



The “new agricultural collectivism”: How cooperatives horizontal coordination drive multi-stakeholders self-organization

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ABSTRACT

This research studied how stakeholders organize themselves in order to collectively manage the presence or absence of genetically modified organisms (GMOs) at the level of agricultural regions. Using case studies, we show that cooperatives have been able to bundle, coordinate, or influence all stakeholders. We show that these new methods of territorial governance require cooperative relations among cooperatives in direct competition with each other on the market, and a type of “collectivism” on a larger scale. The scale is no longer that of mutualism among farmers but of mutualism among competing cooperatives. This new agricultural collectivism permits cooperatives to reinforce their bargaining power and act as a nexus of relationships between the different stakeholders in the supply chain. This competing cooperatives’ unions enabled a multistakeholders’ dialogues and a self-organizations of the agricultural production areas.

1. Introduction

In France, the first agricultural collectives were formed as early as 1880, allowing farmers to adapt to new economic and technical conditions through the use of pooling and collective strategies. These cooperatives developed in a variety of ways. First in the context of a corporatist agricultural unionism, then under the influence of the State (through the Crédit Agricole Mutuel, fiscal legislation, and market organization), and finally under the influence of the dynamic of agrifood markets (Nicolas, 1988). This last phase thus saw the emergence of large and innovative cooperative groups active in export and controlling subsidiaries in various legal forms (Filippi & Triboulet, 2011).

During this process, agricultural cooperatives developed organizational particularities that made them a major player in structuring and managing agrifood sectors. This came about as a result of their growing interventions in the organization of agricultural operations as well as their specific operating conditions. For example, until recently, each agricultural cooperative enjoyed a form of territorial monopoly. This right—granted by the rural code, governed by the high council on agricultural cooperatives [Haut Conseil de la Coopération Agricole], and transcribed into the articles of association of each cooperative—was gradually modified and eventually disappeared in some sectors (e.g. artificial insemination cooperatives in 2006). This change happened in order to keep pace with regulatory changes dealing with

liberalization of national markets and competition law (Schaerer, 1993). Cooperative companies adapt to these institutional changes using mergers or horizontal relations (i.e., relations among competing companies). In particular, this allows companies to protect their bargaining power with respect to other categories of players and to maintain, or even strengthen, their influence on the organization of the agrifood value chains and structuring of agrifood markets.

By examining the case of managing the coexistence of genetically modified organisms (GMOs) and non-GMOs, the objective of this paper is to show how agricultural cooperatives, through horizontal relationships, are able to: i) influence farmers’ agricultural practices and production choices, ii) affect the requirements of the market, and iii) structure the organization of the agricultural region. We propose the term “new agricultural collectivism” to refer to this capacity of cooperatives to reinforce their bargaining power by creating large coalitions of players upstream of the value chain.

This paper is structured as follows: we first present the problem of GMO/non-GMO coexistence (Section 2). Then, after setting out a theoretical (Section 3) and methodological (Section 4) framework, we present the results of our study (Section 5). As a first step, we demonstrate the strategic positioning of cooperatives at the collective scale of the agricultural region. As a second step, we use two case studies to illustrate the manner in which cooperatives are able to federate, coordinate or influence other stakeholders in their region. The discussion

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(Section 6) compares these case studies to the literature and identifies the contributions and limitations of this research.

2. The problem of coexistence of GMOs and non-GMOs in French agricultural regions

Cultivated and marketed throughout the world for about twenty years, GM plants are highly controversial. In France, the government decided to ban GM crops in 2008. The principal cause of this difference in treatment is two opposing approaches to risk: the "product" approach and the "process" approach. For countries having adopted a "product" approach, the risk analysis is based solely on the principle of substantial equivalence (Millstone, Brunner, & Mayer, 1999); new products are compared to conventional equivalents, and only chemical differences may justify specific regulatory constraints for the new product. European countries, on the other hand, have adopted a "process" approach. Under this approach, it is necessary to evaluate the safety of GMOs for human health and for the environment due to the processes by which they are obtained (Sheldon, 2002). For this reason, while in several countries GMOs are not considered a category in themselves and thus no specific market has to be created, in Europe the consideration of potential uncertainties has resulted in market segmentation (into GMO and non-GMO markets) and a change in institutional frameworks (Davison, 2010).

Prior to the GMO ban (i.e., 1998–2008), European and French regulations established the principle of coexistence of different types of products and the segregation of GMOs in the sectors. The aim was to implement legislation that did not ban the sale of GM plants, but provided means to avoid them for those who did not wish to consume them. To achieve this, several European regulations established rules on coexistence and segregation, including directives aimed at guaranteeing information for the consumer (any food containing over 0.9 % GMO must be labeled "contains GMOs") and ensuring the traceability of GM products in the supply chains. At the level of agricultural production, regulations sought to limit the dissemination of GMOs in the environment and avoid cross-pollination¹ (European Commission, 2003).

