Dairy Supply Chain in Southern Brazil: Barriers to Competitiveness

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Abstract:

Different from other sectors in the Brazilian agriculture, the dairy is still immature, especially regarding external markets competition, and therefore is facing difficult challenges. This study identifies the main factors affecting the competitiveness in one of the most promising and dynamic dairy production areas in the world, the "mesoregion Grande Fronteira do Mercosul" in Southern Brazil. It is based on the perceptions of supply chain leaders about the challenges to improve the competitiveness. Missing professionalism, formal agreements, investments in marketing and research, technology, development and innovation, technical assistance, high transport and transaction costs, idle capacities and frauds are among the main factors retarding the modernization of this supply chain. It also present different strategies already implemented by some actors to overcome such competitiveness barriers. Therefore these problems and strategies must be the target of managers and authorities in a sustainable common project of development for the benefit of the whole chain.

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1. Introduction

The dairy sector in Brazil doesn't show the competitiveness traditionally present in many Brazilian agriculture sectors such as soybean, maize, pork, poultry, sugarcane and beef (Mueller and Mueller 2014; Helfand, Moreira, and Bresnyan Jr 2015). The internal dairy production has not been able to supply the internal market with products of higher quality and quantity, even less to export. That can be seen in the trade balance that is historically negative, with positive numbers in only four years in the time series (from 2005 to 2008) because of a special trade agreement with Venezuela. In 2016 the trade balance of added value products such as cheese, yogurt and derivate summed up to -141 million US$ FOB. While the country exports from the whole agriculture and agro-food industries totalled over US$ 71 billion in 2016 (US$ 60 billion positive), accounting for more than 40% of total national exports (FAO and OECD 2015; IBGE 2017). Another unfavorable indicator is the decreasing share of processed products in these exports from 69% in 2007 to 56% in 2016 (MDIC, 2016), representing a lower industrial intensification of added value products. Regarding the production of milk, despite ranking fourth in the world production, Brazil present an extremely low productivity, with less than 1600 kg/animal/year (97th position in productivity ranking of FAO), while New Zealand, with similar pasture-based system like Brazil, produces approximately 4500 kg/animal/year. Furthermore the low productivity of small producers and the poor infrastructure of rural areas in Brazil raises even more the costs per unit of output, especially for cooperatives who collect the milk of smaller producers in remote areas (Carvalho 2008).

Under this context and the pressure of the environment, which turns to be more and more competitive, cooperatives and small producers, but also some national private companies are facing hard challenges to persist, especially in one of the main production regions in the country, the "mesoregion Grande Fronteira do Mercosul" GFM, where 18.5% of the national bulk milk was produced in 2015 (a total of 6.46 billion litters) (IBGE 2015). Many factors were detected to influence the companies' persistence such as professionalization of human resources, technical assistance, correct investments, adequate infrastructure and policies, increase productivity, access

external markets and good management (Young, Charns, and Shortell 2001; Andri and Shiratake 2005; Chaddad 2007; Nivievskyi 2012; Ndiaye, Maître d'Hôtel, and Le Cotty 2015). Therefore based on the perceptions of supply chain leaders about the challenges to improve the competitiveness in this dynamic sector, this case study aims to identify such competitiveness restrictions and levers in GFM.

Regarding the role of the aforementioned factors in improving the competitiveness of successful dairy supply chains around the world, this paper presents a case study on competitiveness of a prominent dairy sector in an emerging country assessed through a qualitative analysis. The purpose is to identify the problems faced by the industry and the possible levers of the competitiveness based on the perceptions of stakeholders. The study provides a global perspective of the supply chain, where a broad spectrum of stakeholders were interviewed and assessed, to then confront with the appropriate literature and derive management and policy recommendations. To our knowledge this is the first study using this approach for the GFM dairy supply chain. The article is organized as follows. In the next section we present the methodological framework employed followed by a description of the data. In sequence the major results are presented. The article ends with a discussion and concluding remarks.

2. Methods and data

Qualitative analyses in a multiple case study

The qualitative approach is preferred in this context where the broad spectrum of problems and strategies and their causes are hard to quantify in the dynamic dairy sector in this emerging economy. Especially in a supply chain perspective that include issues of all levels in the product life cycle, and comparable as well as reliable data are scarce (Neves 2011). With the multiple case study of GFM dairy processing companies, we offer a broad analysis expanding and generalizing the related theory on competitiveness by identifying its levers and restrictions in an emerging economy. Differently from quantitative methods, the case studies are generalizable to theoretical propositions (analytic generalization) and not to populations or universes (statistical generalization) (Yin 1994). It seeks subjectivity, and to explain and understand interactions and individual or group subjective meanings (Alvarez-Gayou Jurgenson 2012). This method is also found in economics to solve business problems, where

investigations through a case study design could explain events such as the individual life-cycles, organizational and managerial processes, neighbourhood change, international relations, the maturation of industries and more (Yin 1994). Additionally, qualitative methods have the advantage of obtaining detailed information from a relatively low number of participants (King, Cassell, and Symon 1994) that may happen because of constraints regarding to geographical area or number of individuals. This method, in general, generate words rather than numbers, as data for analysis (Bricki and Green 2007). In other words, the data is collected and analysed without numerical basis. For instance, data are collected from interviews in which answers explain a specific phenomenon from the point of view of the interviewee.

