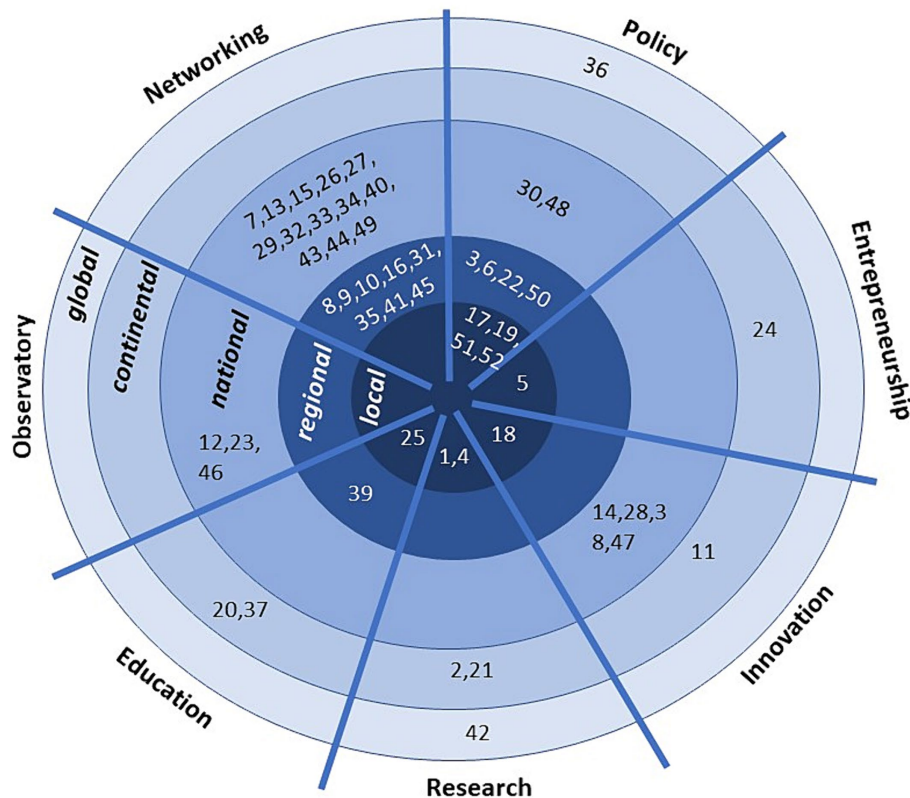


FIGURE 2

Dominant partnership types of interactions, characterized by their main orientation, and their scale of operation; the numbers correspond with the numbers of the case studies in the [Appendix](#). Source: the authors.

ability and readiness to develop, organize and run a business enterprise, along with any of its uncertainties in order to make a profit; (iv) innovation is the process of bringing about new ideas, methods, products, services, or solutions that have a significant positive impact and value; (v) research is the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions; (vi) education and training are the act of teaching knowledge to others and the act of receiving knowledge from someone else and (vii) observatory is a building or place given over to or equipped for observation of natural phenomena; in broader sense: a structure commanding a wide view of its surroundings.

Of the 52 cases, 21 cases (40%) are primarily networking-oriented partnerships, while 11 (21%) are predominantly policy-focused. Innovation-, research- or education-oriented partnerships all cover approximately 10% of the cases (6, 5, and 4 cases, respectively), while observatory- and entrepreneurship-oriented partnerships are less frequent (~5%; 3 and 2 cases, respectively). In a few cases, dominant orientations are overlapping. For example, case number 2 is research-oriented, namely the development of a strategic research agenda, however, it also has a strong EU-wide networking function. A second example is case number 5 where entrepreneurship and innovation are going hand-in-hand to valorize co-products. A third example is case 10 in which the platform has a strong networking role with the ambition to increase innovation in the wine sector. A final example is provided by cases 17 and 18, of which the second is both policy and innovation-oriented; however, the latter is

more clearly emerging due to organizational innovations of involved actors to reduce food waste.

Next, the playing fields of the studied partnerships are quite different, from local (17%), regional (25%), national (42%), and continental (11%) to global (4%). To avoid distinctions between too many scales, the inter-country cooperations are considered under the continental scale, while urban and urban-rural are included in the category 'local'.

As shown in [Appendix 1](#) and [Figure 1](#), 44 out of the 52 initiatives take place at either a local, regional, or national scale. Six initiatives are cross-country and at a European-wide scale, and two cases have a global dimension. Even if 14 European countries are represented, most initiatives originate from different Western European countries, with a high concentration of cases in France, Spain, and Italy, since involved partners are based in these countries and thus are quite familiar with these cases.

### 4.3 The joint objectives and strategies

The collaboration initiatives show a large diversity of co-creation activities with different objectives. The objectives are categorized in [Table 1](#). It shows that activities either directly target the three sustainability dimensions (economic, environmental, and/or social) of the food system, or indirectly via innovation, education, and support measures. The data suggests that innovation, research, and

TABLE 1 The wide range of objectives in the food system cases are grouped into six categories.