At the level of agricultural growing areas, this coexistence generates different problems. It is necessary to consider the risk of mixture during the use of the common seeding or collection equipment, in particular due to cross-pollination (European Commission, 2003). To avoid this risk, one can implement isolation distances between plots and delay production over time (Messéan et al., 2009). However, several studies (Meynard & Le Bail, 2001; Messéan et al., 2009) have emphasized that, considering the context of European growing areas (e.g., sizes of agricultural operations, land fragmentation, market segmentation, and regulations), these problems must be thought out on a regional scale. At the time, however, the recommendations given to agricultural region operators were limited only to isolation measures at the scale of the plot (Devos et al., 2009).

French agricultural region operators have thus found themselves in a situation of interdependence. They had to coordinate with each other in order to achieve the purity thresholds fixed by the market and to manage the problems of externalities, as the mixture risk meant that any agent could see its production polluted by the production of another nearby agent and thus lose business. This situation of interdependence thus necessitates the implementation of governance mechanisms permitting collective management of the presence or absence of GM crops in agricultural growing areas. One category of player appeared to be in a position to direct this type of collective action: agricultural cooperatives.

To test this hypothesis regarding the role of cooperatives and to

¹ GMO and non-GMO species can interbreed. Cross-pollination between GMOs and non-GMOs can result in a GMO being harvested from a plot where a non-GMO had been sowed (and vice versa).

characterize the governance mechanism implemented, this research studied how agricultural region operators and cooperatives organized collectively in order to manage the interdependence caused by the GMO crisis.

3. Theoretical framework

Managing interdependence is often the primary purpose of a collective strategy (Baumard, 2000). It was also one of the objectives of "agricultural collectivism"² in France. In reaction to sectoral crises, the regulator (i.e. the State) structures agricultural supply by farmers in agricultural cooperatives (Nicolas & Peyon, 1986). These new inter-organizational structures developed innovative governance mechanisms, such as democratic administration, voluntary membership, a capitalism, or exclusivism. This institutionalization of collective strategies and governance among farmers was a response to a changing economic and technical environment.

However, a collective strategy is not sufficient to manage interdependence in the long term. Long studied separately and in opposition to each other, the notions of individual strategy and collective strategy—competition and cooperation—appear today to be closely linked (Gnyawali, Madhavan, He, & Bengtsson, 2016). In a situation of interdependence, competitive strategies threaten the sustainability of the firm and increase uncertainty in decision-making (Bresser & Harl, 1986). Conversely, collective strategies create dysfunctions such as loss of flexibility (Santos-Vijande, López-Sánchez, & Trespalacios, 2012), loss of skills (Le Roy, 2008), amplification of external disturbances (Winn, MacDonald, & Zietsma, 2008), and attraction of innovative outsiders (Roy & Guillotreau, 2011). Enterprises can avoid these dysfunctions inherent in collective strategies if they maintain individual strategies (Bresser, 1988) (Fig. 1).

For this reason, enterprises must continually deal with these two dimensions and reconcile individual competitive strategies with collective strategies (Czakon, Fernandez, & Minà, 2014). In this context, a new field of research is emerging, that of "coopetition". This neologism, a portmanteau of the words cooperation and competition, was first used by managers to describe the increasingly frequent situations in markets where enterprises must compete and cooperate with each other simultaneously (Gast, Filser, Gundolf, & Kraus, 2015). This neologism was then the subject of a novel academic theory (Brandenburger & Nalebuff, 1996). Today, coopetition is being studied by a growing community of researchers (Dorn, Schweiger, & Albers, 2016). Although this field of research drives considerable discussion (Yami, Castaldo, Battista, & Le Roy, 2010), its principal contribution is a contextualized vision of relations among enterprises where the concepts of "competitor" or "partner" no longer restrict the strategic interpretation of the environment of an enterprise (Dyer & Singh, 1998). Work in this field of research thus shows the innovation and diversity in mechanisms of coordination (Dyer & Singh, 1998), forms of information sharing (Carson, Madhok, Varman, & John, 2003) and of trust (Hoffman, Neumann, & Speckbacher, 2010).

The main issue in this context is whether cooperative companies are able to articulate collective and competitive strategies, and what governance devices are implemented for this purpose (Fernandez, Le Roy, & Chiambaretto, 2017). The study of how agricultural cooperatives handled the problem of coexistence of GMOs and non-GMOs in French agricultural regions is a relevant empirical field to question this issue in

² The term "collectivism" has multiple meanings and sometimes has negative connotations. In this article, we use "agricultural collectivism" to refer to a method of organizing production based on pooling of means of agricultural production (Nicolas & Peyon, 1986). This method of organizing agricultural production came into being in France out of proactive policies in the face of sectoral crises, and led to the creation of cooperatives and structuring of farmers' supply (Nicolas, 1988).

