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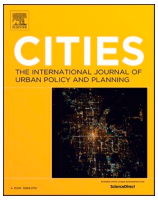

Cultivating change: Exploring policies, challenges, and solutions to support city region food systems development in six European countries

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ABSTRACT

City Region Food System (CRFS) initiatives exist in various forms, featuring a diversified set of social, economic and environmental performances and impacts. The CRFS approach includes all actors, processes, and relationships involved in the food chain (from production and processing to the distribution and consumption of food) in a given geographical area. Therefore, it encompasses the most crucial elements for facilitating interactions between rural, peri-urban and urban areas. Existing policies may have the potential to support or hinder the progress and development of CRFS initiatives. This research addresses international and national policies as well as the related constraints and challenges that affect CRFS development in six European countries. The overall goal of this research relates to the research questions of how this all-encompassing policy system impacts urban food production and how stakeholders, researchers, and practitioners perceive the current policies at the multinational level. Various strategic plans with positive and negative impacts, as well as current policy gaps, were compiled from both theoretical and practical perspectives. Data collection was conducted through desktop research, stakeholder interviews and a workshop. Thus, expanding upon the analysis of the results, the study discusses the current challenges in the field of CRFS policies by providing examples, proposing potential improvements, and offering recommendations.

1. Introduction

Sustainability and food security are among the greatest challenges currently faced by food systems worldwide. There are many laws and regulatory frameworks that can hinder or encourage the development of initiatives dedicated to the transition towards a sustainable food system. Furthermore, since 2010 — and, in particular, after the 2015 Milan Food Policy Pact (MUFFP) — the focus of governance has shifted towards urban food system innovation, as hundreds of cities have implemented food policies to support sustainable initiatives at the local level (Hawkes & Halliday, 2017). Similarly, the so-called City Region Food System (CRFS) approach, launched by the Food and Agriculture Organisation of the United Nations (FAO-UN), aims to promote the growth of resilient and sustainable food systems in urban, peri-urban, and rural areas by strengthening rural-urban linkages and by including all actors, processes, and relationships involved in the food chain (RUAF, 2019). The small-scale production and consumption patterns applied in CRFS initiatives have the potential to bring many positive effects. For instance, they can contribute to improving climatic conditions at the local level in cities (Artmann & Sartison, 2018; Gasperi et al., 2016) and to reducing greenhouse gas (GHG) emissions compared to long food supply chains (Sanyé-Mengual, Gasperi, et al., 2018; Sanyé-Mengual, Specht, et al., 2018; Sanjuan-Delmás et al., 2018). CRFS initiatives also support a greater awareness of sustainable and local food production among the

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population (Ilieva et al., 2022; Opitz et al., 2017; Zoll et al., 2017). However, CRFS initiatives also pose possible challenges. For example, as an exemplary CRFS initiative, urban agriculture (UA) often competes with other urban land uses, such as development for residential purposes, renewable energy production, or even other green and open spaces for the population's recreation. Such challenges can ultimately inhibit the expansion of such food production models (Russo et al., 2017; Specht et al., 2014; Specht et al., 2021).

To counteract conflicting land uses and promote CRFS initiatives, various policies have been established at the European, national, and local levels to reduce or eliminate barriers. The policies discussed in this article address the three policy types introduced by Mickwitz (2003) and include (a) regulations, (b) incentives, and (c) awareness-raising measures. In this regard, one well-known policy that influences CRFSs is the Common Agricultural Policy (CAP). Through the provisions of the CAP, the EU aims to promote sustainable agricultural production and food systems in a manner that takes into account the economic, environmental, and social dimensions of agricultural production and consumption throughout all EU member states (EU, 2013a, 2013b). While the overall objective of the CAP is to improve agricultural productivity and provide a fair income for farmers in the European Union, its track record in the fields of sustainable food production, marketing, and support for small-scale producers (i.e., family businesses or businesses that engage in only local or regional marketing) is uneven. Accordingly, common critics of the CAP consider its effect to be mainly limited to large and industrial farming operations, ignoring smaller and individual farms, which, however, play a major role (two-thirds of European farms are below 5 ha, Eurostat, 2023), especially in the context of sustainable CRFSs (EC, 2018, 2019, 2020a, 2020b, 2021; Pe'er et al., 2017; Piorr et al., 2018). The CAP has historically encouraged large-scale food production by linking direct payments and financing to farm sizes (Curry et al., 2014; Recanti et al., 2019), an approach that is reflected in national policy schemes throughout the EU. The finalisation of the new CAP provisions (2023–2027) and of national strategic plans is *timely* in that it coincides with the present research work. Therefore, the analysis of the challenges arising from the CAP refers to its previous programming period up to and including 2022. Partly in response to the CAP as a mainstream EU policy, "bottom-up" strategies and concrete programmes are being developed to influence a sustainable food system transition, especially at the local level.

1.1. The CRFS theoretical framework

About a decade ago, the City Region Food System (CRFS) approach began to attract significant attention in international discussions on urban food systems. By then, stakeholders recognised that a territorial and holistic approach to food systems was the best strategy for addressing emerging global challenges. The CRFS framework was introduced by Jennings et al. (2015), who defined it as: "the complex network of actors, processes, relationships that has to do with food production, processing marketing, and consumption in a given geographical region which includes a more or less concentrated urban centre and its surrounding peri-urban and rural hinterland." In this regard, the present research adopted the CRFS approach as a theoretical framework to evaluate European, national, and municipal policy impacts on local food systems.

Furthermore, beyond being a multidimensional strategy, the CRFS approach introduces two major innovations. Firstly, it seeks to establish a food governance framework that takes into account local contexts, recognizing that cities are part of a larger geographical setting and that food-related decisions should span the urban-rural continuum. Secondly, this perspective acknowledges the ecological, socio-economic, and governance connections that define food systems. These dimensions are equally important as well as mutually reinforcing (Jennings et al., 2015).

According to FAO and RUAF Foundation (2015), the main aim of sustainable and resilient CRFSs is to improve sustainability by:

- Enhancing food access: ensuring that citizens within a city region have sufficient, nutritious, safe, and affordable food.
- Creating good jobs: establishing a sustainable regional food economy that provides fair and decent employment opportunities in the food supply chains within a city region.
- Boosting regional resilience: increasing the region's ability to tolerate shocks by reducing its dependence on global supply chains.
- Promoting stronger rural-urban relationships: strengthening social ties between consumers and producers, and including smallholders and vulnerable groups in the food supply chains within a city region.
- Improving ecosystem and natural resource management: encouraging agro-ecological diversity and protecting urban ecology and ecosystems.
- Supporting a participatory approach to governance: promoting a co-designed approach to food policies within the context of urban and territorial planning.

Thus, positive and negative policies, as well as policy gaps, were then evaluated based on their potential impacts related to the above-mentioned aims of CRFSs in the analysed EU, national, and municipal regulatory frameworks.

1.2. CRFS policy approach in relevant scientific literature

Most of the literature on City Region Food Systems (CRFS) is either theoretical or focused on specific case studies. Both types offer different insights and approaches to understanding CRFS.

Theoretical literature delves into conceptual frameworks and models that explain the dynamics of CRFS. This type of literature aims to develop a deeper understanding of the underlying mechanisms and principles governing food systems within city regions by providing general principles applicable to CRFS across various contexts. FAO and RUAF Foundation were particularly active in the publication of reports that synthesise common themes, challenges, and best practices that can be adapted to different city regions (2015, 2017). In particular, they developed an indicator framework as a practical toolkit to help cities to assess the performance of a CRFS, plan strategy to achieve desired outcomes and monitor changes resulting from policy implementation (FAO and RUAF, 2017).