To collect such data we used semi-structured interviews as the source of data for analysis, which were carefully prepared and guided to avoid missing important aspects. This type of interview is the most used method to collect data for qualitative research (Myers and Newman 2007).

After all the information is transcribed, coded, analysed and recoded we built the conceptual model to identify how the elements are related between each other in a theoretical model. Following (Ryan and Bernard 2000), once the model started to take form we looked at cases that didn't fit to the model. For these negative cases we suggested connections in order to accommodate them. From this process and from the fundamental topics investigated in this study, the 'problems' and 'strategies' as restrictions and levers to the 'competitiveness' of firms, the explanatory elements emerged (according to the interviewees perceptions), which explain those main topics. They can be of external contingency order contextualizing the firms' agribusiness environment situation, or internal providing a picture of the firms' organizational structure or the management capacities.

Data

The research was conducted in the Southern Region of Brazil, in three states that form the Mesoregion Grande Fronteira do Mercosul (GFM). The Mesoregion is conformed by the Southwest zone of Parana, the West of Santa Catarina, and the Northwest of Rio Grande do Sul (Figure 1).

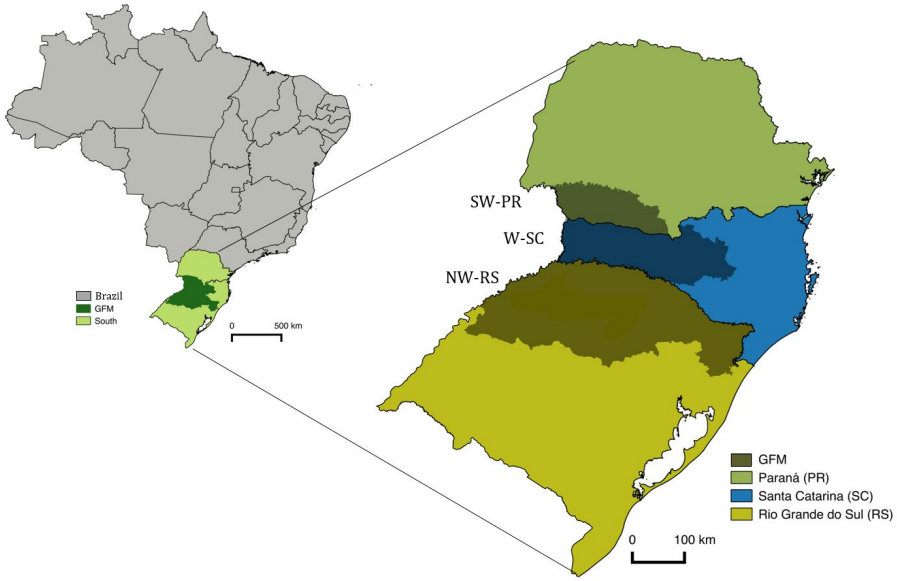

Figure 1: Map of Brazil with southern Brazil and GFM highlighted (left). The three states of southern Brazil and GFM shaded (right). Source: Authors' elaboration based on data from IBGE (2014.)

The importance given to the GFM hail from the accelerated growing of the dairy production and its dynamism. Over the last decades many family farms and small cooperatives have been forced to exit this business due to many economic, productive and external factors, while others prosper, making this sector very dynamic and competitive. In GFM 60% of the farms produce milk totaling 182 thousand farms producing milk in 2006 with 1.95 million cows in 371 municipalities (IBGE 2006). According to IBGE, the milk produced in the region generated 396 million US dollars in total, corresponding to 9.2% of the agricultural and 2.7% of the total GDP in GFM, or more than 2 thousand US dollars per farm/year. In GFM a **high number of small cooperatives** exist with the only purpose to collect the milk from small farmers ensuring a market access. They are generally singular[1] cooperatives, which collect the milk, cool and deliver to other companies for further processing and commercialization, surviving with low margins. On the other hand, large[2] companies have been arriving in this region taking the power by controlling the prices. This power pressure plus economical instabilities in the country, promoted the exclusion of many small companies and family farmers from these activities.

[1] The major system in Brazil is the central-singular scheme. Singular cooperatives are members of a central cooperative, where the firsts collect the milk from farmers and deliver/sell most of their products to the second (or other IOFs depending on their exclusivity contract with the central cooperative), which are mainly responsible for processing and commercializing. This scheme contrasts to the centralized scheme where farmers deliver directly to the cooperative responsible for processing and commercialization reducing one transaction.

[2] According to the National Development Bank (BNDES), large companies are those having a total annual revenue superior to R$ 300 million. Medium companies range from R$ 3.6 to R$ 300 million.

