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INTERNATIONAL
JOURNAL ON
FOOD SYSTEM
DYNAMICS

Proceedings in

System Dynamics and Innovation in Food Networks 2017

Exploring a New Form of Horizontal Coordination to Improve Economic Sustainability of the Soft Wheat Chain in the Northwest of Italy

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ABSTRACT

The Italian legal framework for the agricultural sector has recently introduced a new form of contract, the “network contract”. The aim of this study is to verify if the use of this new contract would be appropriate to facilitate the adoption and diffusion of sustainable innovation of an Italian agri-food chain and to strengthen the agricultural role with dealing food processing companies. We focus on Piedmont, an Italian region where a soft wheat supply chain is in continuing evolution but is still very fragmented; indeed the two Producers Organization and one Consortium specialized in grain storage and trade only work around 30% of the grain produced annually. Following the framework of transaction cost we carried out a survey using semi-structured interviews as a qualitative analysis tool to gather the opinions of the primary operators in the Piedmont soft wheat supply chain. Initial results suggest that there is still an unsatisfactory horizontal coordination in the supply chain and that the network contract still seems to be little known and appreciated. However operators of the production stage of the chain consider the goals of improving the quality of the wheat and the economic and environmental sustainability very important but they think it would be difficult to achieve them simultaneously.

Keywords: *wheat; network contract; supply chain; economic sustainability.*

JEL classification: L14, Q2

Acknowledgements: *the publication derives from the research project on "Filiera avanzate per la produzione di frumenti speciali per l'industria alimentare, Advanced special wheat chains for the food processing industry-Special wheat", which was funded by the CRC (Fondazione Cassa di Risparmio di Cuneo), Cuneo, Italy.*

1. Introduction

The Italian legal framework for the agricultural sector has introduced in 2009 a new form of contract, the “network contract”, which is a flexible and dynamic tool for collaboration and cooperation between firms where

each participant retains its legal and operational independence without the need to register a new legal subject and a fiscal position. The aim of this study is to verify whether the use of this new contract would be appropriate to facilitate the adoption and diffusion of sustainable innovation in an Italian agri-food chain and to empower the agricultural role in dealing with the food processing companies.

To our aim the chosen area, is Piedmont, an Italian region where a soft wheat supply chain is in continuing evolution and is of great importance to the national economy. Piedmont is third among the regions in Italy, based on the level of production of soft wheat and the level of cultivated land. There are about 17,000 soft wheat-producing farms (ISTAT, 2010) and there are also two Producers Organization and one Consortium specialized in grain storage and trade, working with about 30% of the grain produced annually. Nonetheless, the supply chain is still somewhat fragmented and the operators feel a strong need to increase their economic sustainability and the competitive advantages that could bring (Mancuso, 2012, 2013).

To test whether the use of *network contracts* would be appropriate to facilitate the adoption and diffusion of sustainable innovation in the Piedmont soft wheat supply chain, our research includes the use of semi-structured interviews as a qualitative analysis tool, to gather the opinions of the primary operators and of some experts (academic experts on grains, Professional Agricultural Organization Representative, Regional Department of Agriculture Representative, Technical Assistance Representative).

Working to satisfy consumer needs has more or fewer limitations when it refers to imported raw materials, while it is possible, or at least easier, using local products as long as one is working with reliable partners who pay attention to the needs of the market. This means that as well as price and marketing strategies, there must be greater cooperation between the supplier and the customer and also an increase in transparency. The advantages of a supply chain working for the consumer, meaning both consumer as final purchaser as well as consumer as a company, are greater security for all those who operate in the sector, thanks to the reduction of the unknown market variables and of the certainty of selling and purchasing agricultural raw goods. Specialized crops (as opposed to the concept of commodity) aim at increasing the value of the entire supply chain, subdivided between the various participants, in an outlook of a global value chain.

