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How to feed the cities? Co-creating inclusive, healthy and sustainable city region food systems

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People drive transitions. Current urban living conditions, specifically food systems, challenge the health, wellbeing and coherence of individuals and whole societies, and for effective change toward resilient communities, people need to reinvent the way they produce, distribute and consume food. Consequently, in their communities' people are creating foodscapes and governing the transition toward sustainable local food systems. Here, we introduce a conceptual framework to develop this transformation through empowering the urban multi-stakeholder society as the agent of this process. To do so, we reviewed scientific evidence and experiences from seven selected City Regions (Albacete, Baku, Dresden, Izmir, Ljubljana, Megara, and Valparaiso) as case studies and conducted a SWOT analysis to explore the capacity of food systems to enhance multi-functionality of urban landscapes, with special focus on social cohesion and quality of life. We grasp existing policies; hone them and leverage policies and strategies toward human-centered actions for future proofing food systems.

KEYWORDS

multi-functionality, transformation, transition, Food2030, urban sustainable development, community of practice and knowledge, urban-rural relationship, co-creation

Introduction

By 2050, almost 70 percent of the world's population will live in cities (United Nations, 2018). All these urban citizens need not only a decent home and public services; they also need permanent access to safe and affordable food. However, urbanization and food production compete directly for the same land (D'Amour et al., 2017; Barthel et al., 2019), and both cause health issues due to a destructive mixture of environmental degradation, under- and malnutrition, scarcity of knowledge about healthy food, and unhealthy eating habits. Our food systems, complex socio-ecological systems originally made to feed us, are very vulnerable to the ongoing climate change that threatens

biodiversity and the overall functioning of ecosystems (e.g., Chapman et al., 2017), ultimately impacting food security, safety and sovereignty.

Currently worldwide food systems are based on unsustainable modes of production, distribution, consumption and waste management. Food production takes place far from the consumer, “in the global everywhere” (Kloppenborg et al., 1996), resulting in agro-industrial landscapes that have lost most ecosystem services beyond monocultural food production. Rural pristine and cultural landscapes have been eroded and deformed by the ecological footprint of cities, and by what we call their “food-print”, the area required to produce agricultural goods for them. This food-print is usually more than hundred times larger than the administrative area of the city. This means that, for example, in recent decades, the mean food supply distance in European metro regions has increased from 150 to 660 km (e.g., Paris; Billen et al., 2009). The food system along these supply chains is complex, often lacks transparency and is characterized by large food-miles between detached food producers, processors, distributors and consumers (Clapp, 2014). On top of this, current consumer behaviors drive unsustainable food production: for example, urban inhabitants consume more meat, sugar and processed food per capita than rural inhabitants (Regmi and Dyck, 2001; Satterthwaite et al., 2010), as urbanization leads to a profound shift toward higher food energy, more fats and oils and more animal protein from meat and dairy foods (Kearney, 2010). Consequently, chronic diseases related to malnutrition are rising worldwide (Dixon et al., 2007; Satterthwaite et al., 2010; Ng et al., 2014; Boyer and Ramaswami, 2017; Foo and Teng, 2017; Siegner et al., 2018; Steiner et al., 2019).

Growing numbers of citizens are now demanding changes toward more sustainable urban food systems, ones that can provide healthy food while maintaining ecosystems healthy, thus enabling the provision of food for generations to come (American Public Health Association, 2007). Changes that are often requested include access to healthy food, better connectivity between urban and rural communities, a strong and diverse local food economy, reduced food waste and packaging, enhanced social justice, and equality through more active participation of all actors in decision making (Vieira et al., 2018). This has led to a bottom-up movement that seeks policy options and paradigm shifts to enable a new food system governance for the Anthropocene (Pothukuchi and Kaufmann, 1999; Wittman, 2009; Levkoe, 2011; De Friedmont-Goertz et al., 2020), including the mainstreaming of Edible City Solutions for socially resilient and a sustainable productive urban landscape (Säumel et al., 2019). The pandemic has also illuminated the vulnerabilities of our global food supply chains and the need for resilient local food systems (Carey et al., 2020). As a consequence, an increasing number of city administrations have begun to analyze the multiple aspects and outcomes of their food systems (e.g., Milan Urban Food Policy Pact). For instance,

the European Commission’s Food 2030 vision addresses the demands to develop future-proofing food systems on the basis of four main fields of action (European Commission et al., 2020): (1) providing nutrition for sustainable and healthy diets, (2) developing climate-smart and environmentally sustainable food systems, (3) enhancing circularity and resource efficient food systems, and (4) promoting social innovation and empowerment of communities (Pothukuchi and Kaufmann, 1999). However, other than the declared political will and numerous best practice examples, pilots and grass-root initiatives, systematic steps toward design and development of more resilient and sustainable food systems are often lacking. At present, in urban areas, governance lags behind in terms of project level interventions and lacks strategies for transformation of food systems (Haysom, 2015).

Due to the complex drivers and the interrelated processes of urban food systems and their multi-scalar, tele-connected, cumulative and often unexpected impacts, transformation is challenging (Chapman et al., 2017). City-Regions have been identified as the most promising governance unit and territorial scale for successful food systems interventions (Forster and Getz Escudero, 2014; Jennings et al., 2015; Dubbeling et al., 2017; Blay-Palmer et al., 2018). Within them, the place-based, relational and values-based nature of food systems have great potential to enhance socio-ecological resilience and, more importantly, socio-economic stability (Duncan and Bailey, 2017). City-Region Food Systems are an important unit that incorporates a complex network that illuminates next-to production, processing, and also aspects of marketing and economical wealth along a geographically limited chain (Duncan and Bailey, 2017).

