

Embedding sustainable diets into urban food strategies: A multi-actor approach

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ABSTRACT

Urbanization processes have been accompanied by a shift towards diets that have placed increased pressures on the environment and human health. City governments are increasingly striving to address these challenges through a policy focus on “sustainable diets”. Using the example of the city of Vienna (Austria), this paper adopts an innovative multi-actor approach to unpack the complexities involved in the implementation of the core principles of sustainable diets. The analysis of data collected through semi-structured interviews and focus groups with key urban food system actors identifies place-based peculiarities and drivers of change that are not yet discussed within debates on urban food. As we conclude, there are important methodological implications emerging from our findings for both policy-makers and researchers interested in the design, implementation and evaluation of urban food strategies that contribute to democratizing the food system.

1. Introduction

Over the last decades, urbanization has been accompanied by changes towards diets that have placed increased pressure on the environment and human health. As many scholars have highlighted, urban diets tend to be high in fat, sugar and animal proteins (Kearney, 2010), which require substantial amounts of natural resources for their production (Godfray et al., 2010). In the context of the current environmental and climate crisis, the concept of “sustainable diets” (SDs) is gaining traction, both in the academic literature (Johnston et al., 2014) and in the policy discourse (Sonnino et al., 2016), as a possible leverage point to devise urban food strategies¹ that mitigate the environmental impacts of urban food consumption patterns.

The United Nations Environment Programme (2012) summarizes the key principles of SDs in terms of reduced consumption of meat, dairy products and food and drinks with low nutritional value, accompanied by an increased consumption of seasonal fruit and vegetables and of environmentally-friendly products. Others have strengthened this basic definition by stressing that SDs should also be affordable, fair, accessible and culturally acceptable (Burlingame and Dernini 2010). SDs, in other

words, are multi-dimensional; hence, their implementation raises the need for integrated policies that connect the food system with other key (and context-dependent) environmental and socio-economic sustainability objectives (Morgan 2015).

To date, the few available studies that operationalize notions of food system sustainability tend to focus on the macro-scale (see, for example, Ericksen 2008; Allen and Prosperi 2016; Moragues-Faus et al., 2017), neglecting the place-based dynamics that impinge upon the sustainability of the food system (Sonnino et al., 2016; Lever et al., 2019) and that either support or constrain the uptake of SDs. To begin to connect abstract theorizations of global food system dynamics with an analysis of their nature, influence and implications at the micro-level, this paper adopts an innovative soft systems and multi-actor approach to the analysis of an urban food system (UFS) (Vienna, Austria). The goal of this paper is to begin to complement the scholarly focus on urban food governance² with an attention for the perspectives and understandings of different food system actors, especially in relation to the identification of the drivers of change that influence the sustainability of a UFS. During the research, an impact matrix was utilized to rank the drivers identified by different food system actors on the basis of their impacts on one

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¹ Urban food strategies can be broadly defined as strategic documents, produced or commissioned by public bodies, which explicitly aim to reconfigure an urban food system to make it more sustainable (Sonnino, 2016).

² We refer to food governance as the body of formal and informal policies about food developed by governments, businesses and/or societal actors (Steuere 2013).

another. The drivers ranked as the most relevant for the achievement of an SD in Vienna were further analysed to provide both theoretical and practical insights into the relevance of a multi-actor approach to uncover different perceptions and interpretations of the dynamics that shape (and are shaped by) a UFS and, consequently, to establish the place-based foundations of a sustainable food strategy.

2. Urban food strategies: towards sustainable diets?

2.1. Contextualizing sustainable diets

Urban population growth has been associated with diets based on a high consumption of meat, dairy and processed foods, which, as evidence widely shows, contribute to environmental degradation and biodiversity loss and are responsible for around 30% of greenhouse gas (GHG) emissions (Godfray et al., 2010; Johnston et al., 2014; Seto and Ramankutty, 2019; BSFN, 2015). Several studies suggest that the adoption of more environmentally-benign diets at the global level would enhance the food system's long-term capacity for food security and nutrition and improve consumers' health (Goodland, 1997; Stehfest et al., 2009; Garnett, 2011; Johnston et al., 2014; James and Friel, 2015).

This perspective is explicit in FAO's seminal definition of SDs as "diets with low environmental impacts, which contribute to food and nutrition security and to healthy life for present and future generations. SDs are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources" (Burlingame and Dernini, 2010:7). In addition to stressing key aspects of food security and nutrition, this definition gives prominence to other food-related health issues (linked, for example, to chemical and pesticide use), the environment and climate (e.g., GHGs, water and land use), economic and food supply aspects (e.g., markets and infrastructure) and social and ethical issues (e.g., labour conditions, animal welfare), stressing also the importance of prioritizing eco-friendly, local and seasonal foods (Dixon and Isaacs, 2013; Garnett, 2014; Johnston et al., 2014; Downs et al., 2017). Overall, as a concept, SDs help to concentrate policy attention on the need to transform the food system, enabling broad goals to be set for it and within it (Lang, 2014).

Despite widespread acceptance of the core principles that underpin SDs, their translation into practice has proven to be very difficult. Evidence shows that consumers often do not understand the complexities that characterise the composition of SDs (Hjelmar, 2011), and even when they do, they still often choose less sustainable options (Sustainable Consumption Roundtable, 2006; Fresco, 2009; Dixon and Isaacs, 2013). Indeed, the relationship between food knowledge and consumption practices is far from being causal and straightforward. As social scientists have long been demonstrating, the food people consume is an outcome of the interplay between a wide range of factors, including culture, politics, ethics, health, price, availability and social status (Hjelmar, 2011). The uptake of a diet, in other words, always depends, first and foremost, on its acceptability, which will inevitably vary significantly between different communities and groups of food system actors.

2.2. Embedding sustainable diets into (urban) food policies

Researchers have not yet offered comprehensive studies about the acceptability of SDs. So far, there have been some policy efforts to engage with their core principles at the supra-local level (Barling and Duncan, 2015). Examples include the European Public Health Association, which published a policy paper "calling for a greater alignment of its health and sustainability messages on diet" (Birt et al., 2017:8), as well as attempts by countries such as Germany, Sweden, Brazil and Qatar to embed sustainability into their dietary guidelines (Barling,

2011; Gonzalez Fischer and Garnett, 2016). The few available examples of localised efforts to make a population's diet more sustainable refer in particular to urban food strategies³ as the earliest coherent efforts to develop a food policy agenda that integrates different sustainability objectives (Sonnino, 2016; Candel, 2019; Doernberg et al., 2019). As some scholars have noted, the type of soft policy instruments (such as public awareness campaigns, labelling schemes and voluntary agreements) that have been utilised to implement such strategies hold some potential to increase the acceptability and, hence, the uptake of SDs (Barling, 2011; Garnett et al., 2015).