For this study the sample size was set in 26 interviewees covering practically all the main stakeholders involved in the dairy production. They were carried in 2016/2017. We interviewed managers, directors and presidents of almost all the main processing cooperatives and private companies (all large and medium enterprises) processing milk in the region, in addition to the responsible persons of institutes, associations and unions involved in the dairy sector in the zone, to collect opinions from different perspectives of the leaders in this economic activity. Out of the 26 persons interviewed, 8 represent central cooperatives, 4 represent private companies, 4 non-governmental institutes, 5 represent unions, 4 represent governmental institutes, and 1 association. Governmental and non-governmental institutes are research and development and extension services institutes as well as agricultural secretaries/ministries and federations. For confidentiality purposes they are identified in the text with numbers, ranging from *ID001* to *ID026*. The importance of characterizing by type of establishment is attributable to the differences on how each one operates and is managed; those differences, which can be noted and recognized, are determinants to reach the objectives of this research. Likewise, it can be noted that the interviews were carried out in the three states that are part of the mesoregion GFM according to the national standard coding system. 10 were conducted in *Rio Grande do Sul*, 8 in *Santa Catarina* and 8 in the state of *Paraná*, showing a uniform spatial distribution in the zone. In addition, all the respondents were top executives or managers. Some of the companies or cooperatives are the largest in the zone, representing in some cases more than 6.000 producers, covering areas in more than one state. When considering the subsidiaries, associations and alliances it goes to a larger scale and usually are dispersed all over the country. Together, the milk processed by the private companies and cooperatives of the whole sample represents the 55% of the total milk production of the GFM, so more than half of the chain volume (3.55 billion liters/year) pass through these processing companies.

3. Results

GFM is a very dynamic and fast growing region in dairy production. Large companies are installing plants in the region[3] and competing for the procurement of milk,

[3]Nestlè installed two plants in 2008 and 2010. Lactalis arrived in 2014 and is already the largest group in GFM. Other large companies include Tirol, Italac, Piracanjuba, etc. The largest cooperatives are CCGL installed in 2008 and Aurora, which started processing milk only in 2004.

provoking controversy among interviewees. There are those affirming that *"the entry and expansion of **large companies** increase the competitiveness of the sector" (ID003)* and it *"brings improvements in the competitiveness, increasing the production and innovation" (ID012)* so the sector is *"...becoming competitive, professional instead of familiar and that raises the prices [to producers]" (ID009).* On the other hand there are those against, especially some institutes[4] that *"...see future conflicts in the chain because companies are expanding and arriving in the production zone to procure the milk, but there is not enough milk for everybody" (ID002). "Large companies are creating more refrigeration stations to collect milk in remote areas and they are competing against the small [companies] in the procurement of milk" (ID003). "It will be hard for cooperatives to compete. Companies will compete in the milk procurement and [...] will probably "stole" producers from others" (ID001).* In this regard an important aspect recognized by the interviewees that must be prioritized is the **social role of cooperatives** considered *"...different from other private because [we] work in the development of the region with actions to improve the farmer's wellbeing socially and economically" (ID008).* They *"[small cooperatives] are closer to the producer and have an important social service in the communities ... they have a function of income distribution in the rural" (ID003); "…investing in social programs, technical assistance, culture, community programs, quality, pasture" (ID015)* to *"...maintain the young in the farms and also a program for the women" (ID013).* Not only private companies and cooperatives, but also the **Institutes** are being important for the development of the sector. They act mainly to propose policies, developing studies and projects to standardize the quality and sanitary aspects, or to promote the consumption of dairy products as well as training programs and so on. They also act lobbying with the government *"[the union] making the defence of the chain interests on the government with policies, credit, commercial and development projects in the MAPA [Ministry of Agriculture] and with other institutions" (ID021)*. Institutes are also important in the conduction of studies and data collection such as *"...the socio-economic analysis of the dairy chain in 2009, which up to now is one of the most detailed studies of the dairy chain in the country" (ID022).*

[4] By institutes here we refer to research and development and extension services institutes, unions and syndicates and governmental bodies, i.e. all those that are not directly processors (cooperatives or private companies).

In order to increase the competitiveness and improve the efficiency in the chain, all interviewees agreed that it is necessary to have some **changes and investments** in the corporations and at farm levels. *"Efficiency passes through increases in technical assistance, reduce idle capacities, industrial management, cost management in the industry and farms, better inspection services, loyalty of farmers" (ID005) marketing, communication, management and invest more in RTDI" (ID023).* Leaders are aware that *"the main problems of efficiency and productivity are the lack of professionalization of the producers; immediacy from producers and industrials; lack of a deeper analysis and planning ..." (ID024).* Despite some large companies have a good level of professionalization on their teams such as high education and training level of employees and skilled managers for example, the scenario is wide different with respect to the smaller ones, especially to singular cooperatives that *"...are managed by producers in most cases. And they don't have many managerial skills..." (ID018)*. At farm level the problems are even worst. Fifteen interviewees agreed that one of *"the weakest point in the chain is the professionalization of the farmer management." (ID013).* Fifteen interviewees agreed this is a huge problem and it should be fixed.