Strive for economic sustainability	Strive for environmental sustainability	Strive for social sustainability	Strengthen innovation and R&D	Develop education and training	Connect the private sector to other actors/experts
Getting price premiums for local farmers (case 3)	Protecting the natural landscape (case 3)	Including all actors in the chain (case 4)	Promoting innovation and digitalization in agribusiness (case 12)	Promoting the sustainability of the food system via education (case 17)	Promoting living labs, meeting places, activities, and innovation projects for private sector actors (case 9)
Valorizing co-products as business opportunity (5)	Reducing fertilizer usage (4)	Supporting small agri-food actors (6)	Stimulating scientific research (17), development, innovation (15,16) for competitiveness and internationalization (34)	Sharing knowledge regarding the challenges facing the food and agri-food sector (25)	Accompanying agricultural enterprises towards technological, digital, and ecological transitions (13)
Enhancing regional economic development (6)	Reducing phytosanitary products for sustainable viticulture (10)	Delivering healthy and sustainable foods to children, teachers, and old people (19) and ensuring healthy food for all (17)	Improving the sustainability of the bread chain via research and innovation (1)	Documenting annually the contribution of agriculture to the sustainability of the country (23)	Guiding agri-food businesses and researchers in facing challenges regarding digital and ecological transitions (35)
Increasing competitiveness (31) in especially international markets (7)	Producing more with fewer natural resources (11)/ improving resource use efficiency (21)	Stimulating local consumption of quality healthy products (6)	Transmitting scientific and technological know-how through public-private collaboration (32,40)	Providing farmers and agri-food stakeholders with knowledge, skills, and competencies to promote sustainable agriculture (37)	Providing a joint platform for networking between suppliers and buyers of seafood (46)
Increasing competitiveness and visibility of the regional food sector (8)	Fighting against waste (17) and especially reducing food waste (18) and losses (42)	Reformulating dishes in food industries to achieve healthier diets and increase consumer awareness (30)	Developing research and innovation roadmaps for action at eu and national level (2)	Training farmers regarding renewable energy plants (20)	Federating the activities of the technical institutes of the agri-food industry (33)
Promoting entrepreneurship and competitiveness (24)	Tackling (wood) diseases that affect grapevine cultivation (28)	Promoting networking and cooperation in agriculture, food science technology, and nutrition (29)	Establishing the european food technology platform (43)	Exchanging new knowledge and stimulating synergies between food companies (7)	Coordinating synergies among different innovation players (14)
Supporting sustainable economic growth in Italian agri-food (44)	Offering fish products respecting biodiversity (48)	Designing a job platform in agriculture for refugees (38)	Creating an R&I platform for the food industry in Wallonia (45) and Spanish wine sector (27)		Achieving sustainable public food procurement (51, 52)
Sustainably reaching improved market position and added-value fish products (47, 49)		Promoting processes of co-responsibility and empowerment (39)	Coordinating pre-competitive collective research projects (33)		
Promoting research and (technological) innovation for a competitive food industry (32, 41)		Promoting cultural heritage in rural areas (22) and protecting local gastronomic heritage and know-how (6)	Promoting technological innovation in the fisheries and aquaculture sector (26)		

A non-exhaustive list is here given. Source: the authors.

development often have a central place, even though they are not always predominant (see 4.2). Examples are research and knowledge sharing, technological advancements (process innovation,

digitalization), organizational reconfigurations (clustering, networking), and new markets or policies. Also, a strong focus on the economic dimension of sustainability can be observed. This is

coupled with activities directly aiming at supporting the private sector to innovate and contribute to transitions towards sustainability.

The cases are highly diverse in terms of employed strategies. The strategies either target (i) innovation capacity, (ii) new sustainability concepts, like agroecology and circular economy, or very dominantly aim to (iii) maintain and promote their partnership functioning, e.g., by unique networking schemes, acquiring funding capacities, or differentiation communication strategies (Table 2).

#### 4.4 The contribution to the sustainability of food systems

Finally, as shown in Figure 3, most multi-actor partnerships (45 cases) reported some sort of commonly and valuably reached contribution to sustainability. The contributions often address combined economic, environmental, and/or social dimensions of sustainability, e.g., reducing pesticides while making the agricultural sector more competitive. In 15 cases, only the economic dimension is targeted (see also 4.3), while 15 other cases focus on the environmental dimension. The social dimension is a little less expressed but with clearly reached targets.

### 5 Discussion

Results are discussed concerning our main research question of how food system actors from public, private, academic, and civil society (including philanthropic foundations) sectors cooperate to reach a common objective, and how does this contribute to the sustainability of food systems?

The empirical findings presented are solely based on a selection of 52 representative cases in the broad European food systems arena. Although more cases might exist, the selected cases already show heterogeneity in terms of actors involved (section 4.1. A diversity of actors involved in the collaboration initiatives), objectives (Table 1), dominant partnership types (Figure 2), strategies (Table 2), and sustainability outcomes (Figure 3).

Furthermore, the developed methodology, based on the structure of a game, allowed systematically describing very different collaboration initiatives. Results can be coherently discussed, as in the following four sub-sections.

#### 5.1 Diversity of actors in co-creation processes

The findings from the 52 cases confirm that multiple interacting actors from public, private, academic, and civil society (including philanthropic foundations) sectors can work together in different configurations in food systems. Hereby, actors from different sector groups have different roles in the co-creation process.

