

## The role of network creation and actor engagement in the adoption and diffusion of sustainable innovations in food value chains

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### Abstract

The paper aims at understanding how innovations, that are promoted and facilitated by private actors, can be fostered by network creation and actor engagement in the agri-food value chains. More specifically, we investigated innovative governance mechanisms related to the introduction of new sustainable practices in food value chains and tried to evaluate the environmental, economic and social effects of these new practices. We use information derived from a case study based on an ongoing project in the North of Italy, where in 2013 a multinational corporation operating in the pasta and bakery sector has initiated an agreement with other three agri-food companies in order to facilitate sustainable sourcing from a group of farmers.

**Keywords:** networks, sustainability, stakeholder engagement, horizontal agreements.

### Introduction

The paper aims at understanding how innovations, that are promoted and facilitated by private actors, can be fostered by network creation and actor engagement in the agri-food value chains. More specifically, we investigated innovative governance mechanisms related to the introduction of new sustainable practices in food value chains and tried to evaluate the environmental, economic and social effects of these new practices. Indeed, the relevance and role of agribusiness in the debate on sustainability has increased and these types of corporate social responsibility (CSR) initiatives have become a central part of business activities in the food sector, especially for companies with high-value consumer brands (Dlott et al., 2006). The increasing activism of many companies of the food sector, such the implementation of the SAI Platform, is leading to a greater level of engagement in the supply chain that generally is able to generate innovation (Hartmann, 2011).

We conceptualise innovative governance mechanisms from a new institutional and organizational design point of view. Particularly we use the lenses of organization economics

and innovation management to analyse how emerging hybrid forms are used to manage complexity, uncertainty and the appropriability of shared assets and resources (Ménard and Valceschini, 2005; Chaddad and Rodriguez-Alcalá, 2010), when it comes to facilitate the adoption and diffusion of sustainable innovation along the food value chain. While sustainable innovation in the value chain context has been often investigated in buyer-seller relationships, in this paper we propose the analysis of a rather unique sustainable innovation which combines horizontal as well as vertical relationships. In other words the innovation dynamic involves multiple buyers (food processors) and sellers (farmers and their associations). We use information derived from a case study based on an ongoing project in the North of Italy. In 2013 a multinational corporation operating in the pasta and bakery sector (Barilla) has initiated an agreement with other three agri-food companies (Cereal Docks, CoproB and Casalasco) in order to facilitate sustainable sourcing from a group of farmers. Particularly Barilla was concerned to facilitate the adoption of a number of good agricultural practices, which were mandatory for farmers to source cereals and other agricultural products to the company. Among other practices Barilla was actively promoting agronomic rotation as key practice to promote soil fertility and increase (long-term) productivity. However rotation implied adoption of a multi-cropping farm system, which eventually resulted in multiple value chain relations for farmers, including the need to negotiate and coordinate with multiple buyers. Confronted with the increasing challenges farmers were experiencing, supply chain managers and CSR strategists at Barilla envisioned a new form of agreement to simultaneously address farmers' value chain coordination dilemmas. In 2014 a pilot has been implemented with a limited number of farmers in order to preliminary assess the viability of this approach. We used the experienced derived by this pilot to investigate factors affecting farmers participation in new contractual forms in the food value chains as well as evaluate the effect of participation in terms of learning, adoption of sustainable practices and community building.

### **The case study: horizontal agreements**

The case study is based on the introduction of a horizontal agreement between farmers through their associations (i.e. cooperatives), and a platform of food processors in order to introduce sustainable farming practices such as multi-annual crop rotation schemes. The primary aim of the agreement scheme is therefore to ensure outlets to all crops in rotation, therefore supporting farmers in developing multi-year sustainable crop rotation systems that will positively impact the soil quality and fertility, as well as the overall environmental and economic performance of involved farmers.

This type of innovation is now set up and experimented by the Barilla group in the North of Italy and involves three of their main suppliers of seed-oil, sugar and tomato, which are Cereal Docks, Co.Pro.B. and Casalasco.

Barilla, originally established in 1877 as a bread and pasta shop in Parma (Italy), ranks as one of today's top Italian food groups. Barilla leads in the global pasta business, the pasta sauces business in continental Europe, the bakery products business in Italy and the crispbread business in Scandinavia. Always oriented toward proper diet through exceptionally

flavoured and nutritionally balanced products intended for daily use, Barilla became popular worldwide due to its attention to the quality of its products, the result of significant investments in research, innovation and technology, as well as communication. Barilla owns 30 production sites (14 in Italy and 16 outside Italy), of which 9 are directly managed mills that provide most of the raw materials for the production of its pasta and bakery products.