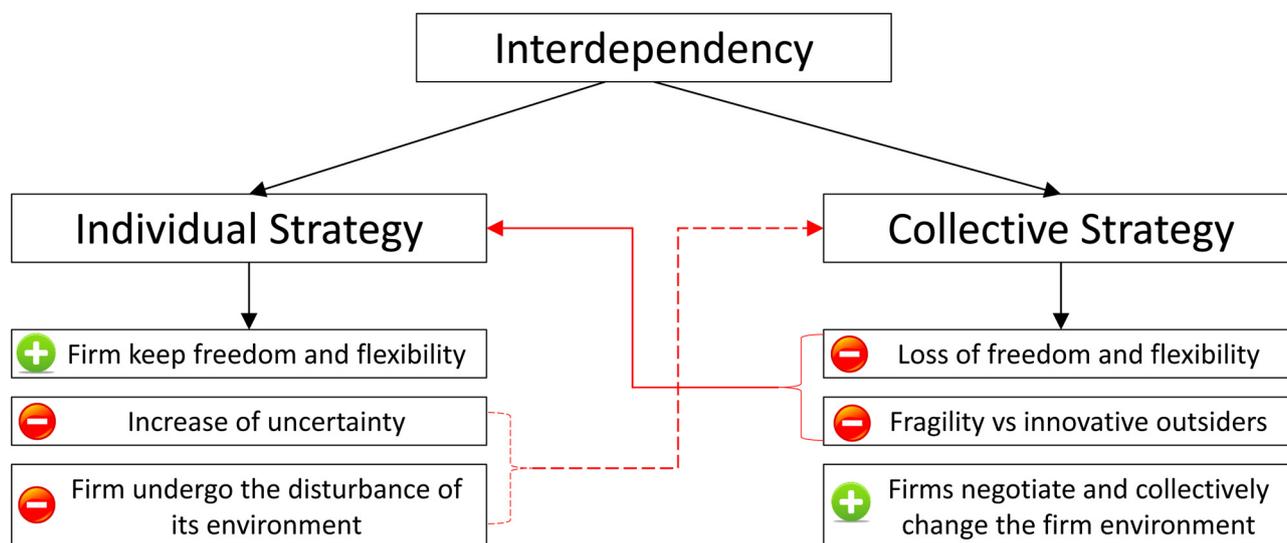


Fig. 1. Links between individual and collective strategies in interdependency context.

the case of governance of cooperatives organizations and to thus explore how cooperatives organization evolve to cooptation.

4. Methodology

To conduct this analysis, we carried out several case studies according to a method based on multiple cases with several units of analysis (Yin, 2003). We first carried out an exploratory investigation at the national level. Then we chose to do two in-depth case studies on two corn growing areas³ affected by the problem of GMO/non-GMO coexistence that had differing market structures and relations among operators. The two regions considered are Alsace and the greater Southwest of France.

Although the knowledge that can be obtained through this type of analysis is somewhat generic, the in-depth case study seem to be the most suitable method for our research. We required access to data of a sensitive or strategic nature (controversies on GMOs, relations among competitors) that makes them rather difficult to obtain. In this context, conducting interviews proved to be the most appropriate method of data collection. This work is therefore based on a series of 41 semi-structured interviews, lasting an average of 2 h each (total recording time: 72 h and 6 min) with current or former stakeholders in the sectors (executives and managers of cooperatives or trading companies, joint trade organization managers, farmers, etc.). Investigating different stakeholders enables us to proceed by triangulation (Miles & Huberman, 2003) to improve the reliability of the data collected. Triangulation mean that each information retained in the analysis have to be corroborated at least by three differing sources. Triangulation facilitates validation of data and at the same time it enables to explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint.

We accumulated these data up to the point of saturation, where no new information emerges from new data and the additional data do not produce a better understanding of the phenomenon being studied. The data collected were analyzed using "pattern matching" (Miles & Huberman, 2003).

Pattern matching start by coding the interviews texts. Coding method (Dumez, 2016)consists in labelling all the elements present in the initial corpus. The second step of the analysis consist to compile and

organize the previous codes in unitizing codes. This second stage named 'open coding' involves the advance refining of data by reorganizing them into the categories using identifiable packets of usable information. This reorganization makes the data more manageable and comprehensible.

The third step of analysis consist to connect the codes identified previously as to be able to find "axial codes". Identifying axial codes means find connections and upper categories that make sense. This step is strongly linked to the previous step (open coding). During these two steps, categories are refined, separated or partitioned as new insights are reached during the analysis progress. This process of redefining the categories covered during the interview enables the identification of relationships and hierarchies within the data.

The final step consist of formulating and exploring hypotheses. The emergent connections between categories have to be tested and explored. Testing the emergent hypothesis consist of seeking alternative or contradictory examples in the data set in order to develop the hypothesis keeping in mind the limitations of the research and the complexity of the phenomenon studied.

5. Results

5.1. Cooperatives as a lever for collective management of agricultural regions

In France, the grain produced is marketed exclusively through approved buyers (Article L. 621-16 of the rural code). The buyer's role is to purchase grain from farmers, store the grain, and market it as is or use it for industrial purposes. The overwhelming majority of these buyers are cooperative companies or trade subsidiaries (FFCAT, 2009).