The actors most directly involved in co-creation processes in the selected cases are those belonging to the food industry and academic institutions. This may partly have to do with the sample of cases selected via the networks of the project partners, however, this finding supports the notion of the co-creation concept as a process of open innovation led by the private sector (Chesbrough, 2003), which corresponds with views of Augustin et al. (2021). Even more, results show that this open innovation process significantly takes place outside the boundaries of a single firm. It involves cooperation among different businesses of the same sector, value chain, or operating in the same territory. Similarly, academic institutions are often involved in co-creation processes not as standalone actors but as part of a consortium or an (inter-)national network. Then, actors from the public sector and the civil society emerge in our cases as less present but still relevant actors. They often facilitate, organize, and frame the interactions among business and academic institutions thanks to a well-structured environment and enabling boundary conditions. In some cases, one or a few key public or civil society actors act as pivots in the initiative.

#### 5.2 Types of interactions between actors, and their operating scales

Results also highlight the importance of the diversity of interactions between actors, in various playing fields, or environments

TABLE 2 The employed strategies in the food system cases, grouped within 3 categories, of which the third is divided into three sub-categories.

Innovation capacity	Sustainability concepts	Partnership functioning		
		Management	Funding	Communication and exploration
Innovation in general (9,29,30,34)	Agro-ecology research concepts (1, 42)	Collaboration (2, 10, 31, 34, 41)	Private funding (28)	Knowledge and information management (20, 23, 30)
Combined technological, business, and social innovation (5)	Agro-ecology and technological innovation (4)	Governance and coordination (17, 33)	Public-private funding (26, 27)	Expert advice (21), knowledge provision (37), marketing advice (45)
Innovation via knowledge exchange (14, 15, 31, 32, 40, 41, 49, 50) and value chain transparency (46)	Waste collection and redistribution (18)	Networking (26, 44, 45), knowledge exchange, and advice (7, 14, 16, 33, 38)	Funding information (43,44)	Product branding, labeling, place branding (3, 6, 22, 46, 48)
Product and technological innovation (7, 10, 11, 12, 42), including digitalization (8, 13)	Valorization of by-products (5)	Clustering of enterprises (8) and partnerships (9, 11, 12, 29, 43)	Funding in general (45)	Innovation in marketing and Enhancing image (47)

A non-exhaustive list is here given. Source: the authors.

