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Acknowledging complexity in food supply chains when assessing their performance and sustainability

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Abstract

Food supply chains (FSCs) over recent years have been epitomised by a range of concerns such as food and nutrition security, the distribution of value and a growing awareness of the threats posed by climate change. Taken together, these pressures have created a sense of urgency to re-examine the performance, equitability and sustainability of FSCs. This paper argues for the need to acknowledge and access the multiple, contested meanings that are attributed to FSCs. Taking its lead from post-normal science, the approach developed aims to understand the different contexts and account for the 'multiple realities' that exist. Key to this has been the development of a range of attributes of FSC performance that are common across narratives of sustainability and yet framed in various ways by different categories of actors, examined across a range of national contexts and within four spheres of influence. In so doing, this approach has the potential to more widely legitimise knowledge claims regarding FSC performance. This is critical if producers, policy-makers and consumers are to have the cognitive tools to enable them to make informed decisions about the broader impacts of the different FSCs they engage with.

Keywords: Food supply chains; performance; sustainability assessment; attributes; spheres; multi-dimensional perspectives

1. Introduction

Food supply chains (FSCs) over recent years have been epitomised by food price volatility, concerns about food and nutrition security, burgeoning obesity (especially within the Western world), contested energy supplies (most notably the conflict between renewable energy and food production), issues of power, governance and the distribution of value within FSCs, and a growing awareness of the threats posed by climate change (Maye and Kirwan 2013). Taken together, this confluence of 'intensifying circumstances' (Hinrichs 2014, p. 144) has created a sense of urgency to re-examine the sustainability, equitability and performance of FSCs. As the source and origin of most food chains, rural areas have been a key focus of agri-food sustainability discussion (Goodman and DuPuis 2002; Marsden 1998; Marsden 2013). The countryside is also a key site of food consumption, conflict and discursive representation (Halfacree 2006; Woods 2012), providing a rich arena in which to examine how sustainability discourses emerge and are contested (cf. Candel et al. 2014). This includes work on new bio-economy and eco-economy models which link food chains, rural space, regions and states; and reflexive multi-level governance analyses which re-frame relations between the countryside, the city, the region, the city-region, etc. (Marsden 2016). Attention is therefore shifting away from dichotomies such as rural/urban, production/consumption or bio-economy/eco-economy, to identify where systemic change is needed (Sonnino et al. 2016).

Sustainability by definition is a slippery and contested concept with multiple meanings and realities. The starting point then should be to capture the variety of perceptions and discursive framings of sustainability, as key mechanisms that produce social realities and determine agri-food governance (Nally 2014). The

rational for this is underpinned by the argument that for change to happen 'sustainability transitions' need to be fostered by social action at different levels, with social action, in turn, framed in particular ways (e.g. Geels and Schot 2007; Hinrichs 2014; Lachman 2013; Seyfang and Smith 2007; Wiskerke and van der Ploeg 2004). Assessments of sustainability are typically structured in terms of 'assessment frameworks', which prescribe the overall way in which the assessment should be conducted and 'assessment tools', which are the analytical tools used to actually conduct the analyses (Brunori et al. 2016). Sustainability assessments are also inclined to rely on reductionist methodologies and tools; in this respect, there is a tendency to use a single measurement indicator or standard (such as GDP per capita) and to focus on a single dimension (very often the economic dimension) as well as a particular scale of analysis (Schader et al. 2014). There is also a propensity to quantify and aggregate the resultant information, principally in response to decision-makers who ask for information that is 'kept simple' (Gasparatos 2010; Gasparatos et al. 2008).

There are clear and growing concerns that such approaches are failing to provide "reasonable and reliable solutions", and that in order to encompass the complexities and subtleties involved in understanding the sustainability and performance of FSCs "the scientific community [needs] to find new models and paradigms" (Sala et al. 2015, p. 315). For those arguing for a re-examination of the metrics used to assess FSC performance, "business as usual is not an option" (Food Ethics Council 2013, p. 6). In this respect, that approaches to FSC sustainability need to be more holistic and to incorporate a wider set of performance perspectives than currently is the norm including wellbeing, social

justice, health and environmental stewardship (NEF 2014). These emerging concerns reflect the values of post-normal science, wherein complexity, uncertainty, incomplete data and multiple stakeholder perspectives are explicitly acknowledged (Funtowicz and Ravetz 1993). Critical also are spatial relations and the socio-economic and geographical context, which can have a significant influence on the perspectives and understandings of those involved (Feldmann and Hamm 2015; Murdoch 2006); in this case, in relation to the performance and sustainability of FSCs.

The aim of this paper, therefore, is to develop a new heuristic with which to assess the performance, and thereby sustainability, of FSCs that goes beyond simply the economic to include their capacity to respond to the wider needs and concerns of society. Key to this is an appreciation and understanding of the socio-economic and geographical context in which assessments of performance are made. Drawing on the findings of an EC-funded project (*GLAMUR - Global and local food chain assessment: a multidimensional performance-based approach*), actors' perceptions of performance are examined across four different spheres of debate and communication (public, market, scientific and policy), as well as across five dimensions of food chain performance (economic, social, environmental, health and ethical). In this respect, the three conventional dimensions of FSC performance have been extended to incorporate health and ethics. In the case of health, which might be understood as coming under the heading of 'social' sustainability, increasing links are being made between diet and sustainability and the impact particular FSC configurations can have on health (Brunori et al. 2016). Similarly, while ethics might be understood as a component of all the other dimensions (either implicitly or explicitly – see Kirwan

et al., under review), it is becoming more and more important to understand the ethical and moral intentions of food chain actors in relation to sustainability (FAO 2016).

The rest of the paper is structured as follows. Section two reviews work on sustainability strategies and the performance of FSC, outlining an alternative methodological framing which analyses FSC sustainability discourses across geographic contexts and spheres. Section three sets out the methodology used, while section four analyses the discourses that emerged from the approach by both geographic context and sphere in relation to the performance of different FSC. The final section of the paper reflects upon the value of this approach to broadening our understanding of the performance and sustainability of FSC.

2. Food supply chain performance and sustainability discourses

Susanne Freidberg, writing in relation to the footprinting of food through its Life Cycle Assessment (LCA), argues that understanding what is meant by sustainable food is critical if companies, policy-makers and consumers are to have the tools to enable them to make the best possible decisions about the broader impacts of different foods and supply chains that they engage with (Freidberg 2014). Nevertheless, she cautions that defining what counts as sustainable food in terms of its footprint can become highly political, technical and self-serving (hence her use of the term 'footprint technopolitics'), often dependent on the power relations of those involved; furthermore, that a technically-based approach such as LCA is unable to capture the "breadth of 'political situations' in which measures of sustainable food are contested" (*ibid.*, p. 186). Hinrichs also highlights the need to address issues of power, politics and governance, asking

“whose voices and narratives remain unheard” when considering how notions of sustainability are defined in relation to FSC, as well as to what ends (Hinrichs 2014, p. 151).

