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Citation: Edwards, F., Sonnino, R. & López Cifuentes, M. (2024). Connecting the dots: Integrating food policies towards food system transformation. *Environmental Science & Policy*, 156, 103735. doi: 10.1016/j.envsci.2024.103735

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Link to published version: <https://doi.org/10.1016/j.envsci.2024.103735>

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Connecting the dots: Integrating food policies towards food system transformation

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ARTICLE INFO

Keywords:

Policy integration
Food system transformation
Integrated food policies
Food systems
Governance
Just transitions
Sustainability

ABSTRACT

Growing evidence shows that current policies are unable to catalyse the necessary transformation towards a more just and sustainable food system. Scholars argue that food policy integration – policies that unite numerous food-related actions – is required to overcome dominant siloed and fragmented approaches and to tackle environmental and economic crises. However, what is being integrated and how such integrations contribute to food system transformation remain unexplored. This paper aims to disentangle frames and approaches to food policy integration through a critical analysis of literature on integrated policies and food system transformation. Complemented by a systematic literature review for “food system” and “*poli* integrat**”, overlapping approaches and gaps between these literatures are revealed over the last twenty years. We use the prisms of processes (“how” food policy integration is being practiced), placement (“where” crossovers between sectors in governance institutions and where synergies between objectives can be created) and things (“what” specific aspects of the food system and related sectors exist within integrated policies and leverage points to trigger transformative dynamics) to explore how policy integration and food system transformation intersect within current debates. Our findings reveal cross-cutting themes and distinct theoretical frameworks but also identify substantial gaps, where frames of food policy integration often remain within their disciplinary silos, are ambiguous or ill-defined. We conclude that to achieve policy integration as a tool for food system transformation, a new research and policy agenda is needed that builds on diverse knowledges, critical policy approaches and the integration of food with other sectors.

1. Introduction

“The food system is broken” has become a familiar cry (Oliver et al., 2018); without food system transformation (FST), food-related climate change and resource degradation are expected to increase up to 90% by 2050, with health outcomes projected to worsen (Rockström et al., 2020). Policy-makers and scholars recognise that policies from the twentieth century are “no longer fit for purpose” (Dengerink et al., 2022¹) and that a lack of policy cohesion is producing negative implications for the food system and other essential sectors, such as public health and the welfare system (Sibbing and Candel, 2021; Slade et al., 2016; Tosun and Lang, 2017).

Based on this assumption, many scholars assert that integrated food policies – i.e., policies that unite numerous food-related actions across

other policy domains and sectors – are urgently required (Candel and Pereira, 2017; Cohen and Ilieva, 2021). Recent events such as the COVID-19 pandemic have catalysed such reflections (Baudron and Liégeois, 2020; Blay-Palmer et al., 2020), creating convergence around a transformative agenda that promotes “not a tweak, but a complete rethink” (Dengerink et al., 2022: 1) of the food system’s purpose, processes and power. As many argue, the food system needs to be made “planet-proof”, “circular”, “regenerative”, “just” and “inclusive” (Klerkx and Begemann, 2020).

Embedded in these narratives is a fundamental shift from a food value chain-centred (“farm-to-fork”) approach to a systemic perspective that recognises food system’s non-linear interactions and feedback loops. In this context, a food system has been redefined as “all the elements (environment, people, inputs, processes, infrastructures,

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¹ See the UN Food Systems Summit (UNFSS),¹ Nutrition For Growth (N4G)² and the Climate Change COP26³ meetings in 2021.

institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes” (HLPE, 2017: 11). Food chains, in other words, have been re-imagined as networks or webs, with research now emphasising their interlinked and relational qualities (Stefanovic et al., 2020).

Despite widespread agreement about the importance of addressing food as a system, approaches proposed so far largely fail to thoroughly capture the systemic nature of food, raising concerns about the capacity of research to support transformative objectives (den Boer et al., 2021). It has been argued that an ambition to integrate all food activities within a single framework can potentially obfuscate the importance of place-based connections (Vignola et al., 2021). Other scholars have noted that different disciplines interpret or highlight aspects of the food system differently, reflecting their underlying values and interests (Béné et al., 2019).

Policy integration (PI) could play a vital role in progressing debates on (and interventions for) FST. As researchers have long been arguing, it would provide a pathway to address cross-cutting and “wicked” policy problems such as food insecurity (see, for example, Barling, 2011; Cohen and Ilieva, 2015; Candel and Pereira, 2017). In theory at least, integrated approaches are suggested to not only address “silos” but to also bring in new actors, locations and demands into the policy arena (Tosun and Lang, 2017). Researchers have identified a range of factors that are hampering PI. According to Margulis’ (2016), for example, there are inconsistent “spikes” of attention on food security in the understudied domain of inter-organisational relations, coupled with the complexity of local approaches that remain difficult to express in international analysis. For McKeon (2021), predisposition to silos could result from a focus on value chains that are underpinned both by a “productivist” focus and powerful trade interests. Barriers to PI for siloed departments also include lack of competencies, scarcity of resources and inertia at different governance scales (Edwards et al., 2023a).

Despite growing calls for more integrated food policies to address FST (Moragues-Faus et al., 2017; Baldy et al., 2022; Sonnino, 2023; Webb et al., 2023), PI continues to have “fuzzy boundaries [...] without a clear blueprint (Candel and Pereira, 2017)” (Sibbing et al., 2021: 57). In this context, questions arise about how integrated policies should be approached and prioritised to attain FST. Specifically, on what scales, in what places and in what departments should food-related policies sit and interact to support a thoroughly transformative agenda? What aspects of the food system are being integrated with resources from other sectors towards achieving FST?

To address these questions, in this paper we disentangle frames (also referred to as discourses or narratives) and approaches used in the literature to conceptualise PI and FST and examine how and to what extent integration and transformation come (or could come) together within current debates on the food system. Insights from a critical and comprehensive review of two bodies of literature that have rarely been placed in conversation with one another highlight a lack of alignment between definitions across disciplines and between theory and practice, raising the need for a more robust research and policy agenda.