Alongside the generally normative tone of this body of literature, more critical voices have warned against the tendency to assume that urban food strategies are the route to SDs. As some have argued, in some cases urban food strategies promulgate lifestyles that can lead to social exclusion and gentrification processes (Cretella and Buenger, 2016), set in motion dynamics that originate political tensions between different levels of governance (Sonnino et al., 2019) or are over-dependent, at the implementation stage, on skilled public employees or engaged civil society organizations (Coulson and Sonnino, 2019; Sonnino et al., 2019). These findings corroborate the importance of identifying overlapping interests and goals of different groups of actors and of gathering place-based knowledge about the food system to establish the foundations of a sustainable (urban) food strategy (Campbell, 2004) that is sensitive to the cultural, social and economic context. Indeed, as Ericksen (2008) explains, although a focus on the macro-level – the structural features of the food system – is crucial to understand its dynamics, it is important to consider that such dynamics (and their interplay) will also be differently interpreted, acted upon or even ignored by local actors in their daily practices.

In this paper, we aim to contribute to the emerging research and policy agenda around the concept of SDs through the adoption of a multi-actor approach that facilitates a comprehensive analysis of a UFS from the perspectives of those who are concretely affected by its dynamics and their interactions. By focusing on how the objectives implicit in the concept of SDs are framed, negotiated and enacted by different actors, our approach helps to uncover synergies, complementarities, tensions and trade-offs that may facilitate or hinder the implementation of policies that aim to increase the uptake of SDs and, more broadly, to realise a transformation of the food system.

3. Methods

3.1. Defining a sustainable diet

Initial discussions within the research team gave prominence to the environmental dimension of the concept of SDs as a possible overall goal of Vienna's food strategy. In this specific case, the concept was operationalized in terms of reduced meat consumption and increased consumption of organic and regional food. Behind this decision were three fundamental assumptions drawn from a systematic review of the literature: (a) meat production is environmentally costly in terms of utilization of water, soil degradation and GHG emissions (Burlingame and Dernini 2010; World Bank 2004); (b) the re-localization of food production has some positive implications for the sustainability of a food system (such as reduced GHG emissions and pollution levels associated with food miles, increased job opportunities for citizens and improved relations between consumers and producers (Feenstra 1997; Sundkvist et al., 2005; Sonnino 2013; Lamine 2015; BSFN 2015), as long as locally-produced foods are also ecologically sustainable; (c) related to this, the definition of an SD needs to take into account agricultural production methods – which are usually neglected in the literature –, by placing

³ Most urban food strategies integrate in their narratives economic, social, environmental and health goals that align with the fundamental objectives of sustainable development (Sonnino 2016).

more emphasis on the environmental benefits of organic agriculture, which avoids or minimizes external inputs, promotes the circulation of nutrients on the farm, uses soil management for pest regulation and develops more resilient farming systems (Khanal 2009; Scialabba and Müller-Lindenlauf 2010; IFOAM 2014; Reganold and Wachter 2016).

Although in our project the definition of SD was determined by the research team, Vienna's food policy council⁴ (VFPC) (as well as the stakeholder group that supports this project) agreed on using it as a guiding principle for the analysis of the UFS and the development of its food strategy. Later in the project, interviewees also agreed with the idea of working towards all objectives of an SD. However, they also pointed out that there are some challenges involved in their implementation, since "it is incredibly difficult for a population as large as Vienna to learn what a healthy diet is. The acceptance is low, and if meat consumption is going to be reduced, there is no acceptance at all" (IP (Interview Partner)-4). In this respect, socio-economic issues such as inequality were also mentioned as potential obstacles at the implementation stage. For example, a representative from a consumer protection organization mentioned that "for many, it's a financial question as to whether they can afford 100% of organic produce, and not always everything is as available as you would like" (IP-17).

3.2. Developing a multi-actor approach

In 2018, the research team performed exploratory fieldwork (Stebbins, 2011) based on the organization of two focus groups, which provided insights for the drafting of semi-structured interview questions, the selection of interviewees (38 in total, representing nine actor groups)⁵ and the design of the first two models for the UFS (Fig. 1). This step-by-step process was an outcome of the adoption of a soft systems approach, which, in contrast with more abstract conceptualizations, considers the system model as an epistemological device to create a shared understanding (based on mutual learning processes) of UFSs between researchers and various actor groups (Checkland and Scholes, 2007). The continuous development of the model is an outcome of the mutual learning processes between the different actors involved (Fig. 1).

During the first focus group in 2018 (step two), participants were distributed a preliminary model for a UFS that was developed on the basis of insights drawn from the literature review. This model was revised and subsequently discussed during a second focus group in the same year (step three), which inspired further changes. The second UFS model was shown to the interviewees at the end of the semi-structured interviews (step four; conducted in 2018–19), which focused on three main issues: their role in the UFS, their understanding of a UFS and their perceptions of the future of their UFS. Interviewees were also encouraged to make changes to the model and share their views.

For the selection of interviewees, two sampling methods were adopted. Snowball sampling (Bernard, 2006) was utilized to identify key actors by asking interviewees to suggest other suitable candidates, whereas purposive sample helped to include in the project all the identified sub-systems – i.e., to identify interview partners from the different sub-systems without establishing a quota.

The initial coding of qualitative data enabled the research team to refine the UFS model and to identify its drivers of change. Subsequently, focus coding was used to categorize the drivers in the data (Saldana, 2009). Data collected during the participatory workshop were analysed using descriptive coding. The results were used to further examine the

perceived internal drivers (Fig. 1).

During the workshop, which took place as part of an event organized by the VFPC in January 2019, the internal drivers identified (Fig. 1) were presented and further discussed by participants in small groups. These discussions were moderated by members of the research team and of the VFPC (nine moderators in total). After the discussions, participants were asked to rate the drivers by answering the question: *How important are these drivers for achieving an SD (i.e., less meat, more organic and regional food) in Vienna?*

As a next step after the workshop, an online survey was sent to the interviewees and other relevant actors, who were asked to evaluate the impact of the main identified drivers (internal as well as external) on the others from 0 to 4 (from no impact to very strong impact) (Fig. 1). Results were used to create an impact matrix that provided a synthesis of the drivers' direct and mutual impacts (Scholz and Tietje 2002, p. 80). In the matrix, "activity" refers to the influence one driver has on the others, while "passivity" refers to how one driver is influenced by others. The activity and passivity scores were calculated to create four categories of drivers (Frischknecht and Schmied, 2002, p. 135): (i) Active (strong influence on the system and slightly influenced by others); (ii) Passive (weak influence on the system and strongly influenced by others); (iii) Ambivalent (strong influence on the system and strongly influenced by other drivers, these drivers act as accelerators (by activating dynamics) in the system, and can then be defined as critical drivers); and (iv) Buffer (weak influence on the system and slightly influenced by other drivers).