Specific case study literature focuses on detailed analyses of CRFS in particular city regions. These studies provide in-depth insights into the unique challenges, strategies, and outcomes experienced in individual cases. This type of literature often includes primary data collection through interviews, surveys, and observations. Blay-Palmer et al. (2018), for example, critically evaluated the CRFS approach comparing it to other approaches and assessing how to make it more robust by applying it to existing projects through several case studies in Latin America and Sri Lanka. Similarly, Dubbeling et al. (2017) examined CRFS in eight city regions across several countries. It includes an analysis of the CRFS concept through case studies in Quito and Medellín and discusses initial progress in policy adoption and territorial food planning. Taking the Chinese city of Chengdu as an example, Fei et al. (2023) developed an indicator framework to assess CRFS existing challenges and capabilities, providing concrete evidence for potential policy interventions. Similarly elaborating on the CRFS approach as a framework, González-Azcárate et al. (2023) conducted 35 semi-structured interviews to City council members in Madrid to understand the barriers and leverage points for municipalities to foster Short Food Supply Chains (SFSCs). Several other papers have addressed the different barriers and opportunities presented by certain policies while focusing on only a specific city or a specific form of Urban Strategy (US), such as the implementation and impact on rooftop agriculture (Marchetti et al., 2015; Orsini et al., 2014; Zambrano Prado et al., 2021).

On this trail, this paper builds up on the existing literature, which

mostly deals with the influence of policies on CRFS initiatives in general. However, there is a gap in the research analysing both positive and negative policies as well as policy gaps across various European countries in different policy domains. Accordingly, by analysing existing (or missing) policies, the present research aims to present (1) the areas in which existing policies can have a particularly inhibiting effect, (2) the areas in which there is still a need for action (policy adjustment or policy gap) for the successful advancement of CRFS initiatives in the European countries investigated, and (3) barriers and challenges that influence their development. Thus, this study organises its results into three main policy categories, i) negative policies, ii) policy gaps, and iii) positive policies, and it examines stakeholders' perceptions and their perceived impact on CRFS development in six European countries. This study also elaborates on the current challenges of the CRFSs approach in the respective policy fields as well as examples, possible solutions, and recommendations.

2. Methodology

Data were collected through desktop research and interviews with stakeholders and were further examined during a multi-national and multi-stakeholder workshop.

2.1. Desktop research

The first methodological step was to conduct desktop research with the aim of identifying a starting set of policies in the selected EU countries. The policies (n = 197) (Supplementing Materials) were collected using two different tools with identical content. One format involved an internal spreadsheet used by project researchers to input policies for the six countries and, more generally, for the EU context based on their research and work background. The other format was an online survey created to elicit the same content, accessible through the "1KA-One click survey" platform (https://www.1ka.si/d/en). Researchers distributed this survey to experts and stakeholders from their respective countries, including representatives of municipalities, CRFS initiatives, and non-governmental organisations (NGOs). The survey aimed to broaden data collection by incorporating information and policies from different perspectives and positions. A total of 19 participants took part in the desktop research and the online survey.

First, the study identified three macro-categories of policies to be entered in a pre-structured spreadsheet configuration: i) policies with positive impacts on CRFSs; ii) policies with negative impacts on CRFSs; and iii) policy gaps (what policies are currently missing and could be implemented to favour the development of CRFS initiatives). For each macro-category, the spreadsheet and the survey consisted of multiple entries. The information required included the compiler's role and affiliation, as well as a general policy overview. Subsequently, more specific details about the policy's relevance for CRFSs could be selected through drop-down menus, with the option to include additional comments as needed. These details covered aspects such as a policy's enactment level (from municipality to the EU), its target areas (e.g., agriculture, education, food safety), its type (regulations, incentives, and awareness-raising, as defined by Mickwitz, 2003), and the stages of the food chain that it addressed (from production to waste disposal) (as expressed in Fig. 1). Finally, a free-text comment field was used to ask specifically about the consequences or effects of the policy. After the separate collection of the policies in the survey and the spreadsheet, the two data tables were merged and analysed using a nominal scale classification (0 = applies or 1 = does not apply) so that all results could be recorded in one table.

2.2. Interviews

The second step involved conducting interviews to complement the policy collection with insights from policy- and decision-makers and to gain valuable qualitative background information on challenges and barriers, offering a stakeholder perspective. Therefore, in addition to the desktop research, a total of 15 guided interviews with various research experts and practitioners took place between mid-February and the end of March 2022. The interviews were conducted with stakeholders and practitioners from countries that were under-represented in the desktop research data collection. Based on a structured guideline the interviews were used to complement the identification of negative policies, positive

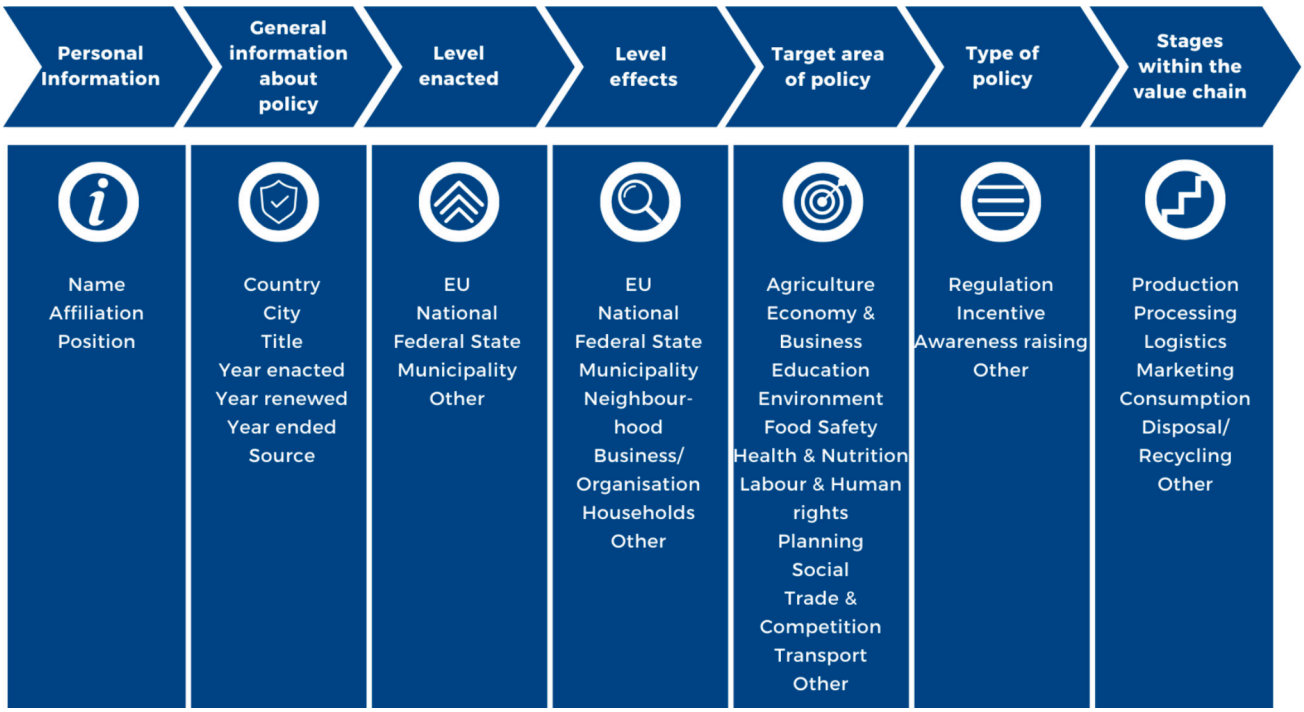

Fig. 1. Summary of the data collection spreadsheet structure and contents.

policies, and policy gaps. In the first part of the guided interviews, the interviewees were asked to identify obstructive policies that hinder the development of CRFS initiatives. In the second part, they were asked to identify positive policies, and in the third part, they were asked to identify missing policies or policy gaps and the respective levels of government in the form of open-ended questions.