Freidberg (2014) introduces an important distinction between *standards* (product or process requirements), and *footprint metrics* (information given to consumers about the sustainability performance of a product). Standards are sets of rules that allow for the classification of a product into a given category. This may require considerable time and effort before the standard is coherent with the legal framework, as well as implemented and accepted by the market. For a firm to create a new standard involves aligning a firm’s reputation, certification bodies, public and private control systems, and communication processes around a symbol (e.g. "dolphin-free", or "fair trade"). Once a standard is consolidated, it becomes a 'black box' (Latour 1987) that encompasses a range of sustainability assessments, giving consumers a product with ‘taken for granted’ qualities. Footprinting represents a different strategy to standards, in focussing on providing information that enables consumers to freely judge the quality of a product according to their own sensibilities and perspective. With footprinting, consumers are encouraged to interact with firms in order to make sense of the information they receive and thereby to reflect on the implications of their choice. From the firm’s perspective, footprinting implies a greater degree of flexibility in the choice of sustainability attributes that they take into consideration. As Friedberg (2014, p. 185) explains, “[t]he product footprint...governs not just by establishing metrics of comparison and progress. It also identifies ‘hotspots’ within product life cycles, where measureable environmental impacts and thus potential improvement opportunities are greatest”. According to Spence and

Rinaldi (2014), in building food chain governance firms develop 'visibility fields', which involves choosing which attributes of a product are to be made visible - and therefore to be measured - and which ones are not. For example, firms may make CO₂ emissions visible yet neglect social inequality.

Sustainability strategies, and in particular footprinting, have raised public interest and participation in assessments of FSC performance and sustainability (Gasparatos 2010), increasing the range of actors involved in this process as well as the volume of information available. As a result, different approaches and methodologies have become the objects of scientific research, and the meanings of the information gleaned are widely discussed and debated. Such debate encourages all those actors involved to utilise appropriate evaluation tools and to provide more accurate and transparent information, thereby enabling an increased level of legitimacy with respect to the knowledge created (Hassini et al. 2012). As a result of this process, competition between firms moves from costs and prices to knowledge creation and is played out over three levels: the performance of given attributes (for example, CO₂ emissions); standards (setting new and more advanced standards, such as GMO-free); and the reliability of the information provided to justify the chosen standards (Unruh and Ettenson 2010).

When considering these issues in the context of sustainable consumption policies (Sanne 2002; Spaargaren 2003), knowledge co-production becomes a strategic area of concern (Goodman and DuPuis 2002). In this respect, sustainable consumption policies need to ensure that the unintended consequences of choice are taken into account, different perspectives and interests are considered, the knowledge generated is 'robust' in scientific terms, and mechanisms are identified

that can link improved knowledge about sustainability to choice options in real contexts (Voss et al. 2006). Callon et al. (2002) argue that there is a continuous process of qualitative adaptation of demand and supply, which they term *qualification processes*, based on 'distributed cognition' (Callon et al. 2002; Hutchins 2000) among a wide range of actors, including consumers.

Food-related decision-making occurs in specific contexts and at different hierarchical levels in the social fabric. This might include, for example, consumers in European medium-sized cities, local public administrations regulating the management of school meals, or village communities in the developing world. Decisions, influenced by available knowledge and information flows, activate both material and immaterial flows (information, money, food, energy, etc.) along the chain. Key elements of this dynamic are the differences between the perceptions that social actors have of the performance of a FSC, available representations of performance, the role that different groups of actors play in these representations, the degree of legitimisation of the scientific discourse used, and the geographical context in which the discourse takes place.

FSC are variously defined and understood, dependent very often on the perspective of those involved and the geographical context. In order to establish a more inclusive understanding of their performance, it is necessary to acknowledge and understand their inherent uncertainty and the plurality of legitimate definitions and interests that result from the range of stakeholders and disciplines involved. To enable robust and legitimate results, sustainability assessment needs to start at the level at which it is communicated; in other words, analysis should start where food chain issues are discussed and

represented, taking account of the variety of different contexts, organisations and individuals involved.

These different perceptions and representations can be conceptualised as a set of *food chain performance frames*. Frames within this context can be understood as “mental structures that help people to make sense of the external world” (Brunori et al. 2013, p. 20; see also: Kirwan and Maye 2013; Lockie 2006; Mooney and Hunt 2009); also that they establish boundaries (Callon 1998), select information (Wilkinson 2011) and can help “explain how policy-makers structure reality” (Tomlinson 2013, p. 83). Frames (which in this paper represent specific discourses about food chain performance) develop and generate through communication practices. In order to help delineate between different communication practices and framings, the notion of a *sphere* can enable a better examination of the spaces of communication, seeing them as being characterised by actors, the media and a range of discourses. Two spheres are typically identified within the literature (Brunori et al. 2013): the *market sphere*, where individuals make judgements regarding commodities; and the *public sphere*, where citizens debate about common affairs (Habermas et al. 1989). Two additional spheres can be identified as important socio-economic contexts where food chain performance is increasingly communicated: the *policy sphere*, where the development of policies is the object of communication, and the *scientific sphere*, where the object around which communication is developed is ‘legitimate truth claims’.

Spheres in this context need to be interpreted as *arenas of interaction*, wherein specific discourses are generated through communication between different

actors and groups (which could include, for example, producers, scientists and consumer groups), and where discursive coalitions unfold. Actors and stakeholders within FSCs may belong to multiple spheres. In each of these they will communicate with particular rules, as well as influencing discourse creation in different ways. In this respect, the public sphere has a specific role, as it is a battleground and space where both dominant and alternative frames can emerge. The creation of meaning in the public space is influenced by the discourses generated in other spheres. In the market sphere, large firms are dominant, as in most cases it is they that set the rules and agenda. Increasingly, firms communicate in relation to the common good, as this in turn is good for brand reputation and value creation (Porter and Kramer 2011). This implies that the power of communication in the market sphere can be used to influence the public sphere. In the public sphere, the communication rules are different and the power to influence is more widely distributed between actors. Media manipulation (Lockie 2006), for example, can be countered by the distributed communication of citizens, as well as the freedom of speech and 'voice' that is (hopefully) guaranteed by public authorities.

Interaction between spheres is, therefore, both inevitable and crucial. For instance, the discourse generated in the scientific sphere can be mobilized to legitimise specific claims raised in other spheres, while the policy sphere draws on the claims raised in other spheres to elaborate solutions. Recognition of this interaction is also helpful in terms of understanding the evolution of corporate social responsibility, whose effectiveness is related to the trustworthiness and quantity of information released by enterprises. As Dubbink et al. (2008) suggest, communication in the market sphere is transferred to other spheres thanks to the

presence of 'infomediaries' who control, verify and translate the information produced by companies. Analysis of the meanings created both within and between different spheres can help to identify different prioritisations of sustainability issues. In so doing, it is then possible to identify and address the trade-offs between different aspects of sustainability, helping to clarify the dilemmas that a community may face when making choices. Such analysis may also identify consensus frames and their 'keys' (Mooney and Hunt 2009) in relation to specific issues. In practice, it may be that there is general consensus about the importance of a particular performance frame (e.g. the need to improve food chain resilience or food security), and yet multiple meanings and opposing ideas about how it can best be achieved (Kirwan and Maye 2013; Mooney and Hunt 2009).