4. Understanding Urban Food Systems from a multi-actor perspective

Our initial approach for the analysis of the UFS integrated Ericksen's (2008) food system model, Checkland and Scholes's (2007) theory of "hierarchical organized wholes" and Ostrom's (2009) model for the analysis of socio-ecological systems⁶. These concepts were used as a starting point to uncover a common set of potentially relevant sub-systems that include all main activities and actors involved in a UFS (Fig. 2). As mentioned earlier, during the process this model was further refined by different actors (Fig. 1).

We have defined the UFS as comprising all the activities and actors related to food in an urban area as well as their interactions, which take place between and within bio-geophysical and human environments, socioeconomic dynamics and governance contexts (Ericksen 2008; Pothukuchi and Kaufman 1999; Canal Vieira et al., 2018). The UFS model is built on four interrelated sub-systems (Resource; Information; Consumers; and Governance) and their elements (e.g., education, research and media for the "information" sub-system). The agri-food value chain (i.e., the set of activities from production ('the field) to consumption ('the table') that are needed to produce food (FAO 2014)), is represented by the resource sub-system, its inputs and outputs. Drawing the geographical boundaries of a UFS requires compromises since some of the sub-systems are located outside of the city's administrative boundaries but are positioned within the system's boundaries (e.g., supermarkets operate at both the international and the local level). Thus, the UFS is represented as relational – that is, as cutting across different scales, each of which has its own environmental, socio-economic and political drivers (Fig. 2).

⁴ VFPC is a civil society association with members from various parts of the UFS (see <https://ernaehrungsrat-wien.at>)

⁵ Interviewees represent the following groups of actors: two supermarkets, two wholesalers, an online local retailer, four municipal authorities, two political parties, a social NGO, a foodbank, two processors, two public canteens, two research institutions, one producer, one newspaper and 10 interest groups representing consumers, (organic) producers, processors and retailers.

⁶ Ericksen's food system model includes the main activities, actors, processes and factors that influence the social and environmental outcomes of the system (Ericksen 2008). The theory of hierarchical organized wholes states that systems are organized hierarchically – i.e., that there are different levels within a system and that every system is embedded into a wider environment (Checkland and Scholes 2007). According to Ostrom (2009), socio-ecological systems comprise sub-systems and internal variables. Sub-systems are relatively independent but interact to produce outcomes, which, in turn, impact the sub-systems and other (larger or smaller) socio-ecological systems.

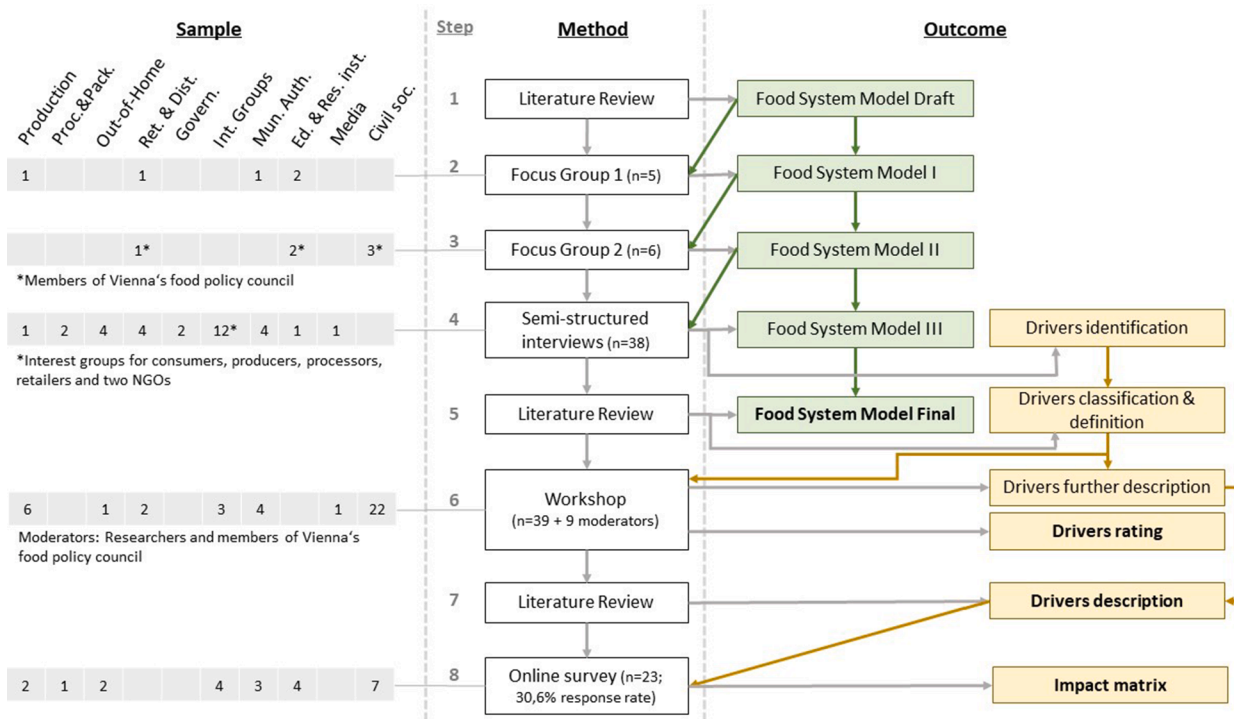


Fig. 1. Flow chart providing an overview on: (a) the research sample (production; processing and packaging companies; out-of-home caterers; retailers and distribution companies; local government; interest groups; municipal authorities; education and research institutions; media; civil society); (b) the methods employed; and (c) the outcomes of each step.