Afterwards, the findings were analysed following the given standards (Kuckartz, 2019) by (1) reading the data intensively, (2) building the coding frame, (3) coding the data, and (4) analysing the coded data. The results covered a broad range of backgrounds with insights into urban food policies. The interviews were conducted via online conference tools, recorded, and then transcribed for purposes of analysis. To ensure compliance with the General Data Protection Regulation (GDPR) and data protection regulations, all data were anonymised and collected in an aggregated data version. Only the aggregated data were used for further detailed analysis (Reichertz, 2016).

2.3. Workshop with stakeholders

As the third and final methodological step, the research group conducted a workshop on May 18th, 2022. The workshop was attended by 22 participants geographically distributed around the countries investigated. They represented three different stakeholder groups (researchers, practitioners, and municipalities) and provided their perspectives on the relevance of certain policies for practical CRFS implementation. The workshop was conducted (1) to provide the participants with knowledge concerning the policy framework in their own region or country and in other countries; (2) to filter out additional negative and positive policies or policy gaps; (3) to weigh and rank the collected policies from the practitioner perspective; and (4) to enable an exchange of the different views and ideas of the reported initiatives, municipalities, and researchers.

To facilitate the discussion between the workshop participants, the 197 collected policies were aggregated beforehand into broader macro-categories based on their content (see Table 1). Subsequently, the policies were abstracted based on the policy types (regulations, incentives, awareness-raising) and classified as positive policies, negative policies, and policy gaps. This structuring facilitated the workshop participants' assessment and expression of opinions. During the workshop, the participants were asked to assess the analysis through personal voting. The representatives from both CRFS initiatives (practitioners) and municipalities as well as researchers evaluated the set of generalised policies given in each of the three categories based on three levels, namely, i) slightly affecting, ii) affecting, and iii) heavily affecting. For the evaluation of this weighting, the points assigned to a policy were added up, and then, a ranking was created. For each category, positions 1–3 were defined based on the frequency of ratings (as later reported in Table 2).

Table 1
Three macro-categories of the collected policies: generalised/summarised as negative policies, positive policies and policy gaps.

Negative policies	Policy gaps	Positive policies
Planning laws that limit the production possibilities in cities	Public awareness campaigns to promote regional/sustainable food	Land access (for example, through leasing from a land trust)
Restrictions on food growing in public spaces	Accessible training and education for food professionals to engage in CRFSs	Municipal strategies for promoting regional food systems
Laws restricting direct sales of food products from producers to consumers	Regulations requiring regional food in public procurement	Municipal subsidies for regional food initiatives/ sustainable farming
Hygiene regulations that are strict for small-scale production	Urban planning regulations to include areas for food production	Extension services (public service advisors for agricultural producers)
Limitations on compost production and use	Regulations on land prices in urban areas	Regulations for preferring regional food in public purchasing
EU and national subsidy schemes for agriculture that ignore urban production	Awareness around sustainable food in the educational system for children	A public food/agency coordinator
Innovation incentives that do not include "low-tech" options/that target only "high-tech" options	Joint planning between cities and rural areas (both structures and funding)	EU strategies (Farm to Fork, Food 2030, etc.)
Water regulations that restrict re-use of water for agriculture	Incentives and policies for young/new farmers	Business innovation development schemes
Education and training preparing new farmers for only large-scale/ industrial farming	Tax cuts for locally produced and traded products	
	Local policies to facilitate land access	

3. Results

3.1. Results from desktop research and interviews

The first findings can be derived from the data collected in the first step via desktop research, interviews, and consultations. A total of 197 entries from the six EU countries were recorded. Countries such as the Netherlands (35), Italy (34), Spain (31), and France (31) recorded very similar numbers of entry values, while the entries for Germany (50) and Norway (5) differed significantly. Entries were also recorded at the European level (9) and the supranational level (valid across countries but not for the entire EU) (2). Most of the identified policies can be traced back to the national level.

3.1.1. Positive policies, negative policies, and policy gaps

The collection of policies in different categories resulted in 132 positive policy, 46 policy gap and 19 negative policy entries. With regard to the policy type (incentives, regulations, awareness-raising, other types), the participants could assign the collected policies to more than one type if applicable. Most of the detected policies were identified as incentives (83), followed by regulations (76) and awareness-raising policies (70). It was also possible to specify other types of policies (27) in addition to these three specific types.

Fig. 2 combines the results of each policy category (positive policies, negative policies, and policy gaps extrapolated from the analysis) with their respective governmental level of enactment (namely, the EU, national, federal state, municipality, or other).

Looking at Fig. 2, it is possible to notice a qualitative distinction between the governmental levels of policy enactment analysed, with a clear predominance of positive policies. The most positive policies were issued at the municipal level, which is also the level with the lowest number of negative policies. The level at which policies are enacted certainly also depends on the country's governance. Furthermore, according to this evaluation, the number of negative policies increases with the increase in the level of governmental enactment, while the number of positive policies decreases.

This confirms what also emerged in the literature reviews, with CRFSs strategies being led by local authorities that can act faster at the municipal level within the CRFS framework. Accordingly, this trend was identified in all the six analysed countries as reported in Fig. 3.

Table 2
Evaluation of the participants' weighting of the given grouped policies.

Rank	Negative policies	Policy gaps	Positive policies
1st Rank	Planning laws that limit production possibilities in cities (48 votes)	Awareness around sustainability for in educational system for children (20 votes)	Municipal strategies for regional food (35 votes)
2nd Rank	Hygiene regulations that are difficult for small-scale production (21 votes)	Accessible training and education (18 votes)	Regulations for preferring regional food in public purchasing (17 votes)
3rd Rank	Laws restricting direct sales to consumers (21 votes)	Public awareness campaigns to promote regional/ sustainable food (15 votes)	EU strategies (Farm to Fork, Food 2030, etc.) (17 votes)