2. Theoretical background

Within the economic literature considerable effort has been undertaken to gain a deeper understanding of business relationships to create new forms of better governance models and for management improvement. Different forms of contracts and factors influencing the coordination among firms aiming to achieve sustainable relationships have been analyzed (e.g. Morgan and Hunt, 1994, Fischer, Hartmann et al. 2010a, Chaddad, 2012, Poulton and Line 2009, Barrett et al. 2012). With the aim of improving the economic organization of the agri-business industry, some analyses were developed by Grandori (2015) regarding the concept of change in order to obtain more efficiency and fairness. In this study for the agri-food sector, Grandori suggests an evolution in direction to more associational and horizontal arrangements, not only in the supply chain but also among companies within the same stage. In this way the governance shifts from market and hierarchy to hybrid intermediate models, to reach reduction of transaction costs and more efficient agreements.

A large amount of literature investigates vertical and horizontal integration in the agricultural and food supply chains, highlighting the advantages and disadvantages for operators, e.g. Cook M. L. and Iliopoulos C. (2000) on investment problems for agricultural cooperatives; a recent work checked the positive effects of vertical integration in the Italian durum wheat supply chain, for pasta production (Carillo, Caracciolo and Cembalo, 2016). The studies focused on another field, the contract attributes, to test the interest and motivation of operators whether to participate or not (Abebe et al. 2013, Cembalo, Pascucci et al. 2014).

From an economic point of view *network contracts* could be studied under the conceptual framework of transaction cost (Williamson, 1981) expanding the concept of a transaction to include transfers among actors at a single segment of a value chain (Chaddad, 2012). Specifically, in agriculture this “horizontal dimension” could be seen as the process of alignment and control between farmers. The literature reports that adhesion to alternative

forms of horizontal coordination implies different efficacy and efficiency in the value chain (Chaddad 2010 and 2012).

Recently specific attention has been focused on exploring the governance models and the role of inter-enterprise relationships in European agro-food chains (Fischer C., Hartmann M. 2010b).

Very interesting concepts to analyze the regional wheat supply chain are contained in Fischer, Hartmann et al. (2010b). In this study, business relationship sustainability and the choice of a type of contract among primary producers, processors and retailers in the European pork, beef and grains chains was analyzed. The Authors have tested a set (nine) of hypotheses to explore the factors that can influence the competitiveness of the supply chains. Regarding the choice of contracts - implicit: spot market, relational contracts; explicit: written contracts, cross-shareholding – four hypotheses were tested. The relationship sustainability (RS) was explored highlighting five hypotheses.

In our paper we try to use these frameworks as a key to interpret the results obtained from the survey.

3. Network contracts and their use in Italy in the agri-food sector from 2009 to today

The network contract is a flexible and dynamic tool for collaboration and cooperation between firms where each participant retains its legal and operational independence without the need to register a new legal subject and a fiscal position. The Italian legislature introduced the new law on network contracts among companies in all sectors in 2009 (L. 33, 09/04/2009) and in 2014 established specific rules regarding the agricultural sector. The network contract is a tool added to traditional models of farm associations such as cooperatives, consortia, producer organizations, and temporary associations. This new tool permits the companies or farms to work together, maintaining their independence and specializations, to share and achieve common goals (Ricciardi, 2013, Servadei, 2013). The network is not a new company or a new subject. The companies involved in a network contract can exchange data and knowledge, work and services. The companies taking part in a common project (network program) want to increase innovation and competitiveness on the market. The more interesting aspect about a network contract, in comparison to the several forms of companies (such as cooperative or limited company, or consortium or other), is that all types of exchanges between companies can be enacted without creating a specific legal company. In Italy, 2,880 network contracts and 14,462 companies participating in a network in all economic sectors have been registered, on the basis of InfoCamere data at the end of June 2016, as shown in table 1.

