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RÉSUMÉ – La transition vers des systèmes alimentaires plus durables implique un passage de la notion de système à celle d’assemblage d’entités autonomes parfois divergentes contribuant à des objectifs communs. Les processus d’assemblage peuvent concerner une entreprise, une fonction, une ville ou une région. Les modes de gouvernance doivent interpréter cette complexité et être capables d’adapter la représentation et l’action aux défis auxquels les assemblages alimentaires doivent faire face.

MOTS-CLÉS – Développement durable, gouvernance, systèmes alimentaires, institutions

BRUNORI (Gianluca), GALLI (Francesca), GRANDO (Stefano), « Sustainable agri-food systems: a reflection on assemblages and diversity »

ABSTRACT – The transition to more sustainable food systems entails moving from the notion of system to that of an assemblage of sometimes divergent, autonomous entities contributing to common objectives. Assemblage processes can involve a business, a position, a city or a region. Forms of governance must understand this complexity and be capable of adapting how they represent and act to the challenges that food assemblages must face.

KEYWORDS – Sustainable development, governance, food systems, institutions

SUSTAINABLE AGRI-FOOD SYSTEMS: A REFLECTION ON ASSEMBLAGES AND DIVERSITY

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THE DIVERSITY OF AGRI-FOOD MODELS AND THE CONCEPT OF SYSTEM

The goal of restructuring the food system to align it to sustainability principles has been climbing the policy agenda for several years now, and the first results have started to appear. Convergence of civil society pressures, regulatory efforts and consumers' demand have undeniably brought to changes in the mode of operation of conventional supply chains and in the strategies of their leading firms. As sustainability becomes a shared organizing principle for supply chain operations (Wilkinson, 2011; Freidberg, 2014), the process of globalization of the food system appears less unidirectional and one-dimensional than described in early works. Emphasis on sustainability also raises attention to alternative food practices and organizational models, studied as drivers of systemic change (Brunori et al., 2011) rather than mere niches of resistance (Winter, 2003; Kirwan, 2004). As a matter of fact, many of the practices initiated by Alternative Food Networks (AFN) have been successfully embodied into conventional chains, and the discourse

they have developed has largely contaminated more conventional chains, willing to meet the needs of a growing consumer segment (Sage, 2003; Kirwan, 2004). On the other hand, AFN have evolved and some of them have consolidated their place in the market, in many cases watering down part of their original innovativeness.

These developments have encouraged scholars and practitioners to study a variety of existing configurations, to analyse their performance and to explore the possible developments related to dynamic interaction between models.

Remaking the food system then suggests neither a revolutionary break nor a radical transformation but rather deliberate, sometimes unglamorous multipronged efforts in areas where openings exist to do things differently (Hinrichs, 2007).

In a recent paper, Fournier and Touzard (2014) discuss the potential complementarities between different food system configurations in view of food security goals. They take the five models identified by Colonna et al. (2013) into consideration: domestic, proximity, commodities, agro-industrial, differential quality (sub-divided into origin, naturalist and ethic models). In real life these models are not isolated: they can overlap and mutually influence each other. For example, the agro-industrial model can absorb elements of the differential quality models, as in the case of the shelves supermarkets dedicate to local or organic products. The coexistence of different models contributes to the achievement of food and nutrition security (FNS), as they respond to different food and nutrition needs. For instance, the agro-industrial model provides mass production at affordable prices, but at the same time it is said to encourage unhealthy diets, and to provide low income to producers. Conversely, differential quality models may lead to higher food prices and be vulnerable to local conditions, but at the same time promote healthy food and higher farmers' incomes.

If coexistence between models are envisaged fostering transition to sustainable food systems, a number of theoretical questions with policy relevance emerge. How the concept of food system can take into account the heterogeneity of models, their coexistence and their interactions? How do different operational logic challenge existing markets functioning? What policy implications can be drawn?