2. Food system transformation meets policy integration

Being intimately connected to interpretations of the food system, FST has many potential understandings. For example, Sonnino (2023: 1) drawing on Patterson et al. (2017), defines FST as “a fundamental change in the structural, functional and relational aspects of the food system that leads to new patterns of interactions and outcomes”. In transition theory, in turn, transformation processes are the necessary steps for a long-term transition towards more sustainable modes of production and consumption (Geels, 2011). For others, FST is about “raising the bar” (Dengerink et al., 2022: 2) to ensure that the food system addresses numerous ills (e.g., unhealthy diets, living incomes

and an unsustainable environment) “simultaneously and in an environmentally beneficial manner” (ibid.). As Whitfield et al. (2021: 1) elaborate, FST evokes “fundamental changes in circumstance occurring to, for and by people within agriculture and food systems”, which can be driven by both internal (i.e., behaviour, technology or governance) and external factors (i.e., climate change, markets or political regimes).

Further differentiations of FST emerge in how it should be approached. Advocates of regime theory, for instance, see FST as an “outcome of many ‘small wins’ instead of a sudden radical change” (Klerkx and Begemann, 2020: 4). For Lam et al. (2022): (2380), transformation consists of “a preparation phase, a navigation phase, and a stabilization phase”, often catalysed by local actors who innovate for change. Alternatively, Klerkx and Begemann (2020) take a mission-oriented agricultural innovation systems approach, in line with Gaupp et al. (2021), who argue for “outcome-oriented policy bundles”, spear-headed measures based on detailed policy analysis and potential barriers for implementation.

Despite disagreements over definitions, timescales, approaches and objectives, researchers working on FST agree on the vital role of re-establishing *connections* within the food system to improve its functioning. For many, the most effective tool available to enhance connectivity within and across the food system is PI – a concept first coined in the field of marine policy (Underdal, 1980) that gained prominence in the 2000s in debates on wicked problems such as the environmental and climate crises. PI aims at incorporating and prioritising concerns about issue x (e.g., the environment) in non-x policy domains (e.g., economics) with the purpose of enhancing policy outcomes in domain x (Sibbing et al., 2021).

With regard to food, Candel and Biesbroek (2016) present one of the few attempts to theoretically define PI. The authors consider a procedural understanding of PI as “an agency driven process of asynchronous and multi-dimensional policy and institutional change within an existing or newly formed governance system that shapes the system’s and its subsystems’ ability to address a cross-cutting policy problem in a more or less holistic manner” (Candel and Biesbroek, 2016: 217). In a later publication, Candel and Pereira (2017) argue that food transcends existing policy domains and, thus, requires integrated policy approaches understood as processes. More recently, den Boer et al. (2021: 104238) have stressed the need to better understand “interdependencies” and align food policy initiatives “at different governance scales and in different fields”. Despite widespread agreement on the need to thoroughly embed PI in the emerging transformative agenda for the food system, as Arcuri et al. (2022: 289) identify, “no methods of operationalising and evaluating coherence and consistency have been agreed upon by public policy scholars”.

3. Methodology

To interrogate underexplored links between PI and FST literatures, we have performed a critical analysis of two bodies of knowledge: the first comprises of a quite extensive (but rather fragmented) literature on integrated food policies; the second focuses on the relatively new concept of FST. The goal of these reviews was to identify cross-cutting themes and understand if, and to what extent, the two concepts have been used together. To meet this goal, we also conducted a systematic literature review for “food system” and “polic* integrat*²” in the title, abstract and key words on the Scopus database over the last twenty years (from 2003 until 2023). This review, which produced a total of 28

² PI can be expressed in other ways. For example, Meijers and Stead (2004) identified similar terms of coherent policy making, cross-cutting policy-making, policy co-ordination, concerted decision-making, holistic government, joined-up policy/government, interorganisational co-ordination, inter-organisational collaboration, inter-governmental management and network management.

documents (after excluding irrelevant articles³), reveals what overlapping approaches and gaps exist between PI and FST literatures over the last twenty years. Table 1 shows the papers reviewed and both the bodies of knowledge and the framing issues they fall under.

Our comparative analysis of these different bodies of literature identified three major approaches and goals that have been framing debates on both PI and FST: *processes* (how food PI is being practiced – from large-scale governance approaches through to the intricate practices of how cross-sectoral meetings are run; and how FST should be initiated and sustained over time); *placement* (where crossovers between sectors are located in governance institutions and where synergies between the objectives of FST can be created); and *things* (what specific aspects of the food system and related sectors exist within integrated food policies and concrete leverage points to trigger transformative dynamics).^{4,5} Such issues have been used in the analysis to organise our critical review of the interplay (or lack of) between FST and PI in the existing literature and propose, later in this paper, a renewed research and policy agenda.

4. Unpacking assemblages of integration for food system transformation: Processes, placement and things

4.1. The “how”: what governance processes are being advocated for food system integration and transformation?

Food system governance, defined as the “processes and actor constellations that shape decision-making and activities related to the production, distribution and consumption of food” (van Bers et al., 2019: 10), represents a core field for FST and PI. Our review of the literature highlights three shared governance traits that need to be in place to align integration and transformation processes.

a) Agreeing on the frames of a shared discourse

Within the broader literature on FST, many authors recognise a diversity of frames that influence conceptualisations of FST and its objectives. Each of these frames highlights different aspects, temporalities and approaches that can conflict over trade-offs and priorities. For example, Vignola et al. (2021) identify six key food system governance frames: social-ecological systems, which emphasise dynamics within and between natural resource and users’ systems (Ostrom, 2009); network governance, which highlights different governance actors and actualisation pathways (Jones et al., 1997); transition theory, which sees FST as requiring an integrated and systemic approach that considers the temporal dynamics of structural system transformation (Geels, 2011); multi-level governance, with its emphasis on the need to locate authority to address competing demands (Piattoni, 2009); environmental PI, which focuses on changing the process of sectoral policy making (Jordan and Lenschow, 2010); and meta-governance, which recognises the values, norms and principles that underlie processes (Kooiman and Jentoft, 2009). Stefanovic et al. (2020) identify six discourses based around desirable FST outcomes: food and nutrition security; global

environmental change; sustainability; food system (sustainability) performance; resilience; and transformation. Finally, Dengerink et al. (2022) identify four dominant discourses of FST processes, distinguishing between FSTs that can be or cannot be engineered through well-designed government policies, FSTs that can be steered by private interests and FSTs that can be negotiated among multiple stakeholders.