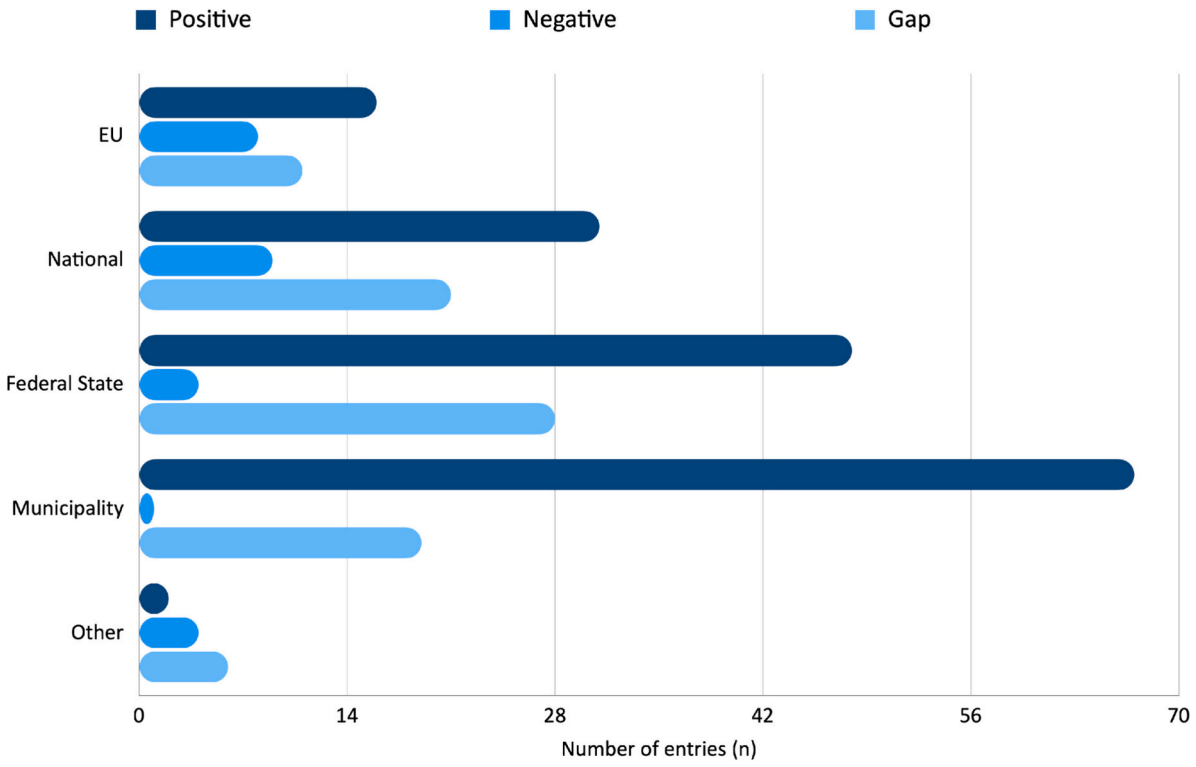

Fig. 2. Governmental level of enactment of the collected policies; n = 275.

3.1.2. Stages of the food chain affected by policies

Another interesting result is the analysis of the food chain stages into which policies could be classified. In this regard, multiple entries were possible, resulting in a total of 511 entries.

There is a clear dominance of policies that focus on and influence the area of food production (154). Policies at the stages of consumption (84), processing (79), and marketing (77) are followed at a considerable distance by policies at two stages of the value chain, logistics (50) and disposal/recycling (48). A final category was added under the name "Other stages" (19), which included those policies that would not easily fit into the previously mentioned stages (i.e., support structures such as creating jobs or the development of food strategies or programmes) (see Fig. 4).

3.1.3. Target area of policy enactment

Fig. 5 shows the policy entries by subject area. Again, multiple entries for a single policy were possible, resulting in a total of 623 entries.

Most of the entries can be assigned to the subject area "Agriculture". With a value of 117, this option is far ahead of the second and third areas "Economy & Business" (84) and "Environment" (81). The "Health & Nutrition" option (71) is also frequently mentioned in connection with CRFS policies. These four subject areas account for more than half of the entries. Additionally, the areas "Education" (64) and "Social" (58) are two options that are often mentioned. The remaining categories, such as "Planning" (44), "Food Safety" (39), "Trade & Competition" (35), "Other Subject" (19), and "Labor/Human Rights" (18), are towards the bottom of the figure. The area with the lowest number of occurrences is "Transport" (11).

3.1.4. Country-specific policy enactment per target area

The previously mentioned subject areas (see Fig. 5) were linked to the countries for which the entries were made. This linkage results in an overview of the distribution and the respective dominance of individual target areas in the different countries (see Fig. 6).

Concerning agricultural policy, Germany (27), Spain (25), the Netherlands (23), and Italy (16) account for the largest share overall. For France, on the other hand, the areas "Economy & Business" (15) and "Environment" are mentioned the most frequently. Additionally, for the EU, environmental policies (9) appear the most frequently. Different distributions and characteristics can also be seen in the less frequently mentioned subject areas. For example, regarding "Food Safety", it stands out that this area appears in the comparison above all in connection with Italian policies (10), while other countries mention it with less frequency. In contrast, the situation is exactly the opposite in the case of the area "Trade & Competition". For example, this area is not as pronounced in Italian policies (5), but it is more frequently associated with policies in countries such as the Netherlands (11) and Germany (11). To interpret these numbers, it must be considered that the number of entries per country varies (see Section 3.1). However, this evaluation can provide some direction on the focus of some European countries and the EU and

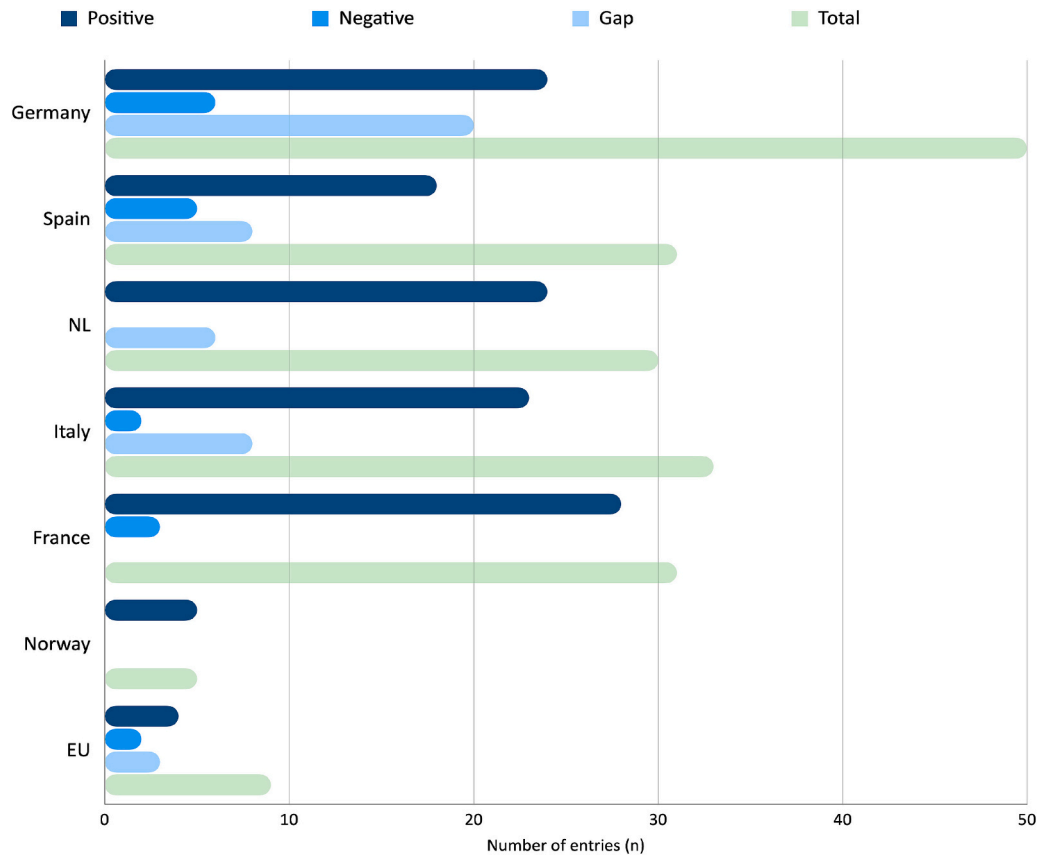

Fig. 3. Policy effects per country; n = 189.