Table 1 - The Italian companies involved in Network Contracts (all sectors) and in Agro-food sectors by Region (03/06/2016)

Regions:	All sectors		Agriculture, Food, Forestry		
	N. of companies	%	N. of farms	%	farms/tot
Abruzzo	746	5.2%	42	3.1%	5.6%
Basilicata	181	1.3%	18	1.3%	9.9%
Calabria	363	2.5%	44	3.2	12.1%
Campania	825	5.7%	73	5.3%	8.8%
Emilia Romagna	1451	10.0%	71	5.2%	4.9%
Friuli V.G.	575	4.0%	154	11.3%	26.8%
Lazio	1245	8.6%	125	9.2%	10.0%
Liguria	458	3.2%	36	2.6%	7.9%
Lombardy	2563	17.7%	116	8.5%	4.5%
Marches	464	3.2%	18	1.3%	3.9%
Molise	41	0.3%	3	0.2%	7.3%

Piedmont	705	4.9%	72	5.3%	10.2%
Puglia	912	6.3%	-	-	-
Sardinia	392	2.7%	129	9.5%	32.9%
Sicily	292	2.0%	23	1.7%	7.9%
Tuscany	1420	9.8%	290	21.2%	20.4%
Trentino A.A.	260	1.8%	15	1.1%	5.8%
Umbria	305	2.1%	19	1.4%	6.2%
Aosta Valley	18	0.1%	-	-	-
Veneto	1246	8.6%	117	8.6%	9.4%
Italy	14462	100.0%	1365	100.0%	9.4%

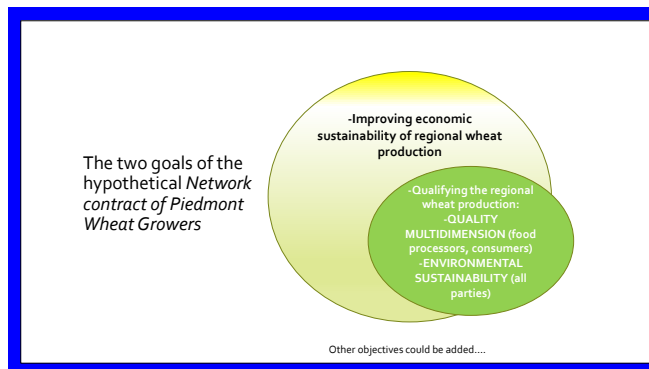
Source: our data elaboration on <http://contrattidirete.registroimprese.it/reti/>

The same database permits the extraction of the farms involved in a network contract, equal to 1,365 (table 1), a very small number, but it is a limited period of time since the enforcement of the specific rules for agriculture (2014). In the Piedmont region the network contract involves 705 companies from all sectors (5.3% of the total), of which 72 are farms (10.2% of the total farms); the number of network contracts implemented in the agri-food sector is equal to 17 (wine, rice, barley, beer, etc.).

Nonetheless, the first important observation is that this contractual tool is little used and we can assume little known by operators. In Italy the Departments of Agriculture of the Regions in writing the Rural Development Plan considered the network contract as one of the different tools included in Measure 16 (M16-Cooperation). The Italian Ministry of Agriculture has included the network contract as a useful tool in the agri-food supply chain¹. The national and regional policies could finance cooperation among partners in the supply chains, also using the network contract.

In this study, we have considered the network contract for a specific chain, a regional wheat chain, to explore whether it would be possible to achieve two goals especially regarding the primary phase. First, more general, to improve economic sustainability in the phase of production of wheat; second, more specific, to find a way to differentiate the regional wheat production both for technological features and for food processing uses and also for specific attention to environmental issues always at the agricultural phase of the regional supply chain, as shown in Fig. 1.

Fig. 1-Goals of a network contract in a specific supply chain



The proposed work shifts the attention of all those involved in the supply chain of soft wheat to raising the level of environmental sustainability as the cross-cutting element that could hold the chain together and identifies it and

¹ See the Decree of Ministry of Agriculture, Prot. N. 1192, 08/01/2016.

above all enhances it. Thus, the contribution of this research is useful for the growers who receive interesting feedback and proposals for a possible path to follow to face the future.

4. Soft wheat for food company processing uses in the NW of Italy

4.1 Advanced soft wheat supply chain with regard to new end-use

The common wheat production of Italy represents only about 1% of world production and 7% of European Union production. The national production of wheat covers only approximately 40% of milling industry needs and the larger amount of wheat grains is imported (ISMEA, 2010). Thus, the production of Italian wheat represents only a small fraction of the global market and it is characterized by a lack of competitiveness, due to homogeneity of lots and organizational structure in comparison to countries such as France and Germany, and for the structure of costs in comparison to countries such as those in Eastern Europe and North or South America. Moreover, the Italian wheat production is characterized by a high yield fragmentation, which in the past did not allow an organized supply chain approach to develop adequately.