Frames that emerged from the specific literature review on food PI are driven primarily by disciplinary siloes, rather than objectives. Situated mostly within governance literature, these frames⁶ include health, the environment, market, society and planning⁷ – each of which prioritises certain objectives and approaches over others. For example, motivated by climate change concerns within an economic frame, Fogarassy et al. (2020) examine the circular characteristics of consumers’ attitude towards food purchasing in Hungary. Alternatively, Recanati et al. (2019: 915) advocate for a nutritional perspective for the EU’s Common Agricultural Policy (CAP) “to support the integration of conventional agricultural objectives with the challenge of improving nutrition and health, and the protection of the natural and human ecosystem on which food production depends”. These examples show how frames impact policy formation and uptake within specific governance systems (Candel and Biesbroek, 2016), where they can also highlight “a way of achieving other policy goals” through integration (Parsons et al., 2021: 5): whichever discourse dominates affects who leads and who is involved in such negotiations, which, in turn, affect what strategies are prioritised and the outcomes that will be enacted.

b) Diverse and numerous pathways

It is normally recognised that no one singular pathway for FST exists. The challenge is to combine different approaches “to shine light from different angles” (Leach et al., 2020: 14). Gaupp et al. (2021: 928) insist that pathways should “elicit the biophysical and technical feasibility of food systems transformation and potential trade-offs among multiple food systems objectives” (e.g., health, environmental integrity and social inclusion goals) to provide decision-makers with possible combinations of policy options.

The processual idea of PI that involves non-hierarchical and non-linear pathways (Candel and Biesbroek, 2016) has also guided much of the research on food. One exception is the study by Sibbing et al. (2021), who address food system’s challenges by focusing on the outcomes and activities of the food system instead of the processes of PI. In contrast, Galli et al. (2020) develop a conceptual framework that links a processual approach to PI with transitions theory and policy cycles, addressing “the reform of food-related policies as a social, economic and technological transition problem” (Galli et al., 2020: 2). Arcuri et al. (2022) draw on the dimensions identified by Candel and Biesbroek (2016) and Candel (2021) – i.e., degree of integration, subsystem involvement, policy goals’ coherence and instruments’ consistency – to analyse how food PI (understood as processes) is translated into practice at the local (municipal) level. Baldy et al. (2022) also build on Candel and Biesbroek’s (2016) conceptualisation but focus on the practices of policy (dis)integration – i.e., doings, saying and things – and advocate for a practice-theoretical perspective to investigate transformation processes in the context of food policy (Baldy et al., 2022).

c) Diverse perspectives through democratic approaches

Acknowledging the disruptive nature of transformative agendas, many authors advocate for “the development of a polycentric and plurivocal governance context” (Sonnino, 2023: 104164). For example, polycentric governance is recognised by Candel and Pereira (2017: 91)

³ Three articles were removed from the review: Sohal et al. (2022) due to being about smart city policy integration (rather than food); and Mathange et al. (2022) and Dougill et al. (2021) being about smart agriculture technologies and approaches (rather than policy).

⁴ While partly similar in expression to Baldy et al.’s (2022) “doings, sayings and things” as encapsulated in their practice-theoretical perspective, this paper strikes across a different scope of the literature to identify a different raft of patterns and definitions.

⁵ ‘Things’ has also been used by scholars such as Cook et al. (2004) in “follow the thing” theory, which identifies specific goods to think through the complexities, vulnerabilities and injustices experienced along their food chain journey. As such, the term presents an apt approach to be adapted for the study of food system transformation.

⁶ From the most to the least popular.

⁷ The frame of technology was present but not in the context of PI and so was not included in the analysis.

Table 1

A summary of the papers reviewed and their categorisation within both bodies of knowledge and the various frames.

Publication	Bodies of literature			Framing issues		
	PI	FST	Systematic review	Processes	Placement	Things
Arcuri et al. (2022)	X		x	X	x	
Artioli et al. (2017)			x	X	x	X
Baldy et al. (2022)	X		x	X	x	
Barling (2011)	X					
Béné et al. (2019)	X	x				
Borrelli et al. (2022)			x		x	
Calla et al. (2022)		x		X		
Candel (2021)	X					
Candel and Biesbroel (2016)	X			X		
Candel and Pereira (2017)	X			X	x	
Cleveland and Jay (2020)			x	X	x	
Cohen and Ilieva (2015)	X					
De Schutter et al. (2020)			x		x	
Dengerink et al. (2022)		x		X	x	
Dong and Juang (2022)			x		x	
Farmery et al. (2020)			x		x	
Fogarassy et al. (2020)			x	X	x	
Galli et al. (2020)	X			X		
Gaupp et al. (2021)		x		X		X
Klerkx and Begemann (2020)		x		X	x	X
Lam et al. (2022)		x		X	x	
Lang et al. (2009)			x	X		
Lu et al. (2022)		x		X		X
Maggio et al. (2016)			x		x	
Medina Hidalgo et al. (2021)			x		x	
Medina Hidalgo et al. (2022)			x		x	X
Milani-Bonab et al. (2023)			x		x	
Minotti et al. (2022)			x		x	
Moragues-Faus (2021)			x		x	
Moragues-Faus et al. (2017)	X					
Moschitz (2018)			x		x	
Parsons et al. (2021)			x	X	x	
Patterson et al. (2017)		x				
Recanati et al. (2019)			x	X	x	
Scudo and Clementi (2017)			x		x	
Shen et al. (2021)			x		x	
Sibbing et al. (2021)	X		x	X	x	X
Sonnino (2023)	X		x	X	x	X
Sonnino et al. (2019)			x		x	
Stefanovic et al. (2020)		x		X	x	X
Tosun and Lang (2017)	X				x	
Trevena et al. (2015)			x		x	
Vignola et al. (2021)		x		X	x	X
Webb et al. (2023)	X					
Whitfield et al. (2021)		x		X	x	X
Wilkins et al. (2010)			x	X		
Zaharia et al. (2021)			x	X	x	

