Mobilising the food system concept: unpacking debates and applications

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Abstract

The food system concept has become the 'go-to' framework to galvanise discussion and bring together academics, policymakers and industry stakeholders to debate changes needed in how our food is grown, made, sold, eaten and governed. The concept is not new, but the paper shows a resurgence in application across science and social science in recent years. What is lacking, however, is more critical analysis as to why this concept is increasingly mobilised and what it offers agri-food scholarship going forward. Inspired by Jackson et al's (2006) analysis of the food commodity chain as 'chaotic concept', this paper undertakes a critical review of the peer-reviewed literature in English language on food system(s) nationally in the UK and internationally. The analysis begins with a review of food system scholarship to explain concept origins and key features of systemic thinking. The second part examines uptake in the wider literature. This spans 1987-2024 and reviews trends from Scopus and Web of Knowledge, followed by a structured review of social science articles for two case studies concerning respectively 'food system transformation and crisis' (process-based) and 'food system and the urban' (place-based). The analysis reveals a pattern of bi-polarisation: the first mobilises the food system as a heurist framing in contrast to the second more systemic framing. The former dominates the material reviewed. The paper argues that recognising not only different mobilisations but also the dominance of heuristic food system uses is important, given its prominence to support changes in the governance and politics of food.

Key words: Food system; Analysing concepts; Heuristic and Systemic framings; Bipolarisation.

Mobilising the food system concept: unpacking debates and applications

Introduction

The food system is a well-established concept. Lang and Wiggins (1985) wrote nearly 40 years ago about the 'dynamics of the food system' and the need for analysis to break out of an emphasis on individual sectors. Ten years later, Whatmore (1995) made the case for a food system approach in response to the globalisation of agri-food production, which demanded a systemic understanding of food provisioning to fully apprehend its growing complexity. However, it appears that 'food system' in the last decade or so has captured the academic and policy imagination with a previously unseen degree of intensity. Certainly it is having a particularly influential moment in policy with the call from The United Nations High Level Panel of Experts on Food Security and Nutrition "to adopt a food systems analytical and policy framework" (HLPE, 2020), a call reiterated a year later at the 2021 United Nations Food Systems Summit. The increased interest in the food system concept is occurring in a context of, and possibly in direct response to, growing concern for multiple interlocking crisis that are imperilling food systems just as food systems are equally major contributors to these crises.

Academic efforts have also gathered apace to define food systems approaches (Ericksen, 2008; Ingram, 2011), understand food system transformation (Leeuwis et al., 2021; Sonnino et al., 2019; Sonnino and Milbourne, 2022) and work with food system concepts to examine a particular context (e.g. Greenberg, 2015; Berger and Helvoirt, 2018). We observe, then, a significant proliferation in the use of the terminology of food system within agri-food social

science scholarship (Brunori et al., 2020; Sage, 2022). However, this proliferation does not necessarily indicate an increase in food systems thinking, a point suggested in Hospes and Brons' (2016) review of the food system governance literature.

Our aim in this paper is to examine the substance of this proliferation and undertake a critical assessment of the use and mobilisation of the food system concept in agri-food social science. The paper is situated in relation to a diverse body of scholarship that has sought to examine the conceptual trends emerging in a particular field of study, notably Jackson et al. (2006), Collier et al. (2006), Ribeiro et al. (2017) and Duminy & Parnell (2020). Inspired by this literature, we appraise the types of work that are being done when the 'food system' concept is mobilised. This complements reviews of the food system concept which frame it in relation to 'multiplicity' (Brock, 2023), 'governance' (Yap, 2023), and to enable a 'research agenda' (Sage, 2022). Critical assessment of mobilisation patterns of the food system concept is valuable because of how discourse can be appropriated or 'hollowed out' (ibid.).

To address this aim, we ask, then, what is the work that is being done by the deployment of the concept of food system? Relatedly, does this indicate an increase in systemic thinking and perspectives? Moreover, what are the risks and opportunities of its future use within agri-food studies? The next section of the paper outlines approaches to analysing concepts to inform an analytical framework. The subsequent section sets out the research approach and methods. The results are organised into two main parts. The first reviews selected 'foundational' papers from food system scholarship to trace conceptual origins and key features of this style of academic practice. The second examines uptake of the concept in wider food scholarship, first reporting general patterns of uptake across time and space and

research disciplines, followed by deeper analysis of two case studies from the social science literature, the first, food system transformation and crisis, signifying a process-orientated focus, and the second, urban food systems, reflecting a spatially orientated focus. We return to the questions that underpin the paper in the discussion to invite further reflections about future applications of the concept.

Analysing concepts: chaotic, contested, and multiple

Efforts to examine concepts and their diversity of application, interpretive flexibility, and different framings are well established in a wide variety of fields from Responsible Research and Innovation (Ribeiro et al., 2017), city science (Duminy and Parnell, 2020), democracy and law (Collier et al., 2006) and food systems (Brock, 2023). Within this work a diversity of conceptual uses, definitions and interpretations is positioned as a source of potential confusion and contestation that can pose serious challenges to efforts in bringing together people with common purpose and approach (Jackson et al., 2006; Brock, 2023). Such analyses seek to provide greater understanding of the root of such differences. This includes, identifying implicit and explicit political interests mobilising concepts differently (Jackson et al., 2006), diverse definitions and framings, and gesturing towards more unified and coherent conceptual development and use (Collier et al., 2006).

Perhaps fittingly, this work is itself incoherent in approach and framing. Variously the literature situates concepts as being potentially 'essentially contested' (Gallie, 1955; Collier et al., 2006), 'chaotic' (Jackson et al., 2006; Duminy and Parnell, 2020), or as 'boundary objects' allowing 'multiple' enactments of a concept (Brock, 2023). However, what they share is a rejection of

concepts as inherently fixed and stable. By invoking terms such as 'contested', 'chaotic', and the more neutral 'multiple', the aim is to foreground conceptual diversity, construct a ground for discussion of conceptual complexity, and examine the implications of said differences for both research and practical efforts to intervene in the world. One core difference is Gallie's (1955) framework which aims to ascertain whether a concept *can be* considered 'essentially contested'. In all cases, however, there is a desire to support reflection and practice amongst those utilising the concept of interest (Ribeiro et al., 2017) to identify productive pathways forward.

Drawing from across this work, we note several shared analytical elements, summarised in Table 1, which are utilised herein to structure analysis of the food system concept in academic literature. Our goal is not to ascertain whether food system concepts are 'essentially contested' or 'chaotic' but rather to trace the origins, definitions and evolution of the concept (Section 1a), to identify common features (Section 1a) and patterns of uptake (Section 2a), and to examine applications and interpretations of the food system concept in particular cases and contexts, including reflections on the implications for food system theory and practice (Section 2b).

