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towards sustainability: the case of  
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Filippo Randelli and Benedetto Rocchi

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Via delle Pandette 9, 50127 Firenze, Italia  
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# **Analysing the role of consumers within Technological Innovation Systems towards sustainability: the case of Alternative Food Networks.**

**Filippo Randelli and Benedetto Rocchi<sup>1</sup>**

## **Abstract**

In recent years, an increasing number of studies have stressed the relevance of the consumer experience in the research of new trajectories towards sustainability. On the early stage of an innovation process the purchase continue to be strategic for the market creation although consumers should not be conceived only as selector of different commercial options.

This paper argues for a broader application of Technological Innovation System (TIS) conceptual framework and proposes an analytical approach that explicitly considers consumers and producers as interacting and then coevolving actors. In this view the transition towards sustainability is not exclusively a production based innovation process and also the interactive relation between consumers and producers may foster the transition towards a new socio-technical regime. The conceptual framework will be introduced and exemplified with the case of Alternative Food Networks, a TIS in the food industry, based on a meta-analysis of the literature.

JEL codes: D12, O31, Q55.

Keywords: Technological Innovation Systems, Consumers, Alternative Food Networks, Agriculture.

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<sup>1</sup> Filippo Randelli, Dep. of Economics and Management – University of Florence, [filippo.randelli@unifi.it](mailto:filippo.randelli@unifi.it). Benedetto Rocchi, Dep. of Economics and Management – University of Florence, [benedetto.rocchi@unifi.it](mailto:benedetto.rocchi@unifi.it).

## **1. Introduction**

Environmental transition studies gained attention in the last twenty years and their aim is twofold: to disclose the mechanisms hindering or fostering the transition towards sustainability, and to offer a response to the demands raised by policy makers, firms and civil society. The transition towards sustainability requires radical changes that are not immediately accepted by all economic actors and this is not uniquely related to the lack of green innovation or to the high price of environmental friendly products and technologies. It follows that market failure based environmental policies, which continue to be focused either on R&D support or market based economic incentives, are not always successful in supporting a transition (Jacobsson and Bergek, 2011). In order to shine a light on the (not linear) process of transition towards sustainability we need a dynamical and complex approach which is focused on mechanisms and processes.

In the last few years Technological Innovation System (TIS) conceptual framework has received increasing attention in the social sciences. TIS research argues that the transition towards sustainability arises from an innovation system build up process in which new and incumbent firms co-evolve with supportive actor networks, policy activities and institutional contexts (Bergek et al., 2008; Hekkert et al, 2007). It promises, therefore, "to inform policy makers of the problems that an intervention needs to solve in order to promote the growth of a particular system or to influence its direction" (Jacobsson and Bergek, 2011, p. 42). TIS conceptual framework may be applied to a technology specific (or product specific) perspective although "innovation does not necessarily have to be a technological innovation" (Markard and Truffer, 2008, p. 611). TIS studies usually focus on technology as the main driver of change and neglect the user-driven innovation and the pre-competitive market formation processes where also consumers, together with entrepreneurs and institutions may have an important role (Truffer and Coenen, 2012).

In recent years, an increasing number of studies have stressed the importance of the consumer experience in the research of new trajectories.

These bodies of literature focused on end-users innovation (Baldwin et al., 2006; von Hippel et al., 2011), on the so called "grassroots innovations" (Seyfang, 2009; Seyfang and Smith, 2007), on domestication (Du Gay et al., 1997; Van Dijck, 1998) or on the co-evolution of producers and consumers (Grabher et al., 2008; Jeannerat and Kebir, 2013). All these bodies of literatures recognise that on the early stage of an innovation process the purchase continue to be strategic for the market creation although consumers should not be conceived uniquely as passive selectors of different commercial.

This paper argues for a broader application of Technological Innovation System (TIS) conceptual framework and it proposes to extend the analytical approach to explicitly consider consumers and producers as interacting and then coevolving actors. In this view the transition towards sustainability is not exclusively a production based innovation process and also the interactive and iterative relation between consumers and producers may foster the transition in a specific socio-technical regime. The conceptual framework will be introduced and then exemplified through a case of TIS in the food industry, where several alternative food networks are emerging and acting as innovative systems in the transition towards a sustainable consumption and production of food.