This paper addresses these questions by using an approach that makes sense of heterogeneity and hybridity of socio-spatial configurations in a dynamic perspective. The paper will proceed as follows: in the next section the coexistence of various models of food production, distribution and consumption will be described, with attention to their different, sometimes complementary, performances. Section 2 discusses the theoretical basis for the analysis of such complementarities, focussing on the importance of the geographical dimension in the evaluation of different configurations. In this complex characterization, the representation of a food system depends on actors' views and perspectives. This leads to consider food systems as contingent and sometimes overlapping "assemblages" of different actors, which can be built around individual actors/chains, around activities/functions, or at urban or regional level, as explained in sections 3 and 4. Orienting these complex assemblages towards sustainability requires reflexive governance and tailored policy actions, whose role is investigated in section 5, which precedes concluding remarks.

1. DIVERSITY OF CONFIGURATIONS AND DISTRIBUTED PERFORMANCE

The emergence of sustainability as a consensus frame (Friedmann, 2005; Brunori et al., 2013; Wilkinson, 2015) in the debate over food represents an important step in the direction of the restructuring of the food system. In other papers we have developed an approach that identifies AFN as drivers of sustainability transition (Brunori et al., 2011). Drawing on transition theories, we argued that innovative niches provide diversity that the regime can embody to adapt to change and avoid crises. In this paper we focus on the patterns of coexistence and coevolution between different models and on the ways to study the food system in view of this heterogeneity.

The basic principle of the paper of Fournier and Touzard (2014) -different models have different potentialities that can be combined to strengthen a food system in relation to food security- has been confirmed in a European project on sustainability of local and global

supply chains (GLAMUR¹), where we have considered sustainability as a quality related to five² dimensions, articulated into “inherent features” or sustainability attributes, as shown in Table 1 (Brunori et al., 2016; Brunori and Galli, 2016). Each attribute in the matrix covers a broad set of impacts, often place and product-specific. For example, “labour relations” imply considering salaries, labour quality, security, duration of contracts, presence of written contracts, etc. This set of attributes represents a conceptual and practical tool that can be used by actors of local and global chains to reflect on their performance from a multidimensional perspective and in a systematic way.

Economic	Social	Environmental	Health	Ethical
1. Affordability	7. Food security	12. Resource use	17. Nutrition	20. Animal welfare
2. Creation & distribution of added value	8. Consumer behaviour	13. Pollution	18. Food safety	21. Responsibility
3. Economic development	9. Territoriality	14. Biodiversity	19. Traceability	22. Fair trade
4. Efficiency	10. Connection	15. Technological innovation		23. Information & communication
5. Profitability	11. Labour relations	16. Food waste		24. Governance
6. Resilience				

FIG. 1 – Sustainability dimensions and attributes, as defined in the GLAMUR project. Source: Author’s elaboration.

- 1 This research was funded under the GLAMUR project (Global and Local food chain Assessment: a Multidimensional performance-based approach—<http://www.glamur.eu/>) as part of the EU 7th Framework Programme (Grant Agreement No.: 311778).
- 2 A starting point for our research is the awareness that the three conventional dimensions of sustainability (social, economic and environmental) do not fully cover the range of impacts of food. Human health, for example, may come under the topic of social sustainability, but in this way its relevance is obscured and often overlooked. A large body of literature has recently emphasized the systemic impact of food chain configurations on health and the link between diets and sustainability. The same can be said with regard to ethics: on the one hand, these cover most of the sustainability attributes but, on the other hand, need specific heuristics when assessing the intention of chain actors to address sustainability.

The performance assessment compared and contrasted with the economic, social, ethical, health and environmental impacts of 39 food supply chains belonging to different sectors (i. e. tomatoes, apples, berries, wheat-to-bread, wine, pork and cheese). The supply chains, selected across 12 countries, differed based on the degree of localness/globalness.

The assessment has allowed identifying points of strength and points of weaknesses in all models.

An extreme synthesis of our assessment exercise is reported in fig. 1, which provides an overall representation of the performance of local and global supply chains as measured in the country reports of the project. It summarizes where “local” and “global” chains perform better in the case studies, for each attribute selected³.