Table 1. Dimensions of concept analysis

1. Origins	From which authors does the concept originate? What were the theoretical, practical and political issues and debates that are being responded to?
2: Uptake	In what academic fields and geographical contexts is the concept being adopted? How does this change over time?
3. Definitions and essential features	What are the key elements / essential features of the concept? How does its definition vary amongst different authors?
4. Applications	To which topics and subjects is the concept being applied? How is the food system concept being utilised when it is applied and mobilised in different empirical and geographical contexts? How do these applications draw upon and utilise other theories and concepts?

Research approach and methods

This section describes our approach to the identification of relevant academic literature for review and analysis noting that this was limited to English language publications. The first stage involved discussion amongst the author team of influential and otherwise notable / significant social science articles, from different time periods, that seek to define the concept of the food system, and delineate an approach that explicitly seeks to develop food systems thinking as an analytical tool. In total, 14 of these 'foundational' research articles was identified in this process, listed in Table 2, with each article closely read by the author team.

Table 2. Selected foundational food system articles (see reference list for full citation details)

Tansey and Worsley (1995), Whatmore (1995), Ericksen (2008), Ingram (2011), Allen and Prosperi (2016), HLPE (2017), Béné et al (2019), Sonnino et al (2019), Brunori et al (2020), Leach et al (2020), Leeuwis et al (2021), von Braun et al (2021), Sage (2022), and Yap (2023).

We acknowledge that the list of papers in Table 2 is by no means exhaustive and that their identification was informed by our collective experience, across several decades, of direct involvement in European agri-food research. It is emphasised that none of us was involved in authoring any of the foundational papers. This process enabled the *origins, definitions* and *evolution* of the food system concept, across different social sciences disciplines, to be clarified and understood.

Having examined in detail the foundational articles attention turned to a broader scoping of the use of the term 'food system' in the academic literature (via Scopus and Web of Knowledge)[1]. Review search start dates are often somewhat arbitrary, particularly when there is no obvious point of first emergence as was the case here. The Brundtland report, published in 1987, is often regarded as a key moment in the development of discussion about large scale, far-reaching – or systemic – transformations for sustainable development, including food and agriculture, and so this was selected as the baseline for the search. The report contains only

[1] We acknowledge it would be both interesting and useful to undertake a similar search within the policy (grey) literature and print news media, to compare use of the food system concept in these different domains.

one mention of food system. The end date was 2024, the point at which the scoping research was conducted. The search yielded 21,823 articles with 'food system' in the title / abstract. The initial search enabled insight into *uptake*, with a number of trends and patterns identified in use of the food system concept over time, space and in different academic disciplines.

Since our interest is primarily in the deployment of the food system concept within 'agri-food studies', an interdisciplinary field of interest within the social sciences, we then focused our attention on articles published in a selection of social science journals. These were selected because they are: agri-food and rural studies-oriented; have published the largest numbers of food system articles; are known to have published relevant work but the scope of the journal goes beyond the rural sphere. The selected journals were: Food Policy; Journal of Rural Studies; Journal of Cleaner Production; Agriculture and Human Values; Geoforum; Journal of Peasant Studies; Land Use Policy; Rural Sociology; Urban Studies; Cities; Sociologia Ruralis; and Energy Policy. Search terms were then identified to enable us to make further sense of the range of contexts – theoretical, empirical, spatial – in which the food system concept was being mobilised within this social science scholarship. Table 3 summarises the search terms and the number of articles featuring each term. This process provided further insight into concept *uptake* and an initial overview of concept *application*.

To help us to further manage the scope of our review and analysis we selected two different types of *application* of the food system concept, one that was more 'process' oriented, encapsulated by the search terms 'transformation' and 'crisis', and the other that was spatially focused, encapsulated by the search terms 'cities' and 'urban' (Table 3). Before conducting further analysis, articles were checked for duplicates. 14 duplicates from the merge of the

transformation and crisis, and 67 duplicates from the merge of the cities and urban search were removed. A further seventeen articles were excluded as these mentioned only in passing the urban sphere (e.g. when referring to the process of 'urbanization' as a contextual factor) but otherwise this spatiality was not the focus of analysis. Twenty-six articles were removed due to lack of relevance from the transformation and crisis corpus resulting in 147 articles. The final total for analysis in the food system and the urban case was 127 articles.

Table 3. Food system search terms and article numbers per term, 1987-2024

Search term	**Number of articles**
Food system	**731**
Food system + policy	**362**
Food system + global	**276**
Food system + local	**257**
Food system + sustainability	**225**
Food system + politics	**172**
Food system + governance	**146**
Food system + transformation	**132**
Food system + urban	**131**
Food system + national	**127**
Food system + cities	**80**
Food system + crisis	**55**

Note: Data covers only the selected social science journals not all social science publications in Web of Science

The 274 articles within the four search term categories (i.e. 147 articles on food system transformation and crisis; 127 food system and the urban articles after duplicates and irrelevant articles were removed for each) were then subject to a more detailed interrogation involving a close reading and thematic analysis of abstracts and key sections of the papers. Informed by the framework in Table 1, this process enabled identification of the subjects and topics explored in studies within the particular search term category (e.g. 'food system transformation'), the different ways in which the food system concept is being applied within this search term category, and the theories and concepts (additional to the food system) that are employed to examine the particular search term category.

Analysis

The analysis is organised in two parts, each working to elaborate the dimensions in Table 1, in turn summarising findings from different parts of the overall corpus of papers reviewed. Part one begins with interpretation and thematic analysis of the foundational food system papers that explain concept origins, definitions and what we observe as an evolution in approaching the food system within those papers. It also identifies key features, characteristics and promises of food system thinking. The second part examines uptake and application in the wider literature, starting with an overview of uptake in the sciences and social sciences, but focusing mostly on a structured review of application within social science articles via the two case studies. The case studies in particular help to examine the different ways in which researchers make use of the food system concept alongside other concepts.

1. Food system concept - origins, definitions, evolution and essential features

1a. Origins, definitions, evolution

As Béné et al (2019) observes, the food system concept can be traced back to the 1970s (Sobal, 1978). Initially the concept achieved limited purchase. For example, 'food system' is referenced only once in the 1987 Brundtland Report and only in relation to increasing food production. However, in the 1990s, scholars began to engage again with the food system concept in the context of understanding the processes of transformation of agri-food systems within capitalism (Whatmore, 1995). Authors such as Whatmore (1995), and Tansey and Worsley (1995), sought to reposition agri-food scholarship in relation to these changes by moving towards an approach that emphasised global connections, the embeddedness of agri-food systems in processes of capital accumulation, and the changing role of the agri-food sector in social regulation. This work was not only extending analysis beyond the farm gate or more linear value chain concepts but was necessitated too by the changes wrought through modern capitalist food production that had destabilised previous conceptual categorisations.