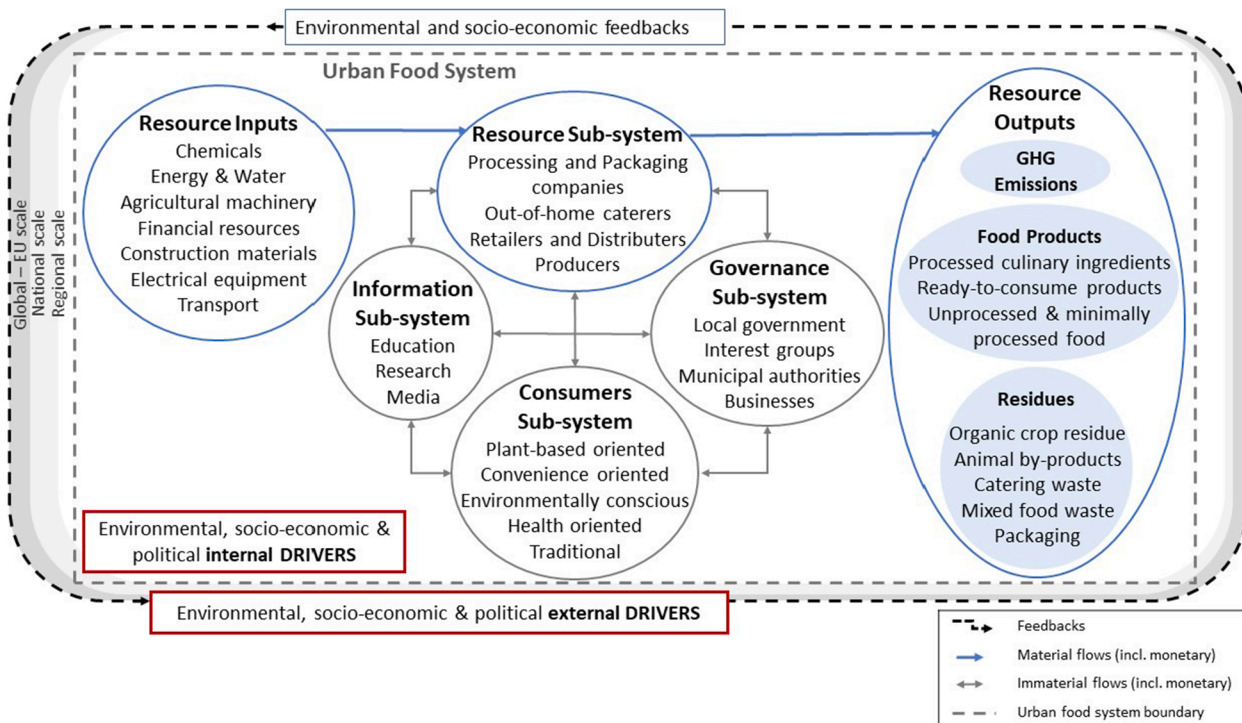


Fig. 2. Urban Food System model. Source: own empirical findings, Checkland and Scholes (2007); Ericksen (2008); and Ostrom (2009).

Drivers (which are represented in the red boxes of Fig. 2) can be internal or external to the food system (Ericksen, 2008; Allen and Prospero, 2016) and may generate impacts on it – either alone or in combinations (Béné et al., 2019). These impacts may elicit a societal or economic response that feeds back on the drivers – and, hence, on the

food system. This, in turn, produces impacts on the main goals of the system – i.e., food security, environmental security and social welfare, which, as explained earlier, are the key principles embedded in the concept of SDs (European Environment Agency 1999; Ericksen 2008).

5. Unpacking the UFS critical drivers

The drivers identified by interviewees were grouped into 15 main categories (step five) – ten internal (i.e., intrinsic to the UFS) and five external (i.e., unfolding at a larger – national or global - scale). From now onwards, we will refer to these categories simply as ‘drivers’ (see appendix for a definition of each driver). The impacts of these drivers on the capacity of the UFS to enable SDs were identified through an online survey (step six) and transformed into an impact matrix (Fig. 3). Internal drivers were also ranked by participants during the workshop (step eight).

The drivers that were ranked as the most relevant for the achievement of an SD in Vienna (step six) included: ‘Citizens’ food consumption practices’; ‘Dependency on international trade’; ‘Urban population growth’; ‘Information and education about the food’; and ‘Urban and hinterland production’. ‘Public procurement’ emerged as one of the least influential driver for the UFS, even though it was one of the most widely mentioned in the interviews and rated as the fourth most important (after production, consumption practices and information) in the workshop (step eight).

Our analysis will focus on the internal drivers located in the ambivalent quadrant – i.e., the critical drivers: citizens’ food consumption practices; information and education about food; and urban and hinterland food production, which strongly influence other drivers and system’s dynamics. In this research, they have been chosen as the main analytic focus for their potential to act as accelerators of a system’s dynamics and their importance in terms of facilitating systemic transitions (Frischknecht and Schmied, 2002; von Wirth et al., 2014). The three critical drivers also emerged from the workshop (step six) as the most highly rated in order to achieve an SD in Vienna (step eight).

In the next sections, we will analyse the selected drivers on the basis of our UFS model (Figs. 4–6). Using data from the semi-structured interviews and the workshop (Fig. 1 – steps four and six), we will examine how drivers are perceived to influence the different sub-systems, what variables are perceived to influence those drivers and their potential consequences for achieving an SD. To better illustrate the results of our analysis we have adapted the UFS model (Fig. 2) as follows: (i) it includes the four sub-systems but not material inputs and outputs; (ii) in the red box representing the drivers, only the driver to be examined is mentioned; we have added another red box with the identified variables that influence the analysed driver – we have intentionally chosen to call

them variables, instead of drivers, to clearly differentiate them from the identified drivers (Fig. 3); (iv) the purpose of the UFS has been included as the defined SD (see Section 3.1) to account for the potential consequences of the drivers for achieving an SD; (v) we have also included some examples of the environmental and socio-economic implications that drivers may have based on insights drawn from the literature review.

5.1. Citizens’ food consumption practices

Vienna was widely described by interviewees as a city with a diversity of consumer profiles in terms of food habits. Reflexive consumers (mainly educated young people), who actively search for alternative forms of commercialization channels (e.g., food cooperatives) and more ecological (e.g., organic) and regional products, coexist with more traditional consumers who prefer traditional food (Austrian or from their countries of origin) and mainly care about the price of their food. This diversity of consumers is seen as a result of Vienna’s multiculturalism – i.e., the coexistence of many different cultures implies many different diets, characterized by different costs, different origins and different kinds of foods. As explained by one interviewee from an institution working with Austrian farmers (IP-20) and another from a large retailing company (IP-29):

“What speaks for Vienna is its multiculturalism. There is a very high proportion of migrants or, I will say it in another way, this is just extreme in terms of consumption of vegetables. This is very valuable to us, because they [migrants] are just good customers. Because Viennese people prefer to eat their roast pork and their schnitzel, and the proportion of vegetables is much higher due to the migrants in the city. In that sense, Vienna is already an important customer base. (...) There is also a large part of young, modern, open-minded people. I can give you a ranking here in terms of diversity, product diversity... I have much less traditional and conservative consumers, so from this point Vienna (...) is a very important and large market ” (IP-20).

“This large and concentrated mass of foreign diets, due to high migration and the density of migrant population [Interviewee means concentrated in particular districts]. That’s something you do not usually find in other federal states because they [migrants] mix more there. (...) We know, for example, that the Muslim community, regardless of their origins, needs Halal meat (...) They eat many vegetables and fruit and they like buying fresh products. (...) However, they look much more at the price of food.