In order to effectively achieve the goal of guiding urban food system transition by strategically modifying the current governance system, it is important to embed social innovation into the existing governance pattern (Maye and Duncan, 2017). Local governance toward future proofing food systems needs to be developed holistically, reflectively and adaptively through cross-sectoral and long-term interventions at different scales. There is no one-size-fits-all solution (Ostrom and Cox, 2010), so diversity in strategies and actions enables modularity and robustness of systems, especially in the face of the uncertainty of our changing world. The crucial actor here is the local community of knowledge and practices that have led to increasing interest and initiatives around the world, in regional food councils, urban food production and distribution initiatives (e.g., Säumel et al., 2019; Scharf et al., 2019). Inclusive and coordinated cross-sector governance has the potential to drive transformation through combined enabling measures (i.e., expertise and incentive-based programs) and strict regulations on food production, distribution, consumption and waste management.

Here, we i) review scientific evidence on the positive impacts of community driven self-governance of urban food systems;

ii) briefly describe the status quo and challenges of local food systems of our case studies, and provide a SWOT analysis of these food systems to, finally, iii) identify and discuss strategies for community-driven transition toward novel food systems for more healthy, sustainable and resilient City-Regions.

Materials and methods

To review research on community driven governance of urban food systems, we screened articles in the Web of Science using keywords covering the “urban food system” AND “transition” OR “transformation” (Figure 1A). This search (April 2019) revealed > 340 references in English in the “topic” OR “title” fields since 1993, more than two thirds published within the last 5 years. We then screened the titles and abstracts of the remaining articles, eliminating article not related to our topic (191). Next, we made a full text review of the remaining articles to gather the relevant information. Two reviewers conducted the whole process independently. Of the 52 papers identified as directly addressing transitions of urban food systems, 28 mention or discuss aspects of community-driven governance. We also included other papers and gray literature found through cross-references in our research, and highlighted current evidence on community-driven governance of urban food systems. However, since social sciences often use publication modes not included in the database of Web of Science, this was not a complete screening of all existing literature.

Due to the large gap between theoretical development and practical implementation, we use the case study approach (Figure 1B) to explore concrete strategies for community-driven transition of urban food systems. The food systems of our seven selected city-regions (in alphabetical order Albacete, Spain; Baku, Azerbaijan; Dresden, Germany; Ljubljana, Slovenia; Megara, Greece; Izmir, Turkey; Valparaiso, Chile) face typical challenges in achieving urban food sovereignty, and provide a broad basis of food system experience. The cities cover different sizes from small, medium-sized to large cities. All cities have different challenges that can be addressed with similar food system changes and local actors that were willing to critically revise their food systems and related strategies. Additionally, cities in the south of Europe are particularly affected by climate change and related challenges. The selected cities highlight urgent challenges related to the food system like rising awareness on impacts of food production, citizen demand for more food democracy, and the need for healthy affordable locally or regionally produced food.

We used a combination of descriptive and analytical research methods to explore each city-region food system. The status-quo description was based on a systematic review of available documents of city administrations (Figure 1B₁) and of knowledge provided by local, mostly non-governmental,

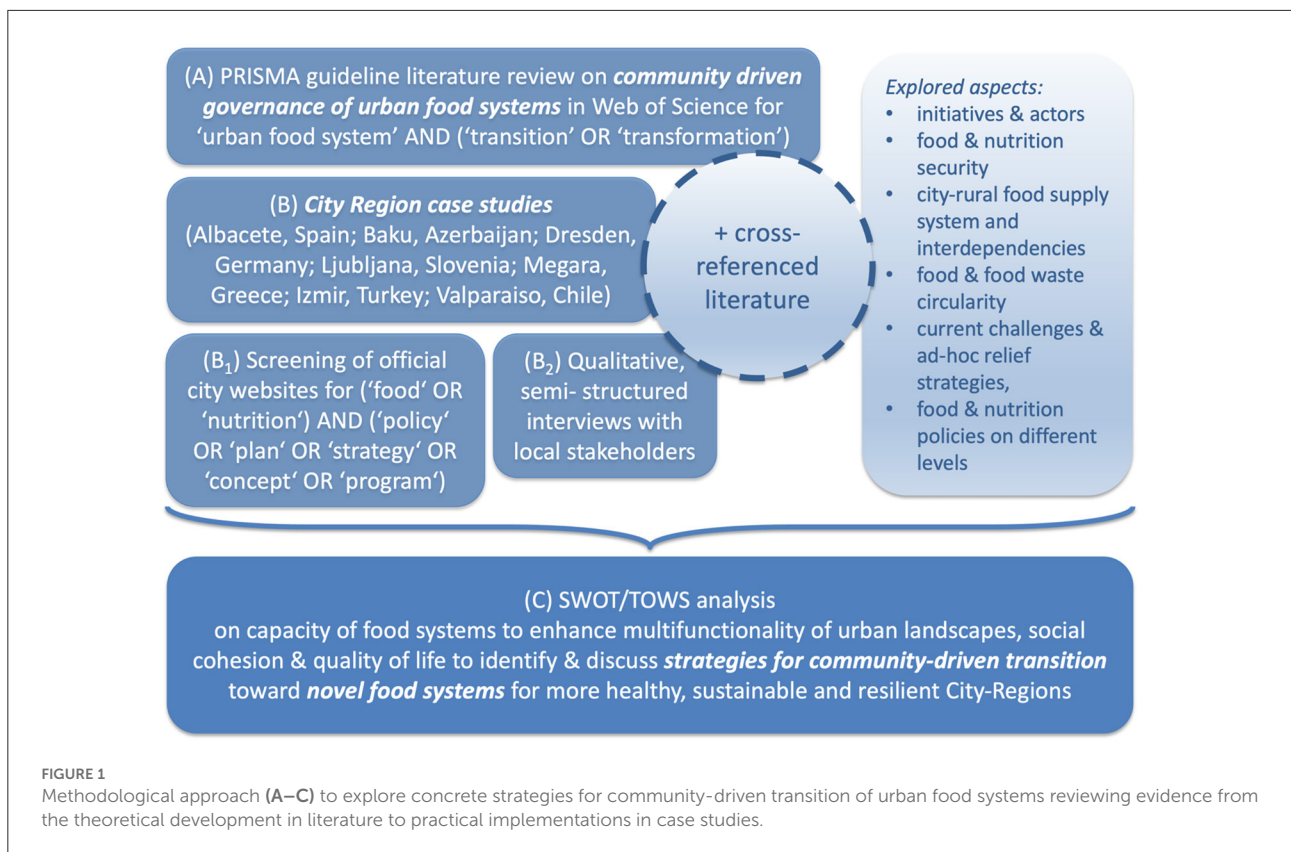
organizations engaged in urban food system transformations and by city representatives involved (Figure 1B₂). The stakeholders were identified following Reed et al. (2009). We included documents of the city administrations identified during the systematic screening of the official city websites. The systematic screening covered the following search terms: (food OR nutrition) AND (policy OR plan OR strategy OR concept OR program). We explored the general characterization of the local food system, with a special focus on the following aspects: (1) local governmental and informal food and nutrition initiatives and actors, (2) assessment of the situation of food and nutrition security and especially vulnerable groups, (3) characteristics of the city-rural food supply system and interdependencies, (4) urban food production sites, (5) food and food waste circularity, (6) current challenges and ad-hoc relief strategies, as well as (7) food and nutrition policies on the micro-, macro-, and meso level. After a systematic review of published information and available gray literature about each case study, we reached out to the main contact people in the cities to collect additional information. Here, we used an explorative approach of qualitative, semi-structured, one-on-one interviews (Ryan et al., 2009) to provide insights from local stakeholders, their role and their evaluation with regard to the urban food system covering points 1–7 from above.