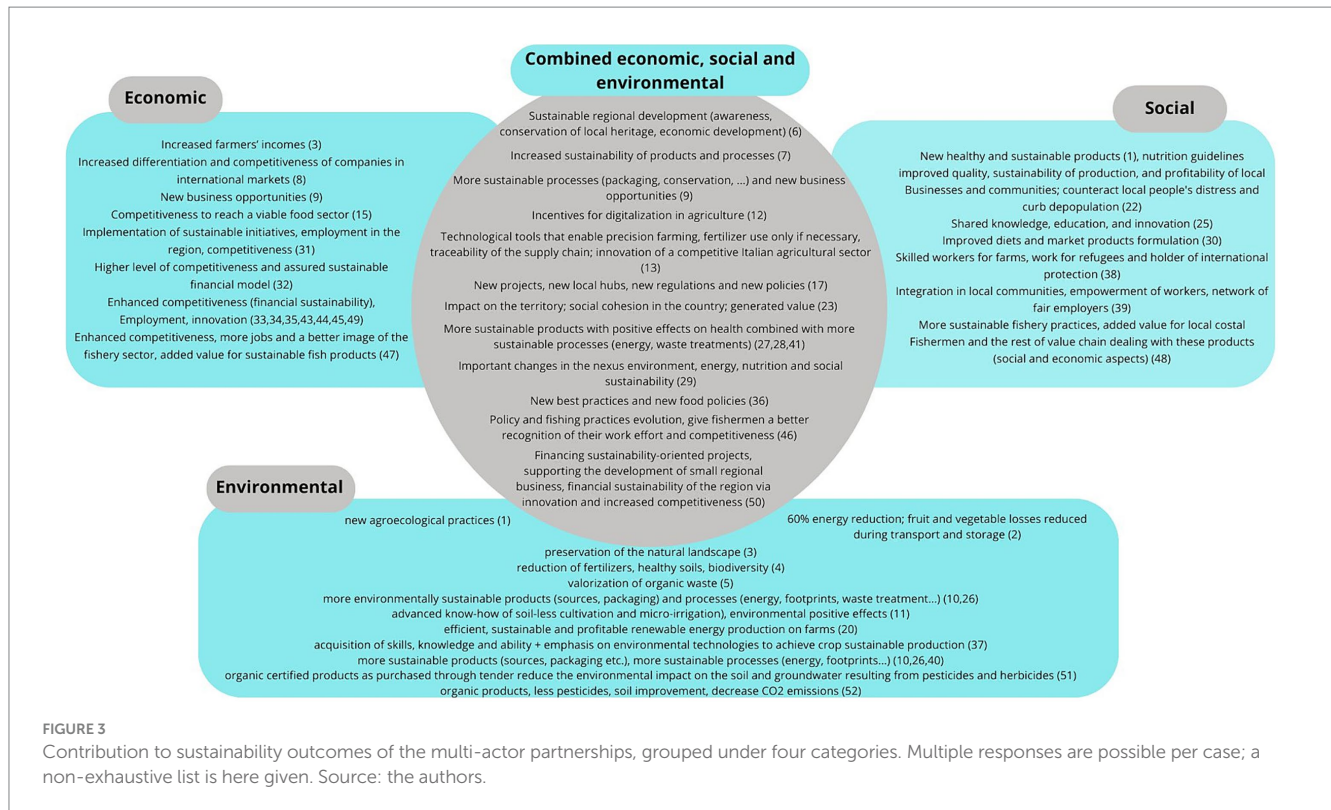


FIGURE 3

Contribution to sustainability outcomes of the multi-actor partnerships, grouped under four categories. Multiple responses are possible per case; a non-exhaustive list is here given. Source: the authors.

such as platforms, production contexts, rural–urban interfaces, or regions. In these environments, actors share material assets like food or related products, and immaterial assets like financial and human resources. The interactions result in various collaborative forms or ‘partnerships’ depending on their dominant orientation and scales (Figure 2). Seven dominant partnership types have been identified namely networking-, policy-, entrepreneurship-, innovation-, research-, education- or observatory-oriented.

The most dominant partnership type is networking-oriented and operates primarily at national and regional scales (Figure 2). Since the main targeted sustainability dimension of the cases is economic, closely followed by the environmental dimension, this suggests that support for economic and environmental performance at national and regional levels has been particularly encouraged. This is further emphasized by the relatively high number of innovation-oriented partnership types operating at a national scale.

The second most dominant partnership type is policy-oriented and, in particular, linked to the local and regional context. The active role of private and academic actors in co-creation processes is thus probably fostered by local and regional policymakers.

Since the number of case studies is rather limited, one may not directly draw conclusions about the relatively low number of cases that are either entrepreneurship- or observatory-oriented. However, the attention of the European Commission for stimulating entrepreneurship and creating an Observatory for sustainable food systems may be related to our findings.

### 5.3 Joint objectives and strategies

Objectives in the case studies are diverse but mainly centered on innovation and economic competitiveness, aside from those being

linked to the promotion of the environmental and social dimensions of sustainability. The participation of civil society and the public sector is very relevant for all the objectives, especially to emphasize the need to integrally respond to the three dimensions of sustainability during the co-creation processes. Next, the ambition of the European Commission to support different forms of cooperation in food systems – utilizing the term ‘inclusiveness’ – corresponds with the enormous variety of objectives observed for the 52 cases. This implies that the sustainability of the food systems cannot be addressed via a ‘one size fits all’ approach. Since the number of food system cases may be very substantial, European support at the individual food system level may be too time-consuming. Structured support focused on ‘partnership types orientations’ and ‘distinguished scales’ – respectively, seven and five are here given – is suggested for public bodies supporting partnerships with very different objectives.

Regarding the different strategies implemented, innovation capacity is included in many different partnership types, even if the dominant orientation is not ‘innovation-oriented’. Hence, innovation remains a priority of very different types of partnerships. Furthermore, those cases including holistic sustainability concepts are mainly linked to research-, innovation-, education- or entrepreneurship-oriented types; suggesting a longer time horizon strategy. Finally, cases under the functioning of partnerships – via strategies focused on governance and coordination – are logically related to policy-oriented partnership types.

Another insight is that the co-creation process activities and strategies often focus on the organization of the multi-actor partnership itself – as underlined by Smyth et al. (2021) for public-private partnerships – managing its complexity and dealing with operational and organizational challenges. This requires new forms of governance and management processes.



## 5.4 The contribution to the sustainability of food systems

This concerns the question of how multi-actor cooperations contribute to the sustainability of food systems. The 52 cases illustrate that they provide input to the three dimensions of sustainability (Figure 3), according to their objectives. A majority of cases still focus on the economic dimension; a recurrent term is ‘competitiveness.’ This is not surprising since many cases – starting in 2000 – were confronted with the economic crises in 2008, the COVID pandemic, the Russian invasion of Ukraine, the subsequent energy crisis, and the current inflation rates. Even more, since most cases represent partnership types that are networking-oriented (12 networking-oriented cases explicitly put upfront the economic dimension), it may be hypothesized that the main aim of networking was – and still is – to increase competitiveness.

More recently, also the environmental and social dimensions got attention as observed in our cases, with specific attention to concerns about efficiently using resources and vulnerable groups, respectively. In networking-, policy-, entrepreneurship-, innovation-, research- and education-oriented partnerships, contributions to the environmental dimension are clearly expressed.

The social dimension is underlined in particular by the policy-, but also by innovation-, research- and education-oriented partnerships. The attention to this social dimension most probably will increase in Europe in the context of recent inflation rates, increasing food prices, and reduced buying power influencing the well-being of citizens in all professions, and in particular vulnerable groups and smaller enterprises.