However, currently the price volatility and the increasing demands for high quality wheat from the milling sector and the food industry have led to a search for increasing characterization of raw materials according to qualitative traits. The new approach to quality in wheat, and more generally in grains, is closely linked to the concept of end-use value: the conformity of the raw material to a specific processing, in accordance with the technological, nutritive and hygiene parameters that allow a more effective and functional use in the production process.

These new technological requirements are not always achievable with the importation of large lots from international markets, but rather by exploiting the characteristics and flexibility of local production. Thus, the Italian wheat supply chains are then progressively segmenting from a commodity approach to a specialty one. A specialty in cereal could be defined as production ensured by a supply chain contract that clearly specifies the technological requirements based on the end-use but also outlines the procedures to achieve them, with guidance on the choice of variety, crop techniques, in particular fertilization and pest control, and harvesting and storage procedures. Since the specialties are scarcely compatible with large production volumes, as they require specific agronomical practices and separate storage, their production could not be easily achieved by international producers.

The main features that have favored this process are:

- the pre-requisite to comply with higher hygiene requirements, in particular for the issue of mycotoxins (DON, T2-HT2), but also for pesticide residues and heavy metal contamination;
- the need for a greater homogeneity and a highly standardized quality level, only obtainable with the selection and storage of lots based on one or a few varieties with similar technological characteristics and characterized by the adoption of similar field programs;
- the compliance with higher environmental certification standards, such as that of integrated farming;
- the search for specific technological requirements in the raw material, for which it is necessary to use particular cultivars with distinctive traits.

Thus, in the last decade the following new wheat supply chains have developed in conjunction with the common bread-making one:

- wheat for baby food, in which the attention is mainly related to the prevention of hygiene risk for the occurrence of contaminants;
- wheat for biscuits or snacks, which require low grain protein content and flour strength;

- special improver wheat, with high and specific grain protein content for specific use in the gluten industry or in the production of dedicated bakery products;
- wheat with special starch characteristics, such as waxy or high amylose wheat, that could improve the uniformity, the texture and the shelf life of new bakery products;
- wheat with high nutritional properties that could lead the production of functional food through the high content of bioactive compounds (dietary fibre, total antioxidant activity) or the use of bran. The development of this supply chain is considering the use of both old and historical varieties or new ones, characterized by a high content of some bioactive compounds (anthocyanins, carotenoids) recognizable by the color of the grain or flour.

For these advanced wheat supply chains, it is actually necessary to differentiate and design the field program able to optimize the productive and qualitative results in accordance with the chain requirements.