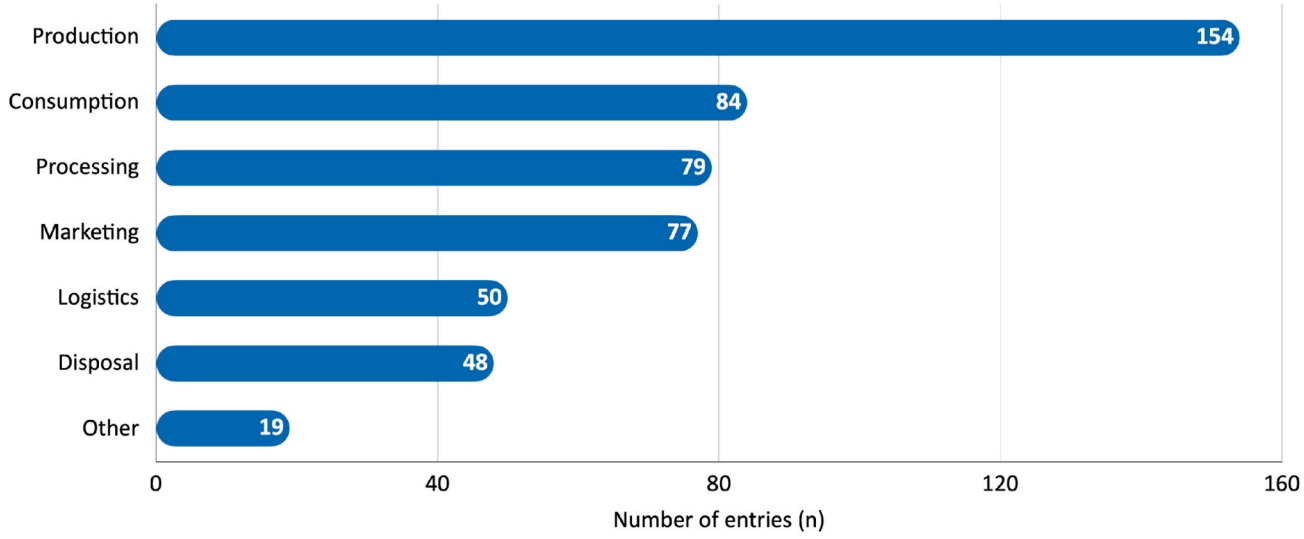

Fig. 4. Collected policies grouped based on their enactment level in the value chain, n = 511.

their policies regarding CRFSs.

3.2. Results from the workshop

The participants in the workshop were asked to evaluate the listed policies. The different backgrounds of the participants (practitioner = P, researcher = R, municipal representative = M) provided multi-faceted perspectives that led to different and interesting results of this evaluation, highlighting different points of view in each category (Table 2). Indeed, even within the most highly ranked policies per category, there were slight differences in weighting between the different workshop participants. The most frequently chosen negative policy, "Planning laws that limit production possibilities in cities", was weighted heavily by all three groups. In particular, practitioners (28) had a strong focus on this topic. Researchers also saw this policy as significant (9), but they felt that another policy, which was not chosen among the top three policies, was even more significant for CRFSs: "Subsidy schemes that ignore urban food production" (11). However, this policy was of very low