These enterprises make it possible to adjust the supply from the collected flow of farmer products to the demand. For these enterprises, collection constitutes the business of processing the products harvested from the various plots into lots that can be marketed in various outlets and that meet industry requirements. This system of production of lots may be described in three phases: (i) transfer of the products in space (from the plot to the silo); (ii) aggregation and stabilization of the product; and finally (iii) transfer in time (storage) to make the product available to users throughout the year (Le Bail & Valceschini, 2004). Superimposed on this system of flows is an information system, including a geographic information system (GIS) and a decision system allowing management of these flows by establishing production plans. These systems shape the cooperative marketing supply for farmers and allows cooperatives to play a strategic role, ensuring that harvests and

³ In France, the only GMO that has been cultivated to a significant extent is a variety of corn (MON 810 corn with insect resistance). Some farmers want to produce this GMO corn in order to reduce the risk of pest attack.

crops are distributed in space and spread out over time. In addition, the activities of these enterprises are not limited to collection and storage, but include also supplying farmers with inputs and services. Just as for collection, input supply to farmers (seeds, plant protection, fertilizers) is predominantly handled by cooperatives and their subsidiaries⁴ (FNA, 2008). Additionally, the network of technical sales representatives of the cooperatives are currently the primary, if not only, providers of advice and technical information to farmers (Labarthe, 2009). For this reason, agricultural cooperatives hold a strategic position in the sector. Present at several levels at the same time, they appear to be able to drive the farmer decisions since they are located in the supply chain upstream and downstream of the farmers and thus may impact the farmer choices using different levers:

- The lever of technical support, advice, expertise, and awareness to their farmers.
- The lever of input access, which allows them to supply farmers with some inputs while blocking access to other inputs.
- Economic levers such as the price of seeds, the price of collection, and control of market access.

5.2. The capacity of cooperatives to establish horizontal coordination to influence and control other stakeholders

Our data show that in the case of accidental mixture of GMO and non-GMO production, the traceability system allows tracing back to the buyer's silo, but it is impossible to trace back further because many farmers have several plots in different zones that participate in filling a silo. The cooperatives provide tests and a risk management system⁵, but their technology and the time constraints due to the harvest process⁶ make it impossible to test each farmer delivery before the deliveries are mixed in a silo. The cooperatives thus find themselves in a situation where, unless they organize an effective separation of flows, they will be held responsible, leading to market share losses and the deterioration of their productions' brand image.

For cooperatives, the coexistence of GMOs and non-GMOs seems to produce two types of constraints: constraints connected to segregation of products and flows, and constraints connected to managing the mixture risk. These constraints push cooperatives competing in a region to cooperate and coordinate themselves. Management of segregation needs pooling resources (division of the territory, or pooling of equipment dedicated to production of one type of product). Management of the mixture risk necessitates sharing of information among competing enterprises (location of GMO plots, purity level of seeds sold to the farmers, etc.). Additionally, if competing cooperatives adopt different strategies within the same agricultural region, this leads to increased rates of GMOs in non-GMO harvests, and consequently, a loss of business for the firm targeting a "non-GMO" market. All of these elements led us to examine the way competing cooperatives coordinate themselves and how they manage to influence and control the other stakeholders. To answer these questions, we are going to illustrate the results of two case studies dealing with two separate growing areas: Alsace and the "greater Southwest."

5.2.1. The case of Alsace

Corn is the predominant crop in Alsace where it represent 75 % of

⁴ Cooperatives alone (not including trading subsidiaries) account for 70% of the market share (FNA, 2008).

⁵ They use the Enzyme-linked immunosorbent assay (ELISA) which is a biochemical technique used mainly in immunology to detect the presence of an antibody or an antigen in a sample. So it allow to detect GMO's but according to the technology in use at that period it take at least 3 days to get the information

⁶ To ensure good grain quality and access to lucrative markets, the maximum time between harvest and drying must be under 48 hours (Hannachi & Coléno, 2015).

the region's grain-growing land. The outlets are mostly focused on human food, essentially corn starch and corn meal production.

In 1998, upon authorization of GM crops, the main customers of the cooperatives in the region reported that consumers had a negative view of GMOs and they began to propose contracts for guaranteed GMO-free corn. Faced with an evolving demand for non-GMO products and a need to manage a large proportion of corn in a region characterized by very small plots of land, the leaders of the principal cooperatives decided to meet on an informal basis where they agree to cooperate to define a joint policy with respect to GMOs and to convince the other stakeholders of the value chain as traders and other buyers, seed companies, farmers, and their trade-unions, etc. to sign on to their policy.