However, the more recent burgeoning of scholarship elaborates what we interpret as a new food systems approach that advocates systemic thinking. It is this more recent literature on food systems that we examine in detail in the rest of this section to identify the essential features of a food systems thinking approach. These insights inform and guide the analysis of trends and cases in subsequent sections.

In reading the foundational papers, it is striking to observe the influence of two key references when it comes to defining food systems. The first is the report by HLPE (2017: 23) and the definition of food systems repeated below and widely quoted:

> "[A] food system gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes".

The report links food system thinking to diet and nutrition, thereby moving discussions beyond just food production. The food system definition comes from an earlier HLPE report about food waste (HLPE, 2014). It is now a common reference point to define food systems for science and policy. The second key reference is Eriksen's (2008) conceptualisation of food system that proposes a framework to study 'the interactions of food systems within global environmental change' (p. 235). In early conceptions, food system scholarship organised around activities that covered production through to consumption (cf. Tansey and Worsley, 1995). Ericksen (2008, 234-5; emphasis added) broadens the definition beyond these activities to comprise:

> "[T]*he interactions between and within* biogeophysical and human environments, which determine a set of activities; the activities themselves (from production through to consumption); outcomes of the activities (contributions to food security, environmental security, and social welfare); and other determinants of food security".

This definition is similar to HLPE but is more explicit in making food part of a wider, complex system. Food systems and food security are characterised by social and economic change and global environmental change. These processes are simultaneous, rapid and complex with uncertain consequences. Ingram (2011) defines the food system in similar terms, reiterating the idea of complex interactions that contribute to realizing a set of outcomes, including food utilisation, access and availability. The food system is therefore a constellation of things, activities, actors and outcomes realised through complex relations.

Allen and Prosperi (2016) employ similar vocabulary, explicit in this idea that food systems are 'complex socio-ecological systems', by which they mean multiple interactions between human and natural environments, that systems have 'intrinsic properties' to ensure 'essential outcomes' are maintained or enhanced and recognising also 'critical vulnerabilities' and 'resilience factors'. This includes connections to system thinking and the idea of uncertainty expressed as non-linear, complex and reciprocally causal processes.

This points, then, to a key development in food systems scholarship, particularly the development of systemic thinking. The foundation for these ideas is Eriksen (2008), with the thinking elaborated in recent contributions to situate global food systems as nested barometers for wider systemic socio-ecological crises. Sonnino et al (2019: 111) usefully elaborate this systemic definition of food systems as follows:

> "A systemic approach unveils emerging patterns, relationships and phenomena that would not be visible under a siloed approach […] when applied to the framing of problems, systems thinking helps to decompose them and analyse them from

different perspectives, capturing differences in viewpoints and roles between stakeholders".

This signifies a critical step change in food system thinking from production-consumption system heuristics to applying input-output models as a framework to capture socio-ecological system interactions and complexities. Akin to Brock (2023), the mobilisation of the food system concept is equally 'multiple'. For example, the HLPE definition of food system acts as descriptive heuristic organising different elements important for considering food and nutrition, which is not necessarily the same as thinking systemically about food in the ways being articulated by authors such as Eriksen, Allen and Prosperi or indeed other aspects of the HLPE framework. This point is further underlined considering the food system is often undefined (as noted in a review of 69 of 79 papers – see Hospes and Brons, 2016) and taken as given.

1b. Essential features of food system thinking

Having observed a move in food system scholarship to advocating a food system approach, in this section we elaborate the essential features of this food system thinking as evident from key themes identified in the foundational literature. The first essential feature is the intention to go beyond siloed thinking, that is to make connections between previously separated activities within food systems, connect the food system to other systems (Sage, 2022), to treat them as coupled environmental and socio-economic systems (Brunori et al., 2020), and to understand those interactions (Allen and Prosperi, 2016). There are several dimensions to this first point. As Sonnino et al (2019: 111) argue, for example, food policy tends to focus on either

the supply (productivism) or demand (access-based) side of the food system. A new policy and research agenda now recognises the need for approaches that connect and account for system interlocking and which frame 'food as part of a complex system' (Brunori et al., 2020). Connecting to other systems also positions the food system as a 'sub-system' within wider political economic, environmental and organisational structures. More holistic examinations of food systems are in part at least attributed to the 2008 financial crisis, which brought the failings of food systems into relief, both for the hungry and the seemingly well fed (Sage, 2022). As we note in other points that follow, this opens up a new vocabulary when it comes to solution building and complexity. It also underscores the argument that outcomes like food security are closely connected to cross-scale and cross-temporal processes that drive vulnerability, highlighting the fallacy of attempting to address such issues without accounting for wider system connections and influences that lie beyond the food system (Ericksen, 2008).

The second essential feature relates to complexity. To think systemically requires addressing complex problems with multi-causality. This is essential in food system thinking, designed to understand key factors that lead to particular outcomes or interactions. Approached as a 'problem-determined system', food systems are "complex, heterogeneous over space and time and replete with non-linear feedbacks" (Eriksen, 2008: 237). This recognises structure and agency interactions as "… an interplay between structure, which is usually at a broader or macro-level, and agency, which is local or micro-level" (ibid.). The objective is to provide a means to understand interactions between the food system and other systems; to understand feedback loops and cross-scale interactions (non-linear feedbacks); and to address complex problems with multi-causality. The nature of food relations – i.e. nature-human interdependencies and interactions – requires systemic tools (Allen and Prosperi, 2016)

Food system thinking is about understanding interconnections rather than the components themselves to understand how a system functions (Brock, 2023). A third feature then is a contrast with linear, reductionist ways of characterising the world. This language broadens analysis beyond narrow food chain and economic perspectives. It promotes a more holistic approach to food production and provisioning, and challenges such as climate change, nutrition and food security, enabling a better understanding of the 'true cost' of food and engaging with the 'real' world in its complexity. This approach also promises to make connections. One aspect of this is to draw attention to wider food-related issues that might otherwise be ignored or closed down e.g. overconsumption, undernutrition (HLPE, 2017), as well as to consider changes along the food chain, such as 'supermarketisation' (Brunori et al., 2020). It is also open to, indeed may require interdisciplinarity in the investigation of food systems. As Eriksen (2008: 237) calls for, the intention is to "be fully inter-disciplinary, aiming for marriage of natural and social sciences". Sonnino et al (2019: 115) argue that thinking of and acting on food systemically requires "the capacity to overcome pervasive fixities, rigidities and ontological divides, including those between disciplines". Their analysis asserts the need for new interdisciplinary collaborations and a relational approach to food in place-making.