The paper is structured as it follows: section 2 introduces the theoretical framework; section 3 implement the role of consumers in the TIS conceptual framework; section 4 introduces the Alternative Food Networks as an example of TIS, analysing their structural components; section 5 discusses the consumers' role within the functional patterns of alternative food networks TIS; section 6 presents some conclusions and insights for innovation policies.

## **2. Theoretical framework**

The TIS framework has emerged in the early nineties and it is rooted in the evolutionary economics literature (Freeman, 1987; Lundvall, 1992;

Nelson, 1993). A TIS can be defined as “a dynamic network of agents interacting in a specific production under a particular institutional infrastructure and involved in the generation, diffusion and utilisation of a specific technology or product” (Carlsson and Stankiewicz, 1991, p. 111). Recent TIS research has gained attention in the sustainability transition studies (for a review see Markard et al., 2012). An innovation system is then an analytical construct, which is to say a tool “we use to better illustrate and understand system dynamics and performance” (Bergek et al., 2008, p. 408). It follows that TIS doesn’t exist always and the network of actors applies for innovation during a certain point of time. The TIS begins in the formative phase and ends at some point in the growth phase (Markard and Truffer, 2008).

From the beginning the goal of TIS studies was the analysis of specific innovation system in order to identify key policy issues and to offer a framework to policy makers to set up policy goals. However, some scholars argue (Klein Woolthuis et al., 2005; Bergek et al., 2008) that is not possible to assess the strength or weakness of an innovation system through the analysis of its structure. In order to increase the ability of research to offer insights to policy makers, TIS research has moved further from a static structural analysis. Some scholars (Bergek et al., 2008; Hekkert et al., 2008) proposed to shift from a structural focus to a process focus and they identified six key process or functions that characterised the system build up. These functions have a direct and immediate impact in the formation and diffusion of an innovation. In this perspective TIS studies move further the traditional “market failure” approach that has influenced sustainability policies in the last twenty years and focus on “system failure” in terms of functional rather than structural weaknesses. For instance TIS approach is able to indicate to policy makers either some blocking mechanisms to remove or some functions to be strengthened in the transition towards sustainability.

The aim of this paper is to assign to consumers a role in the innovation system building process. TIS studies usually stressed the role of science and technology as the main drivers of change and neglect the role of consumers

in the innovation processes. It follows that TIS studies paid attention to the co-evolution of technologies and markets but “in many studies consumers (or users) are simply assumed to be out there” (Geels, 2004, p. 902). Consumers are conceived to have a passive role in the innovation process and their task in the TIS literature is confined to the choice among a range of products on the market. Today consumers can no longer be excluded from the analysis and their contribution on innovation process is recognised to be relevant by several bodies of literature.

The literature on end-users innovation give them a role in the process of creation (von Hippel, E., 1986; 1988; Morrison et al., 2000) and their innovations can also be transformed into commercial products. Baldwin et al. (2006) traced a model of user innovation: first one or more users recognize new needs and begin to innovate; second, due to free revealing communities they increase efficiency of collective innovation; third user-manufacturers emerge, using high-variable/low-capital cost production methods; finally, as user innovation slows, the market stabilizes enough for high-capital, low-variable cost manufacturing to enter.

Consumers may have an important role whether they act through community-based initiatives. The “grassroots innovations” (Seyfang, 2009; Seyfang and Smith, 2007) emerge within institutions such as cooperatives, voluntary associations, informal community groups, and other social enterprises. These consumers innovations are driven by two alternative prime forces - social and environmental needs, and ideology - and emphasize different social, ethical, and cultural rules and values. It follows that grassroots innovations emerge because the market lacks to meet some consumer needs. Incumbent production and consumption systems fail to serve some communities, either because groups are socially and economically disadvantaged, or because the choices on offer do not include a desired choice, such as fresh, local organic food in season, or autonomous housing, or community renewable energy (Seyfang and Smith, 2007).