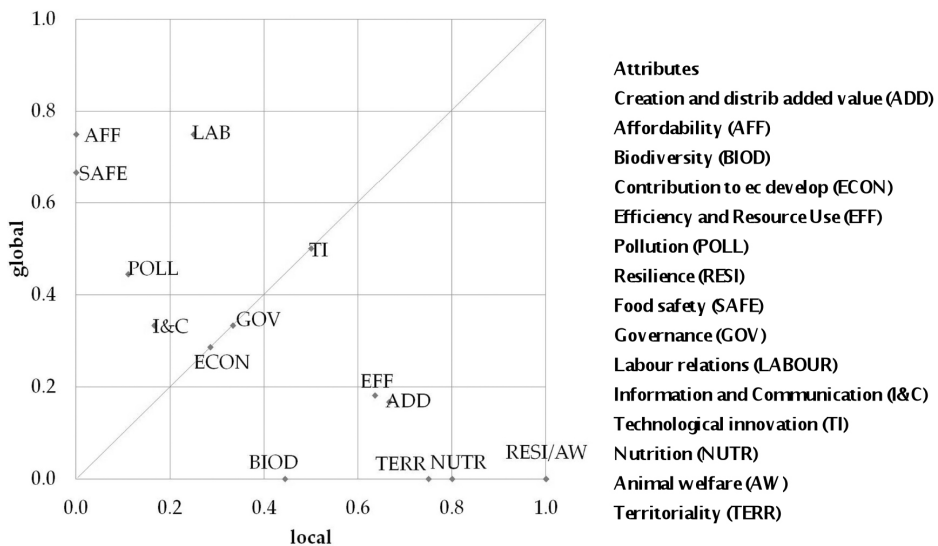


FIG. 2 – Performance of local and global chains on attributes selected for cross-country case study assessment. Source: Author’s elaboration.

3 The coordinates of each attribute indicate how many times the local chain prevails over the global chain (and vice versa), relative to the number of comparisons in which that attribute has been considered. On the bisecting line, local chains and global chains prevail an equal number of times for the given attribute.

The figure shows that it is extremely hard to establish a clear superiority of any model (in this case local and global food chain configurations) especially when embarking on widespread comparisons. In fact, results are strongly dependent on the context, on the actual behaviour of supply chain actors, on the assessment methodologies, and on the perception of external observers.

This apparently trivial -but very politically relevant- statement implies that strong attention should be dedicated to the analysis of the links between the characteristics of the supply chains and their performance (Brunori et al., 2016).

2. THEORETICAL BASIS OF COMPLEMENTARITY BETWEEN MODELS

If different models can cooperate in order to fulfil sustainability goals, it is necessary to overcome an approach that analyses each model in isolation, and to adopt an approach that focuses on relations between models. This implies a critical review of the approaches so far adopted in studying food systems. In recent years, the awareness of the need of turning to a system approach to food policies -and therefore in research on these matters- has grown sensibly, and has been adopted by international organizations. One of the latest contributions is the report of UNEP, that defines a food system as:

The interdependent sets of enterprises, institutions, activities and relationships that collectively develop and deliver material inputs to the farming sector, produce primary commodities, and subsequently handle, process, transport, market and distribute food and other agrobased products to consumers. (UNEP, 2016).

Despite this growing awareness, there is a still lack of clarity on how to manage conceptually the diversity of socio-technical configurations that can emerge around food. For example, the UNEP report (2016), following Reardon and Timmer (2012), distinguishes between ‘traditional food systems’ and ‘modern food systems’ but, recognizing a great variety of patterns, introduces a third typology, ‘intermediate system’.

The report also warns that ‘modern and traditional types of food systems can occur in a town, country or region alongside one other’, and that “food systems do not operate in isolation from other key systems, such as energy, water and health” (UNEP, 2016).

This analytical puzzle is mainly related to the unclear distinction between different levels of analysis. ‘Modern’ and ‘traditional’ are purely theoretical concepts that aim at identifying the main organizing principles of food-related activities. When considering the geographical articulation of food-related activities, the characterisation of a food system needs different conceptual tools. For example, the UNEP report recommends a distinction between ‘food production systems’ and ‘food consumption systems’, pointing out that they may not coincide in space.

These issues show their relevance when the purpose of characterizing a food system is linked to performance assessment. For example, we could analyse the sustainability of the “food production system” starting from the food produced within a region and following the chain downstream until the consumption phase, or upstream until the production of imported inputs, wherever these activities take place. Alternatively, we can focus the analysis on the sustainability of regional food consumption system, which brings us to consider the impacts of consumption on the areas where imported food is produced.