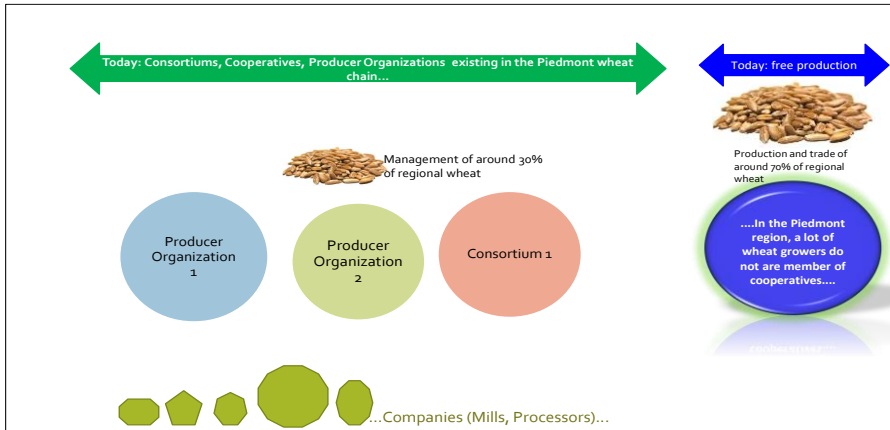
4.2 The soft wheat chain in NW Italy

To our aim the chosen area is Piedmont, an Italian region where a soft wheat supply chain is in continuing evolution and is important to the regional economy. Grain production in Italy in 2013 was equivalent to 3.5 million t in a cultivated area of over 600,000 hectares (ISTAT, 2013). Piedmont is third among the regions in Italy, based on the level of production of soft wheat (approximately 0.46 million t, which is 13% of the national total) and the level of cultivated land. There are about 17,000 soft wheat-producing farms active in Piedmont (ISTAT data, Agricultural Census of 2010) and there are also two Producer Organizations and one Consortium specialized in grain storage and trade, working on around the approximately 30% of grain produced annually (Report unpublished 2011, and personal communication 2016).

Piedmont is highly deficient in soft wheat, of which over 65% is imported, without even considering the direct importation of different types of flours. There are 59 mills in Piedmont and based on data collected recently for a research project (Mancuso, 2012), the producers of finished foodstuffs are represented by 2,729 artisanal bakeries, 17 industrial bakeries and 97 confectioners who, together, represent the final step in a very dynamic supply chain.

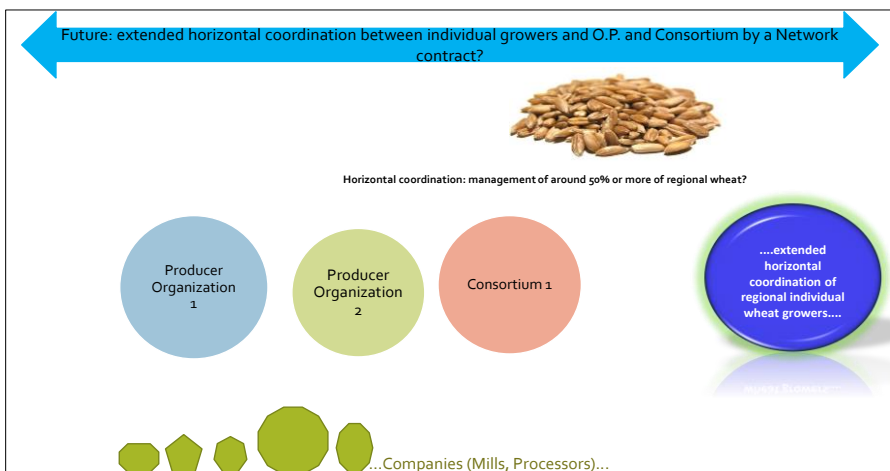
Even though there is a well-structured framework and complex background of wheat growers who try to respond to an ever more exacting market demand, the supply chain is still somewhat fragmented. At the same time growers feel a strong need to increase the economic sustainability of the supply chain (Mancuso, 2013). The environmental sustainability it seems considered less important, underestimating the competitive advantages that it could bring. Figure 2 shows the structure of the upstream side of the Piedmont wheat chain at present time (2A): few big operators in the storage and trade phase assembling growers (PO, consortium) and an higher number of individual growers: the quantity of wheat managed and the quality of wheat could be increased.

Fig. 2 – A: the basic structure of the production phase of the wheat chain at regional level today (Piedmont region, NW-Italy)



In Fig. 2B is represented what could be the influence and actions of a Network contract if it will be implemented. The hoped-for impact could interest first the managed quantity by Producers Organization and secondly the attention of growers should focus their attention on differentiation of wheat (advanced wheat production including also organic wheat) requested by processors. The third step of this hypothetical construction is where the growers should launch environmental impact improvement of the production process to more easily meet the demand of consumers. The whole process could lead to the inclusion of additional growers and could encourage the processors to buy a greater quantity of regional wheat, even though it is more expensive. Finally, this contractual tool could lead to an extended vertical integration, where the value creation of the supply chain would be better distributed among the participants.