A further key feature of food system thinking, as identified in Ingram (2011), is the potential to uncover and balance trade-offs and synergies across different societal goals. It can provide a framework for structuring dialogues aimed at enhancing food security; it can help to both assess the impacts of global environmental change on food systems and identify feedbacks to the earth system from food production activities; and, crucially, to identify intervention points to enhance food security and analyse synergies and trade-offs between food security,

ecosystem services and social welfare outcomes. Béné et al (2019) also links the food system to achieving wider sustainability goals and in a more critical intervention implies system thinking is limited and even problematic when it does not have sustainability alongside it. One should think then in terms of 'sustainable food systems' when describing the system elements of food system thinking. Meanwhile, Leeuwis et al (2021) point to the promise of transformation and improving coordination and impact of interventions. Food system analysis, they argue, increases our understanding of the way in which components in the system interact, and thus provide insight in terms of trade-offs and synergies between development objectives.

Sonnino et al (2019: 115) capture the essence of what this mode of working gives to food scholars, picking up also on the last two features i.e. consideration of the non-human and relational ontology. As they put it, this way of working "gives analytical and practical emphasis to interactions, integrations and relationalities between actors and activities within the food system and between food and other relevant systems".

In summary, food systems are conceptualized in terms that emphasize connectivity and complexity. Interconnections extend not just between the human and non-human actors of the food system but also include connections with other socio-ecological systems, actors and structures. The resulting complexity requires methodological innovations with an emphasis on inter- and trans-disciplinarity in research. This is nested within a normative commitment to develop more sustainable and just food systems and signals a significant level of ambition and aspiration amongst scholars in imagining and envisaging a food system approach.

2. Uptake and applications of the food system concept: patterns and thematic cases

In this section we step back from examination of foundational food system articles to consider uptake and application of the food system concept in the wider academic literature, starting with the broadest optic across sciences and social sciences before focusing on two case studies that are used to illustrate the application of the food system concept within a particular area of agri-food research practice.

2a. Patterns of uptake

Figure 1 tracks the use of food system over time across all article titles and abstracts in Scopus, with social science disciplines indicated in blue. The graph clearly demonstrates the significant growth in reference to 'food system', particularly since the mid-2000s, with wide application of the concept since the latter half of that decade.

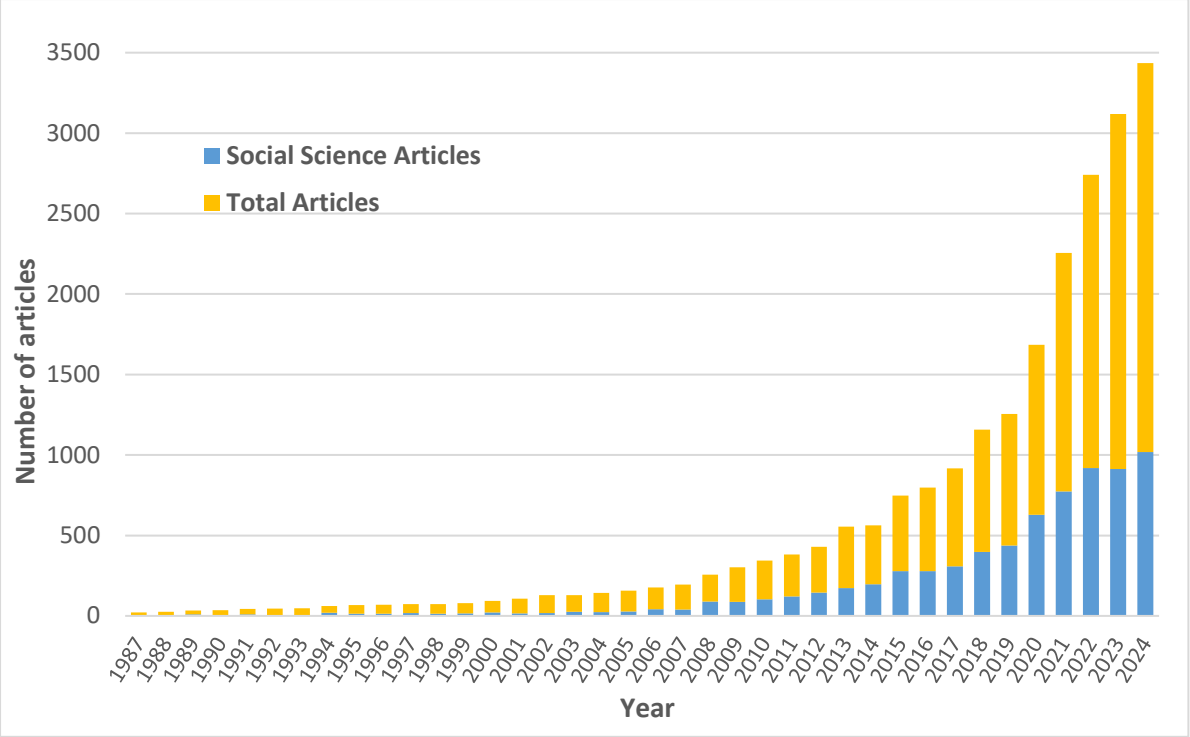

Figure 1. Reference to 'food system' in article title / abstract (Scopus) 1987-2024 (total articles and social science articles as a proportion of the total)

As Figure 1 reveals, there is much broader engagement with the food system terminology than just within the social sciences. Figure 2 provides a breakdown of this engagement by subject / discipline across the time period of analysis i.e. 1987-2024[2]. Social sciences have the second highest use overall, after agricultural and biological sciences, suggesting that the social sciences have been a key field within which the food system has gained growing prominence. We noted that other aspects of the Scopus data showed increased use of the food system over time across all subjects.

[2] Articles can be in multiple categories.