as a means to recognise and harness “the intrinsic tension between policy integration and specialization”. As they explain, in a fragmented policy context, a polycentric governance model means “that specialized subunits are maintained but that increased effort is put in organizing connectivity between them” (ibid.).

A plurivocal approach supports changing the way decisions are made “by bringing together the competing knowledge claims of “experts,” academics, practitioners, policy makers and citizens” (Calla et al., 2022: 2) to disrupt siloed knowledge processes. Such approach is exemplified by Arcuri et al. (2022), who describe a participatory governance model that was designed to keep citizen participation active, purposeful, representative and realistic. Within this literature, multi-level governance across sectoral, territorial and higher governance levels is also advocated due to its inclusive capacity to promote collaboration and practice-sharing, while supporting grassroots’ initiatives (Zaharia et al., 2021).

Scholars assert that knowledge co-production and collaborative decision-making should include “multi-disciplinary cooperation” (Lu et al., 2022: 11; see also López Cifuentes et al., 2023). Cross-disciplinary and sectoral inputs are crucial for ensuring that FST is based on a “robust understanding of system interactions and underlying functions” (Eakin

et al., 2017: 759), where “one cannot understand the drivers and dynamics at local, sub-national, national, regional or global levels from within any particular disciplinary standpoint” (Lang et al., 2009: 4). Other important factors that are considered within this scholarship include diverse geographies and histories, which are crucial to identify “the conditions in which transformations occurred, the precipitating factors, drivers and consequences of such structural change” (van Bers et al., 2016: 98; Lu et al., 2022). Within this literature, some papers highlight the significance of linking scholars with activists (and, as such, theory with practice) for FST (Hammelman et al., 2020; Cleveland and Jay, 2020). Knowledge integration is also central for Wilkins et al. (2010), who advocate for making food system issues integral to dietetic practice.

As Calla et al. (2022: 2) acknowledge, governance processes are “particularly important (and challenging) in conflict situations around transformative change”, where stakeholders “can use knowledge as a form of power—either to strengthen their own positions, or undermine others”. This highlights the problem of institutional integration (Lang, 2009; Risse, 2011) – i.e., issues of authority, legitimacy and coordination that can block pathways to FST. Who drives the conversations, negotiations and decision-making processes between diverse and

representative stakeholders become paramount for co-producing the diversity of innovations “that co-shape [...] future food systems” (Klerkx and Begemann, 2020: 2).

In sum, our analysis of the “how” reveals three main issues. First, key terms within the frames of PI are often not adequately expressed. For example, “integration” often remains ill-defined and ambiguous, as does “sustainability”. Second, while many authors advocate for cross-disciplinary approaches, in reality much research stays within its own disciplinary frames, with key areas that investigate PI for FST being health, environment, market and technology. Such an example is noted by Artioli et al. (2017: 218) for the Food-Energy-Water (FEW) nexus, where “much of the critique [...] derives from the vagueness of the term and the implicit assumptions about cross-sectoral integration on which it relies”. As a result of this disciplinary fragmentation, the goal of a shared agenda remains a key challenge for integrative food policy. Third, when PI is explicitly defined, it is often interpreted too narrowly. This vagueness of interpretation and approach produces diverse, partial and fragmented outcomes that lack connections between local and global actions.

4.2. The “Where”: where should PI occur within FST?

Placement of PI within FST can be interpreted in numerous ways, either at a particular scale, across scales or within government institutions. In the literature, PI is discussed across all (national, urban, continental, regional, city-regional and intra-urban) governance scales (see Table 2). Over the last twenty years, our review reveals both a capacity for integrated food policy to exist at multiple levels and a shift from national level⁸ food PI towards more local approaches.

While continental-level approaches exist, often focused on implications for the CAP (De Schutter et al., 2020; Recanati et al., 2019), national food policies have been prioritised as a level “at which food systems can be understood, agendas agreed on, and where there is the potential to act in a deliberate manner” (Dengerink et al., 2022: 6). Numerous examples exist at the national scale where impact can happen in under a decade,⁹ as illustrated by more than 800 national food system dialogues being organised in preparation of the United Nations Food System Summit in 2021. National food PI from the specific review include the Netherlands (Candel and Pereira, 2017), Germany, Italy, Norway and Romania (Zaharia et al., 2021), Iran (Milani-Bonab et al., 2023), Fiji and Vanuatu (Medina Hidalgo et al., 2022), Hungary (Fogarassy et al., 2020), Timor-Leste (Farmery et al., 2020), Australia (Trevena et al., 2015) and Switzerland¹⁰ (Moschitz, 2018).

Feola (2015) notes how large-scale transformation is often accompanied by a less well-defined analytical concept that is further complicated by distant trajectories transcending “national, sectoral and technological boundaries” (Klerkx and Begemann, 2020: 4). Such trajectories occur in different places simultaneously and connect “supra-national or even global transformative policy narratives” (ibid.) with technology and capital flows. Theories of change for scaling up mentioned in the literature, and also raised as discourses, include local initiatives that generate “proto-regimes”, loosely integrated systems with “the potential to consolidate into a new regime” (Lam et al., 2022:

⁸ Reviewed publications with a national focus are 2015; 2017; 2018; 2020; 2020; 2021; 2021; 2021; 2022; 2023.