In this way, the leaders collectively decided to refuse to market and harvest GMO products. To persuade the other stakeholders to accept this decision, the cooperatives chose to launch communication campaigns. This quickly led to the organization of a number of informational meetings for farmers, featuring presentations by cooperative executives, union representatives, Agricultural Chamber representatives, and representatives of the downstream industries. All presenters expressed to the farmers the benefit of signing on to the policy of refusing GMOs and the risk that the sector might lose its highly lucrative markets if the policy was not properly implemented.⁷ The cooperatives did more than just communicate in order to convince the farmers; they also implemented a control procedure. A sample was taken from each farmer's delivery. At the end of each day, that day samples were mixed and a detection test was performed. In the case of detection of GMO, the cooperative sent a letter to all farmers who took part in filling the silo. This letter contained the positive analysis certificate and the names of the farmers involved with this silo. No penalty was imposed and no deduction was applied. The cooperative merely made use of social conformity pressure to manage deviating behavior.

The cooperatives also coordinated with each other to control the flow of input entering the Alsatian growing areas. They collectively refused to market GMO seeds in Alsace. They also decided to be very selective of the purity of seeds marketed. Any seed lot that arrived in a cooperative was checked and any lot that presented even traces of GMOs was returned to the seed manufacturer. Each cooperative very quickly put the same procedure into place, and the system was operational as of the 1998 harvest.

If the Alsace cooperatives had not chosen to collectively refuse to produce GMO corn, each of them would have been subject to a risk of mixture and therefore a risk of economic loss. Each enterprise would then have been subject to great uncertainty on a key variable of the environment. It is not possible to reduce this uncertainty on an individual basis. These cooperatives therefore decided to manage the exclusion of GMOs, resulting in a specialization of the region: the entire sector shifted toward exclusively producing non-GMOs. Through its collective strategy, over time, the Alsace corn sector developed its reputation on the market, and all Alsatian operators seem to have benefited from this strategy (Hannachi, Coléno, & Assens, 2010).

5.2.2. The case of the greater Southwest

The greater Southwest is the principal grain corn growing region in France, and even in all of Europe. Its market is very segmented and is characterized by: i) the presence of several competing cooperatives, ii) intense pressure caused by boring insects (to which GM corn is resistant), and iii) proximity of a demand for GM corn for the Spanish animal feed market.

Upon authorization of GMOs, the regional cooperatives began discussions at the level of the port silos in the region. Concerned about the traceability requirements of certain processors, they decided to hold a

⁷ Moreover, at technical meetings, some cooperatives invited experts to show the farmers how GMO detection analysis (enzyme-linked immunosorbent assay) is performed.

Patterns		Case	Illustrative Verbatim from cooperatives managers	
similarities	Cooperation motivations	Alsace	"We have new technical and economic issues that we can solve only by working together among competing farmers and rival cooperatives"	
		South west	"Current context is characterized by environmental, economic and technological disruptions. In such issues, we have to work together at the whole agricultural district area to better adapt to the disruptions."	
	Upscale of cooperative level	Alsace	"As a cooperative company we serve our farmers common interest and to this end, sometimes, we have to target a shared interest with the other farmers and to ally with the rival cooperatives."	
		South west	"I work in this cooperative since 40 years...in the past we were a small cooperative of few farmers working together to reach economics of scale and common interest. Now with the globalization of economy and the environmental issues, the scale of few farmers is not relevant. We have to adapt and to establish a new scale of cooperation upper."	
	Competition motivations	Alsace	"There is still need of distinctive and rival cooperatives because farmers need proximity services and local assistance. Being independent and rival in competition is fostering our prices and costs competitiveness and, most importantly our innovativeness and the adaptation of our services to the typicality of local agriculture."	
		South west	"We cannot rest on our laurels and sleep soundly. We have competitors and our farmers challenge us every time by comparing our services to the competitors' services...Moreover, our farmers are opposed to a merger of the local cooperatives. They want to keep the freedom of putting us in comparison and the freedom of choosing their cooperative."	
	Tensions cooperation-competition	Alsace	"It is not easy to work with competitors. You have to define the issues on which you should cooperate with your competitor and the issues on which your interest is to stand out from him. When you agree on the common objective, you have to agree on the collective strategy and this is not easy too. Then when the collaboration starts, you have to manage the trust in routines and at the same time to be vigilant because he is still a rival."	
		South west	"The most difficult is to define and to share among rivals what is "fair-play" and what is "not fair-play"...there is a need of setting collective obligations and a satisfying degree of freedom among differing individuals and firms."	
	dissimilarities	Governance model	Alsace	"I know other cooperatives managers and they know me, we are not friends but we respect each other. Since we have to work together, we know the good way of working and what is the bad way.....We share beliefs in a sort of model of governance."
			South west	"To solve the problem, we had to set a new open organization among cooperatives and farmers. The challenge is to federate all the local actors in a shared project. It took time but by iteration we find the best governance solution....governance model is the most important step."
Formal/informal		Alsace	"No contracts. We work according "gentlemen's agreements"."	
		South west	"We have to formalize every agreement and the agreement always is released in a public announcement. Otherwise we cannot trust the collaboration."	
Direct/indirect		Alsace	"We don't need anyone, we just need to talk about shared problems."	
		South west	"We are rivals in "war". We can cooperate but it have to rest on a neutral and legitimate third party."	