This paper, in drawing on the GLAMUR project, identifies a broad set of sustainability attributes across five dimensions of FSC performance (economic, social, environmental, health and ethical), which were being debated across a range of national contexts in four different 'spheres' of discourse (public, market, scientific and policy). Critically, attributes are not indicators of performance, but rather encompass the multiple meanings that are attributed to food chains. The combination of these different spheres of discourse and dimensions of performance produced a range of knowledge claims and interests, which necessitated trying to discern areas of both convergence and divergence. Taking its lead from post-normal science, the approach aims to account for the 'multiple realities' that exist, which may be more or less visible, placing the generation of performance values and metrics within specific socio-economic and geographic contexts.

3. Methodology

An insight into the narratives involving FSCs was enabled, firstly, by a desk-based analysis of how food chain performance was currently being assessed in each of the 12 countries examined as part of this research. These included 10 European countries (UK, Netherlands, Italy, France, Belgium, Switzerland, Spain, Latvia, Denmark, Serbia), selected in order to reflect a variety of socio-economic contexts, while the addition of Senegal and Peru provided an important developing world perspective. In each country, a systematic analysis of how the performance of FSCs is perceived, defined and communicated was undertaken. The aim was to identify attributes of food chain performance that were common across discourses in each of the countries, even though they may be framed in different ways by different social actors. Unlike indicators, attributes are not specific measures of performance impact, but instead reflect a characteristic or meaning attributed to the performance of a particular FSC. They signify, in other words, common discourses that may have multiple meanings and embody qualities that can be assessed.

Guidance was given on what sources of data this should entail in order to ensure a degree of comparability across the research teams, but included newspaper articles, TV programmes, magazines (journalistic, trade, health, gastronomy), blogs, Twitter and other social media, public information guides, market research, trade networks, academic journals, books and web-sites, as well as government, NGO and think-tank documents. While some of these sources clearly related to a certain sphere (e.g. journal articles are part of the scientific sphere), other sources overlapped between spheres (e.g. a website may span a number of

spheres). The key point was that each of the research teams should review a good cross-section of sources as part of their desk-based analysis in order to cover the full range of spheres and dimensions.

The aim of examining these different sources was to identify a list of attributes related to food chain performance in each of the countries involved, wherein each of these attributes signified a general characteristic that was important in terms of how FSCs were perceived and represented in different socio-economic and geographic contexts. This list was then examined in a series of 10-15 interviews with key stakeholders across the FSC in each of the countries involved (including policymakers, consumer organisations, environmental groups, retailers and so on). This enabled a further contextualisation of meanings about how FSC performance is assessed, as well as helping to ground-truth the selection of the most relevant attributes. Having done this, each of the partners responsible for the 12 countries examined wrote a report specific to their national context that included a multi-criteria performance matrix (MCPM) composed of approximately 20-30 attributes. In each case, the final selection of attributes necessitated encompassing a wide range of debates and issues within a single term or short phrase. As such, each of the attributes was accompanied by a 'thick description' that explained in detail how each of the attributes included within the MCPM had been chosen and what they incorporated. This included the following:

1. A detailed textual description of how and why each of the attributes had been chosen within the national contexts concerned.
2. An explanation of why the attribute had been positioned in a particular cell(s) within the multi-criteria matrix for that country.
3. Any significant differences between the four spheres.
4. Any significant differences between the five dimensions.

5. The nature and extent of discourse coalitions and alternative framings of the issues.
6. The dilemmas and contradictions that emerged from the analysis.
7. Evidence of interactions with other attributes, and the significance of these interactions.

Based upon the 12 country-specific reports, a comparative analysis was undertaken that drew out the diversity of meanings and perceptions associated with the performance of FSC in relation to their socio-economic, social-institutional and geographic settings. Three members of the research team were involved in this analysis, each of whom read all 12 reports. A composite matrix that included all the attributes identified by each of the countries was constructed, delineated by country, sphere and dimension. This produced a total of 207 individual attributes, which was then condensed during a face-to-face meeting between the three researchers spread over two days, in order to produce a MCPM composed of 24 attributes (see Figure 1). An example of how the 207 attributes were reduced to 24 is given in Table 1 below, as well as how attributes were positioned in a particular sphere and dimension.

Table 1: Coding spreadsheet for the attribute ‘information and communication’

Attribute	Country	Dimension/sphere
Information	Italy	Economic/Science; Economic/Market; Environmental/Public; Environmental /Market; Health/Public; Health/Science; Health/Market; Ethical/Public; Ethical/Science; Ethical/Market
Food activism	Italy	Social/Science; Ethical/Science
Information accessibility	Latvia	Economic/Market; Economic/Policy
Consumer information	Denmark	Social/Public; Health/Public
Social legitimacy	NL	Social/Market
Food literacy	Denmark	Social/Policy
Awareness and responsiveness	NL	Health/Science; Health/Market
Knowledge and skills	France	Social/Public; Social/Science; Social/Market; Ethical/Market
Information	Spain	Social/Policy; Ethical/Public; Social/Public
Information for consumers	Spain	Social/Public
Product quality	Spain	Health/Public; Health/Market; Social/Market; Social/Policy; Health/Policy
Certification	Spain	Health/Policy
Transparency	UK	Health/Public
Transparency	Switzerland	Ethical/Public
Transparency	Belgium	Ethical/Public; Environmental/Policy; Health/Policy
Trust and commitment	NL	Social/Public; Social/Market; Social/Policy
Authenticity	NL	Ethical/Public
Authenticity	Belgium	Ethical/Public
(Food) Integrity	NL	Ethical/Science
Trustworthiness	UK	Social/Public

In this example, the attribute is ‘information and communication’, which encompasses a wide range of other attributes identified within the 12 national reports. For example, the report of the Netherlands includes 'awareness and responsiveness', 'trust and commitment', '(food) integrity' and 'authenticity'; the Belgian report also includes 'authenticity', while the UK report includes 'trustworthiness'. The Italian report includes 'information' and 'food activism', Latvia has 'information accessibility', Denmark has 'consumer information' and 'food literacy', and France has 'knowledge and skills'; while the Spanish report includes 'information', 'information for consumers' and 'product quality'. There was also some debate amongst the research team about having ‘transparency’ (as noted in the UK, Swiss and Belgian reports) as a separate attribute, but it was decided that it fits better within the attribute ‘information and communication’, in

that in essence it is being used within the national reports in terms of ensuring an openness of communication throughout the FSC. Each of the 24 attributes shown in the MCPM (Figure 1) was determined in the same way as described for 'information & communication'. Inevitably this was to a certain extent a subjective process, but justified by the detailed description in each case of how the attributes were arrived at and their positioning within particular cells.¹

¹ It is apparent that some of the attributes, such as efficiency and nutrition, appear in more than one cell. This is inevitable, and indeed a case could be made for repeating a number of the attributes in a number of the cells. However, this would degrade the value of having a MCPM that seeks to draw together the diversity of meanings and perceptions of the relative performance of FSCs across a range of geographic contexts. As such, the attributes were placed in those cells where they were most vigorously and obviously debated.