In the GLAMUR project one of the most challenging aspects was to identify the object of assessment and to give clear rules for classification. Another problem was related to the scale of observation. Given that production and consumption can be scattered in space, how to identify the geographical boundaries of the system to be assessed? Let’s make the following example:

Rural regions awash in a sea of commodity agriculture but without groceries or markets selling fresh or nutritious food suggests the sad ironies of our current agricultural “abundance” (Hinrichs, 2007).

The agricultural production system of the example is destined to distant consumption. If analysed at a scale that comprises its consumption, the system to which the agricultural production of this area is linked might be considered fully sustainable, if meeting given sustainability parameters related to production. But when we look at the needs of the population of the region where agricultural

production is located, we could consider the same agricultural system as unsustainable for its inability to fulfill the needs of local consumption. Similar examples can be found when considering the impact of the introduction of common hygiene rules to abattoirs in the EU in the late '90s, that provoked the closure of hundreds of small abattoirs in rural areas. These examples show that sustainability assessment methods that do not consider the spatial impact of commodity chains may bring to misleading results.

One conclusion we can draw from this discussion is that the characterisation of food systems depends largely on the purpose of characterisation, which in most of the cases has operational implications. Actors can influence how the system is shaped, and appraisal is functional to intervene strategically to change it. Corporate view and interests, having a global scope of operations, are unavoidably different from communities' views and interests. Different assessment criteria may bring to different characterisations of the system, and to different intervention tools.

In accordance to this view, we want to develop a 'actor-centred' vision of agro-food systems. Given the necessary level of arbitrariness of the definition of systems and of their boundaries, the capacity to fulfill the autonomous goals of an actor or a group of actors (a corporate, a community, a specific social group) is likely to be linked to a shared and realistic representation of the system and of its connections with the broader external environment.

3. FOOD SYSTEMS AS ASSEMBLAGES

From a theoretical perspective, the acknowledgement that systems are representations of reality enacted by interdependent actors open the space for understanding actors' role in the evolution of systems. To get further in this reinterpretation of the concept of system, we have to understand how socio-technical entities operating with different logics and having diverging goals can interact and contribute -in given spaces and times- for common purposes. In this regard, in the conceptualisation

of a system we propose to move from the metaphor of the 'organism', a whole where its parts contribute harmonically to general goals, to the metaphor of the 'assemblage'.

According to DeLanda (2006), the organism metaphor implies relations of 'internality' among parts, wherein relations are defined on the basis of internal properties of system components. What we observe in territorialised food systems, on the contrary, are relations of 'exteriority', which imply that relations are outcomes of an history and are contingent: evolution of system occurs by processes of attachment and detachment between parts.

The metaphor DeLanda uses as an alternative to the organism metaphor is the 'assemblage', a combination of a heterogeneous set of elements that retain their autonomy while entering into relation with other components. The 'assemblage' metaphor allows to investigate collaboration, conflict, distribution of power, and focuses on the intrinsic instability of resulting configurations. According to DeLanda, processes of 'territorialisation' –that is, progressive intensification of links between components– and 'de-territorialisation' are based on material as well as immaterial flows. Discursive components –conveying shared meanings and shared norms– are decisive in linking together different components independent from each other.

The assemblage approach also shows that linked components retain their autonomy, as attachment to one assemblage normally does not imply total involvement in it. As a consequence, the assemblage approach provides space to analyse actors making part of more than one assemblage.

The implication of such an approach is that the performance of food systems depends on the specific configuration that the assemblage takes. Moreover, the configuration of the assemblage affects actors' characteristics and the assemblages to which they attach themselves. This implies that there is a constant evolution of material, cognitive and ethical basis of action. For an agricultural producer, starting to supplying for a customer who is willing to develop an 'organic quality' product means engaging not only into flows of production with given standards, but also engaging into new discursive games. The assemblage approach gives an important role to actors, as their success depends on the capacity to enrol others into successful assemblages finalized to their own goals, or to attach themselves to successful assemblages.