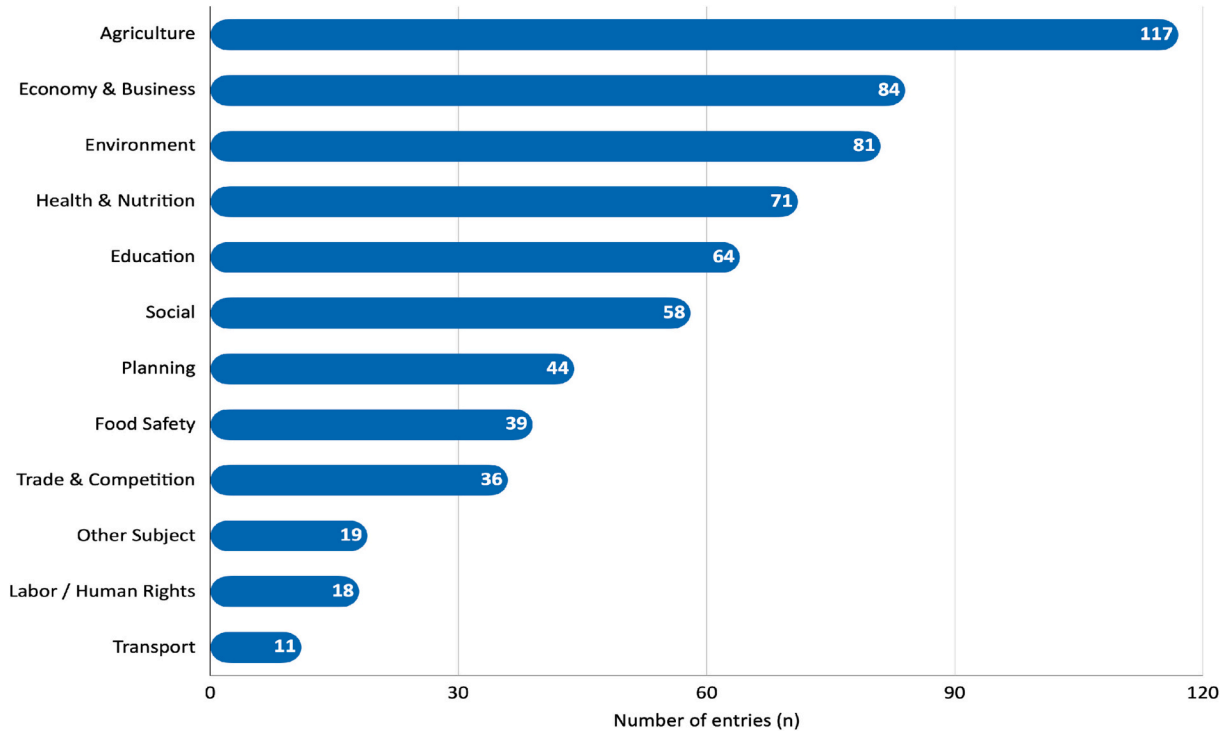

Fig. 5. Collected policies grouped by subject area; n = 623,

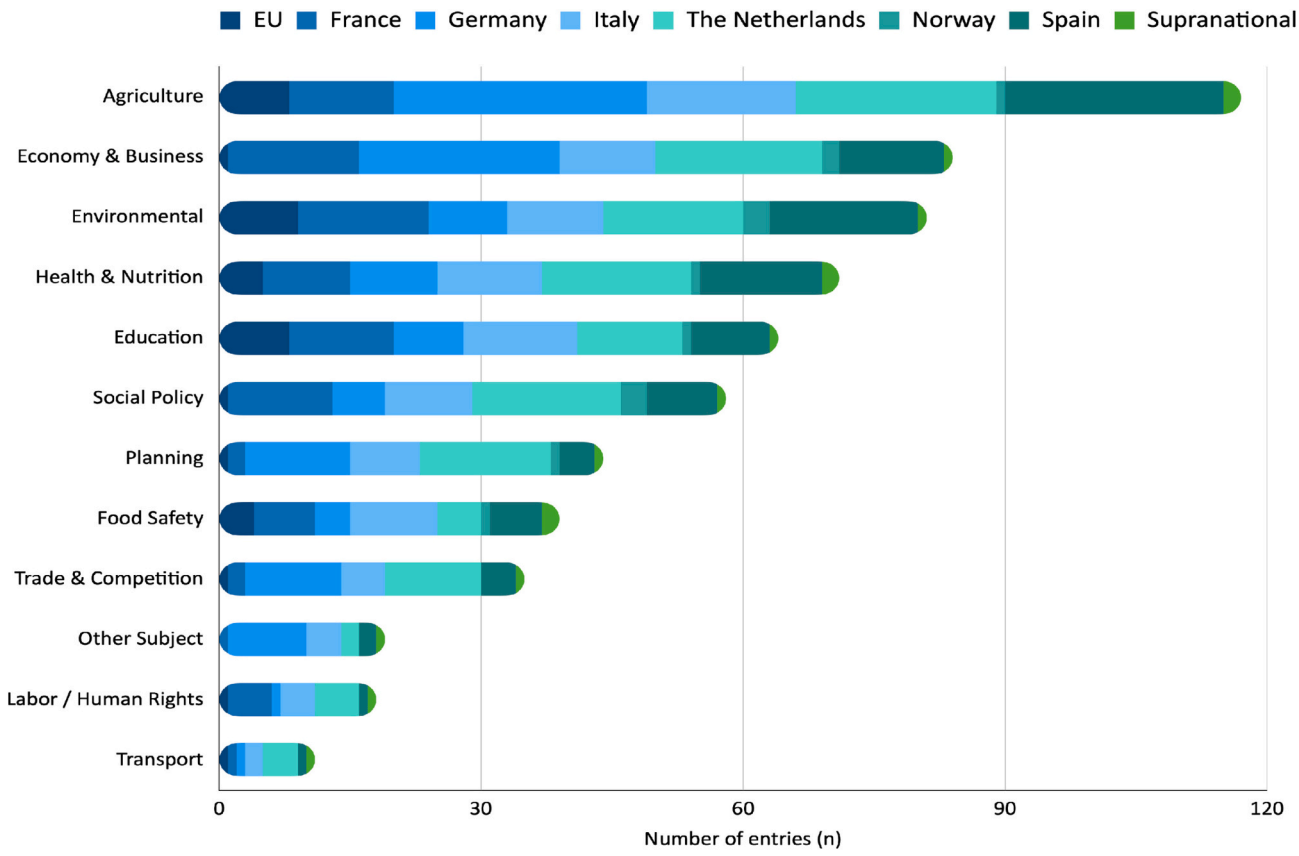

Fig. 6. Policies listed by subject area and put in correlation to the EU and Supranational level, as well as to each of the six analysed countries level.

relevance for the other two groups.

Such a reweighting between the three groups of actors can also be observed for the category of policy gaps. In this case, researchers weighted the third-ranked "Public awareness campaigns to promote regional/sustainable food" first (14), while this policy was weighted as rather less important by both practitioners (4) and municipal

representatives (0). For practitioners and municipal representatives, votes were more likely to be cast for "Awareness around sustainable food in the educational system for children", which also received the most votes, and "Local policies to access land".

In the case of the positive policies, an agreement among the three groups can be observed based on the initial ranking since for all three, "Municipal strategies for regional food" received the most votes. Only practitioners gave one more vote to the third-ranked "EU strategies (Farm to Fork, Food 2030, etc.)" than to the previously mentioned policy. However, these policies were considered by the other two groups of actors (researchers and municipal representatives) to be less relevant. Even though the results entail some bias due to the uneven distribution of the three groups, it can still be concluded that policies are perceived as relevant in different ways depending on the perspective and consideration and are weighted differently by different stakeholder groups.

4. Discussion

The current food system and its policy environment are the result of numerous political decisions made separately over several decades in different policy fields, such as agriculture, trade, social policy, and labour regulations. This policy process has resulted in shifting the European food system towards full commodification, enhancing the primacy of large over small companies, uniformity over diversity, and separation and competition over collaboration between stakeholders. Building a sustainable CRFS entails a systemic change that shifts towards new contexts where other dimensions (social and environmental) are considered and recognised by a new set of policies that are developed accordingly. Such a shift cannot be achieved in the way that traditional siloed governance works – incremental and largely disparate changes made in separate policy arenas – and instead requires a whole-system view and concerted and coordinated action by all actors and at all levels (Monticone et al., 2023). Interestingly, significantly more positive policies were found in all the six countries compared to the negative ones and the policy gaps even though all six countries have different institutional and regulatory bodies, with national laws that are often contradictory both favouring and hampering CRFSs development in their regional and local areas. In France, the Programme National de Développement Agricole et Rural (PNDAR) is the main French agricultural policy instrument that aims to promote the agro-ecological transition, focusing on economic and environmental value creation in agriculture. In addition, Article 39 of the Law on the Future of Agriculture, Food and Forestry aims to promote agro-ecology and sustainable practices in the agricultural sector by setting targets for organic and sustainable food procurement in public catering and measures to reduce food waste. The Law on Innovation and Research, on the other hand, often excludes or restricts urban agriculture due to narrow definitions of permitted land uses in urban planning laws, treating it as a rural activity that is incompatible with cities. This makes it difficult to expand or commercialise urban agriculture initiatives.

Similarly obstructive legislation exists in Germany. Here, the Federal Land Utilisation Ordinance often restricts urban food production or urban agriculture in the city, as it is very restrictive in defining what kind of activities are allowed on individual plots of land. Apart from allotment gardens (supported by the German Allotment Law), urban land-use plans usually do not include a category for agriculture or food production. However, some cities are putting the strengthening of urban agriculture and CRFS on their political agenda. The city of Dortmund, for example, has published an Action Programme Climate - Air 2030, which gives agriculture and food a central role in the policy process.

In Italy, the new legislation focuses mostly on upscaling organic practices in conventional rural agriculture (LEGGE 9 marzo 2022, n. 23 Disposizioni per la tutela, lo sviluppo e la competitivita' della produzione agricola, agroalimentare e dell'acquacoltura con metodo biologico). In this framework, Regione Lombardia has been the first region in Italy in 2021 to approve the first regional regulation entirely dedicated to Urban Agriculture, mostly in favour of the development of the new Vertical Farming sector. Furthermore, in the Bologna's General Urban Plan from 2020, the city foresees the promotion of existing and new agricultural businesses with a wide range of activities within the city limits, including a variety of activities in the agricultural sector. Part of this initiative is the willingness to grant planning permission for new buildings needed for agricultural purposes and related activities. The aim is to create the necessary infrastructure for urban agriculture to flourish. On the other hand, Norway's National Strategy for Urban Agriculture is putting urban agriculture "on the map" for many government agencies that had not previously considered it as a tool to solve problems, raising awareness and attention.

In Spain, the National Strategy for Sustainable Development has fostered a supportive framework for the implementation of CRFSs in the country. However, much of the regulatory and promotional work happens at regional and municipal levels. For instance, the Pla Estratègic de l'Alimentació de Catalunya (PEAC) 2021–2026 is a comprehensive policy framework of the Catalonia Region which aims to transform the Catalan food system into a sustainable, locally rooted and fair system that is in line with the European Green Deal and promotes measures for resource efficiency, biodiversity recovery and circular economy. The city of Barcelona also has a similar strategy to promote urban agriculture: Estrategia de Agricultura Urbana, Barcelona's strategy to improve food security, social cohesion, environmental education and urban regeneration in vulnerable areas by integrating production, processing, marketing and consumption areas with irrigation networks, facilities and housing.