Figure 1: Multi-criteria performance matrix of 24 attributes

Dimension / Sphere	Economic	Social	Environmental	Health	Ethical
Public	<ul style="list-style-type: none"> •Affordability & of •Creation distribution added value •Contribution to economic development 	<ul style="list-style-type: none"> •Information & communication •Food security 	<ul style="list-style-type: none"> •Resource use •Pollution 	<ul style="list-style-type: none"> •Nutrition •Food safety •Traceability 	<ul style="list-style-type: none"> •Animal welfare •Responsibility •Labour relations •Fair trade
Scientific	<ul style="list-style-type: none"> •Contribution to economic development •Technological innovation •Governance 	<ul style="list-style-type: none"> •Consumer behaviour •Territoriality 	<ul style="list-style-type: none"> •Resource use •Biodiversity •Efficiency •Technological innovation •Food waste 	<ul style="list-style-type: none"> •Nutrition •Food safety 	<ul style="list-style-type: none"> •Fair Trade •Animal welfare
Market	<ul style="list-style-type: none"> •Efficiency / competitiveness •Profitability •Connection •Technological innovation •Resilience 	<ul style="list-style-type: none"> •Information & communication •Territoriality •Connection 	<ul style="list-style-type: none"> •Efficiency 	<ul style="list-style-type: none"> •Traceability •Food safety 	<ul style="list-style-type: none"> •Fair trade •Territoriality
Policy	<ul style="list-style-type: none"> •Creation & of distribution added value •Contribution to economic development •Efficiency •Resilience •Food waste 	<ul style="list-style-type: none"> •Consumer behaviour •Labour relations 	<ul style="list-style-type: none"> •Food waste •Pollution 	<ul style="list-style-type: none"> •Traceability •Nutrition •Food safety 	<ul style="list-style-type: none"> •Food security •Governance

4. Examining discourses through identified attributes of performance

In developing the cross-country MCPM (Figure 1) it is apparent that geographical context influences how the performance of FSCs is perceived, as well as how attributes are communicated and valued. As such, the first part of the analysis below presents three dominant food chain performance framings that are geographically related. The second part of the analysis, in drawing on the range of criteria for performance assessment identified in Figure 1, examines how these criteria are being debated within different spheres of debate, as well as how there

is interaction between spheres, helping to reveal the different ways in which food chain performance is valued. The analysis of attributes by geographic context and sphere is summarised in Table 2. It will be referred to below alongside Figure 1 to show how food chain performance is perceived, contested and related to different discourses and narratives.

Table 2: FSC performance attributes (geographic context, meanings and sphere presence)

Attribute	Countries	Meanings	Dominant discourse	Dissonant views	Spheres where the attribute prevails
Affordability	Belgium, Italy, Netherlands, Peru, Senegal, Latvia, UK and Spain	Social (in relation to poverty) and economic (in relation to firm competitiveness)	Making food more affordable through efficiency	Sustain small-scale farming	Policy and public
Creation and distribution of added value	Italy, France, Switzerland, Netherlands, Senegal, Peru, Latvia, Serbia, Spain	Especially in relation to the share of agriculture	Distribution is not fair	Farmers are inefficient	Public, scientific, policy
Contribution to economic development	Senegal, Peru, Latvia, Serbia, Spain, Italy, Netherlands, France, Belgium, Switzerland	Related to governance and technological innovation	Neoliberal in Spain and Latvia, developmentalism in Peru and Senegal	CSOs, academics	Policy, public, scientific
Technological innovation	UK, Denmark, Netherlands, Belgium, Latvia, Serbia	Sustainable intensification, environmental performance, GMOs	This is a way to address food security and sustainability challenges	Doubts on efficacy and concerns for sustainability	Public, scientific, market
Governance	Serbia, France, Netherlands, Denmark, UK, Latvia, Italy, Senegal, Spain	Governance structure / power distribution and democracy	Alliance between the food chain and social movements	Alliance between short food chains and social justice groups	All spheres
Efficiency	Serbia, Latvia, UK, Denmark, Netherlands, Belgium, Spain, Switzerland, Senegal, Peru	Economic / ecological efficiency	Linked to competitiveness	Linked to responsibility, fair trade, consumer behaviour	All spheres
Profitability/competitiveness	France, Belgium, Latvia, Denmark, UK, Netherlands, Spain, Serbia, Senegal, Peru, Italy	Price stability, production costs, access to markets, knowledge and skills	Economic viability	Delivering multiple outputs	All spheres
Connection	Italy, France, Switzerland, Latvia, Netherlands, Denmark, Spain	Cooperation, social capital, connectivity, rural cohesion, nearness, proximity	Connection helps competitiveness and improves society's view of products	Social linkages are idealised through scale or CSR	Market
Resilience	Belgium, Netherlands, Switzerland, UK Spain	Risk and stability, subsidy dependency, reliability	Stability of FSC	Linked to power relations in the FSC	Public, policy
Food waste	Italy, Switzerland, UK, Belgium, Spain, Denmark	Efficiency of FSC to manage resource externalities (i.e. waste)	Food waste as an ethical factor	Food waste as an economic factor	Public, market, policy
Information and communication	Netherlands, UK, Belgium, Italy, Spain, Latvia, Denmark	Awareness, trust, commitment, authenticity, information for consumers, transparency	Need to improve standards of openness	Encouraging FSC activism and collective participation	Public, market
Food security	Senegal, Peru, Netherlands, UK, Italy, Spain, France, Serbia, Belgium, Denmark, Switzerland	World hunger, national self-sufficiency, household food security	Availability and accessibility to food improved through techno-science	Food sovereignty and social grassroots responses	All spheres
Consumer behaviour	Senegal, Latvia, UK, Italy, Belgium, Spain	Perceived taste, consumers' decisions to buy particular products	Promoting informed consumer choices	Consumer behaviour impact on diet and the planet	Policy, scientific, market
Territoriality	France, Italy, Switzerland	Producer livelihoods and welfare	Tradition as a competitive edge	Appropriation of terroir by global FSC	Market
Labour relations	Senegal, Peru, Latvia, Serbia, Spain	Welfare and recognition of workers, labour risks, availability of qualified labour	Social rights / conditions of workers	Labour relations linked to technological development	Public, policy
Resource use	UK, Netherlands, Spain, Italy, Belgium, Denmark	Resource use consumption and techniques to measure resources used by FSC	Techniques and data can document and improve environmental performance	Need to address the dependency on resources	Public, scientific