Cereal Docks is a 100% Italian company, which operates within the national market since 1983 collecting, processing and transforming agricultural raw materials into goods valuable for the feed and the food industry. Cereal Docks is a link between the farmers and the agri-food industry. It is the main Italian industrial Group focused on the process of grains (wheat and corn) and oilseeds (soybean, rapeseed, sunflower) designed for human nutrition, feed industry, technical purposes as well as biofuel production. Cereal Docks is a partner of agricultural entrepreneurs, farms, coops and consortia in order to promote the food/feed and energy chain integration, with the aim of planning the supply of agricultural raw materials, rationalizing the logistics, regulating the supply-relationships with farmers by according them a premium which spur them to continue their job with an ever-bounded productive chain.

CO.PRO.B. is a sugar beet producers' cooperative founded in 1962 in Emilia Romagna and is currently the only sugar cooperative in Italy with a quota of 284,000 tons of sugar, accounting for 56% of the national share. CO.PRO.B. has as a benchmark of its mission the maintenance and affirmation of sugar production in Italy by processing beet conferred mainly by its members, in accordance with the principle of statutory prevalent mutuality. The Cooperative applies a multi-year plan of investments and activities aimed at safeguarding the entire supply chain with the objective of safeguarding a cultural and industrial heritage that goes beyond the economic dimension.

Casalasco Consorzio del Pomodoro was created in 1977 as cooperative of farmers associating the tomato producers to offer the market not only the fruit of their cultivation but the final product ready to use. The farmers, who are also associates of the company, are more than 300 localized in the Po valley among Cremona, Parma, Piacenza and Mantua provinces and they represent the centre and the added value of the cooperative. Today Casalasco can process about 350.000 tons of fresh tomatoes.

The four agri-business companies have common values in terms of sustainability and innovation, thus their operative approach along the supply chain is also similar. For instance, they all have long been engaged in activities to improve and support sustainability in the agri-food sector. More specifically, all the parties use similar approaches and systems for the management and enhancement of agricultural production, both for the purposes of production efficiency as well as quality and traceability. The value chains are certified in accordance with the strictest Italian and European standards. Indeed, complying with voluntary protocols such as the Global Gap – extended to farming members - or joining networks such as the SAI Platform, testifies the attention to the environment and to sustainable productions of the firms involved in the agreement.

Furthermore, there is a common interest in harmonizing the activities related to the sustainability of agricultural processes and processing as well as attention to the common aspects of local identity of the “made in Italy”.

The common features of the four companies that are at the base for the potential success of the horizontal agreement are reported in table 1. The farms involved in the pilot project, that

accepted spontaneously to participate and are limited, have been chosen as match as possible within the productive area covered by the four companies (figure 1).

*Table 1. Common features of the companies involved in the horizontal agreement in Italy.*

| Company engaged in the network | Commodity involved in the agreement | Productive area (hectares) | Quality Standards                                            |
|--------------------------------|-------------------------------------|----------------------------|--------------------------------------------------------------|
| Barilla                        | Durum wheat                         | 200,000                    | FSSC22000<br>ISO 14001<br>EPD<br>OHSAS 18001<br>ISO 50001    |
| Cereal Docks                   | Soybean,<br>sunflower               | 80,000<br>30,000           | ISO 9001<br>Food SGS<br><i>2BSvs</i>                         |
| Co.Pro.B.                      | Sugarbeet                           | 33,000                     | ISO 9001<br>ISO 22005<br>ISO 14001<br>IFS<br>EPD             |
| Casalasco                      | Tomato                              | 4,500                      | Global Gap Emas<br>ISO 9001<br>ISO 22005<br>ISO 14001<br>IFS |

*Source: own elaboration*

*Figure 1. Location of the productive area*



*Source: own elaboration*

Given all these common features and goals, a horizontal agreement having the purpose to support farmers in the development of a long-term sustainable farming system and application of favourable crop rotations have been realised. The agreement consists in the commitment to promote the development of joint activities within the supply chains of the

crops that can be part of a rationale agronomic rotation scheme, which in this case is represented by the alternation of durum wheat, sugar beet, tomato, soybean and sunflower, guaranteeing to farmers an outlet to all crops in rotation.

Beside the evident direct benefit of soil quality improvement and of the more efficiency in input management (mainly fertilizers and pesticides), the advantages deriving from this type of agreement are multiple and can be analysed both in terms of individual and collective benefits. Therefore, they have been deeply investigated through a qualitative analysis based on in-depth interviews and focus groups.