In sequence we present the most important **restrictions** to improve the competitiveness of the chain as well as the strategies employed as levers of such competitiveness. They were raised during the interviews and represent the perception of managers, directors, presidents, politicians, researchers and other leaders in the chain.

One of the most mentioned problems in the sector is related to the establishments and enforcement of **contracts** between producers and processors. Most of the transactions are done on the spot. Almost all the interviewed processors stated that currently work without contracts with producers; some of them used in the past, but not anymore. In the analysis we found three main reasons why contracts do not work properly: i) judicial processes, ii) seasonality in the production and iii) disloyalty.

The general opinion is that *"...contracts don't work because there is no judicial safety to enforce them" (ID018),* "*...the judicial costs are too high"(ID021)* and they "*... could be very slow*" (ID010). *"There is also a problem with the seasonality of production, which make still harder to sign contracts"(ID012) where "...production and prices are instable along the year." (ID004).* In GFM the months with higher

production are during August and September, and the months with lower picks of production are April and May, which represents a difference of about 46 million liters in 2016 (IBGE 2017). Managers find it difficult to comply with contracts in terms of volume. Even though they are aware that "*contracts would be interesting for warranties in volumes and prices, but seasonality is a huge problem to implement those." (ID015).* Another major problem to implement contracts is the disloyalty and the free-riders. "*Very hardly contracts will be established for loyalty and selfish"* reasons *(ID005).* Companies*"...understand the importance of making contracts, but the producer does not" (ID014),* in many cases they often seek the highest prices regardless of who pays due to the lack of future vision and communication.

Disloyalty not only affects contracts implementation, it also affects the relation between producer-to-industry or member-to-cooperative, where "*…any minor pressure under the producer, he/she moves to other company" (ID020)*. Nine interviewees mentioned that they are aware of this problem and should work to solve it because it brings some consequences in different aspects like increasing logistic costs, preventing supply and processing planning on industrial plants, quality standardization, affecting the offer of technical assistance, transparency, and others. Among the main causes of missing loyalty mentioned, we found the poor communication and information about benefits of loyalty from companies, cultural disloyal profile of the producer and the unfair competition in milk procurement. Ten interviewees declared to have loyalty policies or programs as an incentive to retain their producers, they work on strengthen loyalty with simple actions, which give them some advantage and stability in production and transactions. The main action mentioned comprises economic incentives, followed by actions involving the community and family, and also offering support and technical assistance to producers. We found a very large scope of actions, varying from *"[the company] ...extra payments for the milk and encouraging farms to get the certificate [of brucellosis]" (ID019)* to the organization of *" [the cooperative] talks with experts about social aspects, drugs, violations ... also offer health insurance ... have funeral insurance" (ID013)* for the families of producers, especially cooperatives members. Apparently such actions are not having the expected effects over the farmers' loyalty, since the problem persists.

The region also faces problems with **high costs** related to the **transport** of milk from the farms to the plants. The main reasons are the poor infrastructure related to *"...the*

bad situation of the roads" (ID002) in addition to the large distances to collect low volumes from small producers, which *"make higher the cost of milk procurement" (ID003)*. For example, in the SW-PR the average of distance to collect the milk is around 149 km for the large companies, with the extreme of 617 km in one of the cases, and the volumes to collect are on average 55 litter/day/producer (IPARDES 2010). It raises significantly the costs. Moreover, during the rainy season, the access becomes even more difficult and expensive. The consequence is that *"volumes are taken into account to exclude some farms because of logistics ... the transport costs are too expensive" (ID019).* The problems are not only to collect the milk, but also to transport inputs to the farm as well as provide technical assistance for those. Ten interviewees, including institutions, cooperatives and private companies, coincide considering that this problem should be improved to develop the chain. "*Increasing volumes per farm, and maintaining good routes to access the farms can solve those problems" (ID010).*

*"**Quality and sanitary aspects** are issues that must be improved in the chain" (ID012).* The indices are too *"...variable and a trouble for the industry standardization" (ID015).* Ten interviewees agree that is essential an improvement of these parameters, the implementation of inspection and quality control systems especially if the industry aims to reach international markets. *"In order to export, the country has to develop a program of quality improvements to reach the international standards" (ID004)*. It's possible that one of the first measures to enhance such quality, besides technical assistance, would be the payment for quality and solids. Indeed *"there is a tendency for payments per quality and solids because that's only what interests in the milk" (ID016)*. In this case payments are made by protein content and in less degree fat content, because these two components are crucial to elaborate products with high added value, therefore, there are bonuses or discounts over the base price in function of the proportions of those nutrients. In addition to the composition (solids), the quality is also determined by sanitary factors; the somatic cells count SCC and the total bacteria count TBC; influencing the price to be paid (Madalena, Matos, and Holanda Júnior 2001). The requirements are based on the regulatory standards to protect the human health. Such standards in Brazil are regulated by the Normative Instructions 51 and 62 of the Federal Government. Some institutes argue that payments per quality are inevitable in the future, but first it's necessary to work and offer more training to producers to increase their milk quality

in order to avoid more exclusion. On the other hand, five interviewees said that is difficult to establish payments per quality or solids content because the market itself (consumers) do not pay differentiated prices, in some cases also because cooperatives have internal disputes, or just disloyalty because *"...the producers migrate to other companies when they receive payments below the market value as a punishment for low quality. Some don't want to improve"(ID025).*

Six interviewees recognized the **low productivity** as a problem that hinders the development of the chain**,** where only a small proportion of farmers are highly specialized in dairy production. They stated *"the only way to improve that [competitiveness] is by increasing productivity and making farms viable to produce" (ID019) through good farming techniques and animal genetic (ID007)*.