An assemblage approach also takes cognitive and normative factors as keys to the evolution of agri-food systems. Cognitive factors shape the perception of the world, and normative factors tell people what is right and what is wrong. When cognitive and normative factors are combined together into coherent ‘conventions’, they generate different modes of ordering among people and things. For example, ‘domestic’ models of supply chain –based on ‘domestic’ conventions– respond to the goal of fulfilling the needs of the household or of the community by establishing a more direct link between producers and consumers; civic conventions respond to goals related to the respect of certain civic values (green productions, fair trade, etc.); ‘agro-industrial’ models respond to the goal of maximizing the profit of the chain leader and lead to growth and geographical expansion.

Conventions can be defined as broad sets of practices, agreements, formal and informal institutions which connect actors through mutual expectations (Salais and Storper, 1992). They can also be seen as modes in which knowledge is organised, legitimised and shared among actors, as different conventions rely upon (and promote) different set of qualities, opinions, beliefs, norms attached to food and food chains. They are instruments of coordination of the supply chain, as they set the necessary knowledge base and the range of allowed behaviour of actors. As long as the importance of conventions is recognized by system actors as tools to gain the leadership in the system, those actors tend to gain competitive advantage by developing new conventions and, consequently, new socio-technical assemblages. Strategies may differ for different actors: big players develop new conventions to build new alliances and to strengthen loyalty of customers and suppliers, whereas small players develop new conventions to gain autonomy from stronger assemblages and possibly establish new assemblages. Moreover, different industries (and specific actors within those industries) can develop specific conventions, as Ponte (2009) shows in the case of the wine sector.

New conventions may also emerge as assemblages of existing conventions. Initiatives like Eataly (www.Eataly.net) and Wholefood (www.wholefoodsmarket.com) combine domestic (priority given to products with a strong local identity), civic (emphasis on health and environment) and agro-industrial conventions (related to the organization of the retail system). Assembling different conventions means assembling material

and immaterial elements (actors, networks, values, beliefs) and enrolling them as bases for action to pursue specific goals. Through assemblages of convention players can gain legitimacy within different environments and constituencies.

If the two examples mentioned represent the shift towards an agro-industrial organisation of “differential quality” food supply chains, an opposite process can be recognised in those conventional supermarkets that are expanding their local or organic lines. We see here a tendency towards a convergence of different models towards hybrid configurations. In the meantime, and in part as a reaction to these trends often perceived as a cooptation of ideas and values by corporate firms to retain their competitive advantage (Jafee and Howard, 2010), new initiatives try to develop new conventions, reaffirming their alternatives to the dominant ones. This is for example the case for the initiatives referable to the post-organic movement (Moore, 2006).

4. BUILDING SUSTAINABLE FOOD SYSTEMS: THE NEED FOR A MULTILEVEL APPROACH

The concept of sustainability implies not only intergenerational equity but also equity across communities and regions. It also implies awareness of systemic effects of local choices. As there may be a trade-off between short term and long term, welfare in a region and welfare in another region, stability in a region and stability of the system, the equilibrium between these entities should be considered as a process of understanding and recognition of problems at different levels.

We depart from the concept of ‘territorialised food systems’, defined as a “set of agri-food sectors located in a regional geographic space and coordinated by territorial governance” (Rastoin, 2015). In this definition, the system is a political construction, which assigns roles and functions to involved actors, and provides the cognitive basis for its regulation. These sets of agri-food sectors can be conceptualised as assemblages that, as in the food assistance case, gather different actors who can also engage in other assemblages. The analysis of food system sustainability

can be made at different levels of aggregation, which refer to different assemblages. We can here make four examples of relevant ‘territorialized food systems’, ordered by a growing degree of complexity: firm-based systems, function-centred systems, urban food systems and regional food systems.

A first level is the individual firms building their supply chain. Eataly and Whole Food are examples of re-assembling processes led by a firm capable of mobilising material (producers, consumers, local authorities, public spaces) and immaterial (values, beliefs, engagement) elements and to combine them in new configurations. These are also examples of conventions re-assembling, as mentioned in the previous section. Sustainability assessment at this level should consider not only processes directly managed by the firm but also all the activities coordinated into the firm’s assemblage. In this way, the firm is to be considered as responsible also for the impacts generated by actors who are formally independent but are under the firm’s control.

A second level of analysis concerns the functions of the system. For example, the ecological function is analysed by considering relevant interaction with the biosphere; the economic function takes into consideration the relevant connections with the economic system, etc. Assemblages develop around these functions, forming hybrid configurations.