Pollution	Belgium, France, Italy and Spain	Different forms of water, soil and/or air pollution caused by FSC	Need to set or respect standards	Need to assess pollution multi-dimensionally	Public, policy, scientific
Biodiversity	Italy, UK, Switzerland, Netherlands, Belgium	Ability of food chains to preserve biodiversity	FSC that preserve breeds / varieties	New patterns of consumption needed to avoid ecological disaster	Scientific
Nutrition	Latvia, Italy, UK, Netherlands, Belgium, Spain, Senegal	Nutritionally balanced diets	Promoting informed consumer choice (balanced diet, obesity)	Cheaper low quality food vs more expensive high quality food	Public, policy
Food safety	UK, Denmark, Netherlands, Belgium, Italy, France, Switzerland	Related to traceability / as product prerequisites / in relation to food scandals	Technocratic approach	Small farmers in short food supply chains	Public, market, health
Traceability	Switzerland, Denmark, Spain, France, Netherlands, Italy	Means of ensuring the safety of the FSC	Technocratic / regulatory approach	Done via producer consumer trust and direct contact	Market, policy, health
Animal welfare	Netherlands, UK, Belgium, Italy, Spain, Switzerland	Ability of FSC to respect animal welfare rights	Need for improved animal welfare and animal rights via governance standards	Organic agriculture and biodiversity preservation	Public
Responsibility	Netherlands, Denmark, UK, Serbia	Corporate social responsibility	FSC is socially responsible	State needs to assume greater responsibility	Public, market
Fair trade	UK, Denmark, Netherlands, Belgium	Providing fair prices to producers in developing countries	Fair trade labels to enable socio-economic viability of small producers	Fairness for small producers in global north FSC	Public, market

4.1 Dominant place-based framings of food chain performance

The analysis below presents three thematic groupings for the 12 countries, each with a dominant performance frame. This highlights the need to account for the influence of both socio-economic *and* spatial processes of legitimacy.

4.1.1. Socio-economic and structural development

The first grouping includes Senegal, Peru, Latvia, Serbia and Spain. In this grouping there is an emphasis on economic attributes, with socio-economic development the dominant discourse that frames food chain performance. Consequently, 'profitability/competitiveness', 'contribution to economic development' and the 'creation and distribution of added value' are prioritized as key attributes (Table 2). Attributes like 'efficiency' and 'labour relations' are also a priority, but are discussed in economic growth terms and linked to profitability and competitiveness. In Serbia, for instance, there is an over-riding emphasis on market efficiency and developing EU standards. 'Food security' is another important attribute, driving discussions about food chain 'governance' and 'contributions to economic development'. This is particularly evident in Senegal, where the objective is to ensure people's food security and to reduce food imports. The need for enhanced domestic 'resilience' is seen as being achieved through improved 'connection' between actors across food chains, including discussions about reducing food import dependence.

Appreciation of historical context helps to explain why performance is framed in socio-economic terms, especially in policy documents. In Senegal and Peru, structural adjustment reforms and earlier processes of liberalisation and food chain restructuring form an important legacy. In Senegal, food security is the

dominant discourse in all four spheres, with 55% of the population under the poverty line and the country importing 60% of its food needs. Food chains are judged in terms of their ability to provide food for people, as well as to generate incomes for local people and the national economy. In this respect, government policy is to prioritise agri-business and commercial farming, as private national and mainly foreign companies can help ensure investments that the government cannot. Similarly in Peru, the ability to make a contribution to the national economy and state tax revenues is the main criteria by which food chain performance is judged. Since the liberalization of the economy in the 1990s, governments have sought to create an enabling environment for business competitiveness. Policy support for food chains therefore depends on how much money they bring in to the country. However, there are concerns from civil society organisations and academics as to the economic, social and environmental sustainability of this growth model.

Economic development challenges are of particular importance in Spain where, compared with other Western European countries, the process of agrarian industrialisation started later (the nineteenth century); furthermore it was halted by the Spanish Civil War, which led to a lag in both structural and economic development. The result is a complex interplay of issues in terms of assessing food chain performance, although the main focus is a neoliberal discourse, with a Spanish market that satisfies European and global food chain demand. In Latvia too, many of the current problems associated with agriculture are related to the legacy of the Soviet Union. After the collapse of the Soviet Union, access to Western agricultural practices strengthened the view that agriculture should be intensified and opened to competition. Policy support has been based on a neo-

liberal ideology, with 'experts' arguing that production is currently inefficient and that enterprises need to invest more in research and development in order to improve their competitiveness in export markets. A strong economic development imperative also drives how food chain performance is viewed and communicated in Serbia, whereby agriculture is seen as important in terms of helping to ensure rural employment and development, as well as food security and environmental protection. Domestic food chains are regarded as inefficient, with a large number of intermediaries, poorly organised producers and weak consumer engagement. Government regulation of the food chain is seen as crucial in order to improve quality standards and to help ensure EU integration and increase exports. As in the other countries in this cluster, there is a clear intention to 'open up' and liberalise markets and food chains.

4.1.2 Territoriality and global competition

The second grouping includes France, Italy and Switzerland. In this grouping, the emphasis is on national tradition, territory, heritage and culture (encompassed under the attribute of 'territoriality'), that run alongside a strong globally competitive, market-based neoliberal model (Table 2). The two elements are not always compatible. For example, for some proponents of the territoriality discourse, a key solution to food security and the domestic resilience of food chains (which includes food safety) lies in strengthening social relations within food chains (i.e. the 'connection' attribute). Performance of food chains in this context then is generally discussed from an ethical point of view, particularly in terms of producer livelihoods and welfare. Another set of attributes relate more to the relationship between territoriality and global competition/market competitiveness. This is a market-sphere and economic-oriented framing, with

'creation and distribution of added value', 'profitability / competitiveness' and 'contribution to economic development' the three key attributes (also present in Group 1). 'Technological innovation', domestic 'resilience' and (economic) 'efficiency' are also evident, while 'food safety' and 'food security' are important over-arching attributes that characterise food chain performance discourse.