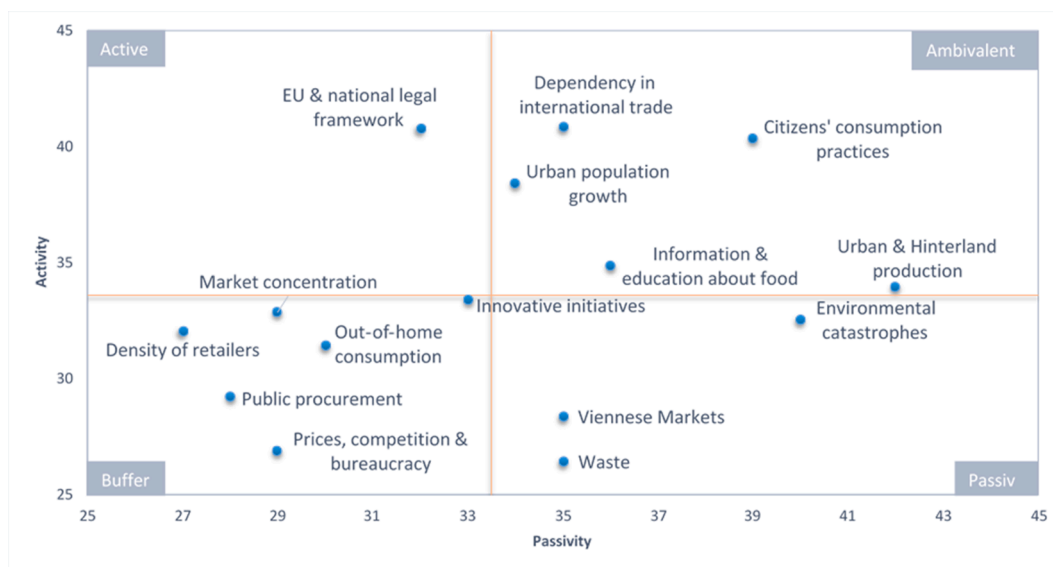


Fig. 3. System grid of the activity and passivity scores of all respondents (n = 23) for the identified drivers. Vertical and horizontal orange lines: mean activity and passivity scores. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

So, it has to be really cheap. And there is always price before quality, always. (...) Organic is not an issue for them [migrants] at all and they do not believe in it. That's something for more educated Austrians because you just have to know what's behind it" (IP-29).

Consumers often seem to be unaware of the impacts of their food choices, and even when they are they do not always choose sustainable options. Interviewed experts on food consumption agree that, in Vienna, there is a value-action gap; in the words of an interviewee: "Shopping choices are so complex and so unclear in reality that, what people say in surveys, is deliberately constructed, but not necessarily how one unconsciously makes choices most of the time" (IP-5).

Consumption practices in Vienna are deemed to be influenced by several variables (Fig. 4), including the price of food, time constraints, information and the availability of food products. Interviewees believe that food trends such as vegetarianism and 'to-go' and 'convenience' food play an important role in shaping consumption habits, which are influenced also by the tendency to choose convenience products in supermarkets or eat frequently out-of-home. An interviewee from a foodbank explained that "a dependence has emerged, in much of the population, on semi-processed or processed products, i.e. convenience food. Now, this is also a highly controversial issue in the context of marginalization, with the issue of poverty. Someone who is unable to prepare food, who has not acquired these skills, is made dependent on relatively more expensive products (...) This brings him/her really into a terrible problem, into a 'vicious cycle. Someone who is already socially deprived and has little money available is not capable of accessing what would be relatively cheap food available, namely staple food (...). So, he/she has to buy more expensive products and has little money" (IP-37).

Purchasing practices are also often seen as a result of convenience: supermarkets are considered to be more "convenient" than other food outlets, due to their cheap prices and geographical spread: "Most of the people [in Vienna] just actually go shopping in the supermarket, which is also legitimate. Because (...) we are totally convenience driven because 10 m away from everywhere you will find a supermarket, and it is just very easy

and cheap to buy food there and therefore it is quite positive that the supermarkets are becoming stronger in terms of organic" (IP-15).

Consumption practices are not without consequences for the UFS (Fig. 4). Increasing demand for convenience and out-of-home foods, media's report on food trends and the risks associated with conditions such as obesity (which influences the public health system) were the most frequently mentioned impacts of this driver, which was considered to have the potential to influence the adoption of an SD. For example, food trends such as vegetarianism may reduce the consumption of meat, whereas growing interest in organic and seasonal food may put pressure on retailers to increase their availability (Fig. 4). An interviewee from a retailing company in Vienna mentioned that "(...) we [supermarkets] are not creating a trend now, but, for example, we are seeing people going to eat out more often and what can we offer? You think, why are people going out to eat? Well, it's cheap ... when prices go up, it looks different again in the gastronomy sector. So, we just offer more products that you can just cook quickly, that are easy to cook, and the like" (IP-35).

5.2. Information and education about food

Information and education were perceived to be drivers that influence all sub-systems of the UFS as well as the previous driver (Fig. 5). Interviewees often argued that "there is no awareness about food production, nor enough information" (IP-13) partly as a result of urban lifestyles, which tend to distance citizens from agriculture and food producers and to influence the kind of food information that reaches them. Some interviewees stated that there is not enough information available to consumers, while others argued that the information available is sufficient but consumers do not know of its existence, may feel overwhelmed by it or are not interested. This disagreement persists with respect to perceptions about the information provided at the point of sale: some interviewees argued there is not enough information, while others felt that the amount of information and labelling is sometimes overwhelming. In both cases, interviewees agreed that consumers do not