Fig. 2. Illustrative Verbatim from cooperatives managers.

formal meeting on the subject. At the meeting, they negotiated and established a collective charter, called the "Charte Qualité Maïs Grand Sud-Ouest" (CQMGSO) which mean in English "Greater Southwest Maize Grain Quality Charter. Created in 1999, this charter establishes "good neighbor rules" (i.e., recommendations for management of cross-pollination by isolation distances) and "good practice rules" (i.e., procedures to follow for segregation of flows in the production chains). In 2000, an association was created. Called the CQMGSO association it is made up of the over 140 storage agencies, i.e. cooperatives and trading subsidiaries, that signed the charter. This organization is administered by an assembly of cooperatives. The association successfully united all the cooperatives of the region, and the other stakeholders of the value chain as seed manufacturers, farmers' union, etc. were invited to participate as "associate members." This association created a standard for identifying goods produced in compliance with their specifications. The use of this mark by the signatories to the agreement is permitted subject to strict compliance with the provisions of the specifications. For this purpose, the association built a partnership with the National Interprofessional Office for Cereals [Office National Interprofessionnel des Céréales], which verifies compliance with the charter's requirements by the signatory enterprises. This led to the "class A corn quality" standard, which becomes reference on their market.

Class A corn refers to corn produced according to the rules defined in the CQMGSO charter. This includes GMO and non-GMO corn, and this mark does not refer to a better quality of product nor to a higher purity of lots, even though coordination and the good neighbor rules should reduce certain mixture risks. The class A corn standard refers to a commitment to use certain means during the production process and to carry out coordination among producers, but there is no guarantee of purity in the end product. In addition, this standard prohibited opening up new markets. The standard came into being to avoid the imposition of downstream measures the cooperatives considered too restrictive, and for which they would have had to pay the costs. The cooperatives therefore decided to act together to refuse their customers' requirements on segregation and instead impose their own standard. This was a matter of uniting all the regional cooperatives, and the charter was

drafted with this objective with the aim of reaching a consensus among those who wanted to produce GMOs and those who did not.

After the charter was launched, the cooperatives in the Southwest refused to be audited on obligations other than those stated in the charter (except for some specific productions under contract). All of these cooperatives then started to produce class A corn, and their downstream subsidiaries and regional port silos also switched to sourcing and marketing only class A corn. In the end, even if the collective creation of this standard did not result in a differentiation or improvement in quality, it nevertheless made it possible to reassure customers and maintain all local outlets (GMO and non-GMO) while avoiding additional costs.

In addition, in certain areas the cooperatives went further than the measures set out in the charter: these competing enterprises share a GIS and a common database managed by an independent third party. This enables each cooperative to organize its own production plans according to mixture risks, by encouraging farmers to choose one or the other type of production after consulting the seeding wishes of neighboring farmers. This enables them to zone crops collectively, thereby reducing the costs of separation and confinement and the mixture risk. In this case, we observe production "islands" in the region, dedicated to one production type or the other. However, in certain zones where the cooperatives were not able to coordinate with each other, the non-GMO market disappeared, because no operator could guarantee nor make a commitment that its products were GMO-free.

To ensure that the stakeholders sign on, the cooperatives use contracts, communication, and lobbying. These cooperatives developed a long-term contract policy with farmers, with incentives to declare their production plans before seeding which permits entering data into the GIS and databases and anticipating the mixture risks. The administrators of the CQMGSO charter have also opened the association to the other stakeholders and have established several partnerships with farmers' joint trade organizations. This expansion has allowed them to communicate their process clearly and to organize several awareness campaigns.

Thanks to horizontal coordination, these cooperatives have been

able to control the farmers, influence their customers, and thus have managed to maintain all of their outlets while protecting their competitiveness and their growing area's leading position on the European market (Fig. 2).

6. Discussion

The findings of these two case studies illustrate collective strategies and forms of coordination among the stakeholders in an agricultural region. In these regions, it is the agricultural cooperatives that have been the instigators and engines of the collective dynamic. By playing on the mechanisms of communication, confidence, and coordination adapted to their regions (Hoffman et al., 2010), they can achieve to unite traders and farmers. In Alsace, coordination is direct and informal, and is based on tacit agreements (Dumez & Jeunemaître, 2000) and social embeddedness (Granovetter, 1985). Social sanctions are used against deviating behavior. In the Southwest, coordination is characterized by the systematic use of a formal process (contract, collective charter), legal sanctions, and the necessary involvement of an outside third party in the coordination mechanism among competitors.

The phenomenon of cooptation among cooperatives in the Southwest is corroborated by the whole cooptation phenomena described in the literature (Aldrich & Sasaki, 1995; Hannachi & Coléno, 2015; Le Roy, 2008; Yami et al., 2010). In all of these cases, formal processes are observed, along with the involvement or creation of third party organizations like economic interest grouping, collective companies, joint trade organizations. The case of Alsace is fairly innovative, and appears similar to a "tacit agreement." These forms of coordination based on tacit agreements and conscious alignment are less well studied because they are very difficult to perceive, but also because they are deemed unlawful by the regulator, and thus are seen as having no reason to exist. Nevertheless, these forms of informal coordination do exist, and, as shown in the case of Alsace, they are not always trying to achieve collusion or abuse of a dominant position, but may instead appear to protect the general interest.