The European project TRANSMANGO⁴ has adopted this approach to food assistance in its case study in Tuscany. Food assistance is a highly hybridized system (Galli et al., 2016), as it assembles components of the food system, civil society organizations, voluntary workers, public social services and consumers. The degree of government involvement, funding, regulatory controls, voluntary sector participation and reliance on surplus and donations from food chain actors, however, is highly variable and context specific. Under the pressure of the current crisis, the studied assistance organizations have started a process of reflection on their role in the system, looking at how to achieve synergies between components of the system (i. e. food, policy, civil society). This process has implied a phase of ‘appraisal’ of the system prior to the identification of a strategy. We have interpreted this ongoing process as an attempt

4 This research was funded under the project entitled TRANSMANGO Assessment of the impact of global drivers of change on Europe’s food security; Grant agreement no: 613532; Theme KBBE.2013.2.5-01.

to 'territorialize' entities governed by different logics and to align these entities around food assistance goals. This process has entailed recognition of the need to implement emerging discourses on food assistance (such as waste reduction, right to food, attention to nutritional aspects) and of the barriers of this implementation.

A third level of analysis regards towns. Urban areas concentrate people, and especially consumers, in space. Welfare in towns depends to a large extent on how flows of material and immaterial resources are managed, and food is a key component of these flows. The resource base of these flows does not have necessarily a local origin, as towns extend their reach well beyond the surrounding production area. However, governance of urban food systems may have a substantial impact on surrounding rural areas, for example in processes of relocalization. Lack of systems thinking has for a long time prevented a clear understanding of the potential for improving welfare by coordinating policy tools related to food, such as public procurement, regulation of food commerce, spatial planning, education, research, health and social care. Implicit adherence to market conventions (according to which market forces play to maximize people's welfare) has given private actors the leadership in the regulation of most food system activities, while public authorities have intervened on food-related issues only through sectoral measures.

The fourth territorial level, regions, comprise both town and countryside, and the representation of regional food systems includes both production and consumption, as well as imported and exported food. Sustainability assessment in this case is more complex, as it needs to conciliate different and sometimes conflicting sustainability dimensions. Pursuing sustainability of regional food systems implies an assessment of the contribution that each component can give to regional income, social stability, environmental quality. Governance of regional food systems should be aimed at creating synergies between different models around given sustainability goals. A certain level of relocalization of food production and consumption, for example, could increase the resilience of the regional food systems and provide a diversification of consumers' choice. In the same region, export-led production systems may contribute to employment, incomes and innovation. Policy tools available at regional level are abundant, but

the lack of systemic vision brings to sectorial approaches that fail to address the potential synergies. Rural development plans, for example, can mobilise a lot of resources and a variety of tools, but they are mainly focused on supply and on production systems rather than on demand and consumption systems.

All these territorialized food systems cannot be seen in isolation from their external environment: their components are subsystems, identifiable within the given territory, of extended (potentially global) food systems. This consideration leads to take into account extra-territorial actors' influence on the governance of the territorialized food system, and the socio-economic and ecological effects that a territorialized food system can have beyond the region's borders. The challenge of building sustainable food systems is hence to conciliate needs and priorities of a diversity of actors and places.

Agri-food policies need to act on both cognitive and normative factors that pave the way to systemic intervention. An adequate representation of territorialized food systems, a shared analysis of their activities and of their vulnerabilities, as well as the identification of drivers of change, can give concreteness to the otherwise abstract concept of sustainability and give action guidelines to citizens, consumers, private enterprises.

5. BUILDING SUSTAINABLE FOOD SYSTEMS: THE ROLE OF GOVERNANCE

Orienting food systems towards sustainability goals requires appropriate governance designs. Whatever the level of assemblage, the issue of combining actors with different agendas and objectives, often engaging in different assemblages simultaneously and not necessarily bounded to any of them, is a complex one. Even more complex is to adapt the governance of the system to changes occurring in the environment or to unintended outcomes of the system activities.