We use SWOT and TOWS analysis (Figure 1C), a deduced strategic approach deriving from the SWOT analysis, to effectively explore the strengths, weaknesses, opportunities and threats to address complex strategic situations. We discuss strategies to mitigate the points collected in the SWOT, e.g., strategies that use strengths to maximize opportunities, strategies that use strengths to minimize threats, strategies that minimize weaknesses by taking advantage of opportunities or strategies that minimize weaknesses and avoid threats (Wehrich, 1982; Helms and Nixon, 2010). Based on these results, we draw conclusions about general strategies to improve City Region Food Systems.

Results

Framework for community driven regional food system transformation beyond theory

Researchers often declare that in-depth understanding of the highly complex food systems is a prerequisite for the development of effective interventions and innovative policies (e.g., Abu Hatab et al., 2019; Steiner et al., 2019). However, our societies need to tackle the immediately radically pressing challenges in urban and rural territories to achieve transformation that benefits all. We therefore address this gap with the knowledge and experiences of the local communities rather than with highly specialized and theoretical expertise,



as the latter often does not match the local situation and daily reality of urban policy and governance processes. This assessment of the local food system balances holistic assessment (Landert et al., 2017) and data availability to analyze the state of the art, envisioning, and the decision-making.

The key expertise and successful practice are anchored in the local communities (e.g., in Figure 2), and promising interventions are based on multi-perspective analysis of the state of the art of each local food system by multi-stakeholder consultations led by local City Region teams, comprised of the relevant stakeholders and potentially conflicting points of view. The future-proofness of this framework depends on the capacity to build inclusive communities of knowledge and practices and innovations. Based on the state of the art of the local food system, the City Region teams can develop their local vision of the food system in collective thinking processes. The co-creation of policy strategies and action plans are developed through a multi-stakeholder dialogue. At the same time, the effects of these co-created interventions and policies need to be controlled by a transparent local monitoring and evaluation system of the food system governance and planning.

Our policy and planning framework explores strategies to strengthen Urban Food Commons (DeLind, 2002; Ostrom and Cox, 2010; Scharf et al., 2019), to protect croplands in urban

and peri-urban landscapes by governing land as a common-pool resource (see protection status of cropland in Cuban cities; Chapman et al., 2017; Säumel et al., 2019) and to mainstream socially inclusive Edible City Solutions (Säumel et al., 2019) and sustainable modes of urban and rural agriculture (Orsini et al., 2013; Goldstein et al., 2016).

Although literature on transformation of City Region Food Systems is scarce and is often limited to vague recommendations (Dubbeling et al., 2017; Vieira et al., 2018), some overall action fields for adaptive and inclusive governance of these local food systems can be derived from literature and reported experiences (Figure 3). An inclusive, adaptive and cross-sectoral policy and planning framework needs to integrate the City Region food system into territorial planning and different sectoral competences to facilitate the cooperation, coordination and integration between producers, distributors and consumers along a urban-rural value chain, to build a more equitable and functional relationship between rural and urban populations, including strategies to protect croplands in urban landscapes, from which, in turn, rural productive landscapes can learn multi-functionality; and to facilitate inclusive and stakeholder-driven innovative policies based on mutual learning processes between society, science, food industry and policymakers.