In The Netherlands, The City Deal Voedsel op de Stedelijke Agenda is a cooperation agreement signed in 2017 by several Dutch cities, provinces and national ministries to strengthen the Dutch food system by focusing on topics such as governance innovation, sustainability, regional food systems, short supply chains, food education, health, and social inclusion.

Although the country-specific policy frameworks show that in all six countries the concept of urban agriculture and CRFS is anchored in policy, there are some laws or frameworks that hinder the strengthening of the CRFS or do not exist at all. Thus, in such contradictory policy framework, the analysis of negative and positive policies, as well as identified policy gaps, could be a step further in understanding the potential of CRFSs within the European food system. What emerged from the desktop review is that the number of positive policies enacted at the municipal level is much higher than the number of negative policies. This result may depend on the fact that there are hundreds of municipalities in Europe, which may have developed specifically site-oriented food policies. In this sense, a much greater number was expected at the local level compared to supranational EU policies. Nonetheless, this result shows that there has recently been an increase in the development of local food policies: new challenges concerning the design of sustainable farming systems that can be tailored to a specific location and are able to respond to the needs of the local community have contributed to the boom in bottom-up approaches that focus on the environment and health, as opposed to top-down policies that thus far have mostly focused on productivity and that perceive food and food-related products as a commodity (Sandhu, 2021).

4.1. Negative policies

Figs. 2 and 3 illustrates how most policies enacted at the national and regional level have positive effects on CRFSs showing that all analysed country-specific policy frameworks have welcomed the concept of urban agriculture and CRFS in their regulatory system. However, there are still regulations that hinder the strengthening of the CRFS.

As shown in Table 2, the three highest-ranking negative policies are urban planning, food hygiene, and marketing and trade policies. This result supports the idea that in urban planning laws, "urban farming" (arguably the most common type of CRFS) is a contradiction in terms:

commercial food production, whether soil-based or soilless hydroponic production, in the open air or in greenhouses or vertical farms, is defined as a rural activity, while urban areas are meant for housing, industrial uses and leisure. Accordingly, the German Federal Land Utilisation Ordinance restricts the possibilities for inner-city production and processing. Businesses that process food are considered "commercial", not horticultural, and are only permitted in "commercial" areas. Thus, selling horticultural production is not permitted in residential areas.

On this trail, the Law on innovation and research (LOI no 99-587 du 12 juillet 1999 sur l'innovation et la recherche) in France also imposes a narrow definition of permitted land uses in urban planning laws and often excludes or restricts urban agriculture by treating it as a rural activity incompatible with cities. In some cases, agricultural activities are carried out in a city without the necessary land use or building permits. However, urban green spaces are under enormous pressure: population growth and economic development are leading to increasing demand for settlement areas, especially in urban agglomerations. Urban residents are allowed to grow food for private or communal consumption in private and community-run gardens, in allotments, or in some places even on public land; however, but they are still not allowed to market it (Pierri & Torquati, 2016; Tei & Gianquinto, 2010). Under these conditions, urban farming remains a small-scale leisure pursuit with no potential for professionalisation or upscaling.

Concerning urban planning strategies, the past decade has seen an increasing awareness of green roofs and rooftop farms/gardens and the many advantages they might have in terms of passive climate control, aesthetics, and possibly social functions. However, often they are not as profitable as adding another floor of residential or office space. Developers often face this dilemma, as, for example, a rooftop greenhouse might be considered as a full additional story according to planning law (Freisinger et al., 2015). As long as developers must forgo a substantial portion of their expected income from a new building to accommodate a garden, they are unlikely to choose this option. According to Fox-Kämper et al. (2023), there is a lack of integration of UA in current policies. Although there are laws that require flat roofs to be greened and maintained extensively and professionally, UA does not often play a role in them.

Furthermore, obtaining the necessary skills and resources, starting a small food production business is already challenging. In addition, navigating the complexities of food safety regulations, originally designed for industrial production, is equally demanding, if not more so. With several sustainable small-scale producers emerging across Europe, particularly targeting the local market, aligning themselves with food safety regulations has posed considerable challenges. According to Purnhagen et al. (2018), there are some precautionary principles that hinder innovation, including novel foods and techniques. Myers et al. (2009) also highlighted that the type of evidence considered by the European Food Safety Authority (EFSA) for its scientific advice hinders the development of novel techniques and innovation. Fink-Keßler and Thomas (2019) highlighted that many regulations in food production and processing (hygiene, reporting requirements, etc.) are geared towards industrial business structures. However, small artisanal businesses are overburdened by a plethora of regulations and reporting requirements. In Germany, for example, this is reinforced by the National Food and Feed Act. To ensure compliance with hygiene standards in food production, there are regulations on production, storage, processing and preparation. This is enforced by law through regular inspections and has a negative impact on CRFS, as it is difficult for small CRFS businesses to comply with these regulations. Accordingly, food safety regulations have different implications for businesses from large to small. Larger companies have dedicated staff and other resources to develop a separate team to coordinate the implementation of regulatory requirements to be compliant. This approach has proven effective for large companies, but for those that fall into the small and very small categories, such as family businesses or voluntary initiatives, this approach is challenging. As many of these producers are pioneering either new technology or new production methods, it can be difficult to obtain best-practice case studies from government authorities. Many food safety regulations require the inclusion of infrastructure for cleaning or packaging food, knowledge of new farming practices (for example, integrated pest management) and improved supervision of labour on the farm, as well as greater capacity for record-keeping and decision-making documentation. These requirements have proven to be a barrier for small-scale producers who operate with little start-up capital and have developed business models that will never reach the scale to justify such investments in infrastructure (Buscaroli et al., 2021).

4.2. Policy gaps

Based on the ranking compiled by the workshop participants, all of the highest-ranking policy gaps concern a lack of educational programmes/activities and awareness for children, citizens or, in general, actors within the food system. Accordingly, more activities should be focused on boosting widespread citizen knowledge. Challenges exist not only around general agricultural education but also in the area of vocational training for food crafts and in food technology education. Many university courses are focused on specialisations or research and do not offer practice-oriented programmes. However, according to Specht et al. (2014), there are a number of existing projects that can serve educational purposes and function as teaching spaces, contributing to environmental education and providing opportunities for hands-on learning, such as (a) the Mens Sana in Corpore Sano project in Naples (in collaboration with the Municipality of Naples and ASL Napoli 1 Centro), which aims to educate primary school children about healthy eating and the consumption of safe and healthy food in the city. Furthermore, innovative ideas for agricultural production sites accessible to the public have emerged in recent years (De Wilt & Dobbelaar, 2005) defining the concept of an "agro-park", which is specifically designed to both entertain and educate visitors, with a particular emphasis on providing an impression of modern food production and high-tech agricultural practices.