In the literature on “domestication” (Du Gay et al., 1997; Van Dijck, 1998) consumption is more than simple buying and it is made also of a cultural appropriation process. Consumers have to integrate new

technologies and products in their routines through learning processes and adjustments. Domestication studies consider the active role of consumers and the adoption of a new product or technologies, especially radical innovations, requires adaptations and innovations in the consumers context (Geels, 2004).

Other authors argue about the co-evolution of a production and a consumption system within a market (Jeannerat and Kebir, 2013). The market is thus not taken for granted as an exogenous force but conceived as a social order of uncertainty that results by the interaction of all economic actors, consumers included (Beckert, 2009). To argue about co-development means first to transform the product from a fixed to a variable thing (Callon et al., 2002); second the market becomes a forum for an ongoing dialogue between producers and consumers communities (Thrift, 2006).

It seems that the main problem related with the neglected role of consumers in the process of innovation is that the categorization of producers and consumers is always separate, distinct, with predetermined roles. The challenge posed by the co-evolution between production and consumption then go beyond a more intense engagement with the latter (Grabher et al., 2008) and it requires the seamless integration of the two drivers of change in the same conceptual framework. In the next paragraph an integration of consumer dynamics in the TIS conceptual framework is proposed.

### **3. The role of consumers in the technological innovation systems**

In this paper we propose to include consumers as a structural components of a TIS together with firms, government agency, universities, entrepreneur organizations, organizations deciding on standards, etc., and therefore as a driver of the functions fulfilled by a TIS. In this approach we will refer to the scheme of analysis proposed by Bergek et al. (2006) and in particular we will analyse the consumers as an active actor in the seven key

processes fulfilled by a TIS (called functions by the authors), characterizing system build-up. It follows that our is a meta-analysis based on the literature and on our previous researches.

### *3.1 Knowledge development and diffusion*

This functions is normally conceived as the fuel of a TIS but in the literature on TIS dominate a production knowledge approach. Even though in the post fordism era the locus of innovation has expanded from internal resources to external networks such as research partner and institute, suppliers, competitors and, more recently the relevance of external knowledge pool culminated in the notion of "open innovation" (Chesbrough, 2003), the consumers continue to be excluded by the pool of knowledge producers. Rather than collect knowledge *about* the consumers the knowledge development function of a TIS should seek to acquire knowledge *of* the individuals customer to draw information on actual and future trajectories. The consumers embody essential knowledge that is needed for a successful innovation process to be completed (Grabher et al., 2008). Sometimes the consumer may be the pivot of an innovation process since the "sticky information" are embodied in its organizational routines (von Hippel, 2004). Furthermore, the circulation of knowledge is not uniquely vertical between producers and consumers but also horizontal between consumers.

The consumer society is more open then firms world as they freely exchange, face to face or through social networks, experience, recommendation and warnings, not only in an individual sense but also draw on experiences that have been gained by relatives, friends and neighbours (Truffer, 2003). For instance, Tripadvisor is a source of critical implementation of tourist services completely build up on the shared experiences of travellers (Wu et al., 2014). Also open source software products such as Linux (an operating system), Modzilla (a browser) and Apache (a web server) were developed uniquely on the knowledge of user communities (Henkel, 2006) which innovated and shared their innovations in an experimental version of the softwares (Baldwin et al., 2006). The

same mechanisms of open source communities have been applied to develop treatments for disease such as Parkinson, malaria and typhoid (Tapscott and Williams, 2006). Who didn't use as source of knowledge a web forum before to buy a new product or service? Why this knowledge should not be used to develop and diffuse a TIS?

### *3.2 Influence on the direction of search*

The development of a TIS requires a large range of activities that attract attention and then let enter in the process of innovation a growing number of firms and other organizations. This function have an influence on further investments in the field and also on the direction of search within the TIS. Bergek et al. (2008) recognise that this function can be measured by analysing "the articulation of interest by leading customers" (p. 415), although in the case it is not meant the final consumers and the authors refer uniquely to commercial or industrial firms.

Consumers may have an active role in this function and influence the direction of search and investment. Like firms, the key mechanism increasing the capacity of consumers to have an influence is networking. It follows that any scale of community is more efficient than acting in isolation (Seyfang and Smith, 2007). The benefits of a networked community of consumers hinge on the non-rival property of innovations and it is supported by a large use of information technologies and internet (Randelli, 2015).