⁹ Dengerink et al. (2022: 6) give the example of the N2Africa bean programme, which spread across Tanzania within three years “despite not having government variety recognition”.

¹⁰ Moschitz (2018) examined if food PI occurred at the national level and found that it was not present.

Table 2

Where integrated food policy is occurring.

Scale	Where does the food policy sit?
All	<ul style="list-style-type: none"> Networked foodscape from 13 national and international initiatives (Moragues-Faus, 2021)
Continental (3)	<ul style="list-style-type: none"> A Common Food Policy (CAP) for the EU (De Schutter et al., 2020) The ongoing reform of the EU’s CAP (Recanati et al., 2019) Identification of the most useful areas for EU policy intervention (Maggio et al., 2016)
National (11)	<ul style="list-style-type: none"> The Dutch government’s national food agenda (Candel and Pereira, 2017) National policy from Germany, Italy, Norway and Romania (Zaharia et al., 2021) Institutionalizing food, agriculture and health policy in Iran (Milani-Bonab et al., 2023) Policy alignment in national planning for Fiji and Vanuatu (Medina Hidalgo et al., 2022) Climate change adaptation plans around the world (Medina Hidalgo et al., 2021) Systematic integration of food safety governance around the world (Shen et al., 2021) Consumers’ attitude towards food purchasing in Hungary (Fogarassy et al., 2020). Food policy integration in Timor-Leste (Farmery et al., 2020) Framing urban food in Swiss policies (Moschitz, 2018) Australian Government’s National Food Plan (Trevena et al., 2015)
Regional (2)	<ul style="list-style-type: none"> Cities in England, Scotland and Wales on national food priorities (Sonnino, 2023) The Vegetable-Basket Project in regional governments in China (Dong and Jiang, 2022) Bioregion concept for eco-efficiency of local systems in Milan (Scudo and Clementi, 2017)
City-region (3)	<ul style="list-style-type: none"> Across 5 municipalities within Lucca, Italy (Arcuri et al., 2022)
Urban (5)	<ul style="list-style-type: none"> Across the Greater London Authority including 33 boroughs (Parsons et al., 2021) Portland’s food policies, including urban-rural relationships (Borrelli et al., 2022) Rome’s defining of urban food policy processes (Minotti et al., 2022) Analysing food-related policy integration in two cities in Germany (Baldy et al., 2022) Analysis of local food policy outputs of 31 Dutch municipalities (Sibbing et al., 2021) Data from 33 cities to understand food in urban contexts (Sonnino et al., 2019) Urbanising the nexus agenda for urban governance in general (Artioli et al., 2017)
Neighbourhoods (1)	<ul style="list-style-type: none"> Integrating climate and food policy in an educational institution (Cleveland and Jay, 2020)

2380) on more expansive scales.¹¹ Such initiatives could produce synergies; as Eakin et al. (2017: 769) state, “diversifying food access and distribution channels might lead to new interest in ecological conditions of production and thus enhanced social-ecological congruence”.

Recently, there has been a re-orientation towards urban and municipal levels¹² as suitable geographic and administrative contexts for FST (European Commission, 2020), with cities becoming recognised as “the optimal scale” for policy innovation (Sonnino, 2023: 3). The positive perception of the local level as an essential site to “envision new innovations and visions for the future” (Lam et al., 2022: 2380) is not always backed by empirical data. For example, in their study of 31 Dutch municipalities Sibbing et al. (2021: 66) find that, although there are

¹¹ In the preparation phase, they are “selected, tested, and adopted at broader meso- or macro-scales”, to later become “routinized, strengthened, and stabilized into a more defined regime” in the consolidation phase (Lam et al., 2022: 2380).

¹² Reviewed publications with an urban focus are 2017; 2019; 2021; 2021; 2022; 2022; 2022; 2023.

“signs of FPI on paper”, it remains unclear this is taking place in practice. As Kayhko et al. (2020: 580) state, in general “empirical studies show little evidence of transformations occurring, and even less evidence that these ensure better outcomes”.

Indeed, the degree from which local actions can instigate and integrate with wider spheres of change is questioned by some, who hypothesise that local initiatives “have to focus on *stabilizing* [...], rather than on lobbying, advocating, or participating in consultation” (Lam et al., 2022: 2391) – i.e., engaging with policy-making processes. As Lam et al. (2022) point out, “bridging organisations” such as food policy councils and networks (Edwards et al., 2023b; Den Boer et al., 2021) could help municipal governments to understand how they can create an enabling environment to amplify the impact of food initiatives. Other scholars focus on the “city-region” (Arcuri et al., 2022) as “a first step towards the development of integrated policies and planning frameworks that empower communities” (Sonnino, 2023: 3). For these researchers, city-regions represent key convergence points across scales and sectors for uniting what would otherwise be fragmented actors around key themes and actions. However, a cross-scalar approach also introduces its own challenges. Quoting Moragues-Faus (2021: 8), it is always difficult to advance “food policy action at the local level (scale deep) while branching out to diverse audiences and include new members in their country or internationally (scale-out) as well as engaging with different networks and administrative levels (scale-up)”.

Our literature review also draws attention to the strategic placement of food policy *within* a governance institution, highlighting a diversity of relevant governance bodies with widely divergent impacts. As Tosun and Lang (2017: 555) explain, PI can occur in numerous ways. For example, in integrated health policy: a). policy sectors other than health can be encouraged or explicitly asked to adopt policies that advance health objectives; b). PI can consist of launching specific policy measures that help to mutually attain the objectives of health policy and other policy sectors; c). actors from the health sector can make their health expertise available to other policy sectors; and d). PI can be realised by assessing and possibly addressing the health effects of proposals from other policy sectors.