The first examples in which all three dimensions are integrally considered – as proposed by Hebinck et al. (2021) and here addressed from a multiple value co-creation perspective – are apparent. This especially holds for the three ‘observatory-oriented’ partnerships, but also for a substantial number of ‘networking’ and ‘policy’ oriented partnerships. Even though, they are still rather vaguely described and rather broadly defined in the case studies. Expressions such as ‘more (sustainable), less (pesticides), increased, decreased’ are used. Still, these qualitative outcomes are highly relevant to observe if collaboration initiatives evolve in the direction of reaching

sustainability of food systems. Additionally, concrete figures or details (numbers, percentages, ...) may provide insights into how fast the food systems are changing; these figures are generally lacking. Despite the efforts of existing strategies such as the EU Farm to Fork strategy (EC, 2020), there is a need for clear indicators, (self-) assessment tools, and observatory-oriented initiatives.

The following Figure 4 illustrates how co-creation is at the core of partnerships that contribute to sustainability in food systems taking into account the seven building blocks of a game. In this paper, the part in the dotted square has been the focal point. The definition of co-creation by Ramaswamy and Ozcan (2018) is well recognizable in the left part of this concept including players, moves, and playing field.

Such a concept, including insights into the seven building blocks of a food system (like playing field or environment, resources, boundary conditions, etc.) and predominantly oriented partnership types, may be translated into practical guidelines that serve policymakers and actors. Then, they can well-structure their co-creation activities to reach the sustainability of their food system based on realistic common sustainability objectives.

The first recommendations for the European Partnership on Sustainable Food Systems, policy makers, and other food system actors are:

1. The use of a template based on a game structure (Figure 1) seems highly appropriate for studying different food systems because all different actors are familiar with games.
2. The collaborative initiatives, here called ‘partnerships,’ are suggested to be inclusive, i.e., involving different actors from the public, private, academic, and civil society (including philanthropic foundations) sectors. Private and academic sector actors are involved in co-creation processes driving the partnerships, while public and civil society actors are initiators, enablers, and organizers of environments of interactions, at local to global scales. Figure 4 serves as a guiding concept for co-creation.
3. The diversity of (forthcoming) partnerships is huge, hence, a distinction between partnership types with different dominant orientations is suggested. Here, ‘networking-,

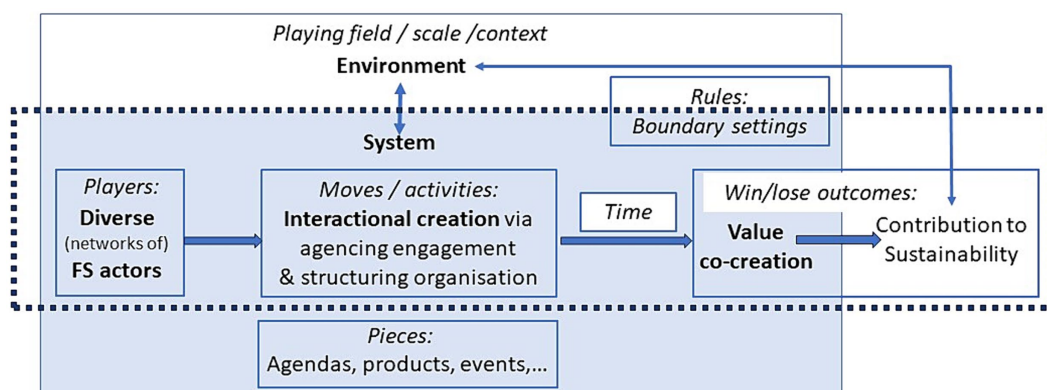


FIGURE 4

Co-creation is at the core of partnerships that contribute to sustainability in food systems taking into account the seven building blocks of a game. Source: the authors.

policy-, entrepreneurship-, innovation-, research-, education- and observatory (or assessment)-oriented partnership types are proposed (Figure 2; based on 52 cases). Since networking- and policy-orientations are dominant, one may strategically use these to reinforce the other five partnership orientations.

4. The partnerships and their objectives are scale-dependent (local, regional, national, continental, and global; Figure 2). Since at continental and global scales policy makers and other individual food system actors are often disconnected, a strong partnership with globally acting networks, which are (sub-) nationally well-embedded, should get a strong impulse. This may generate a snowball effect at different scales.
5. Competitiveness, resource use efficiency, healthy diets as well as cooperation with vulnerable groups and smaller enterprises emerge as recurrent objectives (Table 1; Figure 3). Since most case studies are long-term initiatives, and hence benefit from lasting commitments of members, these objectives are recommended to be used as first forces of attraction in future supported partnerships, before gradually addressing others.
6. Regarding strategies, a focus on innovation with 'sustainability targets', mixed funding schemes, different forms of public-private cooperations and knowledge exchange, remain key drivers for joint activities and co-decision-making processes; it is recommended to integrally maintain these in policy measures.

## 6 Conclusion

Following the three aims of this paper – namely unraveling the variety of co-creation cases for their contribution to the sustainability of food systems, understanding how actors collaborate to reach common objectives within the boundaries of sustainability, and developing a co-creation concept for partnerships (Figure 4) – our insights lead to the following conclusions.