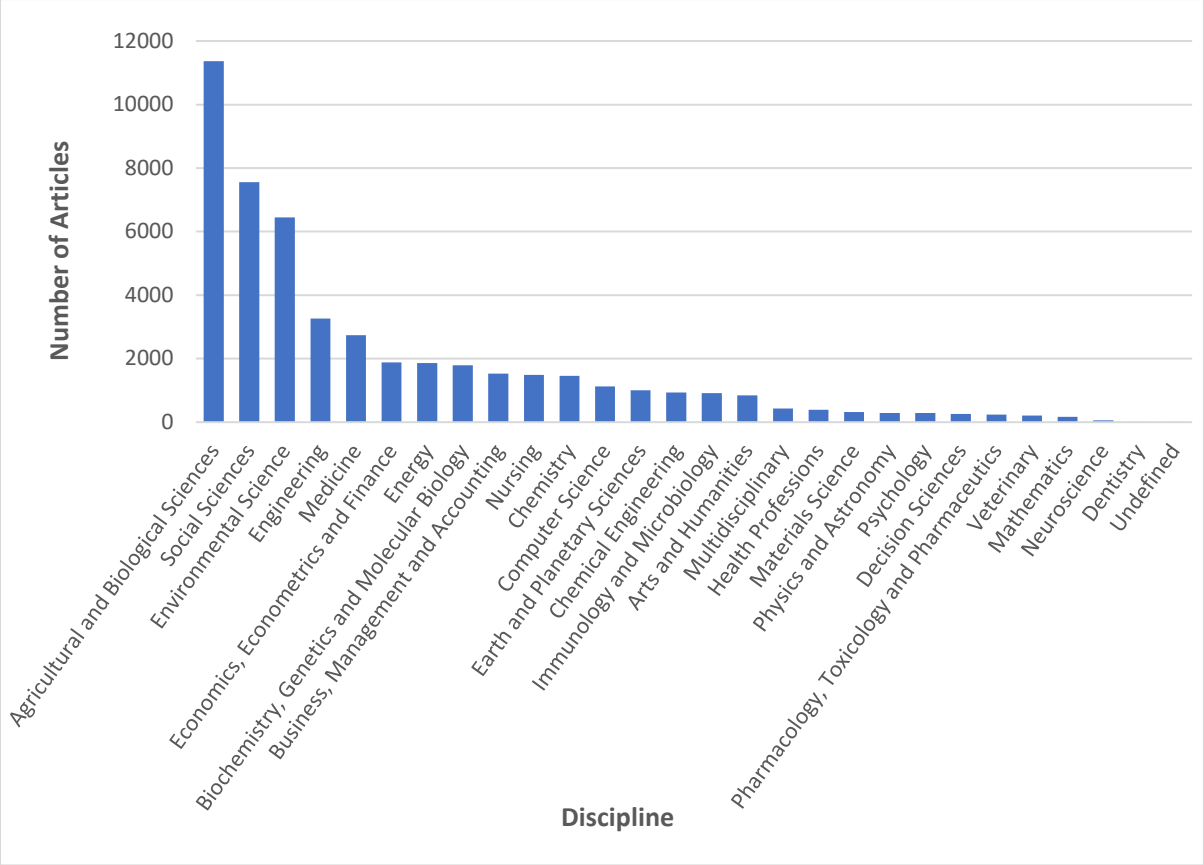

Figure 2. Reference to 'food system' in article title / abstracts from different disciplines

The geographical origin of English language academic studies referencing 'food system' is presented in Figure 3, again spanning 1987-2024. This shows a clear 'North Atlantic' focus.

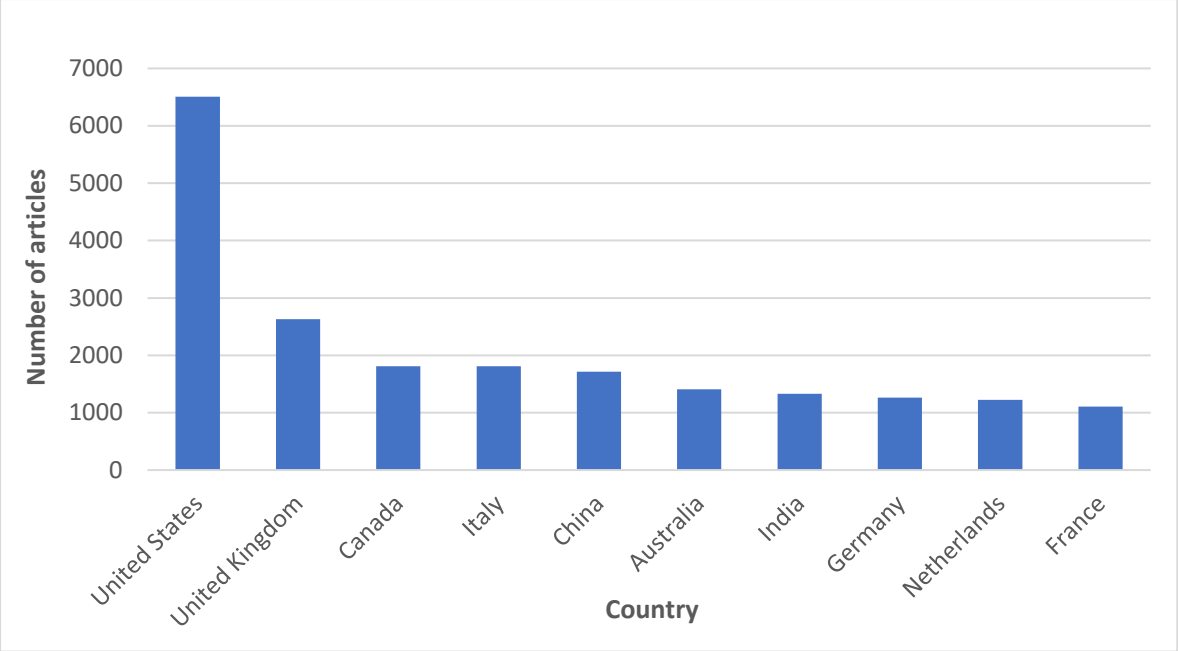

Figure 3. Country of origin of the academic affiliation of the author referencing 'food system' in their title / abstract

Although these data demonstrate that food system terminology has been used extensively across many different academic fields, with use increasing substantially in recent years, such patterns of uptake do not reveal how the concept is being put to work and whether this use reflects all or some of the essential features of food system thinking discussed in the previous section. The two thematic case studies, presented next, aim to provide this insight.

2b. Food system application, case study 1: 'Food system transformation and crisis'

The first case examines work with a 'process' orientation towards the food system, in that these articles emphasise processes of food system transformation and crisis. Over 90% of the

corpus is published from 2008 onwards. Most papers are published in Agriculture and Human Values (56) followed by Journal of Rural Studies (26), Journal of Peasant Studies (22), Geoforum (13) and Journal of Cleaner Production (12). The empirical cases are diverse and include both the global North and South contexts.