The quality and productivity at farm level depend on a good and frequent offer of **technical assistance and diffusion of technologies** from the processing companies. Its low offer and poor quality is incurring a slow modernization in the chain. By the other side, the **training** organizers also complain about the negligence of some farmers saying that *"producers are not bad because of missing information, all have access if they want, ... but few producers participate" (ID017).* Nevertheless some of the companies claim to offer a technical assistance, having *"...a department of promotion in quality, nutrition, silage, hygiene" (ID019)* or even a *"a program of technical assistance to reduce the problem of seasonality. They work in the pasture, nutrition, pregnancy rate in the summer to search for stability in the production" (ID013).* In total thirteen interviewees stated that the sector count with technical assistance, (despite it is still precarious and not so intense) and the most mentioned fields are quality and hygiene, and animal nutrition. In addition, most of these entities which offer this service are cooperatives, hence its importance in technology diffusion.

Lack of skilled labour at the processing plants and management teams are also perceived as huge problems. To mitigate such problems, several companies offer different forms of **training** for their employees in order to "*promote the internal growing, giving scholarships up to 40% to the employees, internal training in leadership, regulation, results, quality ..." (ID019).* Furthermore a *"...central [cooperative] offers training in management to the singulars [cooperatives]" (ID015)* as well as *"training to the technicians of the singular coops, and then those transfer the technologies to the farmers" (ID008)*. Not only companies, but also governmental

and non-governmental institutes offer different kinds of training, acting "*…mostly in the articulation and enabling of events such as training and talks" (ID005)*. In total fifteen interviewees stated that they offer at least one or more types of training for the employees as well as to producers in many areas, which includes internal training, preparation for extensionists, field days, and others. The utmost mentioned area of training was in management (mentioned eight times), following training in quality and hygiene (mentioned five times), and training for transporters (mentioned four times).

Regarding investments, five interviewees, representing large cooperatives and private companies, argue that there is low level of **investment in marketing** in the sector. They say that in general, managers still consider marketing an expense rather than an investment, arguing that *"there is a very poor culture of investment in RTDI and marketing" (ID023)* as consequence of non-professionalization in the chain. Only six participants mentioned marketing as an important investment. Among cooperatives, only few are *"... working the marketing and the brand" (ID008).* They focus more to *"invest in social programs, community programs, quality…, to maintain the producer [loyalty] and avoid losses to privates [companies]" (ID015).* Furthermore specific internal conflicts inside cooperatives interfere when investment decisions[5] have to be taken "*…for financial reasons and weak professionalism of directors" (ID011).* In this regard directors and managers are aware that *"... the cost of logistics for the company to do the marketing directly with the consumer is very expensive; but the return pays off." (ID026).*

Seven participants affirm that they **invest in RTDI** to improve competitiveness, however *"there is still a huge gap to improve and create more products, companies should also diversify the presentation of the products, the types and sizes of packages" (ID004).* In terms of differentiation only two interviewees confirm that their companies have the product differentiation as a strategy and four believe that companies have difficulties to differentiate products, but should do it to increase their gains, especially the *"micro and small companies should differentiate products in order to have gains in the niche markets" (ID007).* It's possible to find good examples anyway, with companies that *"[The company] release new products every year. Have a department of innovation and RTDI for innovation" (ID012)* or even run

[5] See how investment decisions in cooperatives are affected by the Vaguely Defined Property Rights problems in the discussion section or in (Cook 1995).

"[the cooperative] an experimental center (RTDI) to develop technologies of milk production pasture-based. Also have an experimental dairy farm" (ID008) or *"[the cooperative] a team working on products development and quality" (ID014).* RTDI are fundamental to develop products, processes, and technology in order to be more competitive. Moreover, the enrichment of the technological patrimony contributes to the capacity to constant market adaptation and competition changes. In terms of the governmental investment programs, the state of *"SC has invested a lot in technology and genetics. It is also the only state free of foot-and-mouth disease without vaccination" (ID023).* The capital for investment comes mainly from governmental development banks, or in some cases, the capital is a mixture of both credits and own capital.

