Heterogeneity of Members' Characteristics and Cooperation within Producer Groups Regulating Geographical Indications: The Case of the "Prosciutto di Parma" Consortium

Dentoni D. [1], Menozzi D. [2] and Capelli M. G. [2]

1 School of Agriculture, Food and Wine, University of Adelaide, Australia
2 Department of Economics, University of Parma, Italy

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Abstract—**Several studies have analyzed the conditions under which geographical indications (GIs), such as the European Protected Designations of Origin (PDOs) and Protected Geographical Indications (PGIs), can represent a profitable market opportunity for agri-food producers. The development of a common set of rules by a group of producers and the governance of the collective brand are key issues to jointly exploit market opportunities through GIs.**

This paper explores whether heterogeneous characteristics, resources and strategies of individual producers within a PDO Consortium influence their level of agreement on the future of the collective regulation and governance of GIs. We conduct an in-depth study on a representative sample of firms member of the "Prosciutto di Parma" PDO Consortium by integrating a multi-variate statistical analysis with a qualitative description of the vision that companies have for the future of their PDO.

From the results of this study, we found confirmation that "Prosciutto di Parma" PDO Consortium members have highly heterogeneous characteristics which lead to significant segmentation in two major groups. The first segment includes a large number of Consortium members, mostly constituted by smaller firms, producing mainly PDO-labeled "Prosciutto di Parma". The second is composed by a group of larger companies focusing on production of generic hams without the PDO-label. This difference clearly affects the level of agreement on the future regulation of "Prosciutto di Parma" as GI. The first segment advocates for the establishment of a "high-quality" PDO or for a PDO with stricter controls and standards, while the second would prefer that a PGI label was introduced, either in substitution to or parallel with the current PDO.

Results, although explorative in nature, show that group heterogeneity influences the level of cooperation among the members of a producer group regulating and governing a PDO. Therefore, this study provides evidence that increasing group heterogeneity may represent a new challenge for the sustainability and profitability of GIs.

Keywords— **Geographical Indications; Collective Action; Group Heterogeneity; Multi-Variate Statistics.**

I. INTRODUCTION

Geographical Indications (GIs) in global agri-food markets increased exponentially in the latest twenty years. With them, the number of producers' groups establishing, regulating and governing their use increased too. In Europe, GIs such as Protected Designations of Origins (PDOs) and Protected Geographical Indications (PGIs) have been established under a common EU policy framework [1, 2, 3, 4]. In the rest of the world, GIs are generally regulated and governed either by a group of producers, by a local public institutions or through a combination of public-private roles within the frameworks of national legislations [5, 6, 7, 8, 9, 10, 11].

Research has recently established the conditions under which GIs can or cannot represent a profitable market opportunity for agri-food producers [12, 13, 14, 15, 16, 17, 18, 19, 20]. These conditions include consumers' characteristics, attitudes and values as well as the nature and place of origin of the agri-food products. Moreover, researchers analyzed when and how a group of producers can develop a common set of rules to jointly exploit market opportunities through GIs [21, 22, 2, 7]. Finally, a number of studies have

highlighted the barriers that producer groups can find, internally or externally to their organization, to exploit market opportunities through the introduction and regulation of GIs. Often cited barriers external to the producer groups include the lack of international reputation among consumers [2] and the increasing competition among GIs, other labels signalling other intangible attributes and individual brands [2, 7]. Barriers internal to the producer groups mainly refer to the risk of moral hazard of selling products below the jointly established quality standard and the relative coordination mechanisms put in place to avoid this risk [23].

On the other hand, it seems that the literature has not focused on another key internal barrier that producer groups governing GIs may face, that is, the influence of heterogeneous characteristics, resources and strategies of individual producers within a group on their level of cooperation for the future regulation of the GIs. In other settings of collective action, group heterogeneity has been found to have a mixed effect on the level of cooperation within an organization [24, 25, 26] and lead to private incentives that challenge the organization governance [27]. In the context of agricultural and fishery development, research found that increasing group heterogeneity affects common property resource management [28], influences the cooperative strategy of downstream vertical coordination [29], exacerbates the level of control within the organization [30, 31] and makes a change in governance structure necessary [32].

From recent empirical observation, increasing group heterogeneity is a significant factor that may affect also the collective action of producers' groups regulating well established and promoted GIs [33, 4]. In the case of well established and promoted GIs, one or more firms external to the organization and with fundamentally different characteristics and resources from the original producer group may see the opportunity of entering the organization purposively to exploit the GI as an effective signal of quality, therefore increasing the heterogeneity within the producer group. Once becoming insiders within the organization, the new entrants can then lobby for a change in the GI regulation which favours their individual rather than collective interests. While the impact of producer group heterogeneity on the level of cooperation in the regulation of GIs is an internal barrier that may limit the future success of GIs [33, 4], an analysis focusing on this phenomenon in the context of GIs has not been conducted yet.

With the purpose of starting filling this gap, in this study we tackle the following broad question: do heterogeneous characteristics, resources and strategies of individual producers influence their level of agreement on the future of the collective regulation and governance of GIs? To tackle such a broad question, we conduct an in-depth study of the case study on the PDO Consortium of the "Prosciutto di Parma". As we found no existing study contributing to understand the relationship between group heterogeneity and the level of cooperation within producer groups regulating GIs, we adopted an explorative research approach by integrating a multi-variate statistical analysis with a qualitative description of the vision that "Prosciutto di Parma" Consortium members had for the future PDO labelling regulation. Quantitative and qualitative data were collected through semi-structured interviews with 94 Consortium members, key informants and the head of the PDO Consortium.