Consumers association may act as a lobby in order to influence the direction on policies and investments. This is clearly happening through several consumers lobby groups that refer to as advocacy groups, consumers organisation or consumer protection group. These groups are formed either to enforce safer regulations on products (an example is the Environmental Working Group), to protect consumers rights worldwide (e.g Consumers International) or simply to push for new direction and standard in public policy (see for instance the European Consumers Organisation for a further cap on vehicles CO<sub>2</sub> emissions to 75g/Km by 2020 and the

numerous cycling lobbies committed in increasing and improving the use of bicycle in the cities).

### *3.3 Entrepreneurial experimentation*

A TIS evolves under considerable uncertainty. In order to reduce uncertainty a TIS needs many occasions for entrepreneurial experimentation. A "TIS without vibrant experimentation will stagnate" (Bergek et al., 2008, p. 416). The literature on socio technical system recognise that uncertainty is also about consumers preferences and behavioural patterns (Geels, 2004).

Consumers may act as skilled actors who are involved in the qualification of products (Callon and Muniesa, 2005). Evaluation and customizing offer feedback for the direction of product innovation through multiple channels (Grabher et al., 2008). A more direct involvement in the experimentation has been exerted by consumers through long standing user-producers interaction in many industries such as medical equipment (Shaw, 1985), semiconductor technology (Urban and von Hippel 1988), mechanical engineering (Herstatt and von Hippel 1992; Gruner and Homburg 2000), food (Brunori et al., 2012) or pharmaceuticals (DeMonaco, Ali, and von Hippel 2006). Last but not least, stand alone consumers or, more frequently networks of them, may also turn into producers themselves (see Baldwin et al., 2006 for a review of case studies) and then be the leading actor of entrepreneurial experimentations.

### *3.4 Market formation*

In the literature on system innovation the market (both global and local) has a leading role within innovation systems (Lundvall, 1992; Edquist, 2001). Bergek et al. (2008) recognise that "market are often global, but the home market is still strategically important to test new concept and products, to learn, and to obtain early revenues" (p. 416), but later they only propose to analyse "who the users are and what their purchasing processes look like" (p.416). Even tough TIS research explicitly declares "to reject the market failure approach as a basis of policy action" (Bergek et al.,

2008, p. 407), it seems that consumption is not more than simple buying and the role of consumers in the market is uniquely to select among a range of services and products opportunities. In this paper we do not reject the role of consumers in supporting emerging niche market (Hockerts and Wüstenhagen, 2010) which is the fuel of every emerging TIS, rather we argue for a wider concept of consumption. We propose to build up an innovation process also on the needs of consumers. It follows that consumers should participate to the selection of the tasks to be achieved with the innovation process and "contributes critical knowledge throughout the entire development process" (Grabher et al., 2010, p. 256). This clearly already happen in the development of software by the open source community (Henkel, 2006) or in the case of food supply (Brunori et al., 2012; Randelli, 2015) but it is not a feature yet of innovation policies. What is lacking within innovation policies is a dialogue between consumers and producers, some arenas where this relation may develop in a typical iterative process.

### *3.5 Legitimation*

The legitimation function deals with social acceptance of the innovation by relevant institutions. The new technology or product "need to be considered appropriate and desirable by relevant actors in order for resources to be mobilized, for demand to form and for actors in the new TIS to acquire political strength" (Bergek et al., 2008, p. 417). If consumers are conceived as "relevant actors" then they should be one of the target of legitimation actions.

This function can be strictly connected with the previous "market formation". If the market is conceived as a forum for an ongoing dialogue between producers and consumers (Thrift, 2000) then it is not just "out there" and it is needed to be brought down to the level of actual practices of negotiation between consumers and producers. We think that if negotiation comes before the competitive market then legitimation function may result to be strengthened.

For example, a study on the Swiss watchmaking companies reveals that the legitimation process came through participation in workshop, events and exhibitions or through visits to factories or museum (Jannerat, 2012). In the case that a TIS is not able to mobilise resources through these kind of initiatives, policies could be charged of facilitating the meeting between producers and consumers. During these meeting the focus should be on the legitimation of the innovation process through an intense and interactive process between producers and consumers, and the marketing will “stay out of the room”. Broadly speaking, the purchase will be eventually postponed in another moment and place.