Several interviewees complain about **frauds** in the chain were detected during the analysis, standing out two common types of fraud. The first type of fraud takes place basically when the sector face low prices, low production and payments per volume. It involves farmers and transporters, but also people responsible for cooling stations, who add water and other substances to the milk in order to increase the volume for delivery. Since 2013, the MAPA has developed investigations and actions to fight against this type of frauds. Through the '*Operação Leite Compensado*' they discovered adulterations in the milk and some representatives of cooperatives and private companies that were aware of that. The image of whole chain and their products were affected. Companies defend themselves from frauds by constantly taking samples of the milk, doing *"...frequent and rigorous tests in the milk, ..." (ID010)* and punishing when it is detected. Ten interviewees had been direct or indirectly affected by this type of scam. The second type of fraud *"In the sector were huge problems with payment defaults… This impacted discouraging the production because everybody is afraid" (ID019).* At least four interviewees said they had been victims of this type of cheat. *"Frauds and payment defaults are factors that brake producers" (ID015).*

Finally the **Idle capacities** in industrial plants are a problem that was recognized by seven persons interviewed. *"Many industries are still working with idle capacity, which 'weighs' the production system" (ID026).* They mention that *"this idle capacity is very costly" (ID014)* generating losses and inefficiency. It is also linked to seasonality, loyalty, control of supply, and poor management planning to reduce the

fixed-costs of processing. *"In SC the idle capacity was 40%, which made it difficult to get financing from government credits" (ID017)* for example.

In order to overcome such problem and others, seven companies are adopting strategic alliances or outsourcing (or outsourcer). Managers, especially cooperatives', are using them seeking to reduce their huge idle capacities and increase the portfolio of products with low investments. These strategies are supporting managers to overcome huge problems in the chain and their proportion must be higher, however they are not because of disorganization, or conflicts (mainly political) between cooperatives or within cooperatives. By the other hand we found cooperatives having *"... many strategic alliances and also studying make new alliances to process products with and to other companies" (ID013).* It's also used in order to add value to the milk production or to participate in different channels of commercialization, like the example of the cooperative that *"...outsourced the powder milk production to participate in institutional programs from the government" (ID011).* It's a double-sided path with companies that *"[The cooperative] already have strategic alliances with other cooperative processing a product for them and having a product being processed to them…"(ID008).* Outsourcing is also very commonly found (seven companies) in transportation and logistics, which is a huge problem in the chain. Managers agree, *"... it is much more organized now after outsourcing the logistics" (ID018),* especially to control the frauds in the chain. They also mentioned that *"... there is a tendency of fusion between cooperatives to compete in scale" (ID008)* against large private companies, but also to improve their costs structure. Despite interviewees' awareness, we didn't detect important fusions, thus they must occur faster and involve most cooperatives.

4. Discussion and Conclusions

One of the main findings of our research is that the **low professionalization of the human resources** in the production and processing levels of the chain may be the principal cause of several other problems. It is generally found in cooperatives where it is common that directors are in charge (elected) because of their political power inside the cooperative and not by their technical specialization resulting in inefficiencies and high costs. A study conducted by the 'Brazilian Micro and Small Business Support Service' SEBRAE detected that leaders and directors of

cooperatives are not well prepared to confront the changes and transitions in the sector, since investments are made without any market evaluation or viability study, the milk collection is deficient, there are many conflicts between singular and central cooperatives, and predatory behavior between cooperatives (Jank, Farina, and Bertini Galan 1999). More educated managers may have greater cognitive ability to use diverse approaches for problem solving and decision making, which facilitates the adoption of innovation for example (Young, Charns, and Shortell 2001). The transmission of technology and good practices for farmers is also affected by the low professionalization at the processing level. Companies' managers must be highly qualified themselves in order to provide such assistance. Although we found signs that there are programs for **technical assistance and training** in GFM, the companies and institutes should offer more programs, with more frequency, and more excellence; covering themes of production, management, as well as sanity and quality. This is in line with the thoughts of some interviewees from the institutes when they say that is needed to work and improve trainings for producers to increase quality because payments for quality are inevitable in the near future, especially with the entry of large companies. With higher quality of raw milk the producer would get access to better prices. Andri and Shiratake (2005) recommend that farms should work in **increasing the quality** and cooperatives offer the proper price and strive for it. In large-producer countries, differentiated payments have been used for decades under the logic that paying for quality increase the benefits for producers and incentive them to improve, consequently increasing benefits for the company (Madalena, Matos, and Holanda Júnior 2001). Jank and Galan (1998) consider that this problem is generalized in Brazil and the low quality of the milk that arrives at the processing stages discourages firms to differentiate prices. To summarize, the low quality problem may be associated with the lack of technology diffusion. Indeed missing markets for information can slow adjustments on the part of producers and result in costly supply and quality shortfalls for firms that rely on spot markets for their product supply. Prices may not be efficient enough to transfer complex and rapidly changing information. Therefore firms can solve the problem of missing markets for information by internalizing the production process, or by employing production-management contracts (Key and Runsten 1999). Production-management contracts are a good strategy to transfer specialized technology to producers. It's often the case in developing countries where firms want to locate a processing plant in a particular