The literature has three principal themes. The first is that the food system has been (or is being) transformed within the context of the 'status quo' of a dominant industrial, capitalist agro-food regime, primarily in the global North. Within these dynamics there is a focus on financialisation and concentration as a major driver of contemporary transformation of the intensive food system within capitalism (Burch and Lawrence, 2013; Isakson, 2014; Sippel et al., 2017; Keenan et al., 2023). Australia is an important context for this work, but it is not alone, with Europe and the USA featuring. Another transformative trend is the shifting power from processors to supermarkets (retailers) (Burch and Lawrence, 2009; Konefal et al., 2005). Work in this theme focuses on the global South and the ongoing transformation towards modernisation, marketisation and intensification (Appendini and Liverman, 1994; Mergenthaler et al., 2009).

The next two themes both share an emphasis on the need for transition and transformation to achieve a more just, sustainable food secure food system, but in relation to acute crisis events and more chronic unsustainability issues, respectively.

The focus of the second theme then is an imperative that the food system needs to be transformed as a result of intermittent crisis revealing the vulnerabilities of intensive, global agri-food systems. It is here that the focus on crisis is most prominent, although the specifics

of the crisis shifts in relation to emergent events. This includes food safety scares and scandals in the late 1990s and early 2000s (e.g. Flynn and Marsden, 1992; Tanaka, 2008); global food price spikes, food riots and food insecurity crisis in 2007-08 (e.g. Holt Giménez and Shattuck, 2011; Rosin, 2013) some of which connected the crisis to financialisation and neoliberal globalisation (Isakson, 2014; Bohstedt, 2016); with more recent examples including Brexit and its impact on migrant labour (Milbourne and Coulson, 2021) and the Covid pandemic which exposed wider food and financial economy dependencies (van der Ploeg, 2020), and specific regional climate crises and disasters such as the Pakistan floods (Sargani et al., 2023).

The third theme relates to a chronic need for food system transition. Here there is a reoccurring focus on the development of 'niche' alternatives such as agroecology, regenerative agriculture, Community Supported Agriculture (CSA), and Alternative Food Networks (AFNs). Niches are situated as necessary to address justice and sustainability challenges of food systems. There is however a shift in the early 2020s from an emphasis on examining food system transformation and the success and failure of 'niche' innovations, towards supporting food system transformation through research approaches. Alongside this is a growing emphasis of power relations, and the need to more explicitly account for power dynamics when examining food system transformation and failures to achieve it (e.g., Bless et al., 2023; Coulson and Milbourne, 2022; Omar and Thorsøe, 2024; Voigt et al., 2024). In contrast to work on corporate food regime, power relations does not necessarily just refer to the role of powerful actors, but a more heterogenous understanding of the role of power and agency. The literature emphasises ideas of food sovereignty (e.g. Desmarais and Wittman, 2014), food justice (e.g. Levkoe, 2014), food democracy (e.g. Godek, 2021), regenerative agriculture (e.g. Loring, 2022), and agro-ecology (e.g. Anderson et al., 2019).

How is the food system concept applied in studies of food system transformation?

In most cases the food system is positioned as a taken for granted 'thing' that can be transformed, needs to be transformed, or is being transformed. The food system is therefore an active site of political action and resistances with a juxtaposition between local, potentially more democratic, alternative networks and social movements pitted against a corporate, capitalist, globalized food regime. Consequently, the food system is also an arena for power struggles, over values, profits, and practices. However, because it is composed of different sub-systems that encompass the agri-food value chain, these transformations are not necessarily unfolding in the same ways.

In the majority of articles, the emphasis is therefore on particular processes and initiatives seeking to achieve transformative outcomes in specific contexts, notably AFNs (e.g. Matacena and Corvo, 2020) and regenerative agriculture (e.g. Seymour and Connelly, 2023). Distinct from this work examining specific initiatives, is a much smaller body of literature that seeks to apply and elaborate a food system perspective. Notably, food system approaches are positioned here as allowing a focus "on the underlying process-related attributes that could support a more sustainable food system" (Eakin et al., 2017; Sonnino, 2023).

Alternatively, food system perspectives allow insights into the scalar interactions between the global and national food systems. Here the food system approach emphasises relational connectivity e.g. connections between 'the global agri-food system' and global financialisation

to examine, for example, flex crops and commodity agriculture markets (Gillon, 2016) and relational processes of agro-food transformation (Greenberg, 2015).

What theories and concepts are employed to examine food system transformation?

A large number of studies seek to examine experiments in establishing transformative alternatives in specific locales and contexts. Within this literature, there is an explicit and implicit adoption of the niche concept drawing on the Multi-Level Perspective (MLP) and related transition theories that have adopted this formulation (e.g. López Cifuentes et al., 2021; Stempfle et al., 2024). The AFN is the most prominent niche innovation. Even in studies that do not mention the MLP in the abstract, there is a framing of AFNs, alternative methods and social movements in the language of the 'niche' innovation battling to transform the dominant regime (e.g. Coq-Huelva et al., 2017; Stephens, 2021; Zoll et al., 2021). It is here, in the niche, that different practices (e.g. agroecological, community supported) are established and tested whilst having the transformative potential to change dominant systems. Much of the literature remarks on the failure of niche innovations to move beyond the niche and transform the regime.

This explicit and implicit use of MLP concepts suggests that the food system is conceived in similar ways with an emphasis on the regime, niches and the landscape and the interactions between them as being important for change dynamics. In short, mobilising transition theory frameworks with an emphasis on niche, regime, lock-in, niche-regime interactions, and niche management. Transformation is positioned as something achieved through the combination

of new (or old) technologies and practices, policies, strategies and more vaguely things that strengthen social movements that support alternatives.

In contrast, some of the literature is interested in examining the way in which the dominant corporate, capitalist food regime is also transforming and transforming particular locales. This work seeks to examine particular dynamics that are positioned as driving change, such as new processes of financialization and agri-sector concentration that are reshaping agriculture in particular areas (Burch and Lawrence, 2009; Burch and Lawrence, 2013; Clapp, 2023; Keenan et al., 2023). Although distinct from transition frameworks such as MLP, this literature is examining the way in which a dominant agri-food regime is continuing to transform food systems. It is concerned with examining new dynamics within capitalism that are changing agriculture in specific places. Although a much more limited emphasis in terms of the number of papers, it reflects an interest in examining the unfolding ways in which the dominant regime continues to be reshaped by capital and the diversity of capitalisms.