### *3.6 Resource mobilization and development of positive externalities*

The resource mobilization functions include the activities dealing with the mobilization and allocation of basic inputs such as financial, material and human capital. In the analysis is needed to understand whether the TIS is able to deploy competence and human capital through education activities in specific fields as well as in entrepreneurship, management and finance. The same ability to mobilize resources is needed in financial capital and complementary assets such as complementary products, services, infrastructures, etc. The consumers may have a strategic role in terms of resource mobilization whether they are able to stimulate the public concern about a specific issue (Rivoli and Waddock, 2001).

The generation of external economies is a key process in the formation and growth of a TIS and it can be also considered as a cumulative effect of other processes . These positive externalities can be fostered by an active engagement of consumers in the process of innovation as they are able to build networks and exchange knowledge in a cumulative way.

## **4. Alternative food networks as technological innovation systems**

Alternative Food Networks have been broadly described as the "... newly emerging network of producers, consumers and actors that embody

alternatives to the more standardized industrial mode of food supply" (Renting et al, 2003: 394). The beginning of the "alternative" food movement can be placed in the last 1970s. The AFNs emerged as a reaction to two fundamental trends of the globalized food system (Renting et al, 2003). On one side, the growing concerns of consumers for food scares and the increasing attention of people for environmental issues related to food production. On the other side, the continuous pressure on farm incomes caused by the long-run decreasing trend in agricultural prices and to the so-called "technological treadmill" of industrial forms of agriculture, asking farms for increasing investments in new technologies to compress production costs.

The emergence of AFNs, rooted also on previous experiences of "alternative" trade, developed in the 1960s within political movements supporting countries marginalized in the global trade for political reasons and today inspiring the "fair trade" system (Renard, 2003).

From their very beginning, the various experiences of AFNs share an emphasis on environmental sustainability of food production, associated with the adoption of organic farming and with a process of re-localisation of food production (Feenstra, 1997). Another peculiar feature of AFNs, probably at the core of their being "alternative", is the claim to recreate a "sense of social connection, reciprocity and trust" among the actors of the food chain (Hinrichs, 2000: 296). Goodman defines AFNs "place-based and socially embedded alternative food practices" (Goodman, 2003: 1). The sociological concept of embeddedness has been often used (Hinrichs, 2000; Murdoch et al 2000; Sage, 2003) to describe "... the purposive action by which individuals or communities seek to create accessible structures that can allow them to regain some control within exchange process" (Kirwan, 2004: 397), characterizing the creation of new AFNs.

The main "innovation" induced by this social aim is the development of new (or the re-vitalization of traditional) forms of direct marketing of agricultural products. Two paradigmatic examples are the Farmers' Markets (collective points of selling directly managed by "local" producers) and the various forms of Community Supported Agriculture (groups of consumers or

communities supporting local producers in exchange of production shares): while the former try to create an "alternative" market, the latter aims at creating an alternative *to* market (Hinrichs, 2000).

The concept of AFN includes a wide spectrum of experiences. Marsden et al. (2000) classify them within the comprehensive notion of Short Food Supply Chain (SFSC) where the term "short" marks the association of food with an information enabling "...the consumer to confidently make connections and associations with the place/space of production, and potentially the values of people involved and production methods employed" (Marsden et al, 2000: 245). These features are shared by different forms ranging from "face-to-face" markets of food products (where is the personal relationship between the farmer and the consumer the vector of the relevant information, like in Farmers' Markets) to "spatially extended" forms, such as certifications of the geographical origin or of the organic methods of production. Santini et al (2013) correctly point out that the concept of *local food system* (LFS), often associated with AFNs, is a narrower concept, referring only to SFSCs "...in which foods are produced, processed and retailed within a defined geographical area" (Santini et al., 2013: 23). These authors distinguish also between traditional and neo-traditional forms of SFSC (and LFS). The former refer to farm based, rural experiences of direct selling "resulting from longstanding knowledge, culture and skills in a particular place (Santini et al., 2013: 109); the latter "... can be thought of as examples of local food movements which are often driven and supported primarily by urban residents" (Santini et al., 2013: 110).