The rest of this paper is organized as follows. In the next section, we provide a selected background on GIs in Italy and the case of PDO "Prosciutto di Parma" Consortium. Then we discuss the methods, followed by the presentation of the results. After that we provide a discussion of results, and finally we conclude.

II. BACKGROUND

In Italy, agri-food products with GIs introduced within the EU policy framework such as PDO, PGI and TSG are increasingly significant components of Italian agricultural production and a factor of competitiveness and identity of local farms. Italy is the first European country for number of awards achieved today; the number of PDO, PGI and TSG is equal to 213 (78 PGI, 133 PDO and 2 TSG)[1]. In the Italian scenario, at the end of 2009, the players involved in production and processing of these products were 82,120 [34]: the 92,6% of these conducted production

[1] http://www.qualivita.it.

activities exclusively, the 5,7% only processing and the remaining 1,7% made both activities.

In detail, as regards the preparations of meat (ham, sausages, fresh meat and processed products) the sector includes 4,818 companies, where 695 are processors (with 1,067 processing plants) and 4,123 are farms, that manage 5,158 breedings; in this case, a share of farmers, located mainly in Lombardia, Emilia-Romagna e Piemonte, manages simultaneously several breedings. Furthermore, the majority of both producers and processors is registered simultaneously with more PDOs and PGIs, to differentiate production according to market needs. The recognized pork meat specialties include both popular products, such as "Prosciutto di Parma" and "Prosciutto San Daniele", and other niche products (e.g. "Lardo di Colonnata", "Salame di Varzi", etc.).

In this national scenario the "Prosciutto di Parma" PDO plays an important role for product characteristics and type of processing (for example slicing and packaging), for the features of the companies that produce and market, for the number of steps along the supply chain and the type of trading partners, for logistics costs and trade promotion, and for the strategies of the distribution companies [35]. The "Prosciutto di Parma" PDO is produced and processed in the province of Parma, in Emilia-Romagna region, whereas pigs, according to the product specifications, must come exclusively from breeding farms located in ten Italian regions[2]. According to the data provided by the "Prosciutto di Parma" Consortium [36], 164 companies have produced 9,823,000 branded hams in 2009. The value of the "Prosciutto di Parma" at the firm gate is 800 million euros and retail sales are 1.7 billion euros. Parma Quality Institute (IPQ) data of 2008 [37] show that the supply chain is composed by 4.818 pig farmers and 121 slaughterhouses[3].

According to O'Reilly et al. [38] the "Prosciutto di Parma" network reflects the regional-cluster-concept proposed by Enright [39], since many important resources and capabilities are not found within a single firm, nor are they available from another member firm, but are the result of network activities and are shared across members. These bonds, both productive as social type, favor the transmission of technological and market knowledge through the organic interdependence which is created from agents within the district [40]. These can be divided into two types: on the one hand, the supply chain players which execute activities such as breeding, slaughtering, selection of meat, processing, service and distribution. On the other hand, the institutional agents engaged in governance and accreditation functions, namely the "Prosciutto di Parma" Consortium and the Parma Quality Institute (IPQ).

Specifically, the Consortium, which associates the 164 ham producers, is engaged in management and protection activities of production rules, management of economic policy in the division, supervision and protection of the laws and regulations, protection of the designation of origin "Prosciutto di Parma" and its brand (the "five point Ducal Crown"). The Consortium attends to the product valorization in Italy and worldwide by developing advertising campaigns and promotions, and carries out an important work of assisting the companies[4]. The IPQ is an independent organization which objectively controls and verifies the origin and traceability requirements, as well as monitoring the compliance of raw material quality and manufacturing process.

Companies producing "Prosciutto di Parma" are reciprocally involved in two types of economic relations [41]: one competitive which aims to find productive solutions more and more efficient, and the other based on cooperation and mutual trust, derived from players' sense of belonging to the same social and cultural background. Producers and other players share the same language, have a similar history behind and very often know each other personally for years. Moreover, Arfini and Mora [41] noted that, given the frequency and type of relationships, firms are less willing to implement opportunistic behaviors that would serve only to damage the product reputation, an essential element of their business strategy.

[2] The product specifications can be downloaded from the Consortium web site: http://www.prosciuttodiparma.com.

[3] However, the pig meat slaughtering in Italy is highly concentrated in few large scale plants; 70% of total meat production comes from less than 30 firms located in few Italian provinces.

[4] Individual members finance Consortium activities paying annually a membership fee proportional to the quantity produced.

During the last decades, many Consortium members started to produce also non-PDO hams within the same production area, using the same knowledge, skills and facilities of the “Prosciutto di Parma” production. This parallel non-PDO production, usually called "Prosciutto Tipo Parma" [40], has now exceeded in quantity the PDO one[5]. The non-PDO "Prosciutto Tipo Parma", produced through foreign thighs and in minimal part from residual thighs of the PDO circuit, aims to exploit the reputation of “Prosciutto di Parma” while, at the same time, being marketed at lower prices. This mainly because of the lower production costs derived from lower raw material costs and absence of certification and monitoring processes, typical of the PDO specification. Moreover, in-store the non-PDO “Prosciutto Tipo Parma” levers on the similarity with the “Prosciutto di Parma” PDO, gaining advantage from the consumers' difficulty to distinguish between the two products [40].