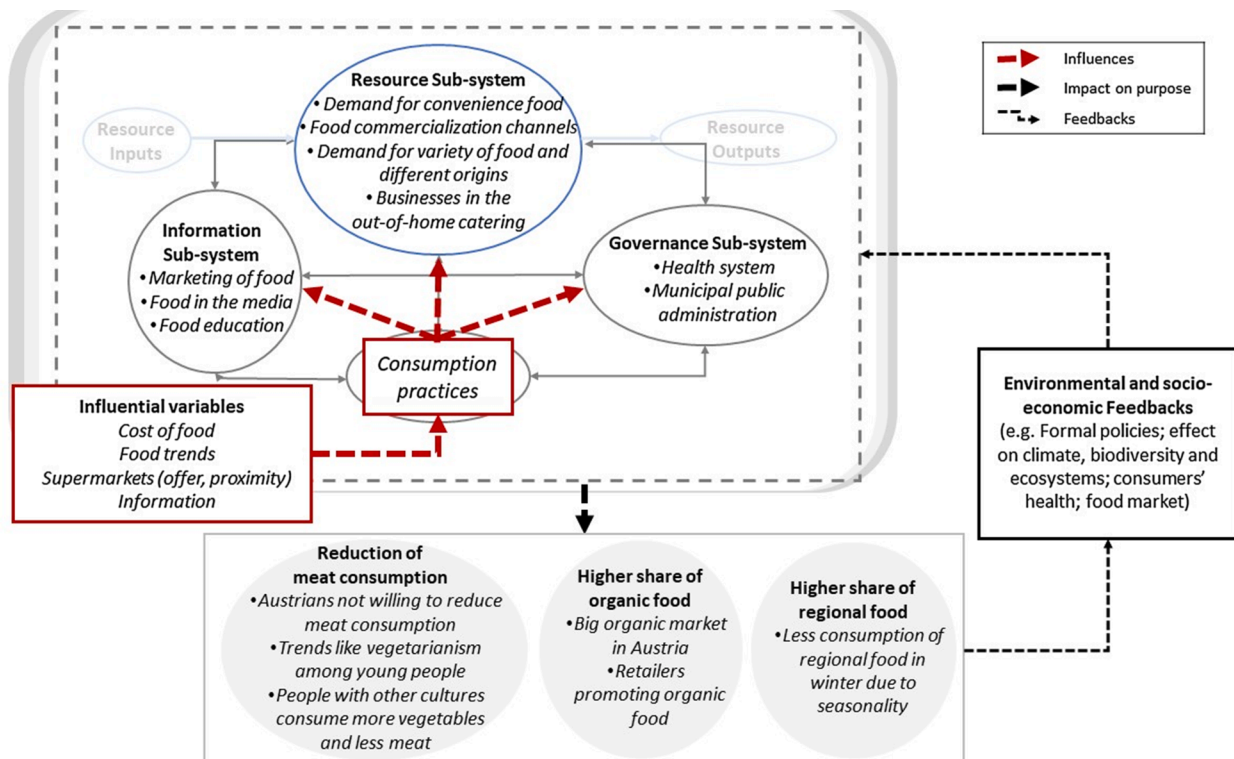


Fig. 4. Perceived influences of the driver "Citizens' food consumption practices" (i.e., consumption practices). Legend: perceptions in *italics* font.

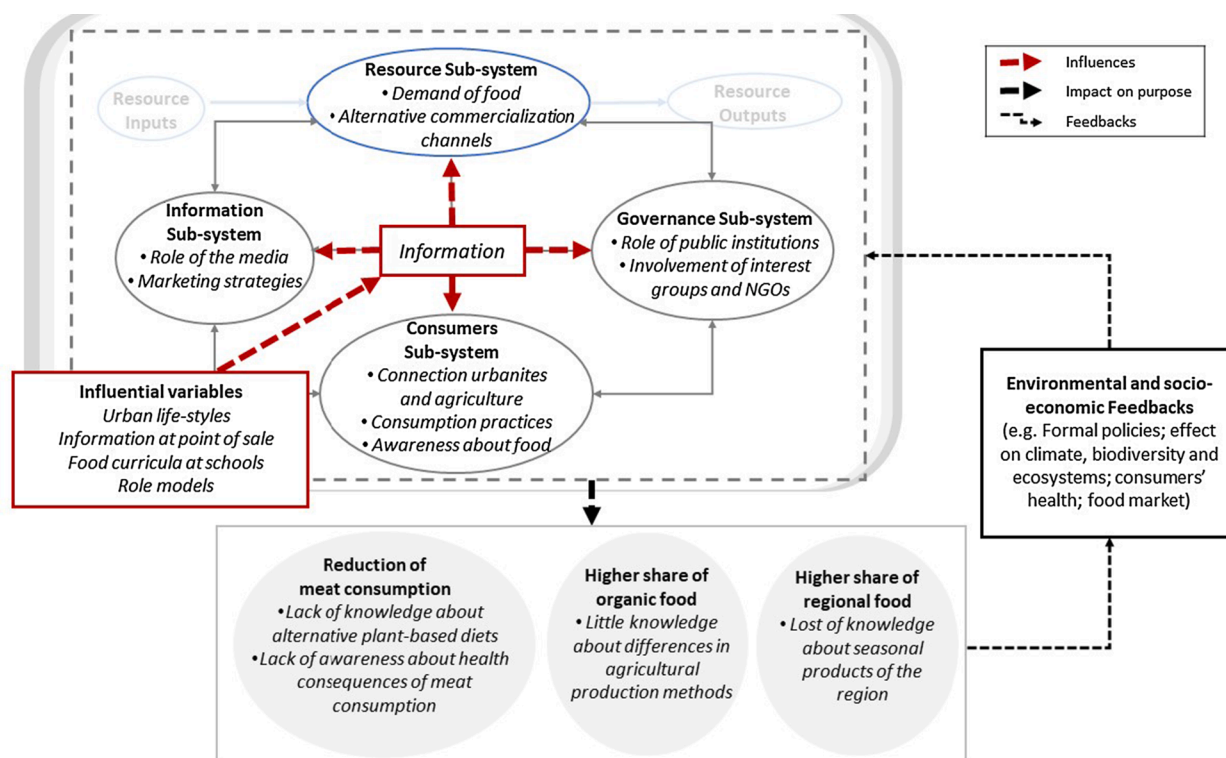


Fig. 5. Perceived influences of the driver "Information and education about food" (i.e., Information). Legend: perceptions in *Italics font*.

seem to be adequately informed about food. One interviewee summarized the issue as follows:

"The level of awareness among consumers [in Vienna] is good, but at the point of sale (supermarkets, restaurants and so on) many consumers do not decide accordingly, because there are other factors at play taking place (...). The transparency of the labelling system is very important so that the consumer sees [has the information] at the point of sale (...) this is certainly very important and then makes it easier to turn that awareness (...) into a purchase, if you know, if it is all well explained and transparent" (IP-39).

Even when consumers are informed and educated about food, interviewees perceived that they do not always purchase more ecologically sustainable products (an example of what we called the valuation gap). For instance, although Vienna is considered to be at an advanced stage in terms of organic food consumption compared to other European cities, the majority of Viennese consumers were described as poorly informed about different agricultural production methods. For example, one interviewee stated that *"there is a problem with regionality, as regional seems to be the new organic (...). That's just not true because I can also buy local products in Vienna from the Marchfeld [area in Lower Austria] which are highly industrialized agricultural products"* (IP-15); another was *"told by students that 'well, regionality is just as organic'. Or 'if I buy that around the corner, then it is also ecological'"* (IP-5).