The economic and environmental impact of AFNs is still debated (Santini et al 2013). Their widespread diffusion in developed countries as well as the long-term persistence of many of them, witnesses the presence of viable forms of business. However, the available evidence of the environmental and economic impacts is often qualitative and based on perceptions and experiences. The overall economic size of the alternative food movement is likely to be small, even if in some local context can be relevant and supportive of positive social impacts.

In our view the main features of AFNs as shortly outlined above, justify the adoption of the TIS framework in their study. The social innovation affecting market relations induces technological shifts on the supply side, towards environmental friendly and locally adapted production techniques (such as organic farming or the conservation and valorization of local cultivars and traditional animal breeds). In turn, this technological change generates new forms of entrepreneurship both in agriculture and in connected industries (food processing, rural tourism, education) and induces the diffusion of new consumption habits.

The Standing Committee on Agricultural Research of the European Union in a recent "reflection paper" argues the necessity to include the concept of innovation as a fundamental driver of agricultural research and knowledge diffusion. "The new emphasis on AKIS (i.e. Agricultural Knowledge and Innovation Systems) is introducing technical and social innovations into the model and is influenced by paradigm shifts ... towards network driven multi-actor innovations" (EU SCAR, 2012: 26). In this perspective AFNs are recognized as examples of social innovations within the food supply chain, involving consumers and stimulated by meso-level actors (municipalities, cities and regions). However, despite consumers are "... recognized as active players in innovation, especially with regard to green technologies and sustainable lifestyles" (*ibid.*, 31) they are considered as "end users" in a model still centered on the agri-food system. The latter should be driven towards a sustainable configuration by a socially appropriate innovation process. In the following section we argue that consumers are much more central in the dynamic of AFNs as technological innovation systems, playing a fundamental role in their functional patterns.

## **5. The role of consumers within the functional patterns of TIS: the case of AFNs.**

The field of rural studies provides a comprehensive and consistent view of the structural components of AFNs as a technological innovation systems:

grounding on literature is a simple task to outline a map of “actors, networks and institutions contributing to the overall function of developing, diffusing and utilizing” (Bergek et al, 2008: 408) these alternative food practices. Conversely, the analysis of functional patterns is rather episodic and non-systematic. In the following, we propose an analysis of functional patterns of AFNs with a peculiar focus on the role of consumers.

In his editorial comment to a special issue of the Journal of Rural Studies dedicated to AFNs, David Goodman calls for a research agenda acknowledging consumers “...as active, relational partners in the transformation of agro-food practices” (Goodman, 2003: 6). Indeed, the role of consumers is central in creating, shaping and affecting the evolutionary path of AFNs. Their nature of networks is strongly associated with an active role of consumers: “... SFSCs are not the result of some kind of external, elusive 'free market'. They result, rather, from the active construction of networks by various actors on the agro-food chain, such as farmers, food processors, wholesalers, retailers and *consumers*. (Renting et al., 2003: 398, our emphasis). It is not simply a matter of active networking to circumvent mainstream food supply chain in a competitive way. The *quality* of relations involved is structurally connected with the process of value creation. A common feature of SFSCs “... is the emphasis upon the type of relationship between the producer and the consumer in these supply chain and the role of this relationship in constructing value and meaning, rather than solely the type of product itself” (Mardsen et al., 2000: 425). A reconfiguration of the consumer-producer relationship is considered a necessary condition for the expansion and reproduction of AFNs (Goodman, 2003).

The presence of consumers as active partners in AFNs strongly affects the process of *knowledge development and diffusion*. Indeed, often consumers join AFNs following motivations and values going beyond economic and hedonic incentives. In the case of quality products with strong territorial identity (as food specialties with Protected Denomination of Origin, PDO) consumption has been interpreted as an attempt of purchasers to reconnect in an “authentic” way to a given place, with all his natural,

historical and social assets. Studies on "culture economy" recognize the role of the "extra-local" consumer in shaping the local identity through his "quest" for authenticity (Ray, 1998). In all kind of AFNs the knowledge on food becomes an asset shared by producers and consumers in a process of "knowledge co-specialization" (Forsman and Paananen, 2002). Producers transfer knowledge (on natural endowments of the origin area, production processes, culinary traditions) to enable consumers to enjoy the local-specificity of their products while the active involvement of consumers incentives producers to (re)define the local-specificity of their products and spread local knowledge outside the geographic borders of the territory. The transfer of knowledge may happen either face to face (in a farmer market, during deliveries and meetings in the informal network of consumers or in the direct sale of a farm) or through the label (in PDO products).