Many companies have implemented policies to develop their individual brand, often displayed next to the PDO label and the Consortium brand, in order to differentiate their products from competitors. This strategy aims often to distinguish specific attributes of the company's ham, usually the length of curing period, where the PDO specification set the minimum characteristics that hams must meet to be marketed as “Prosciutto di Parma”. In many cases, however, the firm's individual brand, as opposed to the Consortium collective brand, adds nothing in terms of controls: it does not provide any special guarantee to consumers except those linked to the company's reputation. For these reasons, the PDO label (“Prosciutto di Parma”) and the Consortium collective brand (the "five point Ducal Crown") generally overwhelm the marketing power of companies' individual brands [42, 38].

In terms of innovation, as also explained by Mora and Mori [43], during the last decades the “Prosciutto di Parma” production system experienced many changes. Initially, the work processing recovered only methods of the rural tradition but later, through technological innovation and continuous research, first started from few pioneering companies and then spread throughout the district through a spillover effect, it was possible to overcome the obstacle of the seasoning with the refrigerated holds. Also new skilled workers were introduced in the companies, such as refrigerator and salter.

The production district was interested by a process of innovation that also involved local mechanical firms, through the introduction of new machinery designed specifically for the curing industry. This new impulse, associated with the availability of skilled labor, attracted new investors to develop synergies between local ham producers and mechanical firms in creating innovative *ad hoc* projects.

One of the latest innovations in the “Prosciutto di Parma” network was the introduction of pre-sliced in a tray. This new process, that must be performed in specifically authorized plants under the supervision of the IPQ inspectors, aims to meet a consumer's demand of higher service. The “Prosciutto di Parma” PDO sold pre-sliced in trays, which now account more than 10% of the total production, is mainly exported and generally marketed at higher price than the traditional product format.

III. METHODS

A. Case and sample selection

In order to explore how heterogeneity in members’ characteristics and individual strategies may influence the level of cooperation for the future regulation of a well established GIs, we chose the case of “Prosciutto di Parma” for three major reasons. First, “Prosciutto di Parma” is one of the products protected with a GI that has the highest reputation both in the Italian and international markets, nevertheless has been recently exposed to a number of external challenges that put at risk its successful marketability [44, 45, 46]. Second, the “Prosciutto di Parma” Consortium represents one of the eldest producer groups that were formally created in Europe to regulate and protect the procurement, production and labelling process of a food linked to its territory of origin [44] and so it represents a archetype for the plethora of younger producer groups that have been recently constituted since the legislation of PDOs. Third, it is already known from recent empirical observations that the

[5] According to the Parma Public Veterinary Service, the production of non-PDO hams within the “Prosciutto di Parma” area can be estimated in 15 million units.

"Prosciutto di Parma" Consortium has recently increased its heterogeneity in terms of its individual members' characteristics and it is more likely to be subject to strategic, organizational and governance challenges [4].

Finally, 94 Consortium members out of 164 were selected. A chi-square test was applied to prove that there were not significant differences between the population and the sample. A comparison of the firms distribution by production classes and firms mapping by geographical origin of the sample with those of the whole Consortium indicated that the sample was representative of the Consortium population (Table 1).

Table 1 Distribution of firms by Prosciutto di Parma production classes (n. hams).

Production Classes (n. hams)	Univ.	Sample	%Univ.	%Sample
< 10,000	31	18	18,9	19,1
10,000 - 50,000	63	35	38,4	37,2
50,000 - 100,000	46	27	28,0	28,7
> 100,000	22	13	13,4	13,8
Missing values	2	1	1,2	1,1
Total	164	94	100	100

B. Procedure for Data Collection and Questionnaire

Before the main data collection, we have conducted in-depth face-to-face interviews with eight "Prosciutto di Parma" PDO Consortium members. These interviews aimed to collect preliminary information on the firms' strategies, their opinions about the effectiveness of Consortium governance and the future of the "Prosciutto di Parma" PDO. We decided to select heterogeneous companies according to their dimension, geographical location and product portfolio, in order to gather insights from different sources. These interviews provided qualitative information useful for the questionnaire definition and for the interpretation of the quantitative results. The questionnaire was also discussed and integrated with the suggestions provided by officials of the Consortium.

The main survey was carried out between April and July 2010. All the "Prosciutto di Parma" Consortium members were contacted first by an introduction letter that emphasized how the research had non-commercial purposes and explained how this analysis would serve to identify the valorisation strategies of traditional "prosciutto". Along with the presentation letter we provided a copy of the questionnaire to be filled. Few days after having sent the letter, every company of the Consortium was contacted by telephone and was submitted to the survey.

The questionnaire is generic and exploratory and for this reason is supported by qualitative evidence [47, 48, 49]. It has been divided into seven sections for a total of 28 questions. Almost all the proposed items were measured according to the Likert scale with values from 1 to 7, with score 1 indicating not at all, not at all important, etc. and 7 indicating very much, extremely important, etc. The first section of the survey gathered general information of the company (number of employees, turnover, type of ham products, etc.), the second investigated the area of origin of meat, the third and sixth the relationships with, respectively, suppliers of fresh meat and costumers, the fourth and fifth sections deepened the marketing and the branding strategies. Finally the last section considered the possible future strategies for the designation of origin.

C. Quantitative and qualitative models

To explore how heterogeneity in members' characteristics and individual strategies may influence the level of cooperation for the future regulation of a well established GIs in the "Prosciutto di Parma" PDO Consortium case, we developed our analysis in three major steps. First, in order to understand if the heterogeneity in producer groups' characteristics also creates a segmentation among producers with different resources and strategies within the "Prosciutto di Parma" Consortium", we run a set of linear regressions. In these regressions, the current marketing and procurement channels and networks, the current strategy for value creation and the intention of developing individual market networks and brand are the dependent variables, while the producers' characteristics (number of employees, yearly turnover, current percentage of PDO production) are the dependent variables.