The distinctive aspect for this group of countries then is that 'territoriality' acts as a dominant framing for performance assessment. In France, for example, 75% of its food chain is linked to an agri-industrial model, yet a patrimonial style food model is also evident, embodied in the notion of 'terroir' and associated with gastronomy, tourism and French culture and in opposition to the agri-industrial model. In Italy, national and international agri-food chains are again the main focus, but in this case complemented by traditional foods and processing methods that add to the 'Made in Italy' brand. The rhetoric is based on the link between food, territory and culture, with this connection being regarded as a source of identity and social values, but crucially also as a competitive edge for Italian produce in global markets. Territory and tradition also permeate the food discourse in Switzerland and sit alongside an on-going liberalisation of the national food market. The territoriality discourse in Switzerland is about the need to protect local territories. This is concerned with biodiversity and land use planning and the development of regulations to protect landscape, biodiversity and traditional ways of managing the land. This runs in parallel with a market-based discourse, centred on value creation and the provision of social or environmental guarantees (such as certified organic production or PDOs) to consumers. Territory and tradition thus influence food chain discourse in this group of countries, linked also to globalisation processes.

4.1.3 *Neoliberalism and food system performance*

The third grouping includes the UK, the Netherlands, Belgium, and Denmark. In this grouping, neoliberalism is the dominant food chain performance frame set against food system sustainability concerns. This framing is not unique to this group of countries: indeed links with global markets and trade liberalization underpins all three discourses in some capacity. Likewise, concerns about 'resource use' and the sustainability of a resource hungry system are evident across the 12 countries studied, but particularly those in this grouping (Table 2). In Denmark, for example, the discourse involves issues such as food miles and the impacts on climate change, as well as responsibility for the working conditions of people abroad. 'Food safety' (which includes concerns about 'traceability') is also increasingly relevant within this country grouping, viewed especially from the health and ethical dimensions. In response to these issues, technocratic and utilitarian arguments are employed as a dominant performance frame that sees these challenges being best addressed through 'technological innovation'.

Global food security has a strong presence in the national food chain debates of this grouping, dominated by a neoliberal market ideology. There is recognition of the need to improve resilience in domestic supply chains but national food security, it is argued, will be best achieved via an effectively functioning global market for food, in conjunction with the European Single Market². Food security is largely framed at the global scale (i.e. world hunger), with a 'moral responsibility' to 'feed the world'. Scientific and technological advances promise to increase yields in response to global population expansion, reduce waste in

² In the UK, this will now almost certainly change as a result of the Brexit negotiations.

processing and allow adaptations to be made in the nutritional qualities of foods. Health, environmental, social and ethical dimensions are subservient in this techno-scientific neoliberal discourse. However, this main framing is countered by proponents of food system sustainability who build their arguments around more socio-economic, environmental and ethical concerns, arguing that a radical structural, cultural and political re-organisation is necessary in order to transform the performance of FSCs. Key to this is a re-negotiation of values whereby the externalities associated with FSCs are captured within food prices, thereby enabling greater transparency.

A discursive battlefield between a neoliberal, market-based discourse and an eco-economy viewpoint is evident, then. In the Netherlands, for example, the negative externalities associated with agricultural modernisation are leading to societal interest and public debate about the sustainability of agriculture and 'corporate social responsibility'. In Belgium, the emphasis is on product quality and taste, which is rooted in its Burgundese culture of 'good food and good life'. There are aspects of territoriality at play here and yet a strong neoliberal discourse dominates, typified by a production-oriented framework that takes production and economic profit as its point of departure. At the same time, there are those arguing for a more holistic framing of performance and sustainability (such as NGOs, and some consumers and producers), who are critical of the neoliberal discourse and highlight social and environmental concerns in their discourses. As such, there is a polarization of discourse in this grouping, with one framing focused on free trade, 'technological innovation' and economic and ecological 'efficiency' as the solution to an increasingly global food crisis, while

others promote more social and collaborative linkages involving 'connection', 'fair trade', 'responsibility' and 'consumer behaviour'.

4.2 Perceptions of food chain performance by sphere

The sections below present an analysis of the issues discussed in the four different spheres. At a general level the analysis reveals that differences evident in particular attributes are often linked to the role of the market, where there are notable differences in terms of the power and influence of those involved, with corporate retailers and large-scale processors dominating, not least in terms of advertising and lobbying. In this context, we identify a dominant neoliberal frame and then more alternative ontologies. This is usefully expressed in discussions about 'efficiency', where a neoliberal-based view of productivity is clearly at odds with an alternative economic view that emphasizes the production of benefits that are additional to economic ones; likewise, a market-based view of ecological efficiency, which is avowedly committed to technological progress and input/output relations, is in contrast to those that emphasise the carrying capacity of ecosystems. Similar battlegrounds are also evident in other attributes: the 'creation and distribution of added value' attribute, for example, notes differences between scientists (scientific sphere) and farmer unions (policy sphere), with the latter critical of the way global chains distribute value added; and the former, in the guise of free-market analysts, who criticise farmers for production inefficiencies (Table 2). Differences of opinion regarding the nutritional benefits of cheaper, lower quality food versus more expensive higher quality food were also noted under the 'nutrition' attribute, as well as concerns about the 'authenticity' and appropriation of territorial values by market instruments. It is evident from the attribute descriptions, therefore, that there is significant

contestation in relation to how the performance of FSC is assessed, symptomatic of the conflict between 'bio-economy' and 'eco-economy' advocates (Horlings and Marsden 2011; Marsden 2013).

4.2.1 Public sphere

The public sphere is an important arena of interaction that highlights issues of public debate. The analysis highlighted a number of issues in relation to economic performance, although 'affordability' is particularly notable as a key public sphere issue (Table 2). It is one of the most cited attributes in the 12 national reports. The debate is about the cost of food to final consumers. Increased public debate about affordable prices for basic food products was heightened in all 12 countries studied by the 2008 price spikes. The 'creation and distribution of added value' is another economic attribute that features strongly in public discourse, especially in relation to how current food chain arrangements influence the distribution of value. In the Netherlands, for example, as well as in a number of other countries (e.g. Switzerland, Spain, Belgium), the dominant position of retailers is highlighted as being a key factor in determining the distribution of added value within food chains. In terms of social performance, information and communication has a strong presence in public discourse, but the debate is often related to specific issues such as trust and commitment, food integrity, authenticity and trustworthiness. The notion of 'transparency' (discussed in the UK, Switzerland and Belgium, for example) is also included, as a way of helping to ensure an openness of communication throughout the food chain. Consumers, in particular, require high standards of openness from the food chain in order to feel assured that the food they eat is both safe and trustworthy.

This debate links also to food safety, which is a much-debated public sphere issue and increasingly perceived as a risk management issue that concerns consumers and public health. It features in a number of national reports e.g. Italy, Switzerland, Belgium, the Netherlands, France, Denmark, the UK, Spain and Serbia, often discussed in relation to food scares, scandals and illegal activities. It is then viewed as a 'public good' and not something that just concerns agriculture and the food industry. This public good perspective extends also to the pollution attribute, which in scientific terms covers the different forms of environmental pollution which may be caused by FSC, such as water, soil or air pollution. In the public sphere the priority given to this attribute depends on the scale of media coverage, usually taking hold around particular events / pollution scares. The public sphere is also particularly important in relation to the ethical dimension, with discussions reflecting a range of 'ethical dilemmas'. For example, discussion about fairer prices, animal welfare rights, labour relations and food security all take place in the public sphere (Table 2). Animal welfare, in particular, is a matter of public debate that is well cited in most national studies (e.g. Italy, the Netherlands, Belgium, the UK, Spain and Switzerland), reflecting a concern for animal welfare rights beyond human health concerns. It is possible then to distil key features of food chain performance that characterise the public sphere, particularly the emphasis on consumer impacts (in relation to the cost of food, trust etc.) and the performance of FSC in terms of public good outputs and the presence of ethical dilemmas.