The effectiveness of this growth-generating role of cooperatives seems to be due to the bargaining power achieved through cooperation between competing cooperatives. However, this raises the question of the risk of shifting toward agreements and abuses that are harmful to the interests of weaker or less well-organized agents. In our study, we see that these cooperatives, while adopting common policies, maintain a competitive relationship on their markets. The restriction of competition in our cases has the objective of managing both technically and organizationally the externalities due to GMO and non GMO coexistence. It has enabled permitting certain improvements—technical (ensuring better separation of GM and non-GM products), economic (ensuring added value for each corn production), and social (the added value and capital gain are equally shared)—for all operators in the region. In the historical context of our study, there were no other means to achieve the same result without restricting competition between cooperatives and developing cooperation (Hannachi & Coléno, 2015). This form of informal cooptation, which addresses a concern for the collective, non-private interest, is an original addition to the literature and is the main contribution of this study. The phenomenon is observed here as being driven by agricultural cooperative companies.

Conceptually, competition can be defined as a state of tension concerning different organizations which are involved in conflict of interest in the pursuit their goals (Anderson, 1988). In the competition process, firms struggle for market share positions by seeking for any ways to improve their competitive advantage and to increase their comparative advantages in resources (Anderson, 1988). Whereas cooperation is linked to actions where seeking for synergies and common goals and interests push firms to join efforts and resources (Lado, Boyd, & Hanlon, 1997; Pesämaa & Eriksson, 2010). However many authors argue that this dichotomy between competition and cooperation appears no longer suitable to foster the understanding of contemporary

organizations' behaviors (Brandenburger & Nalebuff, 1996; Dagnino & Padula, 2007; Hannachi & Coléno, 2012; Le Roy, 2008; Roy & Yami, 2010; Yami et al., 2010). There are authors that consider competition and cooperation as opposites of a continuum and in this view cooptation can be considered as in the middle of this continuum (Bengtsson & Kock, 1999; Lado et al., 1997; Pesämaa & Eriksson, 2010). But other authors (Dagnino & Padula, 2007; Le Roy, 2008; Roy & Yami et al., 2010; Hannachi & Coléno, 2012; Gnyawali et al., 2016) are opposed to this view of a continuum of opposites where cooptation is in the middle. These authors underline that both competition, cooperation and cooptation are intrinsically dynamic social construct process where cognitions, actions and interactions shape organizations' behaviors and strategies. According this view that we share, competition and cooptation are distinctive paradigms and cooptation is a third distinctive paradigm (Dagnino & Padula, 2007). Consequently, separating the competition and cooperative frameworks and analysis is reducing the enquiry on firms' strategies into compartments, that can be less or more connected and simultaneously investigated, but with a loss the grasp the complexity of interorganizational process. We believe that both competition, cooperation and thus cooptation actions have to be analyzed in a systemic and integrated approach and our research on French cooperatives is in line these idea. Thus, our research goes beyond a cognitivism approach (March & Simon, 1958) where interorganizational behaviors and strategies are viewed via networks in connections. Our analysis of cooptation is more in line with a pragmatic approach (Lorino, 2018) and such analysis appears to us very relevant and fruitful to better understand the evolution and the complexity of interorganizational behaviors and strategies. We believe that such may be considered by future research on cooperatives.

Methodologically, this research can be categorized as a phenomenon-driven research that question the lack of plausible existing theory (Eisenhardt & Graebner, 2007). We used multiple case studies and we chose to investigate the case of the French cooperatives under the GMO and non GMO issues because we consider it as an opportunity to explore a significant phenomenon under extreme circumstances. This research is thus based on qualitative approach and case studies and this calls for precaution and further researches. The case study approach enables "grounded understandings" of the cooperatives organization evolution but these understandings remain embryonic premises. The generalization of these findings must be cautious even if they convey a potential to generate theory. The inferences produced here should be tested or corroborated in other contexts. Does this phenomenon exist in other sectors, or outside of the influence of the culture of cooperative companies? Does the size of the economic district and the size cooperatives companies matter in the cooptation coordination design?

Further research could consider other industries or other countries in order to test the existence and the evolution of these differing managing ways of cooperatives cooptation. A quantitative research on the links between the size of cooperative and/or the size of cooperatives companies and the emergence and the form of cooptation between cooperatives can be a fruitful approach to test and understand the drivers of the evolution of the cooperative business model.