We focus on the local economy to support regional value chains and link these to local food demand and local



markets, thus promoting sustainable production modes to (i) diversify and optimize the City Region food production and processing capacity; and to (ii) increase distribution and retail of regionally-produced food via diverse outlets, e.g., markets, canteens, food supply hubs, and IT platforms, including (iii) improved access to, and use of, safe, healthy, nutritious, and culturally-appropriate City Region food for vulnerable households/groups in sufficient quantities in the City Regions. As a successful example of local and regional food networks, the community-supported agriculture (CSA) fosters economic development (Deller et al., 2017), links producers and consumers (Raftowicz et al., 2021) and changes food lifestyle behaviors and health outcomes of citizens involved (Rossi et al., 2017) including waste minimization (O'Neill et al., 2019). Local trade and employment can be promoted through consumption of local products, thus contributing directly to the regional economy, creating green jobs and opportunities throughout the entire food chain, ensuring social inclusion, equity, and fairness for all workers. Moreover, local economies will benefit substantially from the principles of a circular economy (e.g., community-supported business models; Mars, 2015). However, concrete reports and scientific evidence on

the synergies between Circular Economy and CSA approaches are scarce.

Scientific evidence for the positive impacts of self-governance of local communities of knowledge, practice and cosmologies

The new concept of urban food systems relies on hybrid governance modes with vertical (e.g., policy interventions from local, regional to global level, and vice versa), and horizontal elements (e.g., cross-sectoral and multi-stakeholder approach; Dubbeling et al., 2017; Vieira et al., 2018). Both governance modes need an active civil society that participates in the co-creation and co-implementation of policies. For a long time, food democracy and sovereignty literature have used local self-governance and self-organizing bodies (e.g., food councils, other voluntary organizations, traditional leaderships; Figure 2) by repatriating decision-making from large vertical integrated 'food giants', returning it to producers and consumers (Trauger,



2014; Mars, 2015). A cross-sectoral and multi-stakeholder governance approach implies a pluralistic dialogue among diverse stakeholder interests needs and wants, together with different knowledges and ways of knowing (Jansen, 2014; Martínez-Torres and Rosset, 2014).

To drive and mainstream the local food system transformation and to normalize existing alternative practices, the empowerment of bottom-up initiatives needs to interact effectively with existing or innovative governance structures (Edelman et al., 2014). For example, agricultural food

production is often subsidized, and cost-sharing programs targeting ecosystem services offer an opportunity to use subsidies as economic incentives for sustainable land management. Croplands in urban landscapes can also be protected as a common-pool resource, resulting in a high degree of self-sufficient urban food production (See protection status of cropland in Cuban cities; Barthel et al., 2019; Säumel et al., 2019). Conservation-focused subsidies can account for local impacts driven by distant drivers through tele-connected relationships. There are already successful top-down policies

to tackle food waste (e.g., a French law prohibits supermarkets from discarding food, requiring it to be donated; Gollnhofer, 2017).

Many successful policies are already being implemented at levels lower than state. An often cited, but rarely implemented, pocket-effort strategy providing best practice and practical education is public procurement regulations to encourage locally produced, healthy food on the plates of public canteens, in schools or kindergartens (European Committee of the Regions, 2018). The (re-)implementation of school gardens in the scholarly curricula (school gardening is an established topic in all schools in the German federal state of Thuringia) is an efficient policy tool to foster environmental and health education of future generations across different socio-economic groups, and to create more environmental equity in urban areas (Blair, 2009; Ray et al., 2016; Bucher, 2017). City administrations are now developing urban food strategies and agendas, or anchoring edible city solutions in urban masterplans (Säumel et al., 2019).

City regions case studies

Albacete (Spain, 173,329 inhabitants/ 217,774 in agglomeration) is the modern capital of the rural region of Castilla-La Mancha and a main driver of the local economy system. Around 90% of the population lives in rural or intermediate areas, and more than half of the region's territory is used by agriculture. Castilla-La Mancha is known for producing barley, wines and olives, mainly for the export, not as the final product. The organic farming sector is increasing, while the traditionally important sector of extensive sheep and goat farming is declining. However, the financial crises have challenged the accessibility of healthy food, actions in the food system transformation have been marginalized, and local policies are limited. Consequently, a generational change, and a diversification of farm activities and market channels is needed. The regional agro-food industry consists mainly of self-employed workers and small and medium-sized businesses, and the main challenges are the isolation of urban dwellers from surrounding landscape and a destroyed City Region Food System, together with post-crisis divestments and high unemployment. Threatened by an unbalanced rural-urban relation, awareness is rising among the local authorities of the need to revise agricultural production, processing and commercialization strategies, to valorize the heritage of traditional food as a territorial resource, and to stimulate the local society to discuss a new rural governance (Hernández-Perlines et al., 2020).

Baku (2.3 m inhabitants/ 3.2 m in agglomeration), the capital of Azerbaijan, is a booming Eurasian metropolis dominated by an oil and gas economy with an unsustainable and disconnected City Region food system and high dependence on imports, despite agriculture having been an important activity for the