While many papers refer to “food policy” in various domains (such as food security, climate-smart agriculture policy, etc.), we found that not all food-related actions are integrated within specific *food* policies. For example, some papers argue that food should be integrated within climate policies – a topic of high priority that can drive change on many related issues (see, for example, Medina Hidalgo et al., 2022). The review also highlights how food policy’s placement within government departments is uncertain, as it requires a change in existing priorities alongside of “cross-sectoral buy-in and multi-level cooperation” (Candel and Pereira, 2017: 90). For example, Parsons et al. (2021: 8) recognise how “the discretionary nature of food” in the London Food Policy means that it is “not a natural ‘fit’ for food within the current political framework”. As they describe, the London Food Team has moved departments – from Environment to Economics to Social Integration, Social Mobility and Community Engagement. This placement has impacted the purpose and outcomes of the Team, which managed to have its policy taken more seriously only after this was moved to the Economic Development department.

In short, where PI is occurring in government departments and across scales it appears to be haphazard, fragmented and short-lived, illustrating – in the case of food – that “normative approaches need to be better balanced with organizational and procedural approaches” to facilitate implementation across different domains and governance scales (Medina Hidalgo et al., 2022: 1142).

4.3. The “What”: what is being integrated and transformed to make the food system more sustainable?

Policy levers – the “control knobs” that can be adjusted to achieve system change or “transformation” (Parsons and Barling, 2021: 13) –

might also be identified and deployed to bundle specific “things” together for change (Gaupp et al., 2021). The things of food policy are often expressed in general and vague terms or are indicative of prominent discourses. With regard to the first issue, Sibbing et al. (2021), for example, identified key aspects across 31 municipal policies in the Netherlands as: public health, local food, the economy, learning/empowerment, the two ends of the food chain, social welfare (i.e., literacy, education, and employment) and urban–rural linkages. As for the second feature, things are indicative of prominent discourses such as health, environment, market, society or planning interests and concerns.

Sitting within the environment frame, the FEW nexus offers perhaps the most clearly defined PI goals. This approach “gives policy makers the mandate to consider broader interdependencies for ensuring resource security in a global context of increasing and competing demands” (Artoli et al., 2017: 215–216). However, many critique the FEW nexus for its lack of “empirical attention for the social dimension of resource security” (Sonnino, 2023: 3) — or, as Herrero et al. (2021) describe it, for the differential impacts of wider processes of change across socio-economic sectors and communities. Other things considered in the literature include socio-cultural contexts and contemporary issues, such as disaster preparedness and traditional customs (Medina Hidalgo et al., 2022).

An alternative approach to identify things to integrate for transformative change is to target novel food forms that are guaranteed to transform the food system due to their peculiarity, such as vertical, cellular or digital agriculture, food tech or protein transitions. These things open integrative pathways to highly diverse stakeholders, ideas and processes (e.g., information technology, solar energy generation, satellite or robot technology, nature-based and ecologically-regenerative solutions) (Klerkx and Begemann, 2020: 2), where business interests that often hope to profit from the thing (e.g., biological and ecological agents and technological processes) become the drivers of innovation.

In summary, the things that are either propagating or are in themselves being transformed as part of FST are vaguely expressed. This could result from the fact that much literature presents an aspirational, rather than evidence-based, description of desired FST outcomes, lacking analysis of the outcomes of grounded, existing policy actions. Overall, the review demonstrates that current policy approaches do not place enough attention – theoretically or empirically – to the tripartite dimension of sustainability and that spatial linkages are quite neglected in the various narratives, which have remained silent about the role of PI in progressing social (and knowledge) inclusion. Taking into account the implications of the ambiguity of frames and approaches, the lack of cross or trans-disciplinarity, the fragmentation and instability of policy placement and the vagueness of what things should be included in PI, this review demonstrates that an expanded notion of integration is needed.

5. Re-thinking policy integration for food system transformation: towards a new research and policy agenda

Recognising that the food system exists in very different forms and that a one-size-fits-all approach to governing (let alone transforming) it is not possible (Gaitán-Cremaschi et al., 2018), we return to processes, placement and things to propose a robust, reinforcing and resilient model for FST that converts integration from its current state as a descriptor to a tool for transformation.

5.1. Processes: to integrate diverse knowledges as a robust evidence-base for policy action

PI must be built on a diverse, relevant knowledgebase that integrates all the required knowledges for systemic change. Key overarching omissions from this review include gender, relationships between the Global South and North, transport and technology.¹³ These omissions can obfuscate links between the food system and issues of unfair labour conditions (such as for gender relations and Global South/North flows), environmental degradation, food access and housing (for transport) and escalating trends such as smart agriculture and smart cities (for technology). Other core knowledges that need to be consistently integrated within policy include indigenous perspectives (Kennedy et al., 2022) and perspectives that contribute to social justice outcomes. For example, in response to smart city discourse, Sonnino and Coulson (2021: 1045) acknowledge the need for research that looks at cities through the eyes and embodied experiences of citizens. Whitfield et al. (2021), among others, support this statement, arguing that transformation discourse places insufficient attention to social differentiation, politics and power.

As frames exert a dominant impact – influencing the specific goals, the selection of stakeholders in the decision-making process, how decisions are made and the transition pathways they follow – it is crucial that all stakeholders define their terms and agree on their desired outcomes. To capture diverse perspectives, there needs to be a shift to transdisciplinary approaches – defined as based on the integration of diverse academic and nonacademic perspectives (Klein, 2010) – that are action- and solution- oriented, that critically analyse projects in practice and that link local actions to global FST impacts (den Boer et al., 2021). For this to happen, new cross-disciplinary methods need to be developed to bridge science and policy (Hainzelin et al., 2023); art and science (i.e., applying embodied and artistic methods; Denham and Gladstone, 2020); humans and nonhumans (i.e., more-than-human and new conservation approaches; Argumedo et al., 2021); and virtual and physical worlds (i.e., to recognise the extent and power of digital technologies; Benfica et al., 2023).