In addition, agriculture is a political business – there are many different opinions on methods and best practices, especially in regard to "sustainable agriculture". Agriculture and food trade curricula still focus on scaling up, mechanisation, and industrialisation as a path to success, while many aspiring food producers have a very different mindset and aim for small-scale, artisanal, often low-tech production for a local market. It can be difficult to find quality, locally relevant information. However, this is not necessarily considered a negative aspect of food system development since cities will always rely on rural and peri-urban agriculture, which in turn can be positively affected by incentives and innovative technologies (e.g., machinery, new hydroponic techniques, drones). In this sense, well-educated farmers and food craftspeople are essential for implementing technical, social, and environmental innovations. For instance, in Germany, most agricultural training courses, both vocational and academic, focus on technological innovations in production but do not cover social or economic innovations such as new forms of regional marketing or community-supported business models, which could play an important part in shaping more sustainable livelihoods. In Italy, there are many opportunities to create and obtain funding for training courses for professionals and technicians in agriculture, for example, under the regional Rural Development Programmes (such as the programme in the Campania region), but few target potential new small farmers and agri-entrepreneurs. A study by the German Federal Environment Agency (2023) supports the finding that there is a lack of institutionalised knowledge building that provides young farmers and gardeners with the necessary skills in farm structures and in regional and direct marketing. Existing training opportunities show considerable deficits, which make it more difficult rather than easier for young people to find their way into successful regional value creation. Relevant practitioners and interest groups should be involved

in the development of training towards a non-industrialised agriculture and artisanal food economy.

4.3. Positive policies

Setting a food policy was not under the competencies of cities, with food provision being primarily left to the market under a policy environment determined by higher levels of government. However, within the CRFS policy framework, cities all over Europe, as well as in other parts of the World, have recently started playing a key role in the transformation towards sustainable urban and regional food systems, particularly after the 2015 MUFFP. This awareness calls for new modes of policy formulation and has started creating new structures and approaches to foster the development of local and community-led food systems.

In many cities, regions, and countries, sustainable food strategies, often developed in a participatory process, have proven to be powerful catalysts for creating a shared awareness and vision, a coherent set of mutually reinforcing policy measures and a network of actors committed to their implementation (see, for example, France's national food plan "The Regions in Action" from 2019, Wallonia's "Manger Demain" strategy from 2018 and Norway's National Urban Agriculture Strategy from 2021 – the German state of Brandenburg just started its strategy process in 2022). The study conducted by Science Advice for Policy by European Academies (SAPEA, 2020) states that collaborative governance approaches have the potential to improve policy design and implementation towards a sustainable food system and to develop new strategies by drawing on different sources of knowledge and involving relevant stakeholders from the outset.

Some municipalities and regional governments, including Milan (Italy), Bordeaux (France), Cologne (Germany), and Wallonia (Belgium), have created offices of "food policy coordination" within their administrative structure. These offices are charged with coordinating the activities of all relevant departments and stakeholders and driving the implementation of their food strategies. The study by Doernberg et al. (2019) supports this finding. A wide range of city departments are currently involved or will be involved in the implementation of various food projects and governance processes. In addition, the study emphasises that cross-sectoral planning and regulatory instruments, as well as resources for implementation, are essential to manifest food policy as a field of policy and planning at the local level.

Collaborations between cities and their neighbouring rural districts on land use planning and joint food infrastructure development, such as the "Eco Model Regions" in several German states, or between cities, research institutions, and regional and national governments in joint food policy projects, such as the Dutch "Voedsel op de Stedelijke Agenda", have been successful in putting the food system on the agenda and creating momentum for transformation on the ground. Food policy councils, which are multi-stakeholder platforms for food system change, have emerged in more than 100 European cities, mostly at the instigation of civil society but with the active participation of local governments and actors from the food value chain, and they have played a crucial role in creating a space beyond the walls of sectors and silos. These local food policy councils have started creating regional networks to replicate the effect at higher governmental levels, but this process is still in its infancy. Indeed, it has been reported in related literature (Doernberg et al., 2019), how urban actors will adopt food system thinking and develop more integrated food strategies driven by the 2030 Agenda for Sustainable Development, the MUFFP and the food policy councils that are currently being established. However, city councils, food policy councils and other local actors need knowledge, institutional innovation as well as financial and human resources to get started.

The peri-urban horticultural areas that have played an important role in feeding cities throughout their history and that are vital to the development of sustainable CRFSs are under pressure from urbanisation. Housing development and the expansion of business and industry, including relatively new phenomena such as very large data and logistics centres and the new roads and other infrastructure that they require, all jostle for space in and around cities. Indeed, even though brownfield sites are available for redevelopment, it is much cheaper to start afresh on a greenfield site – which, in most cases, means agricultural land.

5. Conclusion

This research shows how the impact of EU and national policies on current and future CRFS projects is perceived differently by different stakeholder groups. Indeed, researchers, practitioners, and municipal representatives agree that isolated planning laws limit the production opportunities in cities and that subsidy schemes can inhibit urban production, which is still crowded out by residential, industrial, and leisure land uses. In addition, legal frameworks prevent the marketing and sale of food produced by non-commercial actors or informal farmers. In the food sector, small businesses also have little chance of complying with food safety regulations with the necessary infrastructure facilities. Accordingly, the widespread adoption of both research-based and citizen-based innovations from European CRFS is often hampered by the lack of adequate national and European policies (Fox-Kämper et al., 2018). Urban agriculture and local food systems are experiencing a wave of innovation through new technologies (e.g. vertical farms, rooftop greenhouses), production models (e.g. community-based agriculture or fisheries), and supply chains (e.g. solidarity buying groups, farmers' markets). However, the growth and efficiency of these initiatives are often impeded by outdated or inadequate regulatory frameworks and, especially, a lack of supportive top-down policies. This results in missed opportunities for integrating agriculture with urban infrastructure and connecting small-scale producers to local markets. Similarly, the efficiency of the various production and supply chains is limited by the absence of policies that support the adoption of circular strategies (e.g. encouraging rainwater harvesting or greywater reuse in urban farms, promoting energy synergies between agriculture and the built environment, facilitating the establishment of formal food supply channels associated with small-scale CRFS) (Dunn, 2010). Accordingly, there is a need to expand vocational training in the agricultural sector and to offer practice-oriented programmes at universities. In addition, curricula should be increasingly oriented towards sustainable agriculture instead of focusing on scaling, mechanisation, and industrialisation.

However, in contrast to hindering policies, most of the policies identified have a positive impact on CRFSs. For example, sustainable food strategies have already been developed at the local and EU levels, raising awareness of sustainable food systems, which has already led to many networks of actors working on implementation (e.g., the establishment of food policy councils worldwide). Another positive measure at the policy level is the establishment of relevant departments in administrative structures that promote supportive food strategies. Accordingly, a significant outcome of this research is showing that several regional and municipal legislation bodies, in all the analysed countries, are moving in similar directions to implement, and include, CRFSs within their policy frameworks. Therefore, this research highlights the need of policy uptake for sustainable CRFS in Europe, which is slowed down by the absence of strategic framework on most sustainable innovations and their adaptability to the different contexts. A legislative and regulatory environment able to ease the establishment and management of small scale and citizen driven CRFS initiatives is needed, overarching the economic, environmental, and social functions that sustainable food systems may play. Finally, policies often underestimate the ecosystem services associated with multifunctional CRFS, overall resulting in a limit support to initiatives that in turn would provide climate change prevention and resilience, job creation and social inclusion in Europe.

CRediT authorship contribution statement

A.K. Steines: Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **M. D'Ostuni:** Writing – review & editing, Writing – original draft, Conceptualization. **A. Wissman:** Validation, Formal analysis, Data curation. **K. Specht:** Writing – review & editing, Validation, Data curation. **C. Iodice:** Formal analysis, Data curation. **R. Fox-Kämper:** Writing – review & editing, Investigation. **F. Monticone:** Writing – review & editing, Formal analysis. **I. Righini:** Writing – review & editing, Investigation, Formal analysis. **V. Saint-Ges:** Supervision, Formal analysis. **A. Samoggia:** Writing – review & editing, Supervision, Formal analysis. **F. Orsini:** Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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