City Region and the whole country throughout its history (Aksoy et al., 2018). With the enormous influx of oil revenue, the Baku is spending vast sums on new projects, buildings and infrastructure, without strategic planning or institutional coordination. This has led to a loss of open space in urban areas, the privatization of the public realm, social stratification and informal housing (Valiyev, 2009; Valiev, 2013; Gulaliyev et al., 2019). The agricultural sector here has low economic and environmental sustainability, mainly due to serious degradation, salinization and desertification, and moderately concerning social aspects, as 3.5 million people make their living from agriculture, forestry or fishing activities (Aksoy et al., 2018; Gulaliyev et al., 2019). The environmental diversity in the City Region allows crop production to range from subtropical to cool or temperate environments (Aksoy et al., 2018). One of the strategic roadmaps focuses on production and processing of agricultural products and foresees a set of goals regarding the local food systems, among them strengthening the sustainability of food safety by increasing sustainable production along the value chain, enhanced access of producers to the local market, and increasing employment and welfare in rural areas (Center for Analysis of Economic Reforms and Communication (CAERC), 2017). The main products of the Baku Region are tomatoes, cucumber and other vegetables, and in the Absheron district, cereals, barley, legumes and livestock products (Azerbaijan Ministry of Agriculture, 2020). Since 2008, specific legislation on organic production has been in force (The Law of the Republic of Azerbaijan on Ecologically Clean Agriculture; No 650-IIIQ/13 June 2008), and a draft guideline (2014) has been developed but not yet implemented. There is a lack of awareness about organic production along the whole value chain, gaps in legislation and governmental support. Moreover, the existing organic agriculture is export oriented and organic products are mostly consumed by foreign embassies, hotels, and high-income families (Aksoy et al., 2018). Malnutrition among children and youngsters is particularly high and deserve serious consideration (UNICEF, 2013).

Dresden (Germany, 554,649/780,000 inhabitants in agglomeration) is the capital of the federal state of Saxony and involved in clear networks. In recent decades, the City administration has developed a range of political concepts, strategies and supported processes to shift to more sustainable urban (Blum et al., 2016). These include several fragmented actions on food system transition undertaken by a diverse landscape of more than 100 transition initiatives to overcome the de-connected consumer-producer relationship, and also strategic approaches to lower barriers to food system transition, including a transition team as a cross-sectoral contact point or interface for politics, administration, business, science and civil society. There is awareness to rethink support (e.g., by institutionalized grants) and to keep public spaces available for transition initiatives and related living labs, urban innovation and public debates. Urban Gardening Network Dresden

functions as an umbrella organization supporting cooperation between initiatives and the city-administration. The Consumer Cooperative for Organic Products, linking about 100 local producers with more than 11,000 consumers among the city-region of Dresden, and creating more than 200 jobs directly related to the Food Coop, is one of the biggest local cooperatives for organic food in Germany (Ehnert et al., 2018). There is a need to work jointly on synergies of policies and strategies through the establishment of top-down and bottom-up hybrid-measures to mainstream food and nutrition policies, and to convert policies and strategies into concrete actions. Here the local food council is the agent for hybrid solutions taking advantage from bottom-up and top-down movements.

Izmir (Turkey, 4.3 m inhabitants/5.3 m in agglomeration) is the historic hub or “borderland” (Eylemer and Memişoğlu, 2015) between Asia, Europe and the Middle East & North Africa region. This fast-growing city currently hosts a large number of displaced persons from the neighboring crisis zones (Ogli, 2019). Up to the late 1970s, the Izmir region had a high food self-sufficiency, with local, fresh, non-processed products in open markets (bazaars) or neighborhood stores, and a state-subsidized strong agricultural economy. The subsequent neo-liberal transformation completely modified the food system, including industrial standardization and an increasing hegemony of wholesale and modern retail structures with highly processed products. Overall, this has led to CO₂-intense supply chains and increasing malnutrition, with children and displaced persons especially affected. The city of Izmir has set up programs to improve their situation. As a response to the increasing land use conflicts between urban sprawl and an industrialized agriculture (van Berkum, 2005; Hepcan et al., 2013), and rising criticism of the neo-liberal food system, numerous community-based initiatives have emerged to develop alternative agro-food regimes and have pushed the topic onto the local agenda (van Berkum, 2005; Karakaya, 2016; Ozatagan and Karakaya, 2016). Today, the Izmir Municipality is a pioneer in using strategies and programs to foster regional organic farming, local family farmers and cooperatives and a healthy and local food supply. A challenge for the future is to combine food system transformation measures with measures to improve social cohesion (e.g., establish food culture events and Eco-Markets and Producers’ Markets in low-income areas).

Ljubljana (Slovenia, 286,000/520,000 inhabitants in agglomeration), categorized as a medium-sized European city, an experienced and commended MUFPP City (e.g., European Green Capital in 2016), is a pioneer in the implementation of a circular economy, short food supply chains and 0 km food. A variety of associations support and encourage food system transition, for example, food and nutrition programs are facilitated in kindergartens, and many schools provide hands-on horticultural activities in school gardens. At governmental level, the municipality has established operational goals and relevant measures to achieve self-sufficiency for the rural

development strategy. More than 800 local farms sell their products to consumers and public bodies in Ljubljana in different ways (Monaco et al., 2017). The Municipality helps them develop their primary agricultural activities and to enter the market through different actions, running programs to shorten food supply networks through measures such as promotion events for local good suppliers, encouraging doorsteps sales, establishing market areas, providing guidance for environmentally friendly food production, stimulating new forms of sales such as e-marketing.

Megara (Greece, 37,591 inhabitants/3.8 m in agglomeration, including Athens) is a city in the sub-urban Attica Region and one of the main food suppliers of Athens. It has suffered a variety of setbacks that have further hampered effective food system transformation: local wildfires and flooding have destroyed croplands and gardens; the financial crisis hit the especially vulnerable hard; and decreasing income has left little room for sustainable diets. Megara and Athens share a dysfunctional dependency in their food systems. While Megara delivers Athens fresh produce, in return the Athens food-processing industry provides packed and processed items, leading to unsustainable side effects (i.e., packaging waste, unhealthy eating habits). Megara needs to develop confident strategies to actively drive food system transformation from the perspective of being a food supplier for a neighboring large metropolis of Athens. Megara successfully used the window of opportunity during the economic crisis as a turning point in the homogenized food geography of Athens and as a catalyst for food planning (Skordili, 2013) and has played a leading role in urban food planning and formulated a Food Policy Plan. As a result of austerity capitalism, numerous bottom-up initiatives and a new community-based food planning movement were developed at different levels (Morgan, 2013; Morales-Bernardos, 2019), e.g., food policy was introduced into political discourse of the City Region and civil society.