region but at the same time markets for inputs or services needed in the production are missing (Austin 1981), which is the case in GFM. To confirm, we detected the **establishment and enforcement of contracts** is a major problem in GFM, since almost all the interviewees mentioned it. At the processing level, the disincentive to use contracts with small producers are the transaction cost involved associated with providing inputs, credit, extension services and product collection and grading (Key and Runsten 1999), but also the time and costs involved in the enforcement of such contracts. Legal systems and crime prevention are poor in developing countries especially in rural zones, and corruption represents a serious problem, so the protection of property rights and the contract enforcement can be problematic and costly (Brunetti, Kisunko, and Weder 1999; Tybout 2000). To reduce this problem, small farmers have created cooperatives and associations, so the volumes transacted are higher and the frequency of transactions is lower reducing its costs. They incur the high costs associated with the transactions and transport and don't add much value to the primary product. Lannes (2002) also observed that in the first stages of milk processing, cooperatives have the highest costs, especially the smaller ones. These forms of business tend to disappear with the observed vertical integration and scale increase trend. In this regards it's important not to forget that cooperatives could also have different objectives than profit maximization. They may have the intention to maximize the members' welfare, leaving as secondary the market orientation. In some cases, the social orientation dominates the decisions and difficult the adoption of competitive strategies (Magalhães 2007). For instance, it is difficult to exclude inefficient producers, and at the same time consider that the situation of the members depends on the economic success of the cooperative; and they compete against for-profits corporations that have a clear market orientation (Bialoskorski Neto 2002; Carvalho 2008). The variable price has the major influence on producers and cooperatives have to be competitive enough to be able to offer the same or greater prices than its competence to ensure a regular supply in addition to bear the higher transaction and transport costs. Therefore a **good contracting system** should be enhanced and its benefits communicated to farmers ensuring their loyalty. It gives farmers the opportunity to improve and can reduce the price variations, increase incomes for poor farmers, and promote rural development (Key and Runsten 1999; Andri and Shiratake 2005; Alemu and Adesina 2015). Moreover, improvements in the

judicial system (easier access and debureaucratization) to enforce and make cheaper the enforcement of contracts may help to solve the problem.

Cooperatives also face higher restrictions and challenges in GFM regarding investments **in RTDI**. There are common problems implicit in traditional cooperatives[6] organizational characteristics affecting the investments decisions and increasing the competitiveness constraints. They are related to the "Vaguely Defined Property Rights" in these cooperatives and concern the 'free-rider', 'horizon', 'portfolio', 'influence-costs' and 'control' problems, which are fully explained in Cook (1995). "These five property rights constraints are increasingly recognized as major inhibitors of growth activities for cooperatives, especially in the capital intensive, value-added downstream levels of the agri-food chain" (Cook and Iliopoulos 1998 p. 545) as is the case of the dairy sector assessed by this study.

Cook and Iliopoulos (1998) and Iliopoulos and Cook (2013) propose a set of actions and measures to overcome the aforementioned property right problems in cooperatives. They involve a relaxation in the "traditional cooperatives" organizational characteristics with the definition of individual delivery rights (defined volumes) and mechanisms to allow their transferability, liquidity and appreciability. The implementation of such measures in GFM could help cooperatives avoid several problems and increase their competitiveness. To achieve this, the government must update the outdated and inflexible Brazilian cooperatives law (Law Nº 5.764, 16/12/1971).

This research also shows the interviewees' perception of the **large companies' entry to GFM dairy sector**. Some believe that these companies will develop the dairy sector stimulating the improvement in techniques to achieve greater competitiveness. Others think that these companies harm the smallest and bring negative consequences establishing a monopsonistic position in the milk procurement of some areas with an anticompetitive effect. In fact the dairy chain has experienced significant concentration at all levels in most OECD countries (Hewitt 2001; Seyoum et al. 2003; Rozanski and Thompson 2011). In the southern region of Brazil from the 469 processing companies existing in 2012, only 390 (-17%) still remain in 2017, while the volumes collected are stable around 8.6 billion litres per year. Efficiency gains and countervailing market power arguments have been offered as explanations for

[6] All cooperatives in GFM are "traditional cooperatives"

increases in concentration at various stages of the dairy supply chain. The consolidation of farmers into cooperatives might be a response to consolidation of processors, which might be a response to consolidation of retailers (Rozanski and Thompson 2011). Furthermore as profit margins decline, increasing concentration is inevitable, in order to spread fixed costs and remain competitive (Sutton 2003). On the other hand Porter (1990) considers that rivalry generates pressure on competitors and stimulate to improve continuously and sustainably their competitive advantages. Despite the process of concentration and internationalization is inevitable and should happen in a fair way, especially to small producers, the most affected. In this regard the merges and acquisitions of small companies (cooperatives) would be an important strategy to gains in scale and bargaining power. Otherwise the consequences of monopsonies would be lower returns to farmers, increase the risk in farming activities and cut-off of more farmer and small companies especially cooperatives.