Finally, there are two sets of articles that each have a handful of cases. The first is a small number that use a Life Cycle Analysis approach (e.g. Benis and Ferrão, 2019), which differs from the majority of articles that are qualitative social science studies. The second are a handful of cases that adopt a food system approach (Fanzo et al., 2021; Sonnino et al., 2019), which contrasts with the majority using the 'food system' as a stepping off point to utilise a different conceptual approach from which to examine a specific set of dynamics within the food system. A major point of difference is that conceptually these papers stick with the food system approach. Sonnino et al (2019), for example, examine cities, but rather than conceptualising urban food systems in relation to concepts and theories developed in urban

studies or transition studies, instead applies a food system approach to consider the urban dimensions of food system challenges and their multi-scaled and multi-dimensional interactions. This approach substantially retains the dimensions of a food system approach elaborated in section 3.

This raises a wider reflection concerning 'how is transformation being theorised?' Notably there is an emphasis on remaking the food system in a new image. Transformation is an act of replacement whereby AFN values and practices completely take over from the corporate food regime. This is also reflective of MLP conceptualisations of transformation, in which the niche transforms the former regime and configures a new set of dominant regime level relations. In contrast, very little literature engaged with ideas of sustainable intensification for example, or other agendas that signify transformation through maintenance of productivist modes of production and the dominance of corporations and capital.

2b. Food system application, case study 2: 'food system and the urban'

The second case study examines the various deployments of the food system concept within scholarship that has an urban food focus, published in the selected social science journals[3]. The first article in the sample was published in 2002 by Hendrickson and Heffernan in

[3] Most of the 127 articles were published in the journal *Agriculture and Human Values* (34) while the urban focused journals *Cities* and *Urban Studies* together published 24 articles. A similar number were published in the geography journal *Geoforum* (13), the food-oriented journal *Food Policy* (10), the *Journal of Cleaner Production* (12) and the *Journal Rural Studies* (10).

Sociologia Ruralis, examining alternative forms of food consumption in Kansas. The most recently published article was by Weller (2022) in Agriculture and Human Values, which focused on how rural and urban actors made sense of the inequalities experienced by farm workers in the craft cider industry in the Pacific Northwest. As these two examples begin to reveal the articles in the sample include a broad range of empirical case studies with those from the global North contributing the majority - 81 articles - although four of these were concerned with both the global North and South[4].

There is a clear distinction within the corpus between two groups of studies. In the first group cities and other urban spaces are approached as arenas in which the major focus of concern takes place or is particularly visible e.g. emplaced social movements such as those promoting food sovereignty (e.g. Moragues Faus and Marsden, 2017; Meek et al., 2019), food justice (e.g. Smaal et al., 2021), food democracy (e.g. López Cifuentes and Gugerell, 2021), community food security (e.g. Johnston and Baker, 2005), and food sharing (e.g. Loh and Agyeman, 2019); named initiatives that have their origins in particular urban places (e.g. Hendrickson and Heffernan, 2002); and wider processes taking place in food provisioning such as supermarketisation (e.g. Berger and van Helvoirt, 2018). In many of these instances, 'the urban' appears to be a convenient location in which to undertake an analysis of a particular food provisioning issue. Alongside these studies are those focused on specific activities that are distinctively urban with the most prominent of these being urban agriculture (e.g. Benis and Ferrão, 2017), but also featured are food foraging (Nyman, 2019), backyard livestock slaughter (Blecha and Davis, 2014), and public and wet markets (e.g. Zhong et al., 2020).

[4] In a small number of articles, the geographical context or scope of the study was not stated.

This first group of studies is distinct from a second group that is more centrally concerned with urban food policy or governance (e.g. Sonnino and Coulson, 2021) or that recognise cities as 'food policy actors' (Moragues Faus and Marsden, 2017). It has historically been the case that urban places have not featured prominently in food governance. However, this has begun to change over the course of the past two decades during which time towns and cities have been independently developing food governance arrangements in response to the absence or limitations of national level *food* (cf. agriculture) policy (Coulson and Sonnino, 2019). Urban places have therefore been attempting to fill a policy void and address a democratic food deficit (op cit.) through more localised, urban-based action to create more sustainable, secure, resilient, healthy and just food provisioning arrangements (Blay-Palmer, 2009).

How is the food system concept applied in studies of food and the urban?

It might be anticipated that an urban specific mobilisation of the food system concept, in the form of 'urban food system', 'city food system' or 'city region food system', would be to the fore in the reviewed articles. However, this is not the case, and is deployed in relatively few studies (approximately 10 e.g.López Cifuentes et al., 2021). Instead, the food system is usually a point of context for the investigation of another phenomenon such as urban agriculture, food sovereignty or urban food governance, or as a system the sustainability, resilience or security of which might be enhanced through that phenomenon. As such, the urban food system per se is not the focus of analysis nor is a formal 'systemic' analysis employed in the investigation.

This, somewhat passing, reference to and contextual mobilisation of the food system concept is evident across most articles within the corpus with 'system' being taken as read or as a given, and not requiring any further discussion or analysis. A common jumping off point is the 'global food system', 'dominant food system', 'current food system' or 'industrial food system' being identified as a system beset with a range of socio-ecological problems that require a different way of organising food provisioning, one (urban based) example of which is examined in the article. In such cases, the food 'system' is not the focus of analysis per se. An improved or 'transformed' 'food system' is also identified as a very broad, somewhat abstract end point or objective of many of the studies e.g. the realisation of food system sustainability, security, resilience, democracy, equality or ecological diversity. Again, in these cases this ideal system is not the focus of analysis. Other mobilisations of food system that appear in the articles include: local food system, national food system, alternative food system, community food system, agri-food system, food-energy-water-waste system, at times as a point of context or starting point and in other cases as a focus of the investigation.

In only a handful of cases is 'system' employed to do work other than as a point of context and / or as an 'object' that needs to be changed for the better through, for example, the more extensive implementation of urban agriculture or the pursuit of food sovereignty. In an analysis of the modernization of the food retail sector in Nairobi, Kenya, Berger and Helvoirt (2018) make the case for "more holistic food policies *that stem from a food systems perspective*" (emphasis added) to build an inclusive urban food system that can tackle prevalent food insecurity in Nairobi. Abu Hatab et al. (2019) review interactions between urban sprawl, land and resource use changes, agricultural production and food security in developing countries and note a failure to take into account interactions between different

aspects of urban food systems. They call for more attention to be paid to 'food system transformation pathways, system feedbacks and trade-offs' i.e. a more system oriented approach to analysis in future research.

These two studies make the case for greater use of one form or another of system thinking or system analysis in future research. Distinct are two further studies that seek to understand how system framings or approaches are already mobilised in research and practice. Morgan (2015) considers the 'urban food question' in the Global North, including understanding theoretical framings of food system in (the literatures on) urban planning, urban political ecology and community food security. Sonnino et al. (2019) investigate how 33 cities around the world interpret and apply a systemic approach to food and whether there is a gap between food system theory and practice.