A vital issue to consider in this respect is that who is in the room will also drive and shape how PI informs FST. The power of dominant stakeholders, their assumed discourses that underpin what they represent and why they advocate for FST (business, social inclusion or environmental reasons) must first, be acknowledged; and, second, be either tempered or mobilised to push through barriers to influence policy. To ensure that PI tackles the difficult questions inherent within a “broken food system”, policies may need to confront and negotiate frames that prioritise questionable pathways to FST – one such example being the justification of agricultural mechanisation in the Global South (Daum, 2023). As found in this review, scant literature engages in the analysis of the interactions between stakeholders, which is vitals “to identify policy incentives for aligning competing interests” (Brouwer et al., 2020: 8).

5.2. Placement: to integrate a critical policy approach that disrupts entrenched siloes and advocates action at multiple governance scales

PI must be relevant to whatever scale is required to achieve specific FST goals. In this vein, PI for FST echoes Ostrom’s (1990) principles of the commons that uphold the idea of subsidiarity, whereby “decisions are to be taken as closely as possible to, and with the involvement of, the citizens affected by them” (Wahl, 2017: n.p.). For example, Cleveland and Jay (2020) highlight how food system change can occur at small yet critical points of intervention like universities, where stakeholders hold high potential to instigate and support environmental sustainability.

¹³ Two papers were removed from this review as they do not directly connect to policy integration. Dougill et al.’s (2021) paper focuses on integrating research into climate-smart agriculture and Mathenge et al. (2022) reviews literature on integrating GIS in policies that support agriculture sustainability.

Numerous small-scale analyses of grounded projects exist (and more are needed) and should be discussed in relation to their capacity to disrupt entrenched siloes across disciplines, territories and sectors. The city-region concept proves useful in this way as it accounts for projects’ impacts across urban-rural linkages (see text box 1), enabling a shift “from the resilience-building paradigm toward critical governance of resilience trade-offs” (Borrelli et al., 2022: 2; see also Sonnino and Milbourne, 2022).

Acknowledging food system’s function in a global context, where decisions in one place may have a myriad of consequences elsewhere (Oosterveer and Sonnenfeld, 2012), so too must the impact of food system initiatives be assessed from the local and regional through to the global scale. Here, multi-level governance can foster multi-directional connections, align strategic power roles and dynamics and direct the impacts of food system policies across governance levels. Horizontally, commitment across municipal departments can improve buy-in from other departments to co-implement policies, adding capacity, potential co-funding and increasing accessibility to specific audiences (Edwards et al., 2023a). Vertically, integrated food policies can seek to address complex local issues that result from global food systems (Sonnino and Beynon, 2015), while enabling municipal governments to obtain the necessary power and responsibilities to further develop or deliver policy within their local context (see also Hawkes and Halliday, 2017; Sonnino, 2023).

The relational flows across place *and time* must also be acknowledged. For example, assessing if changes are taking too long may entail drawing on robust bodies of interdisciplinary knowledge, such as the IPCC reports. Here transition theory complemented by innovation approaches may be useful to set essential timelines and targets and to identify the steps required to meet them. Indeed, while much focus has been placed on time to explore possibilities of just and sustainable food futures through visioning approaches (den Boer et al., 2021; Mangnus et al., 2019), Parsons et al. (2021) remind us to also recognise the “historical roots” of integration that underpin our assumptions and, in doing so, foster our future trajectories.

5.3. Things: to integrate food with other relational sectors as leverage points to spearhead FST

From a systemic perspective, “things” do not exist independently but are part of a wider and dynamic assemblage. For FST to occur, the connections of parts of the food system with other sectors, such as water, built environment and waste, need to be recognised and strengthened. As demonstrated in the examples below, parts of the food system can be transformed through their integration with other territories or sectors. These things may be changed in themselves (in example 1, where waste becomes food), may change as an assemblage of things (in example 2, where waterways contribute to mobility) or may work together to influence change in other aspects of the food system (also in example 2, which promotes a reduction of pollutants in local environments).¹⁴

More generally, transformative relationships need to highlight the actual and potential co-benefits of PI that can further stimulate cross-sectoral stakeholder investment in FST. Cleveland and Jay (2020: 24) acknowledge the importance of potential (co-)benefits when they state that “food system change scenarios not only reduce GHGE, but [...] provide many health, environmental and social benefits”, and “these climate and health goals need to be explicitly linked in policy”.

Not all pathways will be equally feasible for integrating co-benefits (Weber et al., 2020). Here, concepts such as policy “levers” are useful for bundling together things that are most relevant for FST. As den Boer et al. (2021: 152) recognise, “to be able to transform and future-proof complex food systems through integrated governance interventions, it

¹⁴ See Edwards and Davies (2018) for an example of assemblages involved in urban food sharing ecosystems.

is necessary to [...] identify the *leverage points* where intervention will be most effective". It is crucial that pathways of FST are then integrated within policy on both horizontal and vertical governance axes. This approach is supported by others, especially in the field of agroecology, within which some advocate for place-based approaches, civil society engagement and institutional flexibility to enable subsidiarity decision-making towards comprehensive and transformative policy integration (Place et al., 2022). Convergence research represents a nascent framework that similarly seeks to integrate research at different policy scales through intermediaries to bring together relational aspects of food, climate, environment, health and social equity (Sixt, et al., 2022).

5.4. Designing integrative policy for FST: from theory to practice

Brief examples are given below that show how an integrative policy for FST could be designed. "The problem" needs to be: a) specific and b) both grounded/place-based and linked to global FST transformative dynamics. "Partners" need to include stakeholders that operate at different governance levels. "Things" need to include assemblages of specific elements from within and beyond the food system that will either themselves be transformed or will aid in the transformation of those things. "Outcomes" need to provide numerous pathways that can resolve the problem. Such pathways should offer different degrees of transformation to enable a trajectory from immediate through to long-term action and should consider the food system as consisting of multiple subsystems, with various feedback loops and connections (Candel and Biesbroek, 2016).