Valparaíso (252,888 inhabitants, 901,468 in agglomeration) is the main port of Chile’s food-producing region, and supplies European supermarkets (e.g., wine and avocados). The neo-liberal economy disfavors small local producers and the low purchasing power of households hinders access to healthy food. These are an abiding legacy of the dictatorship of Pinochet, which still generates fear of change. Even so, a food movement began, supported by the local government. Valparaíso is a historic city composed of a flat narrow downtown surrounded by 44 hills that cover most of the city’s surface. The hills are bounded by ravines (quebradas), which originally had abundant native vegetation and streams. We identified three different micro-territories within the city of Valparaíso, each with particular features from a social and geographic perspective: the flat downtown, the hills, and the ravines. Most public services are in the small surface of the flat downtown. People living there have good connectivity to local markets, services, and public transport. However, most of Valparaíso’s people live on the hills,

which are themselves severely segregated by altitude. Living in the hills, particularly in those of higher altitude, implies more restricted urban connectivity, considerably lower levels of public services, and higher risk of impacts from natural disasters like floods and fires. The third micro-territory is composed of the ravines between hills. These ravines are, particularly at higher elevations, non-urbanized places between the urbanized hills. Steep slopes, unpaved soils, and, compared to the rest of the city, a relatively denser cover of native and non-native vegetation characterize these places. Their living conditions impose social limitations linked to poverty (Pino and Hormazábal, 2016). The inhabitants have appropriated the ravines and use them as informal settlements where they build, by themselves, their homes and construct their neighborhoods, social networks, and culture. Living in these ravines involves serious and complex circumstances for their people and the city, mainly arising from limited access to public services, risk associated with physical collapse after heavy rains, frequent earthquakes, the risk of fires, which constitute a huge threat to the city during the warm season of each year, and the health conditions arising from deprived living situations and malnutrition.

Overall aspects of community driven food system transitions

Based on the literature and on the experiences reported by the actors of our case study cities, we explored community-driven transitions of urban food systems. The SWOT analysis (Figure 4) clarifies the most important strengths, opportunities, weaknesses and threats to co-create inclusive, healthy and sustainable food futures of the urban food system across the case studies.

The citizen demand of local, organic, fresh and healthy food and an active seek for alternative food system by citizens, municipalities and other local actors is evidenced in all our City Regions. Moreover, health, wellbeing and sustainability became at the core of regional agendas during the last years (FAO, 2019; Martín and de la Fuente, 2022). Within each City Region a rich portfolio of innovative best practice has been emerged for solving production, distribution, processing or packaging sustainably. Interviewees highlight the opportunities of global networks and communities as basis for upscaling and replication of best practices and identified an increasing political awareness and will to drive food system transitions. Urban food initiatives foster the democratization of food systems (Desmarais et al., 2017; Bornemann and Weiland, 2019; Clark et al., 2021) and therefore relieve coordination workload from municipalities. Interviewees agree, that the awareness of citizens for healthy and sustainable diet for their own (also economic) benefit and future generations is constantly rising.