What (other) theories and concepts are employed within studies of food and the urban?

Since the vast majority of studies in the corpus do not make central to their analysis a food systems approach (but instead refer to the food system concept as a point of context or end point) it follows that they make use, instead, of other theoretical perspectives. A wide range of theories are mobilised across the different studies including: social movement perspectives as these relate to the specific concerns of food justice, food democracy and food sovereignty; social-ecological embeddedness; (urban and educational) political ecology; assemblage theories; theories of justice; urban bias theory; willingness to pay; social practice theory; Bourdieu's theory of distinction; the MLP and transitions theories. Obviously, a system perspective can be open to a wide range of theories that bring important additional insights.

However, the food system concept is a framing device for other types of analysis rather than something into which other theories are being integrated to develop original insights.

The diversity in concept and theory illustrates how, in most cases, studies of food and the urban are not explicitly undertaking an analysis of the food system even when reference is made to the concept suggesting in turn that a systemic analysis is insufficient or inappropriate conceptually to help answer the research questions that are posed. In some cases, no reference is made to a specific theoretical or conceptual framework and this is particularly apparent in studies that are empirically led. There are a handful of papers in the corpus that employ modelling and other quantitative approaches including Life Cycle Analysis and spatial analysis in their investigation of various urban food phenomena. In sum, the food system concept is rarely, if ever, utilised alone in studies of food and the urban.

Discussion and conclusion

This paper started life as a set of conversations between the authors over an observation that we seem to be witnessing a resurgence of interest in the food system concept in academia and policy discourse. Brock (2023) in particular provides valuable insights of how the concept is interpreted in policy domains using stakeholder interviews to develop the idea of 'multiple ontologies'. In this paper the focus was academia (specifically agri-food social sciences) and our original theoretical inspiration was Jackson et al's (2006) analysis of the commodity chain and the 'chaotic concept' (cf. Sayer, 1984). Inspired by these ideas of 'the chaotic' and 'the multiple', we developed our own framework to analyse food system concept mobilisation (Table 1), assessing patterns of uptake, empirical applications and how those interpretations

reflect (or not) essential features of the concept. Below we summarise four key discussion points that emerge from the analysis, combining the data presented on general uptake and definitional work, alongside the case studies of food system transformation and crisis and food systems and the urban.

The first point concerns what we call 'the food system as boundary object', meaning a shared heuristic device. If a concept has valuable heuristic properties this is already a strength and we see from Figures 1-3 that the concept clearly has appeal to scholars in agri-food studies and beyond, which is important for work that increasingly calls for inter- and trans-disciplinary working. Think of various science-policy interfaces at international, national and regional levels, for example. Such exchanges require a collective language and object of common focus to meaningfully facilitate research practice working. This boundary making property is valuable and is not to be lost, even if we do not find that a food system approach is being explicitly applied in many surveyed studies.

The second point is we find a clear pattern of bipolarity in mobilisation between two styles of practice, which we label 'heuristic mobilisation' and 'conceptual mobilisation' respectively. Building on Brock's (2023) multiple ontologies idea, elaborated through knowledge claims, we regard these observable styles of knowledge practice also as 'epistemologies'. The heuristic mobilisation is the most common and is effectively epistemic, giving researchers a mental framework and vocabulary that works to hold a set of material and social relations together (although often not in their totality) as an object of study for empirical analysis and transformation. The food system concept is thus an organising framework that is more dynamic and less linear, production-orientated or econometric than e.g. commodity or value

chains but somehow less nebulous than networks or assemblages. The conceptual mobilisation more explicitly uses food system thinking to shape these studies, but as noted in our analysis, such applications are much less common than the heuristic mobilisation.

Third, despite the promising features noted in the 'foundational papers' reviewed, the concept does not appear to be doing the type of work we were expecting to be reported. So, whilst we find saturation of food system terminology from the mid-2000s (Figure 1) this is mirrored also by much less evolution of the concept and a general trend towards using the term as a heuristic device. This is not to dismiss the value of the sampled studies but rather to note that we do not find the conceptual mobilisation initially anticipated when devising the research (i.e. systemic analysis). At one level this supports Leach et al's (2020: 102025) observation that the term food system "has become something of a development 'fuzzword' […] a shared language amongst diverse actors obscuring sometimes opposing viewpoints on meaning and implications". It may indicate also a shared approach emerging in the literature, hence less need for further conceptual development, even if that shared approach is application at the heuristic level.

One explanation for this pattern of mobilisation is that food system thinking is in practice quite demanding and so researchers mobilise alternative theoretical resources, as evident in both case studies. The fourth point turns then to think about how to support more system thinking in future studies. To answer this question, analysis here started by mapping out what we termed 'essential features' of system thinking e.g. thinking beyond silos, attention to feedback loops, a focus on relationality, and incorporating the non-human. What is interesting in the case studies too is to observe the way researchers employ wider bodies of social theory to

address for example questions about justice, power or relationality. It seems important to encourage this continued cross-fertilisation between complementary theoretical frameworks. The other step is to identify and celebrate food system methodologies that researchers can apply when employing the food system concept (cf. Eriksen, 2008). In the systems thinking literature we have two quite distinct approaches between what are called 'hard' (more quantitative) and 'soft' (more qualitative) approaches (cf. Allan and Prosperi, 2016 and Sonnino et al., 2019), which should be more clearly incorporated in studies. Within food system studies useful methods (e.g. food system mapping) also exist to support, for example, boundary work, but more training is needed to support future generations of scholars to think in systems. This can materialise in different ways. For instance, food system training is located mostly in specialist research centres, postgraduate programmes and taught courses, but this could be expanded to undergraduate programmes and teaching in e.g. agriculture, food studies, environmental, health and nutritional sciences, particularly as learning needs shift to embrace greater interdisciplinary problem-solving skills. Another important step is to support and extend in-house training of system concepts in policy and research funding environments.

In conclusion, the food system concept has clearly attracted much interest and offers value to researchers. We observe dual mobilisations with different purposes. Whilst the food system is essentially a gatekeeper, this does not always mean using a food systems approach. We need to recognise these differences more explicitly to avoid a 'hollowing out' of the concept and to support future meaningful uptake to address increasingly complex food, environment and health transition challenges. Future research should consider also the impact that adopting the food system has on governance. Intuitively the food system discourse evident herein is shaping policy, but outcomes remain unclear. This requires systematic analysis across

multiple domains of governance to better evidence food system approaches in this context and in turn support longer-term training needs.

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