## Method and Results

In order to better understand the relationships within the network and to evaluate the environmental, economic and social effects deriving from these new forms of agreement focus groups have been carried out. Focus group sessions permitted to gain qualitative data and information to be used to integrate the explanation of the existing quantitative data. Furthermore, this method, as highlighted in many studies on innovation diffusion along the supply chain, was also intended to improve social cohesion among the stakeholders involved into the process. Indeed, conducting less formal meetings *"can enhance multi-stakeholder learning experiences in and around supply chains, enabling solving coordination and managerial problems resulting from different stakeholder interests in chains and networks"* (Wubben et al., 2013: 103-104).

Focus group meetings were conducted by a moderator following a trace with the hints to be discussed and were organised in three steps: introduction of both researchers and participants; presentation of the aims of the meeting; discussion led by the moderator on the basis of the trace.

The discussion basically consisted in listing and highlighting the strategic priorities that reflect the productive specializations and organizational structures of the four firms involved within the project. Once having this general overview, the conversation focused on which are the drivers and the expected benefits for joining the horizontal agreement.

It clearly came out that the four companies have similar objectives and expectations that can be summarized as follow: stabilization of the value chain, long-term productivity, improving competitiveness, corporate social responsibility and sharing of knowledge and awareness.

More specifically, through agreements with other growers or processors, which are part of the companies' strategies related to improving competitiveness in general, a greater stabilization of the value chain is pursued. Indeed, one of the declared strategic objectives chased by the implementation of horizontal agreements is the reduction of production costs, the increase in efficiency, the improvement of the yields, a better price positioning in the industry and eventually to be in compliance with the common agricultural policy (CAP).

Beside these direct economic aspects, a high stress is also given to the practice of corporate social responsibility objectives like the preservation and the development of some marginal farming activities that can be supported with long-term production contracts, as well as by the introduction of innovative and sustainable agricultural practices.

Furthermore, all four companies operates within an integrated control system of the supply chain (including mapping and production contracts) and ensure the adoption of production rules already applied and supported by the certification bodies.

Finally the Barilla group shared the positive results obtained with the Barilla Sustainable Farming (BSF) project, which is basically based on favourable rotations of durum wheat with other suitable crops and the use of specific Decision Support Systems. The results show that the correct application of knowledge and agricultural practices not only improves crop value and the quality of products, thus allowing an increase in the income generated by crops, but also reduces the environmental impacts (up to 35% less greenhouse gas emissions) due to, mainly, an increased efficiency of fertilization (USDA, 2013).

In this context, the advantages of the introduction of a broader and agronomically rational rotation, facilitated by the horizontal agreements, could lead to three main benefits: (i) increased efficiency of the production through a reduction of production costs (estimated between 20 and 30% with a four year rotation as, for instance, grain-oilseed-beet-tomato); (ii) improving the long-term productivity; (iii) strengthening of the characteristics that build “credence” within processed products and improving competitiveness in the business to consumer segment.

The information collected during the focus groups were then analysed and interpreted according to the Massey model that tries to merge the methodological approach ordinarily used in “evaluation efforts” (Kruger and Casey, 2000) with thematic analysis, which is the usual approach concerning common themes emerging from participants’ interaction (Massey, 2011). These themes may reveal individual attitudes, opinions, beliefs, norms and social values (Kamberelis and Dimitriadis, 2008).

From the consultations it emerges how the common response among the different stakeholders is that of a general approval about the benefits that should derive from the horizontal agreements. The participants were also able to list and to give a priority to the individual advantages they perceive by taking part to the horizontal agreements. These specific benefits have then been clustered according to the three pillars of sustainability and are reported in table 2.

*Table 2. Perceived benefits of horizontal agreements*

| Benefits                                                                                                                                                                                              |                                                                                                                                                                                                       |                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Economic                                                                                                                                                                                              | Environmental                                                                                                                                                                                         | Social                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"> <li>• To reduce production costs</li> <li>• To improve management and organization</li> <li>• Longer term planned production</li> <li>• Better logistic</li> </ul> | <ul style="list-style-type: none"> <li>• To preservation and improve soil fertility</li> <li>• To reduce soil erosion</li> <li>• To limit hydrogeological risk</li> <li>• To reduce inputs</li> </ul> | <ul style="list-style-type: none"> <li>• To guarantee continuity in farming activity</li> <li>• Confidence among operators of the value chain</li> <li>• Better environment and ecosystem services</li> <li>• CAP respect</li> </ul> |

*Source: own elaboration.*



Beside the several advantages that are perceived by the representatives of the companies involved in the pilot project, also few critical points have been mentioned as potential bottlenecks for the future implementation and enlargement of these type of agreement. The first difficulty, mentioned by all focus group participants, it would probably be the embracing of the agreement by a larger group of farmers. Indeed, the farmers involved in the pilot project are the ones with a high inclination to innovation; thus, trying to enlarge the number of farmers joining the agreement, it could bring to some resistance especially if the benefits are not promoted with a perceptible and concrete approach.