Second, we used structural equation modelling to provide an exploratory test of hypotheses on the

relationship between Consortium members' characteristics, their firm strategies for procurement, value creation and marketing and their suggested strategy for the future of the PDO regulation. As the purpose of this study is to explore which elements of heterogeneity among many, if any, have an influence of the level of cooperation within a producer group regulating GIs, the nature of this hypotheses testing is exploratory [50, 51, 52]. This is reflected by the fact that the number of parameters to estimate and the consequent number of degrees of freedom in the model tested is too large for the sample collected to conduct a solid confirmatory analysis. With a bootstrapping procedure of re-sampling, the balance between degrees of freedom and sample size can be rebalanced, but given the number of freed parameters the focus of this analysis remains exploratory in nature.

Third, as this was an exploratory survey on a small sample and conducted on the phone with a restricted number of questions, we collected also qualitative information from respondents and from other key informants in order to gain a complete sense of the data results, according to the methodology established in business research. It is recognized in the literature that this helps the researchers understanding the meaning of the quantitative results [48, 49], especially in a setting of missing data, non-normally distributed variables and small samples [51]. It is also recognized that a combination of qualitative data supporting the quantitative results strengthens the internal validity of case-based research, which is exploratory in nature [47].

IV. RESULTS

A. "Prosciutto di Parma" Consortium members' characteristics

The heterogeneous characteristics of the 94 "Prosciutto di Parma" Consortium members surveyed confirm the differences that have been already observed empirically as a potential factor of strategic contrast within the Consortium [4].

First of all, the Consortium members have very heterogeneous characteristics in terms of size and turnover. Out of the 94 Consortium members surveyed, the average number of employees is 26 but the median is only 8. Also, 20% of our sample has 5 employees or less, while only four members (less than 4%) have more than 100 employees and one having 1,000 employees. Yearly turnover is also very heterogeneous: the average is €11 million but the median is €3.3 million. Also, 20% of the members have a yearly turnover of €1 million or less, while only five members (less than 5%) have a more than €50 million/year turnover and one has a €360 million/ year turnover.

Second, the total ham quantity produced and commercialized, including both PDO "Prosciutto di Parma" and non-PDO "Prosciutto Tipo Parma" product, is also heterogeneous across the Consortium members. Out of a total of 121,340 tons produced by the sampled members, around 78% is produced by large members with more than 1,000 tons/year output (54% of the sample), and 22% is produced by smaller sized members with less than 1,000 tons/year output (46%). This distribution is consistent with the secondary data collected[6]. Moreover, out of the total of ham production, the PDO product on average is 55% in 2008, while the remaining 45% is non-PDO product, close enough to secondary data.

Third, production systems vary significantly across the surveyed Consortium members. Seventeen members out of 94 produce more non-PDO product than PDO product. In particular, seven Consortium members produce less than 10% of PDO product out of their own ham production and therefore mainly focus on commercializing non-PDO product. The non-PDO ham production of these seven Consortium members only constitutes around 57% of the total non-PDO production of the surveyed Consortium members. Therefore, while the "Prosciutto di Parma" PDO is produced quite uniformly across the Consortium members - as no surveyed producer makes more than 5% of the total PDO production - the non-PDO "Prosciutto Tipo Parma" is mainly produced by a restricted number of members.

Fourth, the organizational structure of the survey Consortium members is very segmented, too. Sixteen members out of 94 are part of a corporation/group,

[6] We have considered, as control, the data related to the quantity (tons) produced and processed by each firm within the Consortium (source Public Veterinary Service of Parma, 2008).

while the others are independent and managed directly by their owner. Twelve of these 16 members are vertically integrated with the company that owns them, either upstream or downstream along the chain. Moreover, three members are vertically integrated with other companies although maintaining their organizational independence.

Fifth, the procurement channel used by Consortium members to obtain the slaughtered meat, which is their strategic resource and key raw material for the ham production, is very heterogeneous. On average, only 7.5% of the slaughtered meats come from the same territory where the PDO "Prosciutto di Parma" is produced, while 77% comes from elsewhere within the Italian territory and 15% comes from abroad. However, there are two members obtaining more than 70% of their meats from the PDO "Prosciutto di Parma" territory and other three obtaining between 30% and 70%. On the other hand, there are eleven members out of 94 that obtain 50% of their meats or more from abroad, which is meat that cannot currently be certified as PDO product.

Finally, Consortium members vary significantly also in terms of their current marketing channels and market focus. On average, 28% of the "Prosciutto di Parma", both PDO and non-PDO certified, is commercialized through supermarkets, but there are twenty-five members selling more than 50% of their prosciutto production through this channel. On average, 30% of the "Prosciutto di Parma" is commercialized through traditional channels, but there are other twenty-five members selling more than 50% of their prosciutto production through this channel. Wholesale represents around 39% on average of the marketing channels for "Prosciutto di Parma", but there are twenty-nine members selling 50% or more of their production through this channel. The remaining 4% of "Prosciutto di Parma" is marketed through the food service sector, including hotels, restaurants and caterings. Furthermore, 40% of the surveyed Consortium members export part of their production, while the remaining 60% market their products only domestically.

From the set of linear regression analyses conducted, we found the following three key results. First, importantly, "Prosciutto di Parma" Consortium Members selling a higher percentage of PDO "Prosciutto di Parma" out of their total prosciutto production are not part of a group or corporation, have a smaller number of employees but have a higher yearly turnover. This means that, vice versa, Consortium members that are part of a corporation, that have a higher number of employees but a smaller turnover are likely to have a small percentage of PDO "Prosciutto di Parma" and a higher percentage of non-PDO "Prosciutto Tipo Parma" production (Table 2).