The idle capacity is affecting processing plants that do not count on enough milk suppliers because they cannot offer better prices to producers, they cannot manage the seasonality, or because an excess of infrastructure or simply poor management and planning. This problem may be addressed through the offer technical assistance to control for low production effects of seasonality at farm level and establish contracts for supply control. Furthermore companies must establish strategic alliances or outsourcing, which allow to reduce costs and even gain economy of scale, also differentiate the portfolio of products to access other markets and increase sales, fusion with other companies and replanning the processing plants. In fact fusions, strategic alliances and outsourcing, are considered by the literature as important strategies to increase competitiveness. Various successful examples of fusions all over the world reinforce these strategies.

Outsourcing is also a powerful strategic management tool as part of the global process to solve problems (Schneider 2004). It could be used not only to mitigate the consequences of bad infrastructure in the chain, but also in any process in which the company is not able to perform with efficiency. It's useful to improve the costs structure, the global efficiency, reduce the idle capacities and most important, provide a rapid reaction capacity to market changes (Winkleman, Dick, and Lee 1993; Duque-Ceballos, González-Campo, and García-Solarte 2014).

Definitely, **measures to prevent frauds must be taken**. Frauds in dairy chain occur often, especially in countries where regulations and inspection are deficient. Our

study shows that frauds in GFM mainly occur altering volumes. The impacts of adulterating milk go further than just fooling buyers, it implies serious consequences to consumers' health, since in general is added non-potable water, detergents, urea, hydrogen peroxide, caustic soda, and other toxics. Handford, Campbell, and Elliott (2016) present a broad review of the literature on milk fraud in developing countries outlining the impact on nutrition, food safety and consumer confidence. This discourages potential consumers, national and international and it is terrible for the image of the product and the chain. In order to guarantee that such problems would not be repeated, the government and sector authorities should review the actions conducted by other countries like some European countries and US where this problem are more controlled. Their actions are focused on organizing an efficient inspection system with updated detection methods and the conduction of regular audits on suppliers together with training to the personal involved in the operations and a good education for farmers to avoid malpractice (Handford, Campbell, and Elliott 2016).

Infrastructure, especially in the transport of the milk seems to be another problem in the dairy chain of the GFM region, since it is considered expensive due to the long distances between producers and industry tacking into account the bad situation of the roads. This issue involves the provision and maintenance of the public works service by the local/state governments, in which the producer has low or null direct control. Moreover, the World Bank report (1994) says that roads, ports, airports, communication facilities, power, and safe water access tend to be quite limited in developing countries. In instances where infrastructure services are missing or unreliable, production techniques and costs are affected, some firms must produce their own power, transport, and/or communication services. Thus, a better infrastructure may increase sales, decrease costs, and enhance the rural development.

Indeed **the government and professional institutions** may help in various fronts. The government must look at the dairy sector as it did decades ago with other sectors, on which Brazil is among the most competitive on the planet. Producers of soybeans, corn, poultry, pork, sugar cane and beef receive high-level technology funded by the government/taxpayers via EMBRAPA[7] and other institutes and credits with very low

[7] Brazilian Agricultural Research Corporation

rates. They also have access to the CONAB[8] for production stock among other support programs and good technical assistance. The dairy is still perceived as a "social shelter sector" to protect small and less professional farmers preventing rural exodus and ensuring employment. However this is changing and companies are pushing it to enter in the competitive market. So measures to enhance the competitiveness and support small producers and processors are fundamental, as it is in most developed countries. The executive-chief of EMBRAPA said that milk should be treated as a State matter. "It's like this everywhere in the world. There is no country that works with free trade regarding the milk". Indeed governments generally have a special attention to the dairy sector, for example in Canada there are quotas, in the USA the "Milk marketing orders", "MPP-Dairy" and "DPDP" in the European Union (EU) there have already been several subsidies and today there are payments for production reduction, etc. In Brazil the problems could be alleviated if the governments improve infrastructure, the judicial security, the inspection and control system and promote the diffusion of technologies already available for the dairy production and management. The government must anticipate and encourage and/or pressure the companies and farmers to raise their aspirations and their competitive performance creating an environment that facilitate the development of competitive advantages (Porter 1990). But at the same time improve the institutional procurements, microfinance, rural extension, education, professionalization and entrepreneurship at the rural, so that small producers are not only excluded but have the consciousness of how to progress and adapt to the competitive market.

This research shows that GFM region dairy sector in GFM region is still far from competing at the international level, since the productive chain still presents many factors to develop. **Productivity** is one of the fundamental pillars to increase competitiveness through the adoption of technology, an adequate scale of production, and increment of efficiency. The dairy sector of southern Brazil must work more in improving its productivity. To achieve this goal it was recognized by participants the necessity of incrementing the level of professionalism at the whole chain. Moreover, **quality** is a key factor to develop the chain. It requires better managerial practices, raises the standards and allows the development of better products and guarantee access to international markets. In developing and transition economies the efficiency

[8] Brazilian National Supply Company

tends to spread in a top-down flow. Thus it is necessary to increment the provision of training and technical assistance to farmers in order to spread the new technologies and techniques already available. Since companies are the main responsible for such technical assistance, more professional and competitive companies are able to transmit them in a better way to their farmers. Therefore management professionalization at processing level is one of the firsts steps to improve the competitiveness of the whole supply chain.

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