The two examples provided below address territorial and sectoral (re)integration by focusing on the problems of food losses and waterway pollution. Both examples are grounded in local contexts yet are linked to multi-level planning and policy changes for their enduring integration in wider systems. Both examples use a "mission" problem-based approach for integrating places and things, while applying transdisciplinary and multi-sectoral approaches to disrupt conventional assumptions and relationships. The first example is located centrally within the food system on the topic of food losses in the peri-urban farmland, whereas the second integrates food with energy in urban waterways. Significantly, the latter provides a different perspective to the conventional approach of the FEW nexus, extending its definition to the complex and often unrecognised connections between the environment, energy and food retailing and consumption. Importantly, both examples require PI to occur across diverse government departments for change to "stick". While these examples may be more representative of local rather than global actions, they provide a grounded base from which to influence and extend broader multi-level governance and planning processes, while challenging traditional assumptions that separate city from country, highlighting extended possibilities for waste and re-valourising the role of waterways within cities.

Example 1: Transforming waste into food through rural-urban integration

problem: Food losses from farmers' fields in the UK is estimated to be 3.3 million tonnes each year, of which 2.9 million tonnes is classed as "edible" (World Wide Fund for Nature, 2020). This problem is replicated in many countries elsewhere and further heightened in disasters, as experienced in Norway, which is largely reliant on migrant labourers for farm work (Melund, 2020).

Proposal: To re-integrate food that is currently wasted between farmers' fields in the countryside to consumers in the city.

Processes: To form a place-based taskforce to discuss what new systems could be established to improve (streamline/innovate) peri-urban food distribution. Task force shall include: stakeholders (such as farmers, charities, foodbanks, supermarket distribution centres, volunteers, entrepreneurs from tourism) and representatives from government departments (such as land zoning, social welfare and food health and safety). This place-based taskforce can then be integrated with related groups and institutions at different governance levels and/or on related themes, such as those working on UK and EU food systems policy, migration or environmental degradation.

Placement: Occurs in the peri-urban zone to consider rural-urban flows of

(continued on next column)

(continued)

resources, through which food losses can be redistributed to the city. Outcomes from this action could then be applied to peri-urban regions in other cities and countries.

Things: A nutritional and economic re-valuing of crop losses from fields into meals.

Potential FST outcomes: To suggest a number of transition pathways (and changes in policy and planning frameworks that can support them) – from radical to more conventional – that can be assessed and prioritised on their capacity to: reduce quantities of food and resource losses; create social, economic and environmental co-benefits such as entrepreneurship and increased food security; be translated to other city-region contexts.

Example 2: Towards resolving waterway pollution through sectoral integration

Problem: Living on boats is a rising phenomenon in the UK (due to increased housing scarcity and economic costs) that relies heavily on red diesel; a 'red' flag that questions boaters' environmental impact on urban waterways.

Proposal: Biodiesel, based on left over vegetable oil consumption, is a possible alternative fuel for boats that could be sourced from wasted cooking oil from retail outlets.

Process: To bring together stakeholders in the national energy sector with food store owners, boaters, food waste advocates and government representatives (water management, environmental pollution, energy and housing) to explore if biodiesel could be produced in distributed locations to replace red diesel. Stakeholders shall include: the energy sector, food store owners, boaters, food waste advocates and government representatives from departments of water management, environmental pollution, energy and housing.

Placement: Waterways – a source that connects many people, industries (including the food sector) and nonhuman natures; a potential network of "nodes" for redistribution.

Things: Red diesel, boats, wasted cooking oil repurposed as biodiesel.

Potential outcomes: To provide an alternative fuel source through food waste that can alleviate both environmental and economic costs for boaters and urban waterways.

6. Some conclusions

This paper sought to better understand how and to what extent PI contributes to FST. Using the prisms of *processes* (the "how" of engagement), *placement* ("where" PI occurs in terms of scale and governance institutions) and *things* ("what" specific aspects are being included within food PI), our analysis identified cross-cutting themes across the literature, such as the need for a systemic approach, the existence of multiple transition pathways for FST and the importance of bringing together diverse perspectives. Our critical review also revealed significant gaps and lacks; in essence, "integration" remains ill-defined and ambiguous; frames predominantly remain within their disciplinary silos; where food integration sits in policy is fragmented and unstable; and what aspects are included in policy remain specific to singular interests – all indicating a lack of cohesive approach for PI within FST.

To convert food PI from being a descriptor to a tool for transformation, we have suggested a new research and policy agenda that relies on three building blocks: 1. diverse knowledges as a robust evidence-base for policy action; 2. a critical approach that disrupts entrenched siloes and advocates action at multiple scales; and 3. the integration of food with other relational sectors as leverage points to spearhead FST. Two examples were presented to illustrate the possible connections, implications and policy outcomes of this novel research and policy agenda. While small, such examples illustrate how new framings that utilise this renewed agenda can catalyse and steer much needed transformation – in the food system and beyond.

CRedit authorship contribution statement

Marta López Cifuentes: Visualization, Writing – review & editing, Writing – original draft, Formal analysis. **Ferne Edwards:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing, Visualization. **Roberta Sonnino:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing, Writing – original draft, Formal analysis.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Ferne Edwards, Roberta Sonnino and Marta López Cifuentes report financial support was provided by the European Union, Grant ID. 101060717. Marta López Cifuentes also reports financial support was provided by the Austrian Science Fund, Grant ID. J 4647-G.

Data availability

Data will be made available on request.

Acknowledgements

The authors gratefully acknowledge a conversation with Oliver Milner, marine engineer, on the current state and possibilities of fuel for boating in the UK.

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