Table 2 Factors Associated to the Percentage of PDO "Prosciutto di Parma" Production

Independent Variable	Coefficient	Std. Error
Number Employees	-4.89*	1.69
Annual Turnover	12.28*	4.27
Corporation	-2.67*	0.55
Modern Retail	0.07	0.06
Traditional Retail	0.06	0.07
Wholesales	0.10	0.08
Website	0.18	0.34
Exporting Firm	-0.08	0.35

R-Square = 0.282. Asterisk (*) indicates 95% statistical confidence.

Table 3 Factors Associated to the Percentage of Meat Origin from Parma

Independent Variable	Coefficient	Std. Error
Number Employees	-2.51	3.22
Annual Turnover	0.59	7.55
Corporation	1.04	0.98
Modern Retail	0.20*	0.10
Website	0.46	0.60
Exporting Firm	-0.44	0.62
Traditional Retail	-0.01	0.12
Wholesales	-0.08	0.15

R-Square = 0.105. Asterisk (*) indicates 90% statistical confidence.

Therefore, consistently with the PDO "Prosciutto di Parma" regulations, Consortium members with higher percentage of important meats have lower production percentage of PDO products and so are more likely to be part of a corporation and to have a higher number of employees but a low yearly turnover. Second, the marketing channel - supermarket, traditional, wholesale or food service sector - is not significantly associated to the percentage of PDO "Prosciutto di

Parma" produced and commercialized by the Consortium members. Third, the Consortium members marketing through supermarkets have a higher percentage of their meat from the Parma District (Table 3), while there is no significant statistical association among the percentage of meat with Italian and foreign origin and the marketing channels.

B. Descriptive analysis

Consortium members have recurrent trade links both with suppliers and customers (Table 4), whereas ties with customers' are based more on reciprocal trust than those with suppliers'. Usually the pig meat for "Prosciutto di Parma" is supplied to processing firms by few large scale slaughterhouses with high bargaining power, which may influence the trust perceived by ham producers. Similarly, Consortium members perceive as more important ties with customers than with suppliers'.

Table 4 Descriptive Statistics of "Prosciutto di Parma" Consortium Members' Networks and Strategies

Item	Mean	Std Dev
Suppliers' ties recurrence	5.65	1.18
Suppliers' ties trust	5.24	1.54
Perceived importance of suppliers' ties	6.15	1.16
Customers' ties recurrence	5.84	1.10
Customers' ties trust	6.09	1.05
Perceived importance of customers' ties	6.47	0.94
Perceived importance of developing an individual brand	5.11	1.85
Intention of developing an individual brand	4.11	1.87
Intention of investing more on individual brand than PDO	4.32	1.95
Intention of investing more on PDO than generic ham	5.60	1.56

All variables are represented in 7-point scale (1 = not important at all, 7 = very important).

More than a half of firms perceived as important and very important to develop an individual brand next to the PDO label and Consortium brand (median value of 6). However, on average few of those firms actually intend to develop individual brands and invest more on them than on PDO label (their median values are 4). The valorization of "Prosciutto di Parma" PDO is still perceived as very important by firms, since many of them agree and strongly agree to invest their financial resources mainly on production and marketing of PDO certified hams than on generic ones (median value of 6).

Then, we asked producers to give their opinion on the future collective strategy for the "Prosciutto di Parma" PDO. Four alternative strategies were investigated. These options were suggested from the eight in-depth interviews performed, from opinions expressed by Consortium officials and from the literature. Respondents were also asked to indicate the motivations behind the choice made. This qualitative information helps to gain more insight into the real opinions of Consortium members about the future of the PDO label.

The first possibility is to maintain the current situation (status quo); this scenario was chosen as the most effective for the "Prosciutto di Parma" future by one third of the contacted firms (Figure 1). From these Consortium members' open-ended answers, we found that the main reason to maintain the status quo is that the current PDO specifications already set the basis for a high quality product; thus, according to these members, all the other options may only create uncertainty or mislead consumers' expectations.

Interestingly the majority of the respondents (45%) believes that the introduction of a higher regulated level of label differentiation between the current PDO and a "higher quality" version of the PDO would be the most effective strategy. This strategy has already been suggested by other authors [42, 40], but still lack of the Consortium general consensus to be introduced in practice [40]. From qualitative information, we found two key reasons to support a more restrictive certification of origin. First, the current pool of products with PDO certification has a too wide difference in intrinsic quality, such that consumers cannot use the current PDO label before consumption as an effective cue of the taste, flavour and sweetness of the "Prosciutto di Parma" that they will eat. As quality under the same PDO label is very uncertain, the average PDO-labelled product price decrease. Second, these members perceive that a necessary increase in joint marketing and promotion activities needs to be supported by stricter quality controls to deliver to customers the promised quality.