The *influence of consumers on the direction of search* for new and better forms of re-socialization and re-spatialization of food is well exemplified by the case of the neologism "locavore". On 2007, Oxford University Press voted it as "Word of the Year". According to the account of its inventor (Prentice, 2007), the word was created for the launch of a new local food initiative by a group of highly motivated consumers (challenging the population of the San Francisco Bay to eat only locally produced food for one month). The term quickly spread on the internet becoming a global reference to describe a specific consumer attitude and promoting the birth of new AFNs experiences.

The strong relational features of AFNs are probably a source of opportunities for *entrepreneurial experimentation*. Farmers' Markets are an example of neo-traditional SFSC (Santini et al., 2013) where farmers can experiment a new form of direct marketing allowing them to reduce the risks of an exclusive dependence from the mainstream retail channels and to intercept a different segment of demand (Kirwan, 2004). Even though the large majority of producers do not leave standard forms of trade, the participation to FMs challenges their businesses, asking for changes in logistic and in communication management. Furthermore, the success of these experiences, often promoted by urban consumers, opens the space to

new forms of marketing through modern retail as “locally produced foods” and on line marketing.

The consumers’ pressure operates also at the local level and is able to support *the creation of new markets*, as in the case of public procurement of school meals. For instance in Italy, the normative framework enables consumers to orient the choices for ingredients in the preparation of school meals. The presence of a food culture deeply rooted in local traditions led in recent years to a widespread orientation towards organic food, often locally produced, more than in other European countries (Morgan and Sonnino, 2006). Similar experiences are widespread now in the USA under the National School Lunch Program (farm-to-school; Hardesty, 2010). The public procurement of school meals not only represents a relevant market opportunity for farmers but also a valuable tool in promoting the process of knowledge co-creation through education, reinforcing the process of innovation.

Probably due to the ideological roots of the local/alternative food movement, AFNs represent a paradigmatic example of the role consumers can play in *legitimizing technological innovation systems*. Indeed, the public merit of small, local food networks, their eligibility for public support and normative protection have been often patronized by consumers’ associations. This is for example the case of Slow Food and its “Ark of Taste” manifesto (Jones et al, 2008), promoting a global initiative to protect small, traditional, local food productions as a cultural heritage. Furthermore, ssimilar to mainstream pressure groups, informal group of consumers “have started to raise awareness on environmental and social justice issues by promoting educational projects in schools, by organizing conferences, or by promoting environmentally friendly pilot projects at the local level” (Graziano and Forno, 2012, p.125).

Consumers play an active role also in terms of *resource mobilization* in favour of AFNs. The public concern on healthiness of food and sustainability of farming, captured by several EU-wide Eurobarometer surveys, is also at the base of relevant EU policies for Rural Development (supporting organic

farming and the conservation of traditional productions) and geographic labeling of food.

Implicit throughout the description proposed above of some features of the functional patterns operating in AFNs are *the positive externalities* created by the active involvement of consumers. They are related to social impacts in terms of "... community building, knowledge exchange, skills development and health and well-being" (Santini et al., 2013: 111). Not surprisingly, the notion of "regard" (Offer, 1997) has been often used to characterize market relations within AFNs, to mark their distance from standard trade relations. Beside economic gains from trade the participation to AFNs yields personal relationships "... cemented through such mutual responses as: reputation, friendship, sociability, respect, attention, and intimacy - or in Offer's terms, the exchange of 'regard'" (Kirwan, 2004).