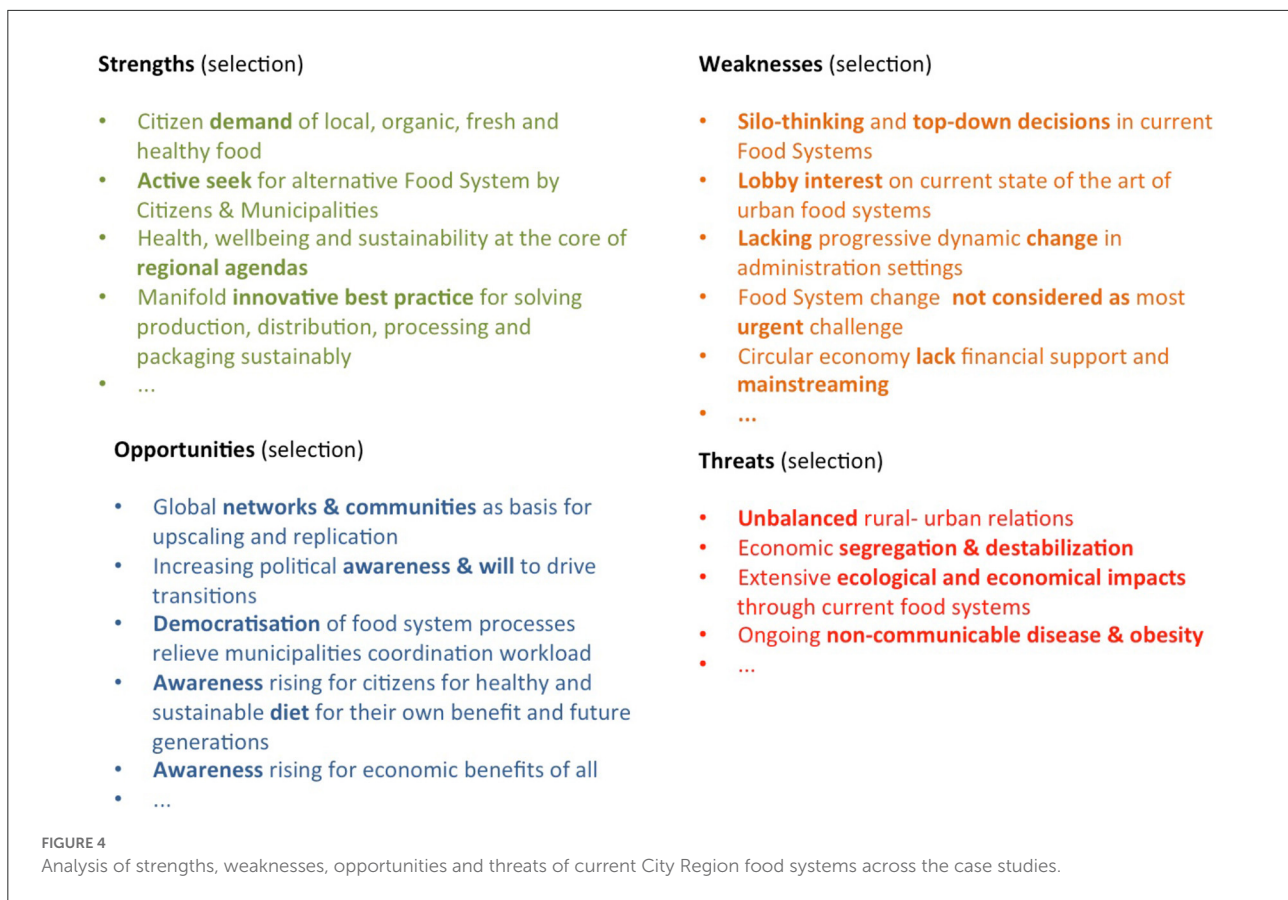
Most actors agree on criticism regarding silo-thinking and top-down decisions in current food systems, the lobby interest on current state of the art of urban food systems, identify lacking progressive dynamic change in administration settings and lacking financial support and mainstreaming of circular economy approaches. Thus, it is perceived by local actors, that food system change is not considered as most urgent challenge by key stakeholders. Among the threats the unbalanced nature of rural-urban relations, economic segregation and destabilization, the extensive ecological and economic impacts through current food systems and the ongoing non-communicable disease and obesity have been mentioned by the interviewees most often.

Discussion

Community of practice and knowledge for inclusive and innovative governance and action

The active and inclusive communities of knowledge and practice drive the crucial lifestyle changes. We clearly demonstrate a bottom-up movement on food system related issues in our case study cities and beyond (e.g., food councils, garden or food sharing networks and co-operations), and strong involvement of citizens from all backgrounds, with a wealth of knowledge and experience about the concrete shape and weaknesses of local food systems, which cannot be drawn from any holistic study. Multi-stakeholder consultations, inclusive collective thinking exercises and co-creation of new visions on local food systems and of steps to translate visions into actions drive and mainstream life style changes.

Co-creating the transition of local food systems goes beyond the current stalemate in inter- and transdisciplinarity. Inclusive participation of a wide range of local actors and societal groups expands scientific knowledge and literacy within the urban society. In turn, the collective intelligence enriches scientific innovation processes in academia (see successful examples from Citizen Science, e.g., Bonney et al., 2009, 2014; Woolley et al., 2010). An inclusive community of knowledge creates new knowledge regimes that are currently being tested in the emerging field of sustainability science by shifting borders between academia, society and politics (e.g., Pfister, 2017). These inclusive communities are linked to the activation discourse that is reshaping the conceptual foundations of citizenship, especially with regard to its exclusionary elements (Pfister, 2011), and foster socially linked knowledge production. Transformative literacy strengthens the discovery of different forms of knowledge, self-reflection among learners and self-organized, “real-world” oriented learning arrangements for inclusive transformation research (Schneidewind et al., 2016).



However, co-creative processes also challenge administrations that, due the unpredictability and open-endedness of co-creative processes, stick to traditional planning concepts. Traditional planning regularly includes a citizen participation module within the process, and ultimately aims for the implementation of a specific plan. Dynamics including opposing decisions in co-creation processes need to focus on adaptive and multifunctional planning options that also allow “trial and error” approaches. Beyond potential risks, this will develop awareness of the consequences of decision making, including a responsible use of resources (e.g., of participatory budgeting; [Institute for Comprehensive Development Solutions, 2020](#)), decisions of resource allocation, and also to the further co-management of co-created projects.

Food connects us all

Citizenship across all reviewed case studies seeks alternative food strategies and to break down silo thinking. Negotiating issues on resources such as water, energy or food highlights the inadequacies of sectoral approaches and the need for integrated management to address system transitions (e.g., [Bhaduri et al., 2018](#); [Florentin, 2018](#)). To explore and deploy

synergies, and identify and mediate potential conflicts, food policies need to be integrated into numerous existing agendas, including on social justice and equity, urban green, economic regulations, air, water and climate protection or biodiversity. A cross-sectoral approach should involve the following areas of action: public procurement, sustainability reporting, advising services, education programs and information campaigns, farmer subsidization, public support and lobbying at higher administrative levels, public investment and infrastructure.