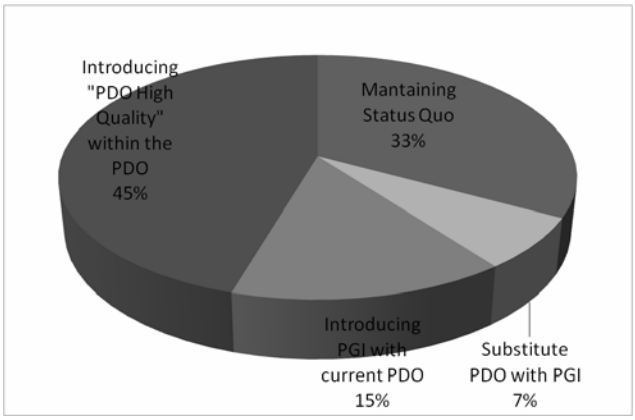

Fig. 1 Consortium members' strategy for PDO

The two other suggested possibilities, introducing a PGI ham also made with foreign meat next to the PDO or completely substituting it, are the least appreciated by the Consortium members with, respectively, 15% and 7% of respondents. From these Consortium members' open-ended answers, we found three major reasons for introducing a less restrictive certification such the PGI label rather than a PDO label. First, a PGI label would allow increasing the raw material supply with fresh pig meats supplied from outside Italy and so reduce the cost of a key production input. Second, members preferring a less restrictive certification perceive that the origin of the meat does not affect the intrinsic quality attributes of "prosciutto". Third, they consider important to give a certified recognition to the processing phase that takes place in the Parma territory, even if the supplied fresh meats comes from abroad, as the link among product, tradition, and territory is established during this phase of product transformation rather than from the origin of the raw material.

C. Consortium members' strategy for value creation

The "Prosciutto di Parma" PDO Consortium members' strategies for value creation can be described with a triangular diagram similarly to Sneed & Folk [53] for the representation of particle shape. This scaling of the triangular diagram can be applied to compare the relationships between three independent variables. An excel application called tri-plot provides a simple method of producing these Sneed and Folk triangular diagrams [54].

The graphical results from this tri-plot graph can be summarized in the following three points. First, around 60% of Consortium members indicated that tangible quality is the most important element for creating value within their range of operations rather than technological innovation and operational efficiency, although they do not ignore these other two aspects of value creation. Second, almost 30% of the Consortium members do not seem to have a clear strategy for value creation, as they have assigned almost equal importance to tangible quality, technological innovation and operational efficiency in their answers. Third, only five Consortium members consider technological innovation and operational efficiency as slightly more important than tangible quality in terms of value creation, while there are only three Consortium members that are more oriented to operational efficiency rather than tangible quality and technological innovation (Figure 2).

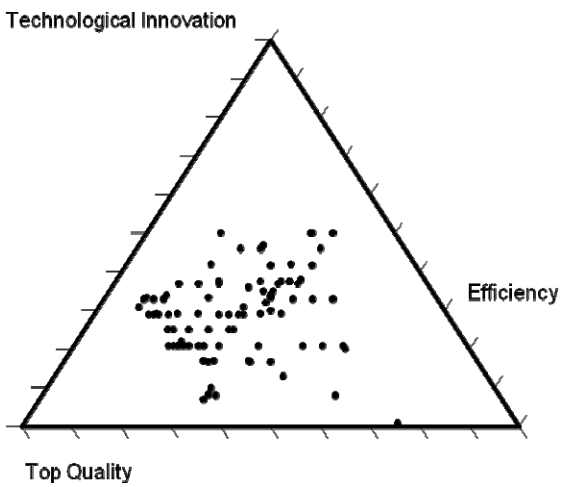

Fig. 2 Consortium members' strategy for value creation

Results of the linear regressions show that members of corporations are likely to create value through operational efficiency rather than through technological innovation (Table 5). Moreover, Consortium members selling less to supermarkets and food services and more to traditional channels aim at competing more in tangible quality rather than in technological innovation (Table 6). Finally, Consortium members marketing through traditional

channels aim at competing more on tangible quality rather than on operational efficiency (Table 7). It seems that traditional food shops, usually specialized in meat products, are more targeted by firms following product quality-oriented strategies.

Table 5 Factors Associated to the Operational Efficiency versus Technological Innovation Strategy

Independent Variable	Coefficient	Std. Error
Number Employees	1.76	2.30
Annual Turnover	-8.11	5.56
Corporation	1.51*	0.73
Modern Retail	0.04	0.08
Traditional Retail	-0.01	0.09
Food Service	-0.15	0.12

R-Square = 0.091. Asterisk (*) indicates 95% statistical confidence.

Table 6 Factors Associated to the Tangible Quality versus Technological Innovation Strategy

Independent Variable	Coefficient	Std. Error
PDO Production	-0.17	0.14
Modern Retail	-0.14*	0.06
Food Service	-0.29	0.10
Traditional Retail	0.28*	0.07

R-Square = 0.247. Asterisk (*) indicates 95% statistical confidence.

Table 7 Factors Associated to the Tangible Quality versus Operation Efficiency Strategy

Independent Variable	Coefficient	Std. Error
PDO Production	0.03	0.19
Modern Retail	-0.09	0.08
Food Service	0.02	0.14
Traditional Retail	0.24*	0.10

R-Square = 0.084. Asterisk (*) indicates 95% statistical confidence.

D. Consortium members' visions for the future of PDO labelling

The tested structural equation models put into relationship the described Consortium members' characteristics, strategies for value creation, procurement and marketing channels and networks and individual branding strategies with their suggested collective strategy for the future PDO label and Consortium brand.

Initially, a number of models were tested and rejected as the overall fit with the data was insufficient on the basis of the most common fit indexes such as Root Mean Square Error of Approximation (RMSEA), Confirmatory Fit Index (CFI) and the chi-square p-value. First, we rejected the models having networks with suppliers and networks with customers as reflective factors of three individual measures, namely the Consortium members' recurrence of ties, the extent of trust holding the ties and the perceived importance of ties. Although these two factors had convergent validity when tested in a confirmatory factor analysis (CFA), when tested in a structural equation model we found no discriminant and nomological validity. Specifically, we found that individual measures were influenced by other variables than the hypothesized latent factors (discriminant validity) and that the latent factors reduced significantly the overall fit of the hypothesized structural equation model (nomological validity).