The 52 cases have contributed to the visibility and novel empirical insights into highly distinctive food system partnerships in Europe. Thanks to the methodology based on the game structure with seven building blocks, information was collected and analyzed in a structured way by different actors even if collaboration initiatives and their contexts, scales, products, and boundary conditions were highly different.

Also, common features could be extracted from the data regarding interactions between actors, joint activities, a wide range of common objectives and diverse strategies, as well as contributions to sustainability. The latter revealed that in particular measurement and interpretation of sustainability contributions require attention due to different environments and scales.

Our data about interactions elucidated the richness of diverse partnerships allowing actors to jointly and strategically operate to reach common sustainability objectives. However, these also expressed the need for a structuring of partnerships in orientations and scales. A typology of partnerships that are either predominantly networking-, policy-, entrepreneurship-, innovation-, research-, education- or observatory-oriented help structuring (public) support actions at different scales.

The current co-creation literature addresses multi-actor activities to create a commonly accepted value. Our scientific contribution underlines the significance of how joint co-creation activities and interactions between heterogeneous actors, in diverse partnership settings, result in commonly defined sustainable value creation. A scheme that connects the co-creation definition with partnerships structured according to a game has been presented in Figure 4.

This scheme, based on a definition of co-creation in literature, will guide the Partnership on Sustainable Food Systems, and others in Europe, to support distinctive, well-structured collaboration with common, realistic objectives. Based on the discussion of results obtained in the 52 case studies, 6 main recommendations have been formulated above (chapter 5).

Finally, this work evokes new research questions. One concerns the role and types of actions of public actors and civil society, but also other actors that act as intermediaries. Another question is about the type, inclusiveness, and adaptability of innovative governance models that are at the core of co-creation processes and the transformation of food systems to reach our sustainability development goals. These themes are currently elaborated on in in-depth case studies.

## Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

## Author contributions

HV: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. MD: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. FF: Writing – original draft, Investigation, Formal analysis, Data curation. MM: Writing – review & editing, Investigation, Formal analysis, Data curation. JL-M: Writing – review & editing, Investigation, Data curation, Conceptualization. EC: Writing – review & editing, Investigation, Data curation. CA: Writing – review & editing, Investigation, Data curation. JM: Writing – review & editing, Investigation, Data curation. GA: Writing – review & editing, Investigation, Data curation. DR: Writing – review & editing, Investigation, Data curation. EP: Writing – review & editing, Investigation, Data curation. TM: Writing – review & editing, Investigation, Data curation. AB: Writing – review & editing, Investigation, Data curation. JV: Writing – review & editing, Investigation, Data curation. VA: Writing – review & editing, Investigation, Data curation. LL: Writing – review & editing, Investigation, Data curation. AV: Writing – review & editing, Investigation, Data curation.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## References

- Agrawal, A. K., Kaushik, A. K., and Rahman, Z. (2015). Co-creation of social value through integration of stakeholders. *Procedia Soc. Behav. Sci.* 189, 442–448. doi: 10.1016/j.sbspro.2015.03.198
- Asheim, B. T., and Coenen, L. (2005). Knowledge bases and regional innovation systems: comparing Nordic clusters. *Res. Policy* 34, 1173–1190. doi: 10.1016/j.respol.2005.03.013
- Augustin, M. A., Cole, M. B., Ferguson, D., Hazell, N. J. G., and Morle, P. (2021). Perspective article: towards a new venture science model for transforming food systems. *Glob. Food Sec.* 28:100481. doi: 10.1016/j.gfs.2020.100481
- Bendapudi, N., and Leone, R. P. (2003). Psychological implications of customer participation in co-production. *J. Mark.* 67, 14–28. doi: 10.1509/jmkg.67.1.14.18592
- Béné, C., Oosterveer, P., Lamotte, L., Brouwer, I. D., de Haan, S., Prager, S. D., et al. (2019). When food systems meet sustainability – current narratives and implications for actions. *World Dev.* 113, 116–130. doi: 10.1016/j.worlddev.2018.08.011
- Bock, A., Bontoux, L., and Rudkin, J. (2022). Concepts for a sustainable EU food system, vol. 2022. Luxembourg: EUR30894 EN, Publications Office of the European Union.
- Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Boston, Massachusetts: Harvard Business Press.
- Clapp, J. (2021). The problem with growing corporate concentration and power in the global food system. *Nat. Food* 2, 404–408. doi: 10.1038/s43016-021-00297-7
- Contini, C., Marotta, G., and Torquati, B. (2020). Multi-actor approaches to implement cooperative strategies and value chains based on sustainability. *Agric. Econ.* 8:7. doi: 10.1186/s40100-019-0147-3
- de Vries, H., Donner, M., and Axelos, M. (2021). A new conceptual ‘cylinder’ framework for sustainable bioeconomy systems and their actors. *J. Agric. Environ. Ethics* 34:11. doi: 10.1007/s10806-021-09850-7
- de Vries, H., Donner, M., and Axelos, M. (2022). Sustainable food systems science based on physics’ principles. *Trends Food Sci. Technol.* 123, 382–392. doi: 10.1016/j.tifs.2022.03.027
- EC (2019). Available at: [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en) (Accessed November 22, 2023).
- EC (2020). European Farm to Fork Strategy. Available at: [https://food.ec.europa.eu/system/files/2020-05/f2f\\_action\\_plan\\_2020\\_strategy\\_info\\_en.pdf](https://food.ec.europa.eu/system/files/2020-05/f2f_action_plan_2020_strategy_info_en.pdf) (Accessed October 17, 2023).
- Egal, F., and Berry, E. M. (2020). Moving towards sustainability—bringing the threads together. *Front. Sustain. Food Syst.* 4:9. doi: 10.3389/fsufs.2020.00009
- Ericksen, P. (2008). Conceptualizing food systems for global environmental change research. *Glob. Environ. Chang.* 18, 234–245. doi: 10.1016/j.gloenvcha.2007.09.002
- Eurostat (2023). Available at: <https://ec.europa.eu/eurostat/cache/website/economy/food-price-monitoring/> (Accessed October 17, 2023).
- FAO (2022). *The future of food and agriculture – Drivers and triggers for transformation*. The Future of Food and Agriculture: FAO, Rome.
- Footprintnetwork (2023). Available at: <https://www.footprintnetwork.org/our-work/earth-overshoot-day> (Accessed November 22, 2023).
- Galvagno, M., and Dall’i, D. (2014). Theory of value co-creation: a systematic literature review. *Manag. Serv. Qual.* 24, 643–683. doi: 10.1108/MSQ-09-2013-0187
- Gamache, G., Anglade, J., Feche, R., Barataud, F., Mignolet, C., and Coquil, X. (2020). Can living labs offer a pathway to support local Agri-food sustainability transitions? *Environ. Innov. Soc. Trans.* 37, 93–107. doi: 10.1016/j.eist.2020.08.002