Food is an essential for survival and wellbeing and a shared interest, it brings people together and links them along diverse paths and to traditional pasts. Community-based strategies can promote healthy eating of local products ([Espino et al., 2015](#)). A crucial leverage instrument is the establishment of new procurement principles for public catering and hospitality in order to increase the offering of healthy, safe, and nutritious food. Public canteens can serve as role models for changing nutritional behavior. Innovative educational approaches with a wide public outreach increase the responsibility of all members of society along the agriculture and food value chain (including industry, farmers, traders and retailers, consumers, citizens, policymakers and other stakeholders). This enhances the transparency between consumers and producers, fosters biosphere stewardship behavior among key actors and

reconnects people with cultures of food cultivation (Clapp, 2014). The facilitation of mutual learning between actors of urban and rural agriculture will amplify visions on agroecology, productivity and multi-functionality of landscapes, including the provision of a wide range of ecosystem services, enhancing the resilience of the whole system to climate change impacts (e.g., change in average rainfall patterns, increased mean temperatures, frequency and intensity of extreme weather events) and reducing the ecological footprint of humans.

Changing urban-rural relationship

A common feature of our City Regions are unbalanced rural-urban relations in almost all sectors. Revision of urban and rural realities and impacts from the urban to the rural and *vice versa* are necessary. Re-thinking food systems breaks down not only the silos between different administrative sectors but also between the “urban” and the “rural”. To explore opportunities for more sustainable regional food systems, we need to scrutinize this obsolete dichotomy and develop new frameworks for hybrid landscapes as multifunctional mosaics of urban and rural patches (Lerner and Eakin, 2011). The setting up of an inclusive, adaptive and cross-sectoral city region food systems thus requires a common policy and planning framework that integrates urban and regional processes beyond sectoral competences.

Rural-urban linkages are obviously manifold, comprising ecosystem services, socioeconomic dependencies, interrelations and contradictions between urban and rural governance structures (Jennings et al., 2015). Although literature reviews have highlighted the dependence of the urban areas on rural ecosystem services and localized the basic foundation of these ecosystem services in rural areas (Gebre and Gebremedhin, 2019), rural areas can learn from appreciation of a wide range of different ecosystem services in urban areas that are not-, or are under-explored in rural settings (e.g., strategies on biodiversity friendly urban gardening can be adapted to rural horti- and agriculture; multi-functionality of urban green can be explored as blue print to re-think rural land use modes).

First and foremost, the urban rural relationship changes through cooperation, coordination and integration between urban and rural dwellers, who are the producers, distributors and consumers of food. Our cases demonstrate the empowering role of bottom-up initiatives for both urban and rural dwellers (e.g., in food cooperatives, community-based agriculture, local food markets and distribution initiatives such as Food Assembly; Figure 2). The urban-rural relationships are already changing through these initiatives. We can learn from them and facilitate inclusive stakeholder-driven innovative policies based on mutual learning between society, science, food industry and policymakers. The future viability of this framework depends on the capacity to build inclusive communities of knowledge,

practices. The effects of the evolving policies have to be controlled by a transparent local monitoring and evaluation system of the food system governance and planning. Shaping this process critically and reflectively requires a new culture of error, where failures are dealt with transparently and mistakes may be made to test and learn from innovative ideas.

In addition, to drive the transformation of urban rural relationship, including principles of circular economy or nature-based solutions; these innovative community-driven approaches need to interact effectively with existing and revised governance structures. The implementation of nature-based solutions is missing in regional agriculture, and focuses mainly on urban landscapes (Almenar et al., 2019). For example, agricultural food production is often subsidized, but solutions-oriented cost-sharing programs targeting ecosystem services offer an opportunity to use subsidies as economic incentives for sustainable land management and food production. Croplands in urban landscapes can be protected as a common-pool resource, leading to a high degree of self-sufficient urban food production (Barthel et al., 2019; Säumel et al., 2019). Conservation-focused subsidies can also influence tele-connected relationships in food systems. There are successful top-down policies to tackle food waste (e.g., a French law was introduced to prohibit supermarkets from discarding food, requiring to be donated (Gollnhofer, 2017). The Common Agricultural Policy is the baseline EU financial mechanism to guide toward an ecologically sound and climate friendly food production that reduces food carbon footprint, achieves high levels of resource use efficiency, and protects biodiversity.

Finally, the changed urban-rural relationship fosters the local economy through support of regional value chains, sustainable production modes, and linking these to local food demand and markets: (i) diversifying and optimizing the city region food production and processing capacity; and (ii) increasing distribution and retail of regionally-produced food *via* diverse outlets, e.g., markets, canteens, food supply hubs, and IT platforms, including (iii) improved access to, and use of, safe, healthy, nutritious, and culturally-appropriate city region food for vulnerable households/groups in sufficient quantities in the city region. Local trade and employment will be promoted by consumption of local products and will contribute directly to the regional economy, creating green jobs and opportunities throughout the entire food chain, ensuring social inclusion, equity, and fairness for all workers. The local economy will benefit considerably from the principles of circular economy.

Conclusions

Each city region has individual settings that require tailor-made approaches on urban food system transitions. There is broad evidence for effective food governance by

local communities in literature and in practice among the different case studies. The dissemination, co-implementation, and public monitoring of policy impacts and the gained local knowledge will enrich scientific and political discussions, and enhance the overall literacy of urban communities on food knowledge and skills. Ultimately, this is the key to changing the societal paradigm toward healthy lifestyles, to a re-use oriented, cross-sectoral management of resources in City Regions, to foster social cohesion, to improve ecosystem services in both urban and rural areas, and to strengthen local green economies by creating more sustainable businesses and jobs.

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/s.

Author contributions

IS, SR, and TW: conceptualization and visualization. IS, MS, SR, TW, and RR-J: methodology, validation, formal analysis, investigation, and writing—review and editing. IS: resources and writing—original draft preparation. All authors have read and agreed to the published version of the manuscript.

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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.

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