The prevailing opinion was that information can influence food demand, bringing citizens closer to agriculture and the origins of food, shaping their consumption practices and fostering the involvement of public institutions, among others (Fig. 5). Private and, especially, public canteens – which, together with interest groups, were identified as especially important sources of information about food, along with parents and school teachers –, are considered to play a crucial role in this respect as disseminators of knowledge on plant-based diets, on the relevance of organic agriculture for the environment and on the importance of seasonality (Fig. 5), with potentially significant impacts

on the sustainability of the UFS.

5.3. Changes in urban and hinterland production

Urban agriculture was seen not just as a source of food, but also as a way of bringing food production closer to urban consumers. In this respect, *peri-urban* agriculture was identified as an especially important component of the UFS, given the role it could play in providing a higher share of regional food to its almost two million residents. *"In Vienna, we are in a privileged position, whether north or south of Vienna, we have a lot of producers, especially for fruit and vegetables. Dairies are rather distant (...) Meat production are rather south (...) in Lower Austria there's certainly a slaughterhouse (...) But it's still all within a radius where you say it's manageable"* (IP-35). As the city of Vienna continues to expand, more and more space is needed for housing purposes, which places pressure on urban food producers. Interviewees working directly with the latter reported that many are abandoning agriculture or moving to rural areas due to their inability to cope with increases in the price of land and the bureaucratic pressures that have intensified in the last decades (Fig. 6).

In general, interviewees believe that it is important to protect food-growing areas in and around the city, given the role of (peri-)urban agriculture in reconnecting food producers and consumers, fostering the development of agricultural technology, enhancing the consumption of seasonal food and promoting food education. More generally, an increase in the local and regional production of organic fruit and vegetables was identified as an essential pre-condition to achieve an SD (Fig. 6).

6. Drivers of change as leverage points for sustainable food system transformation

To some extent, our analysis confirms the relevance of drivers that have been widely researched at the global, European and national levels – such as consumption practices (e.g., Allen and Prosperi, 2016), dependence on international trade (e.g., Moragues-Faus et al., 2017)

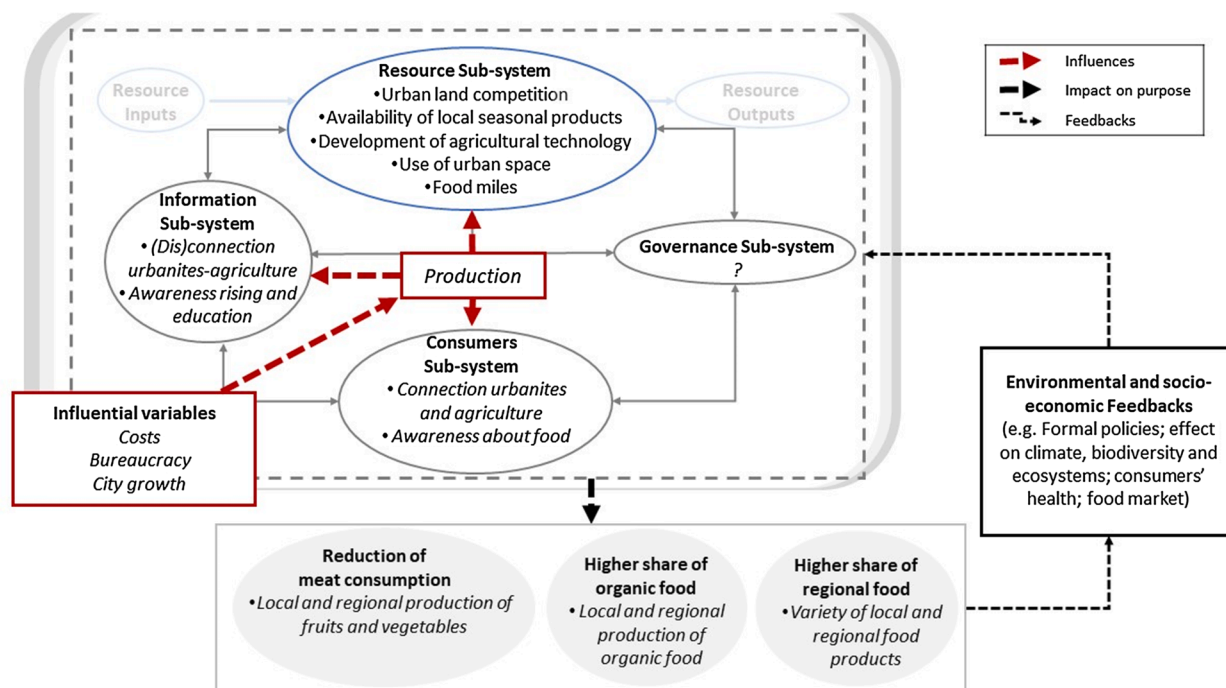


Fig. 6. Perceived influences of the driver “Urban and hinterland production” (i.e., production). Legend: perceptions in *Italics font*.

and (urban) population growth (e.g., Godfray et al., 2010). At the same time, however, the adoption of a multi-actor approach has enabled us to identify some drivers of change that are not usually considered in the literature on UFSs. These include not just strongly context-dependent features of our specific UFS (e.g., the density of retailers in Vienna) but also drivers that may prove to be relevant for other urban contexts, such as public procurement (Sonnino, 2009), out-of-home consumption (Seto and Ramankutty, 2019) or innovative initiatives such as community supported agriculture and zero waste supermarkets (Gugerell and Penker, 2020). If confirmed by future empirical research, the analysis of these drivers of change could offer important insights in support of ongoing efforts to bridge the gap between theory and practice surrounding SDs and reconcile their inherent tensions.

An in-depth analysis of the impacts of different drivers of change on a UFS is also useful to assess their perceived relevance and tackle them through place-based strategies. In our case, the use of an impact matrix orientated the analysis towards three specific drivers of change that emerged as crucial leverage points for facilitating a successful transition towards an SD in Vienna. Confirming insights from other studies (Allen and Prospero, 2016; Moragues-Faus et al., 2017), consumption practices, in particular, were identified as a critical driver to align the UFS with the principles of SDs. However, whereas in other studies consumption is addressed as part of the food system or as an outcome of it (Ericksen, 2008; James and Friel, 2015), in our case interviewees perceived consumption as both a sub-system and as a driver, influenced by a range of variables that call into question the role of urban lifestyles in shaping food habits (Kearney, 2010; Seto and Ramankutty, 2019).