4.2.3 Scientific sphere

Within the scientific sphere, the most significant debate concerns the economic and environmental performance of food chains (Table 2). In terms of economic

performance, 'contribution to economic development' overlaps between the scientific and policy spheres. The scientific debate is mostly related to national and local economic development, measuring and reporting, for instance, food chain contributions to the national economy, employment income and revenue (Senegal), inter-linkages with the wider regional rural economy (the Netherlands), helping to understand the contribution of food chains through exports (Italy) and employment and contribution to GDP (Spain). There is debate about the best ways to measure contributions to economic development, but the more critical debates emerge in relation to 'governance' and especially 'technological innovation'. Critiques of forms of food chain governance in the scientific sphere are informing debate in the policy sphere, for example. In particular, the state's role in food governance is questioned (e.g. France, Italy, the UK, the Netherlands, Spain), with debate about who has influence over food systems and policy and how the power balance influences democracy and accountability in food chains. In terms of environmental performance, 'technological innovation' (e.g. GMO (Latvia and Serbia), the high-tech redesign of health claims (the Netherlands) and sustainable intensification (the UK)) has a strong presence in the scientific literature in relation to the usefulness (or not) of technology in addressing environmental issues, including adaptation and/or mitigation. The economic / scientific framing references an underlying aim to reduce costs and increase economic efficiency and profitability, and thereby competitiveness.

Discourse in the scientific sphere also plays a key role in terms of measuring environmental performance. Resource use, for example, concerns the use and management of the flows of available resources through food chains, with discussions in the scientific sphere concerned mainly to develop the tools with

which to measure resource use efficiency (e.g. ecological footprinting (Spain, Italy), ecological efficiency (Senegal, Belgium), and food miles (the UK and Italy)). Discussion in the scientific sphere about biodiversity is also informative. Biodiversity reflects concerns in the science discourse (e.g. in Italy, the UK, Switzerland, the Netherlands and Belgium) about the ability of food chains to preserve the stock of natural resources: soil preservation, for example, is included here as it reflects the threat soil loss poses to global food security.

4.2.4 Market sphere

Unsurprisingly, the market sphere is dominated by economic performance issues, yet important debates emerge too in other dimensions, particularly ethics, which is increasingly important in terms of building a firm's reputation and profile. Profitability and competitiveness is fundamental to an assessment of the economic performance of any FSC and its importance is evident in all the national reports. In market terms, it describes the ability of the food chain to make a profit and to remain competitive. 'Connection' (within food chains) is critical within the market sphere, in terms of ensuring the competitive position of a producer or firm. It is discussed in two main contexts: firstly, in order to improve the competitiveness of smaller scale producers and consumers; and secondly, to help improve society's understanding of the distinctiveness of certain products within the marketplace. These two elements have an economic aspect, but they are also about empowering society to make better purchasing decisions. Larger-scale producers and chains have sought to replicate this process of connection through the development of labels and certification schemes, although there are questions as to the 'authenticity' of this approach.

In the market discourse, technological innovation relates to economic efficiency and productivity, but also to controlling safety standards. It is also an issue of competitiveness, especially where international and national policies mean that some countries have better access to innovations than others (a concern raised in the Serbia report). Efficiency also has a strong presence in the market sphere discourse: first, economic efficiency, which refers to a set of economic arguments about food chains that are common across national reports (e.g. Latvia, Spain, Belgium); and second, ecological efficiency, which reflects increased food industry discussion and interest in improving environmental performance (e.g. the Netherlands, Senegal). Efficiency is clearly a commodity-based discourse, but it is increasingly framed in ecological terms and is more than simply a measure of the ratio between economic cost and profit.

'Information and communication' is a key feature of social performance from a market perspective, giving a different inflection to the public discourse. In Latvia, for example, this is framed in terms of 'information accessibility', which relates principally to producers. In Denmark 'consumer information' is important in terms of its potential influence on the market. Notions of connection, proximity and nearness from a market perspective are used as a way of demonstrating that the products involved are qualitatively different from those that come from anonymous and disconnected global food chains. Debate in the market sphere also concerns the authenticity of the message that is being communicated to consumers about the underlying 'territoriality' of the produce they are buying. Global chains in some cases are engaged in appropriating the underlying values and value added of links to particular territory or 'terroir'.

There is a market-based health performance discourse, which is linked to the policy sphere and forms of regulation and arrangement to manage risk. 'Traceability', for example, is referred to in a number of European reports e.g. Switzerland, Denmark, Spain and France, the Netherlands, Italy, as means of ensuring the safety of the food chain and protecting people and the environment from harm. In the market sphere, there is also a legal obligation on food companies to ensure traceability, meaning that traceability is directly associated with regulation and certification. In turn, this links with the policy sphere as a means of helping to prevent the contamination or adulteration of food, as well as being able to trace the cause of any pollution that may impact on the environment as a result of food chain activities.

4.2.2 Policy sphere

There is a dominance of economic performance issues in the policy sphere, with 'contribution to economic development' particularly notable in, for example, Switzerland, the Netherlands, France, Latvia, Italy, Belgium, Spain, Serbia, Senegal and Peru, with the discussion often focussed on the contribution food chains can make to economic development at a national, regional and local level (Table 2). A key dilemma for policymakers in this respect is the relative balance between global food chains and domestic food chains. The capacity to create added value within food chains is another key challenge that requires policy support, as well as ensuring that food chain costs and benefits are fairly distributed across the FSC. This links with the 'governance' attribute, with many of the studies making reference to power distribution and democracy within FSC and asking who determines the direction of food chains. These policy dilemmas

are also present in public and scientific documents, raising challenges for the role of policy in food chain governance.