Our research shows that historical studies enable a better understanding of the evolution of cooperative organizations. This allows to us to epitomize and analyse emergence of the simultaneity of the competition and cooperation dimensions and thus to emphasize the emergence of the cooptation phenomenon. On the other side during this study, we faced a strong demand from cooperatives managers asking for help and knowledge on how to set and manage interorganizational relationship among rival cooperatives. An intervention-research can be a fruitful methodology to test and understand the management and the emergence and the management of cooptation. Participative research, between academics aiming to understand cooptation and cooperatives managers aiming to establish sustainable cooptation relationships can be a suitable research design in order to push the boundaries of the knowledge of cooptation.

Finally, our study examines the management of the coexistence of GMOs and non-GMOs, from the introduction of GMOs in 1998 until their prohibition in 2008. The ban on GM crops in France has made it impossible to examine the continued evolution of the collective strategies presented. However, the sustainability of these co-competition phenomena is a very interesting topic for future research that can be investigated through combining qualitative and quantitative methodologies.

7. Conclusion

After a liberalization that strengthened competition at the different levels of the agrofood value chains, the stakeholders experienced a profound change in their markets following the introduction of GMOs, generating an interdependence situation between stakeholders. This situation needs the implementation of collective strategies and the emergence of new modes of governance of agricultural regions. At the level of growing areas, the behavior of a player who grows GMOs or who has them grown may affect the well-being of a player who does not wish to grow them. The modes of governance implemented therefore needed to allow coordination of all stakeholders in order to manage the problem at an appropriate scale, i.e. the regional level. At this scale, the agricultural cooperatives occupy a strategic position. However, in a given region, there are several cooperatives in direct competition with each other, and managing this problem at the regional level involves coordination among competing cooperatives.

Based on two case studies, we have shown that the cooperatives are able to unite, coordinate, or influence all operators to manage the region which includes constitution of dedicated "islands" or regional specialization. We have shown that this requires cooperative relations among enterprises in direct competition with each other on the markets and a type of "agricultural collectivism" on a larger scale. This scale is no longer that of mutualism among farmers but of mutualism among competing cooperative enterprises. The benefit of cooperation strategies among competitors has been demonstrated both academically (Axelrod, 1984; Brandenburger & Nalebuff, 1996) and empirically (success of Japanese consortia in the 1980s; Aldrich & Sasaki, 1995). This type of strategy, which is an alternative to mergers and integrations and is able to take different forms (Hannachi & Coléno, 2012), permits cooperatives to take advantage of synergies and reinforce bargaining power without major losses of freedom or flexibility.

Historically, to permit agricultural sectors to adapt to new technical or economic conditions, French operators have often chosen the cooperative model; this was the case, for example, when hybrid corn and artificial insemination techniques in dairy cattle were introduced (cf. Hannachi & Tichit, 2016). In an economy that is now global, the cooperative model changes the scale and takes the form of "co-competition" among agricultural cooperatives.

As shown by the case of coexistence of GMOs and non-GMOs, this "new agricultural collectivism" permits cooperatives to reinforce their bargaining power and act as a hub in the sectors. Thanks to this coordination among competing cooperatives, these enterprises report the market's requirements to the farmers and implement the process and provide advice to organize production, generate margins, and ensure their farmers a satisfactory income. Conversely, they also give feedback on their requirements (which result from the technical constraints and flexibility of the farmers) to the downstream industries, sometimes refusing certain practices or prices. This "new agricultural collectivism" thus plays a decisive role in structuring the agrofood sectors and the regions.

However, this "new agricultural collectivism" is greatly upsetting the rules of competition. After several fines from the competition authorities (notably in the flour, endive, and pork sectors), the European Commission is exploring a possible exemption of agricultural cooperatives from antitrust rules. Thus, on March 4, 2015, a public consultation entitled "Cooperating to Compete: The New Agricultural

Antitrust Guidelines" was launched by the European Commission (European Commission, 2015).

While the old agricultural collectivism which gave birth to cooperatives of farmers constituted a form of entrepreneurial and territorial democracy,⁸ this new agricultural collectivism is polymorphic and raises several questions. It is important today to study the evolution of the principles of agricultural collectivism in situations with strong oligopoly concentration or in cooperatives that are becoming increasingly large because of the need to achieve a critical size on a market that is now global. More specifically, it is important to study the evolution of the exercise of the power of the members, owners, and customers (i.e., farmers) when they are at a critical number or have differing visions for agricultural production systems in crisis because of sustainability issues that go over the GMO coexistence issue as water agri-pollution, crop health management and pesticides, etc. These reflections are essential, because they are in line with developments in financial capitalism in crisis and possible alternatives to shareholder capitalism.

Confidentiality statement

The data used in this research consist of semi-directive interviews that focus on sensitive or strategic data (controversies on GMOs, relations among competitors). Interviews were done via a confidentiality agreement and the data are confidential. We are not uploading our research data in order to protect the informants.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.jcom.2020.100111>.

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⁸ In France, farmers are involved in the cooperative governance via the board of directors which is composed of elected farmers. The President of the cooperative is an elected farmer but the Chief executive officer of the cooperative is an employee. This last is responsible of the management of cooperative.

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