Therefore, we kept testing a set of path models, were each measure reflects one variable, rather than structural equation models. Second, we rejected the models that included Consortium members' strategies for value creation on the basis of the overall fit with the data. Specifically, we excluded these variables as they had the lowest individual fit based on the R-squared index of the individual equations where they were independent variables. Third, we tested alternative models with three out of the four Consortium member's marketing channel variables, but without including all of them to avoid perfect collinearity. We chose the model including supermarkets, traditional channels and food services and excluding wholesalers on the basis of the comparative fit indexes (AIC and CFI).

Based on these preliminary results, we tested and failed to reject a path model putting into relationship the Consortium members' characteristics, their procurement and marketing channels and networks, their individual branding strategies and their suggested collective strategy for the future PGI and PDO labels. The model has a good overall fit with the data as the

chi-square p-value = 0.15507, CFI = 0.964; RMSEA = 0.034; RMSEA 90% Confidence Interval = (0.000, 0.058). We realize that we tested a model with a very large number of degrees of freedom (d.f. = 183) with a very small sample (n=94), which may deflate the chi-square and so inflate the overall goodness-to-fit. However, the individual high statistical significance of the individual relationships among the variables and the stability of the results across the different models tested are cues that the overall fit is likely to be good or acceptable even with a larger sample. A model-based bootstrapping re-sampling simulation can establish if the suggested model maintains a good fit also with a larger sample.

From the described path model, results can be summarized in the following points. First of all, the relationships between the Consortium members' characteristics (Table 8) are overall consistent with the linear regressions described in table 2 and table 3, although the higher power of the linear regressions resulted on a larger and more reliable number of statistical significant effects among variables.

Table 8 Relationship among Consortium Members' Characteristics

Dep.Variable	Ind.Variable	Estimates	Std.Err.
Number Employees	Turnover	0.869*	0.99
	Meat Abroad	0.217*	0.00
PDO Production	Turnover	0.133	1.55
	Meat Abroad	-0.700*	0.04
Corporation	Turnover	0.432*	0.48
Modern Retail	Turnover	0.467*	3.52
Traditional Retail	Corporation	-0.237*	0.66
Food Service	Turnover	0.220*	3.20
	Traditional Retail	0.292*	0.05

Satorra-Bentler scaled Chi-Square = 202.4 on d.f.=183. P-Value for Chi-Square=0.155. CFI=0.964. RMSEA=0.034. Asterisk (*) indicates 95% statistical confidence.

Consortium members with a higher turnover are likely to have a higher percentage of PDO production, a higher number of employees, to be part of a group/corporation, and to have marketing channels with supermarkets and food service. Obviously, companies that have a higher percentage of PDO production have a lower percentage of meats coming from abroad consistently with the current PDO "Prosciutto di Parma" legislation. Companies marketing through traditional channels are less likely to be part of a group/corporation and are more likely to market also to through the food service sector. Finally, the members' number of employees is statistically associated with a high percentage of meat supplied from abroad.

Second, Consortium members' characteristics and their networks with suppliers are loosely associated. Consortium members with strong and recurrent ties with suppliers perceive more the importance of meat origin for quality purposes. Moreover, we found that Consortium members supplied with meat from Parma are less likely to have a trust-based relationship with their suppliers (Table 9). This relationship is not significant even at a 90% confidence level and so it has to be considered loose. Still, it significantly increases the overall fit of the model when Wald and LM test are performed [51, 52]. Therefore, although loose, this relationship needs to be taken into consideration and its reasons explored.

Third, Consortium members' characteristics and their networks with customers are more strongly associated. Members with recurrent ties with their customers are more likely to market through supermarkets and less likely to have meat from Italy as a raw material. Moreover, members less likely to have a trust-based relationship with costumers are those marketing through wholesales and having higher yearly turnover, while members producing a higher percentage of PDO and having a lower yearly turnover are likely to perceive ties with customers as less important. Finally, Consortium members that have a high percentage of meat with Parma origin and that are not part of a corporation are more likely to perceive the importance of building an individual commercial network (Table 9). In this case, the linkage with the local origin of meat may be an incentive for the company to develop individual commercial strategies.

Fourth, Consortium members' characteristics and their individual branding strategies are strongly associated. Consortium members that are not part of a corporation, with a higher yearly turnover, with a lower number of employees and that are mainly marketing through traditional channels and supermarkets intend to build and develop an individual prosciutto brand.