An example of change is the case of subsidies to biofuels that has been corrected only after that evidence had shown its impact on food security and on land use change. Another example is the process of elimination of palm oil from most of the products of the Italian food industry in

recent years⁵. This process has unfolded from consumers' concerns in reaction to new information; CSOs mobilisation has amplified the concern; processors –in order to meet consumers' demand and to gain competitive advantage– have studied technologies to replace palm oil with other vegetable fats; big retailers –through their strong purchasing power- have made this process generalized. This has led to a change in the existing configurations of some of the parts of the food system where palm oil was used: alternatives to palm oil had to be identified and used, creating new connections in substitution of the old ones.

Assemblages, unlike organisms, are intrinsically unstable. To keep them together and finalize their interaction with given goals, appropriate governance arrangements are necessary. According to Smith and Stirling (2007), governance consists of two groups of activities: appraisal and commitment. Appraisal regards the rules for developing an appropriate representation of the system and of its likely evolution in relation to external factors. Appraisal regulates the 'fields of visibility' and the "episteme" (Spence and Rinaldi, 2014) that represent respectively the aspects of the system to be taken into consideration as relevant to action with the methods used to measure and visualize them, and the forms of knowledge and discourses the agents rely upon and use to support action. Commitment regards the rules and the techniques that regulate decision-making, compliance and control (for example meetings, monitoring systems, sanctions, identity building). In the previous examples all actors exposed to new information related to sustainability of biofuels and palm oil, have updated their cognitive and normative frames (appraisal) and changed behaviour accordingly (commitment).

A good governance design for sustainability should be able to adapt the representation of the system and its governance to the perceived changes. This approach to governance is called 'reflexive', as it implies a system that is able to detect and analyse threats and change accordingly (Voss et al., 2006). One of the principles of reflexive governance is to be able to improve the appraisal process. According to a growing number of scholars, this appraisal process cannot be linked to scientific knowledge alone. A better quality of appraisal comes from recognizing that different points of view may give insights on aspects that science has not explored yet and that may be worth exploring.

5 <http://www.wired.it/economia/business/2016/09/22/senza-olio-palma/>

‘Opening up’ appraisal and commitment to a variety of actors helps decision makers to embody knowledge and concerns outside scientific evidence, provides a shared cognitive basis and legitimacy for easier coordination and rapid response to external shocks.

A reflexive approach to the examples made above would have accelerated the process of change or even avoided many mistakes. For example, listening to civil society organizations would have cast light on the relation between subsidies to non-food items and food prices. An earlier sustainability assessment of the use of palm oil would have mitigated the huge environmental damage that it has provoked.

Recent literature shows a variety of examples of models of governance that ‘open up’ appraisal and commitment. In these examples, ‘internal governance’ (based on relationships between suppliers and customers) is replaced by ‘extended governance’ (Sacconi, 2006) whereby actors external to the supply chain as public administrations and NGOs have a stake: contract farming in developing regions, sustainable commodity round tables for the definition of sustainability standards, co-produced sustainability brands. It is this wider approach to governance, and governance design, that seems to be more adequate to guide the action of socio-technical entities towards the building of sustainable food systems.

FINAL REMARKS

In this paper we have elaborated on the principle according to which diversity can contribute to sustainability, as it can make the system more capable of addressing different needs and to adapt to a changing context. The transition towards more sustainable food systems needs taking into account coexistence and interaction dynamics between different models of organization of food-related activities, as the understanding of these processes is the basis for steering the system towards sustainability.

Such complexity requires a shift from a vision of systems as “organisms”, wherein all parts cooperate harmonically, to systems as “assemblages”, wherein autonomous socio-technical entities with different, and sometimes diverging, goals can interact and contribute to common

purposes. In the assemblage view, the boundaries between the system and its environment are continually reshaped by system components. A view of systems as assemblages opens the way to an update of methods of analysis of the food system, as it focuses upon actors as protagonists of assemblage processes and on their capacity to modify their operating environment. This view also implies an innovative approach to integrated food policies, as it entails a multidimensional and multilevel approach.

We have identified four levels at which assemblage processes can occur: around a firm, a function, a town, or a region. These levels communicate with each other, but are not necessarily ordered hierarchically, as the spatial boundaries of each level may extend beyond a given geographical space. Good governance design -including the arrangements made to open up governance processes to stakeholders- should interpret this complexity, being capable of adapting representation and action to changing contexts, and endeavouring to conciliate conflicting goals and trade-offs between levels.

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