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fsufs.2024.1399275/full#supplementary-material>

- Gascuel-Oudou, C., Lescourret, F., Dedieu, B., Detang-Dessendre, C., Faverdin, P., Hazard, L., et al. (2022). A research agenda for scaling up agroecology in European countries. *Agron. Sustain. Dev.* 42:53. doi: 10.1007/s13593-022-00786-4
- Georgescu-Roegen, N. (1971). *The entropy law and the economic process*. Cambridge, Massachusetts: Harvard University Press.
- Gereffi, G., and Lee, J. (2012). Why the world suddenly care about global supply chains? *J. Supply Chain Manag.* 48, 24–32. doi: 10.1111/j.1745-493X.2012.03271.x
- Gillespie, S., and van den Bold, M. (2017). Agriculture, food systems, and nutrition: meeting the challenge. *Global Chall.* 1:1600002. doi: 10.1002/gch.2.201600002
- Goodman, D., DuPuis, E. M., and Goodman, M. K. (2012). *Alternative food networks: Knowledge, practice, and politics*. London: Routledge.
- Hebinck, A., Zurek, M., Achterbosch, T., Forkman, B., Kuijsten, A., Kuiper, M., et al. (2021). A sustainability compass for policy navigation to sustainable food systems. *Glob. Food Sec.* 29:100546. doi: 10.1016/j.gfs.2021.100546
- Herrero, M., Thornton, P. K., Mason-D’Croz, D., Palmer, J., Benton, T. G., Bodirsky, B. L., et al. (2020). Innovation can accelerate the transition towards a sustainable food system. *Nat. Food* 1, 266–272. doi: 10.1038/s43016-020-0074-1
- Ind, N., and Coates, N. (2013). The meanings of co-creation. *Eur. Bus. Rev.* 25, 86–95. doi: 10.1108/09555341311287754
- IPBES (2019) in Global assessment report on biodiversity and ecosystem services of the intergovernmental science-policy platform on biodiversity and ecosystem services. eds. E. S. Brondizio, J. Settele, S. Díaz and H. T. Ngo (Bonn, Germany: IPBES Secretariat), 1148.
- IPCC (2023). “Sections” in Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II, and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. eds. Core Writing Team, H. Lee and J. Romero (Geneva, Switzerland: IPCC), 35–115.
- Jackson, P., Rivera Ferre, M. G., Candel, J., Davies, A., Derani, C., de Vries, H., et al. (2021). Food as a commodity, human right or common good. *Nat. Food* 2, 132–134. doi: 10.1038/s43016-021-00245-5
- Jull, J., Giles, A., and Graham, I. D. (2017). Community-based participatory research and integrated knowledge translation: advancing the co-creation of knowledge. *Implement. Sci.* 12, 1–9. doi: 10.1186/s13012-017-0696-3
- Leminen, S., Westerlund, M., and Nyström, A. G. (2012). Living labs as open-innovation networks. *Technol. Innov. Manag. Rev.* 2, 6–11. doi: 10.22215/timreview/602
- Markelova, H., Meinzen-Dick, R., Hellin, J., and Dohrn, S. (2009). Collective action for smallholder market access. *Food Policy* 34, 1–7. doi: 10.1016/j.foodpol.2008.10.001
- Meadows, D. H., Meadows, D. L., Randers, J., and Behrens, W. W. III (1972). *The limits to growth; a report for the Club of Rome’s project on the predicament of mankind*. New York: Universe Books.
- Miles, A., and Hoy, C. (2023). Editorial: achieving food system resilience and equity in the era of global environmental change. *Front. Sustain. Food Syst.* 6:1126013. doi: 10.3389/fsufs.2022.1126013
- Prahalad, C. K., and Ramaswamy, V. (2004). *The future of competition: co-creating unique value with customers*. Boston, Massachusetts: Harvard Business Press.
- Prigogine, I., and Stengers, I. (1985). *Order out of Chaos: Man’s new dialogue with nature*. London, UK: Flamingo.
- Ramaswamy, V., and Ozcan, K. (2018). What is co-creation? An interactional creation framework and its implications for value creation. *J. Bus. Res.* 84, 196–205. doi: 10.1016/j.jbusres.2017.11.027

- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., et al. (2009). A safe operating space for humanity. *Nature* 461, 472–475. doi: 10.1038/461472a
- Sacchi, G., Cei, L., Stefani, G., Lombardi, G. V., Rocchi, B., Belletti, G., et al. (2018). A multi-actor literature review on alternative and sustainable food Systems for the Promotion of cereal biodiversity. *Agriculture* 8:173. doi: 10.3390/agriculture8110173
- SAPEA (2020). Science advice for policy by European academies. A sustainable food system for the European Union. Berlin: SAPEA.
- SCAR (2023). Available at: [https://scar-europe.org/images/FOOD/Main\\_actions/SFS\\_Partnership\\_SRIA\\_31012023.pdf](https://scar-europe.org/images/FOOD/Main_actions/SFS_Partnership_SRIA_31012023.pdf) (Accessed October 20, 2023).
- Scaamuzzi, S., Gerini, F., Sara Gabellini, S., and Casini, L. (2023). Food systems R&I needs and gaps report; SCAR FS SWG - Action 1 "Food Systems of the Future". 75 pages. Available at: [https://scar-europe.org/images/FOOD/Deliverables/FOOD-SYSTEMS\\_RI\\_Needs\\_Gaps\\_Report\\_12-01-2023.pdf](https://scar-europe.org/images/FOOD/Deliverables/FOOD-SYSTEMS_RI_Needs_Gaps_Report_12-01-2023.pdf). (Accessed December 12, 2023).
- Smyth, S. J., Webb, S. R., and Phillips, P. W. (2021). The role of public-private partnerships in improving global food security. *Glob. Food Sec.* 31:100588. doi: 10.1016/j.gfs.2021.100588
- Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., et al. (2018). Options for keeping the food system within environmental limits. *Nature* 562, 519–525. doi: 10.1038/s41586-018-0594-0
- Tanzer, M., Gläsel, A., and Egermann, M. (2022). Elucidating the capabilities of international mechanisms to foster procedural just system change – the case of the 2021 UN food system summit. *Environ. Innov. Soc. Trans.* 45, 72–82. doi: 10.1016/j.eist.2022.09.002
- Torring, J., Sørensen, E., and Røiseland, A. (2019). Transforming the public sector into an arena for co-creation: barriers, drivers, benefits, and ways forward. *Adm. Soc.* 51, 795–825. doi: 10.1177/0095399716680057
- UN (2015). Sustainable Development Goals. Available at: <https://sdgs.un.org/goals>. (Accessed November 22, 2023).
- UN (2022). The United Nations world water development report 2022: Groundwater: Making the invisible visible. Paris: UNESCO.
- UNEP (2016). Food Systems and Natural Resources. A Report of the Working Group on Food Systems of the International Resource Panel. Westhoek, H., Ingram, J., Van Berkum, S., Özay, L., and Hajer, M.
- UN FSS. (2021). Summit Vision. Available at: <https://www.un.org/en/food-systems-summit/vision-principles>. (Accessed November 22, 2023).
- Vargo, S. L., and Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *J. Mark.* 68, 1–17. doi: 10.1509/jmkg.68.1.1.24036
- Vermeulen, S. J., Campbell, B. M., and Ingram, J. S. I. (2012). Climate change and food systems. *Annu. Rev. Environ. Resour.* 37, 195–222. doi: 10.1146/annurev-environ-020411-130608
- Von Hippel, E. (2006). Democratizing innovation. Cambridge: The MIT Press.
- Voorberg, W. H., Bekkers, V. J., and Tummers, L. G. (2015). A systematic review of co-creation and co-production: embarking on the social innovation journey. *Public Manag. Rev.* 17, 1333–1357. doi: 10.1080/14719037.2014.930505
- WCED (1987). World commission on environment and development. Our common future (commonly referred to as the Brundtland report). Oxford, UK: Oxford University Press.
- Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., et al. (2019). Food in the Anthropocene: the EAT–lancet commission on healthy diets from sustainable food systems. *Lancet* 393, 447–492. doi: 10.1016/S0140-6736(18)31788-4
- Wind, J., and Rangaswamy, A. (2001). Customerization: the next revolution in mass customization. *J. Interact. Mark.* 15, 13–32. doi: 10.1002/1520-6653(200124)15:1<13::AID-DIR1001>3.0.CO;2-#