Furthermore, another critical task, it could be the shift from an agreement that lists general purposes and the main commitments to a proper contract, where all legal terms must be well delineated. Indeed, a crucial term could be the length of the contract. At the moment, the ordinary practice for the four companies is to sign a one-year cultivation contract, while it would be reasonable and precautionary to extend it to the length of the rotation scheme (hence, 4 years).

The information gained through the analysis of this first tentative of horizontal agreement can be considered as the base for a deeper analysis aiming at quantifying the real benefits and at outlining a sort of guidelines for the implementation of horizontal contracts.

## Conclusions

The objective of the paper was to analyse how private network creation and players engagement in the agri-food value chains can lead to innovations, which often can be considered and communicated as CSR initiatives. More specifically, we investigated the dynamic capabilities within a sustainable innovation context related to the introduction of new sustainable practices in food value chains.

The drive for the introduction and the diffusion of new forms of cooperation, for instance the horizontal agreements, arises from the increasing need to give meaning and perspective to the concepts of quality, competitiveness and sustainability. To face large-scale challenges as climate change, environmental degradation and ecosystem destruction, is fundamental to have companies, which not only operate in a sustainable manner but that also participate in improving the perception of the community towards the value of agriculture in preserving the territory.

Even if a quantitative analysis was premature, the qualitative evaluation of the ongoing project on horizontal agreements has shown positive outcomes in terms of environmental, economic and social impacts, which determine, beside the single advantages for the companies involved, a benefit to the whole territory and community. Horizontal agreements introduce further commitments and uncertainties related to joint activities and resources affecting several value chains at the same time. Since they work as a multi-stakeholder and multi-annual based arrangement, farmers also need to engage in long-term relationships and learning processes with other actors of the value chain as well as other farmers and rural actors. This is calling for developing horizontal collaborations with reliable players in all value

chains, in order to coordinate and align activities, as well as set similar objectives and trajectories towards environmental, economic and social sustainability.

Since it is believed that a proper distribution of the economic value within the supply chain is one of the founding pillars of the link between agriculture, land and industry, these types of approaches should be encouraged and supported through the establishment of public-private-partnerships as well as by local development policies.

## References

- Chaddad F., Rodriguez-Alcalá M. E. (2010). Inter-organizational relationships in agri-food systems: A transaction cost economics approach. *Agri-food chain relationships*, 45-60.
- Dlott J., Gunders D., Arnold A. (2006). Sustainability Trends in the Agrifood Sector. *Sure Harvest Briefing Paper*. Soquel, UK: Sure Harvest.
- Hartmann M. (2011). Corporate social responsibility in the food sector. *European Review of Agricultural Economics*, 38(3), 297-324.
- Kamberelis G., Dimitriadis G. (2008). Focus groups: strategic articulation of pedagogy, politics and inquiry. In: Denzin, N.K. and Y.S. Lincoln (eds.) *Collecting and interpreting qualitative materials*. 3rd ed. Sage publications, Thousand Oaks, CA, USA, pp 375-402.
- Krueger R., Casey M. (2000). Focus groups: a practical guide for applied research (3rd ed.). Sage publications, Thousand Oaks CA, USA.
- Massey O.T. (2011). A proposed model for the analysis and interpretation of focus groups in evaluation research. *Evaluation and Program Planning*, 34: 21-28.
- Ménard, C., Valceschini E. (2005). New institutions for governing the agri-food industry. *European Review of Agricultural Economics*, 32(3), 421-440.
- Wubben E.F.M., Bremmers H.J., Ingenbleek P.T.M., Wals A.E.J. (2013). Governance of differential stakeholder interests in supply chain and networks. *Journal on Chain and Network Science*, 13(2): 99-105.
- USDA Foreign Agricultural Service (2013). Italy and Sustainable Agriculture Overview. GAIN Report-IT1306.