Here probably can be found the main cause of the small scale of AFNs. Indeed, such social positive externalities are strongly dependent from an extension of the networks compatible with the development of market relations based on trust and personal commitments. The personal dimensions of producer-consumer relationship is probably the main asset of AFNs and the major constraint to their becoming a standard "technology", i.e. a standard "food practice". This is not surprising for an "alternative" innovation. Probably, the major success of AFNs as a TIS is the widespread diffusion throughout the global food system of a new perception of quality where differentiation, local specificity, environmental compatibility and social embeddedness are valuable characteristics of food (Sage, 2003).

## **6. Concluding remarks**

In the last years the traditional categorization of producers and consumers into two separate and predetermined roles is undergoing a deep reconfiguration. Many consumers refuse a passive role in the economic system and they base their decisions on the ethics of the behaviour itself (Vermeir and Verbeke, 2006). Beside that, the product has been

transformed from a fixed and frozen thing into a variable one (Callon et al., 2002), under a never ending and iterative process of experimenting, negotiation and modification. As a variable, products are not pushed down a linear commodity chain, but rather are the result of an iterative process of innovation (Grabher et al., 2008). These changes conflict with the well established Schumpeterian idea among economists and policymakers of product innovation (1934), as a linear process ruled by producers, with consumers simply selecting among different offers provided on the market.

In this article we have argued for a broader application of TIS conceptual framework and we have proposed an analytical approach that explicitly consider consumers and producers as coevolving actors. If the aim of TIS approach is "to inform policy makers of the problems that an intervention needs to solve in order to promote the growth of a particular system or to influence its direction" (Jacobsson and Bergek, 2011, p. 42), then overlooking the role of consumers risks to make the TIS approach less effective and incisive.

Both insights from the existing literature and the case of AFNs have demonstrated that consumers may have a role in every function fulfilled by a TIS. Their involvement can strengthen the process of innovation and create the conditions for a more rapid and robust system build-up process. Furthermore they can positively influence the social legitimacy of an innovation, mobilize local resources and affect the process of creation and dissemination of knowledge. The key mechanism fostering the consumers as drivers of innovation is networking and a free-revealing community. It follows that "any scale of community is more efficient than innovators acting in isolation" (Baldwin et al., 2006, p. 21). The benefits of a networked community of consumers hinge on the non-rival property of innovations and it is fostered by a vast use of information technologies and internet.

Our view has important policy implications. While entrepreneurs allowed to ignore consumers in their internal process of innovation, the same should not be for policy makers. Policy makers could facilitate both the networking among consumers and their interaction with firms. Policymakers have a

tendency to promote hard infrastructure or supporting firms with funding projects, but this paper would suggest that smart innovation policies should try to develop soft infrastructure (Benner, 2003), able to improve connectivity between consumers and firms. What is lacking in many TIS are arenas where skilled consumers and entrepreneurs can meet each others so to reinforce the TIS build-up process. In the case of AFNs the spaces of interaction are farmer markets, informal network of consumers, the direct sales in the farm and the web (online marketing). Furthermore, the circulation of knowledge is facilitated by the small scale of these networks. The challenge for policy makers is to upscale these mechanisms to medium and big enterprises environments, which tend to protect their knowledge so to inhibit any iterative process with consumers.

Our analysis has only touched upon the different type of activism that consumers may have in a TIS. As a matter of fact, we are aware of the limits of the AFNSs case study. Those limits basically concern the specificity of the innovation process within AFNs. First, in the food industry and particularly in AFNs there are less barriers between producers and consumers so the interaction is easier than in other TIS. Second, in the food industry the role of technology is less important than in other economic sectors and this probably facilitate the activism of consumers. Third, AFNs are a niche and they do not represent even the food industry. For these reason the case study can not be considered entirely representative of the way consumers influence the innovation process of a TIS. However, it is quite informative on the potential role of consumers and on the mechanisms fostering their engagement in the process of innovation.

Future research should concentrate more on the consequences of consumer networking for the transition towards sustainability. In the last few years, due to a vast use among individuals of new digital tools, the capacity of networking has dramatically increased. In this respect studies on innovation systems should consider consumers as a stakeholder and include them in the analysis of the innovation process. On the other hand firms should be aware that consumers are rather a resource of innovation than being competitors. This is a misunderstanding that inhibit the co-evolution

of consumers and firms and hinder the transition towards a sustainable future.

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