Some policy debates are fairly instrumental and pragmatic. 'Food waste', for example, is mainly discussed from an economic perspective, with discussions centred on how excess packaging might be more cost-efficiently used as raw material for other purposes. Likewise, 'pollution' is reflected principally in the importance of standards and thresholds that are not to be exceeded, and traceability and food safety are described in similarly technocratic terms. However, other issues are much more challenging and contentious, especially consumer-focused aspects of policy discourse in relation to consumer dietary practices and habits (e.g. Latvia, Italy, the UK, the Netherlands, Belgium, Spain, Senegal). This discourse recognises that the globalisation of food chains has made it difficult for consumers to understand the implications of their food choices, with a focus on how to promote informed consumer choice that may then lead to healthier or more environmentally sensitive decisions being made and diets followed. Similarly, with 'nutrition' where the emphasis of the debate is on trying to move towards diets that are more nutritionally-balanced in terms of helping to ensure better health and well-being. These issues are discussed within the public and policy spheres, informed by input from the scientific sphere. Food security also features in national reports as a well-established policy issue (e.g. the Netherlands (food security and resilience; accessibility); Denmark (food security; seasonality and freshness); Senegal (food security; availability within the context of affordability); Spain (food security; availability); Serbia (food security; accessibility); and Peru (food security in terms of availability/affordability), although more recently in some contexts it is taking on

a strong moral discourse about 'feeding the world' (e.g. the UK, the Netherlands). The focus of the performance discourse in the policy sphere then is primarily economic development, albeit with recognition that there are important social consequences as a result of that economic development.

6. Discussion and conclusion

A key argument running through this paper is that FSC performance assessment should start at the level of attributes via analysis of narrative contexts and communication discourses. In this case, it involved moving from analysis of individual national-level studies (each with its own matrix) to a comparative analysis of all 12 countries studied (with one combined comparative matrix – Figure 1). This approach to FSC performance assessment, which in essence starts at the level of food discourses across spheres, is informed by post-normal science (Funtowicz and Ravetz 1993) and designed to allow multiple realities and stakeholder perceptions to be acknowledged and accounted for. The identification and construction of attribute descriptions draws out the principal discourses, as well as highlighting where the interpretation of individual attributes is contested (Table 2). Analysis of attributes has been presented at two levels: geographic context and in relation to spheres. Examining the creation and communication of FSC performance discourses in this way enables a more inclusive understanding of what is meant by sustainable food and the 'politics of supply chain governance' that Friedberg (2014) and others illuminate and call for.

The comparative matrix and final set of 24 attributes documented in Figure 1 helps develop a more inclusive and multi-dimensional view of FSC performance, enabling the capture of a broader range of attributes beyond conventional

sustainability assessments (although it is not intended as an absolute or complete assessment of FSC performance). This is helpful for a number of reasons. First, this approach helps to overcome so-called ‘hypocognition’ (see Lakoff 2004), whereby FSC performance metrics are linked to one single issue (e.g. climate change, food security), in the process ignoring other equally important issues and performance challenges (labour relations, for instance). For example, firms will tend to be selective in terms of the information they disclose to the public when preparing sustainability reports, highlighting what they have done well. Policy makers, not least due to electoral cycles, will tend to address short-term issues rather than long-term ones. Scientists tend to address measurable items (e.g. economic efficiency measures), failing to fully address non-measurable ones, partly as a result of the demands of policy-makers to provide quantitative evidence-based data. This tendency is evident in Table 2, where although economic performance attributes are evident in all four spheres, some attributes of performance may only be discussed in one or two spheres. For example, ‘animal welfare’ is predominantly debated in the public sphere, ‘territoriality’ in the market sphere and ‘biodiversity’ in the scientific sphere. In other words, aspects of FSC performance are given a different emphasis, dependent on the sphere in which the discourse takes place. The notion of a ‘sphere’ is critical then in providing a means by which to delineate between communication practices and frames, in this case represented as four spheres (market, public, scientific and policy), each conceptualised as a significant communication space and arena of interaction. An appreciation of geographic context has also helped to understand how FSC performance is valued. Three country groupings were identified to show how food performance differs geographically: i. socio-economic and structural development; ii. territoriality and global competition; and iii. neoliberalism and

food system performance. Taking this approach enables the capture of a breadth of 'political situations', as advocated by Friedberg (2014), helping to build a more robust meaning of performance.

Second, the approach helps to show how attributes are constructed, how they interact across spheres and dimensions, how meanings are contested by different interests and ideologies, as well as helping to identify trade-offs and dilemmas. We see, for example, the way 'contribution to economic development' is discussed in the policy sphere and the scientific sphere, the way 'food security' is discussed in the public sphere and the policy sphere, and the way 'technological innovation' is discussed in the scientific sphere and the market sphere. The usefulness of the latter is exemplified in another paper written by the authors (Brunori et al. 2016), where the MCPM (see Figure 1) was used to compare the performance of local and global food chains, identifying that for some attributes global chains perform better than more localised chains, and for others they perform worse. Through developing this inclusive methodology, it is possible to develop more reflexive forms of governance that encourage those involved to continually revise their understanding of the sustainability of their actions (as advocated by Stirling 2006). Unreflexive governance in relation to performance sets targets against a list of parameters (emissions, pollution, animal welfare etc.), organising 'regimes of practice' (Spence and Rinaldi 2014) around them. However, regimes of practice do not provide feedback mechanisms that enable the revision of targets, meaning that unintended consequences of business operations that may adversely affect their performance and thereby sustainability are dealt with only once they become evident. Reflexive governance on the other hand entails a continuous, intentional and organised

reflection on objectives, means and pathways (Stirling 2006). In adopting a reflexive governance approach, firms are able to anticipate unintended (and unwanted) consequences of supply chain operations and adapt their regimes of practice accordingly, before they become unsustainable. Such assessments can also act as devices to open up the discussion of what is meant by FSC performance to a wider range of 'legitimate perspectives' (Funtowicz and Ravetz 1994) in both the food chain and wider food system, including under-represented dimensions (most notably ethics), and unheard actor voices (such as consumers) (see also Kirwan et al. under review). In the process, the 'visibility fields' (Spence and Rinaldi 2014) of FSC performance are opened up to greater scrutiny and to a greater range of actors. There is, in other words, the potential to democratise and more widely legitimise knowledge claims regarding FSC performance.

In conclusion, this paper has argued for the need to adopt a more inclusive and multi-dimensional view of FSC performance to enable effective sustainability assessment and appraisal. At one level, the issues raised in this paper have already been addressed in the food supply chain and sustainability literature. In this sense, the idea of 'labour relations' or 'food security' are not new, for example. The novelty of the methodology developed here, is that the discourses are being allowed to emerge from a wide range of perspectives and contexts. In the process, it is possible to identify certain typologies and interactions that may have been lost in top-down definitions of performance, and subsequently sustainability. The 24 attributes presented are not intended as an absolute or complete representation of what needs to be included in assessments of FSC performance. Instead they provide a worked example of how this methodology can be operationalised, demonstrating its ability to incorporate a wide range of legitimate

perspectives and values in relation to FSC performance. In keeping with new approaches to sustainability science, attributes are heuristic devices that capture complexity, multiple ways of knowing and a diversity of perspectives to enable more reflexive forms of FSC assessment. In other words, the approach presented in this paper has the potential to provide producers, policymakers and consumers with the cognitive tools to make better-informed decisions about the broader impacts of the different FSC they engage with.

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