Overall, consumption was identified as a sub-system that needs urgent intervention to facilitate a sustainable transformation of the UFS. In particular, the consumption of organic and regional products was seen as a luxury that not all citizens may be able to afford – an issue that highlights the importance of financial variables in shaping consumption practices. Interestingly, participants expressed the view that even if organic products were to be made affordable and available for Viennese consumers, this would not necessarily translate into the consumption of a higher share of organic food. For interviewees, this highlights the importance of providing information about food production and the environmental and health consequences of diets both through education

in schools and at the point-of-sale (i.e., retailers and gastronomy). More generally, interviewees stressed the importance of building capacity around a systemic view of the food system that overcomes the prevailing narrow focus on production and health issues (Doernberg et al., 2019).

Finally, urban and peri-urban agriculture also emerged as a crucial leverage point for embedding SDs in the UFS, raising a widely perceived need to address issues related to land price and heavy bureaucracy and to protect agricultural areas from urbanisation. Although interviewees showed interest mainly in food production, there are other elements represented in the resource sub-system (i.e., processing, distribution, retailing, etc.) that create complex interdependencies across the Vienna metropolitan area. This confirms key insights from the literature about the importance of thinking in terms of city-region metabolism (Heynen, 2006; Forster et al., 2015) to ensure that UFSs reconnect with their surrounding regions to support small producers (as well as processors, retailers, SMEs, etc.) as key actors in the implementation of the objectives of SDs.

Significantly, our findings also show that the driver of change that is perceived to have the highest level of influence on the UFS is the European and national legal framework (see impact matrix), which has a direct impact on agriculture, public procurement, city administration, etc. This reflects the concerns expressed by the respondents about the limited capacity of city governments and administrations to influence a UFS – or, in more theoretical terms, the constraints created by its relational nature, which raises the need for both horizontal and vertical governance integration to sustain food system transformation over space and time.

7. Delivering sustainable urban diets through a multi-actor approach: Some conclusions

Macro-level analyses of the food system are useful to identify the multi-scalar social, environmental, economic and power dynamics that have been (re-)producing malnutrition, in all of its different forms. The effects of these dynamics and their interactions, however, cannot be captured at the macro-level; they inevitably vary from place to place – and so do the local perceptions (and acceptance) of their implications. Theory and practice surrounding food system transformation can no

longer afford to neglect the context-dependent values, needs and priorities that shape the place-based interpretations of (and, hence, commitments around) the relationship between food and sustainability (Jehlička and Smith, 2011).

Our multi-actor approach attempts to address the need for re-orientating some of the analytic and policy focus to the micro-level, where the active involvement of local actors is often perceived to be crucial to create a consensus frame (Sibbing and Candel, 2020) as a basis for more inclusive food policies. As an interviewee with a long-standing experience in food policy highlighted, “it could work better if people sat together and develop common strategies (...) People, you are all dealing with the same things, so work together! That could really work better” (IP-13).

In this context, researchers advocating for a sustainable transformation of food systems are beginning to calling for “trans-disciplinary” approaches based on co-creation processes between different actors (see, for example, den Boer et al., 2021). The literature, however, has not yet provided robust examples of methodologies and approaches that should underpin the activities of the growing number of multi-actor platforms that are emerging in urban areas, where real-life communities (“Living Labs”) of academics, practitioners, policy-makers and citizens are coming together to co-design innovative projects around shared visions and objectives. In this respect, the example of Vienna could offer an innovative methodological approach in support of the co-creation of knowledge.

More specifically, the relevance of food knowledge flows and of the spatial interdependencies between a city and its surrounding region that this study has highlighted brings to the fore the importance of actively engaging with the multi-scalar processes that shape a UFS. An important limitation of our research in this respect is the lack of a more in-depth analysis at the sub-system level, which could have uncovered other place-based peculiarities of the urban context. Since we felt that an excessive emphasis on details could have limited the applicability of our approach to other contexts, we purposefully decided not include the sub-systems in our analysis.

Future research could greatly benefit from more micro-level analyses

performed in conjunction with citizens, especially vulnerable groups and minorities (such as migrants, refugees and, particularly in the case of cities in the global South, indigenous and ethnic communities), whose food practices and food-related lived experiences have not yet entered academic debates on food policy (Sonnino and Coulson, 2020). The next step for research and action on (urban) food systems will entail a further strengthening of multi-actor approaches through the development of robust participatory methodologies that draw upon the experiential knowledge of citizens in collecting, mapping and analysing data. Indeed, knowledge about the multifarious ways in which food consumption and production practices are enacted by ordinary citizens and the daily strategies through which they engage with (or attempt to reconfigure) multi-scalar power relations is vital to ensure that food policies in support of SDs are both inclusive and progressive and identify the governance modalities that are necessary to sustain them over time.

CRedit authorship contribution statement

Marta López Cifuentes: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Bernhard Freyer:** Conceptualization, Validation, Writing - original draft, Supervision, Funding acquisition. **Roberta Sonnino:** Conceptualization, Validation, Writing - original draft, Writing - review & editing. **Valentín Fiala:** Conceptualization, Methodology, Writing - original draft, Project administration, Funding acquisition.

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Appendix A. Drivers short descriptions

	Perceived VUFS drivers	Short description
Internal drivers	Citizens’ food consumption practices	The way Viennese consumers purchase food (e.g., supermarkets),the kind of food their consume (diet) and how (e.g., out-of-home).
	Information and education about food	Information available for consumers about food. How well informed and aware consumers are about food.
	Innovative production, processing and marketing initiatives	Start-ups and different kinds of institutions (e.g., organizations) that innovate in production, processing, marketing or other areas related to food.
	Urban and hinterland production	Peri-urban or metropolitan production, market-oriented agriculture; urban gardening, which ranges from illegal gardening of vacant space, to gardening in individual allotments and in community gardens; and production at a regional scale.
	Density of food retailers	Number of supermarkets per m2 in the city of Vienna.
	Public food procurement	All meals served in public canteens. The vast majority is attributable to kindergartens, schools, hospitals and nursing homes and homes for pensioners.
	Prices, competition and bureaucracy of the city	Prices of land, living, infrastructure, etc. in the city; competition between farming and building areas; and bureaucracy processes for producers, processors and retailers in Vienna.
External drivers	Food waste and overproduction	Food waste along the whole food production and supply chain in Vienna and overproduction of food.
	Viennese Food Markets	Food (farmers) markets in Vienna.
	Increasing out-of-home consumption	Increase in the consumption of food in restaurants, canteens or on-the-way (to-go).
	Market concentration	Concentration of market share by retailers.
	Environmental catastrophes and extreme events	Change in the climate on earth. The current global warming, mainly caused by man-made, will result in a continual increase in temperature in Central Europe.
	Dependency on international trade	The increasing intensity and scope of cross-border economic exchanges, the creation of global or continental markets and an intensification of international competition.
	Dependency on national and European legal framework	Laws, regulations and legal framework conditions at EU and Austrian level.
	Urban population growth	Population increase in the city.

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