Fig. 2 – B: possible influences and actions on the wheat chain in the future by implementation of a Network contract (Piedmont region, NW-Italy)



The environmental sustainability of the supply chain is currently the task that is challenging the wheat growers. The ideas cited above could finally be the push needed to think about creating a specialized zone which would be easily identified as a “green zone”. This type of specialized area could be created so long as there is a willingness to create a single, regional coordination of all the growers in the regional supply chain.

5. Method

To test if the use of *network contracts* would be appropriate to facilitate the adoption and diffusion of sustainable innovation in the soft wheat supply chain our research includes the use of semi-structured interviews as a qualitative analysis tool (Cohen and Crabtree, 2006, Massey, 2011), to gather the opinions of the primary operators in the already existing supply chain. These are people who are known thanks to having worked with researchers on recent projects and who are relatively open to discussion and an exchange of opinions (Mancuso 2012, 2013). The survey, which is still partially open at the time of writing, asks questions to two regional Producers Organizations, to the most important Agricultural Consortiums of grain collectors, to the Professional Farmers Organizations and their policy management and extension services teams, and to some experts (Technicians and Academics) of the grain sector. The survey includes seven questions about the network contract and two of which were suggested by the study of Fischer, Hartmann et al. (2010b).

The four main points of the interviews concern 1) the attitude of the Associations of Farmers (Cooperatives, Consortiums, Producers Organization) towards the proposed project of creating a “network contract”, 2) checking the opinion about starting continuous improvement of the quality of wheat and the environmental performance, 3) the use of tools for the integration of policies that are already being used such as contractual arrangements, 4) analyzing the behavior and approach of Piedmont wheat chain operators regarding the relationships between them and the use of contracts.

After the interview phase, we will check the willingness to create a focus group (Massey, 2011), among representatives for discussion of if and how to build a “Network contract of Piedmont soft wheat Growers”.

6. Preliminary results and discussion

In this work we have tried to explore a new, flexible and dynamic form of horizontal coordination recently introduced by the Italian legal framework for the agricultural sector, the “network contract”. We have started a feasibility study about this form of coordination especially regarding the horizontal stage of the chain (growers), but without excluding the others operators.

Our research includes the use of semi-structured interviews of primary operators but at the time of writing the survey is still underway. In fact, so far it has been quite difficult to obtain interviews with operators, especially

because during the survey it seems there was a merger between one (of the two) Producer Organization and a Consortium, which had to turn their attention to other problems that occurred at the same time.

The first interviews provided results that are not yet well defined; however, we can identify some key points. Overall, what emerges is that there is still an unsatisfactory horizontal coordination in the Piedmont soft wheat supply chain. The network contract seems to be little known and there is still little interest in this tool because the operators have to overcome some behavioral and psychological barriers. Operators consider the idea of improving the quality and sustainability of the wheat very interesting but they think that the “environmental sustainability profile” is by now almost totally in the hands of the food processing industry and to change at this point is very difficult. They are still not convinced that it will bring immediate gain, however respondents to whom this contract was explained think it could be used to ask for financing for some very important services for the wheat chain: a) technical assistance, b) the experimentation of new wheat varieties, c) strengthening the storage center systems. Both the Minister of Agricultural Policy and the Regional Department of Agriculture could decide to promote this tool for financing them as well as other actions.

Conclusion

The network contract could improve the wheat production process increasing sustainability from an economic and environmental point of view. The technical assistance and the growers feel it is very difficult to receive monetary compensation from the buyer (food processors) even if the wheat could be “differentiated”. Moreover operators consider very interesting the idea of improving the quality of the wheat because it increases competitiveness, it is from local production and this is more appreciated by consumers. It seems essential to provide education of the operators of the agricultural stage of the supply chain, to highlight and to stress the potential of this tool and also search for other solutions. We hope that the wheat regional system, meaning all operators involved, both institutional and private, observe that tackling the difficult situation caused by natural events, volatility of markets prices, and other pressure factors such as quality standard requirements, means medium-long term investments, original solutions and all other ways should be explored. Our vision of the future of this agricultural product, in this region which is simultaneously commodity and ultra-high differentiated product, is oriented toward economic growth of the agricultural stage of the supply chain.

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