Table 9 Consortium Members' Characteristics and Strategies

Dep. Variable	Ind. Variable	Estimates	Std. Err.
Supplier Tie Recurrence	Imp. Meat Origin	0.347*	0.11
Supplier Trust	Supplier Tie Recurrence	0.438*	0.13
	Meat from Parma	-0.150	0.07
Importance Suppliers Ties	Imp. Meat Origin	0.187*	0.13
	Supplier Trust	0.536*	0.11
Customer Tie Recurrence	Modern Retail	0.133	0.04
	Meat from Italy	-0.172*	0.04
	Imp. Supply Ties	0.259	0.13
Customer Trust	Turnover	-0.109	1.39
	Wholesalers	-0.274	0.06
	Customer Tie Recurrence	0.583	0.13
Importance Customers Ties	Turnover	-0.124	0.86
	PDO Production	-0.050	0.04
	Imp. Commercial Network	0.150*	0.05
	Customer Ties Recurrence	0.293*	0.07
	Customer Trust	0.509*	0.09
Imp. Commercial Network	Corporation	-0.159	0.38
	Meat from Parma	0.210*	0.07
Imp. Individual Brand	Turnover	0.173*	2.59
	Corporation	-0.196*	0.54
	Imp. Meat Origin	0.187*	0.11
	Imp. Commercial Network	0.594*	0.08
Intention of Investing on Individual Brand	Employees	-0.432*	1.83
	Turnover	0.611	4.50
	Corporation	-0.116	0.33
	Modern Retail	0.115*	0.05
	Traditional Retail	0.592	0.06
	Imp. Meat Origin	0.098	0.12
	Imp. Individual Brand	0.592*	0.06
Intention of Investing in Brand More than PDO	Employees	0.653*	2.59
	Turnover	-0.606*	5.77
	MeatfromAbroad	-0.251*	0.09
	Supplier Tie Recurrence	-0.198*	0.16
Restrictiveness of Certification of Origin	Turnover	0.251*	1.63
	Corporation	-0.308*	0.31
	Imp. Meat Origin	0.204*	0.09

Note: this is the continuation of the model results presented in Table 8, so the same overall goodness-to-fit indexes apply.

Moreover, members that perceive the importance of the meat origin and developing commercial network are more likely to perceive the importance of building an individual brand (Table 9). These firms seem to be more market-oriented, and the possible development of an individual brand may be a likely strategy to increase their products value. Importantly, these Consortium members that intend to develop an individual brand do not necessarily intend to invest in the individual brand more than on the PDO label preservation and promotion. They instead seem to intend to invest on the development of an individual brand together with investing on the PDO preservation and promotion. On the other hand, the Consortium members that intend to focus their investments on their individual brands are mainly with lower turnover, higher number of employees, less recurrent ties with their suppliers and supplied with Italian meats.

Finally, we found a strong association between Consortium members' characteristics and their vision for the future of the PDO labelling. Consortium members with a higher turnover, which are not part of a corporation and that perceive the importance of meat origin for the quality of "Prosciutto di Parma" would prefer to have a more restrictive legislation on PDO regulation and labelling and to introduce a higher regulated level of label differentiation within the current PDO specifications.

On the other hand, Consortium members with a lower yearly turnover, which are part of a corporation and which perceive less the importance of meat origin for quality are more likely to prefer a less selective PDO labelling regulation, such as introducing a PGI label along with the current PDO label or substituting the current PDO to a PGI label entirely. This is seems reasonable since, in this latter case, the meat could be supplied from different sources without any origin restriction.

V. DISCUSSION

From the results of this study, we found confirmation that "Prosciutto di Parma" PDO Consortium members have highly heterogeneous characteristics. As they are associated with different procurement and marketing strategies and with a polarization of the network system within the

Consortium [40], these heterogeneous characteristics create a significant segmentation within the Consortium in two major groups.

The first segment includes a large number of Consortium members which produce mainly PDO-labelled "Prosciutto di Parma" and it is constituted by smaller operators – in terms of number of employees but not necessarily in terms of yearly turnover, which varies – that are generally not part of a corporation or group. This group is tightened by social networks which keep this group together beyond the individual economic incentives [38, 40]. As mainly producing PDO-labelled product, they are mainly supplied with meats from Italy and from Parma. In terms of procurement strategies, this segment of Consortium members believes that fresh meat origin is an essential element for establishing the tangible quality of meat. For this reason, they give great importance to developing ties with their suppliers and generally have recurrent and strong ties with them. In terms of marketing strategies, these Consortium members strongly perceive more the importance of investing in building an individual brand to differentiate the quality and the origin of their product. Interestingly, in order to achieve differentiation, these members intend to invest more on the development of their individual brand than on a further generic promotion of the PDO label. From our interviews, it seems that these members currently feel that the PDO label currently does not effectively distinguish the superior quality of their product and the importance of its origin, and so they are looking for signals of quality and origin attributes that go beyond the current PDO label. Therefore, they would prefer investing to promote their own branded product rather than make a further investment to promote the current PDO label, which does not differentiate their product effectively.

The second segment is composed by a group of larger companies that mainly produce "Prosciutto Tipo Parma", i.e. without the PDO-label, and so most of their fresh meat comes from outside Italy. These members are mainly part of corporations/groups, have a higher number of employees but not necessarily a higher turnover. Some of these companies have recently joined the Consortium, while a significant number of them have been bought by slaughterhouses to vertically integrate downstream or by Italian corporations that kept the processing operations and the historical prosciutto brand. In terms of procurement strategies, they do not perceive meat origin as a key element for the tangible quality of prosciutto, and so they do not generally develop strong relationships with suppliers. In terms of marketing strategies, these Consortium members perceive more the importance of developing strong relationship with customers but not necessarily of developing an individual brand for quality and origin differentiation. Interestingly, in order to achieve differentiation, these members intend to invest more on the generic promotion of the PDO label than on the development of an individual brand. As a matter of facts, members that mainly produce non-PDO "Prosciutto Tipo Parma" may be interested in investing in the promotion of the PDO product because of the strong reputational spillover on all the product carrying an image related to Parma, including the non-PDO labelled product. On the other hand, if developing an individual brand, "Prosciutto Tipo Parma" producers have less quality and origin attributes to signal, including raw material coming from abroad and lower importance given to the supplied raw material.

This segmentation within the Consortium, although not extreme – as the turnover, the marketing channels and the strategies for value creation tend to vary significantly across the two identified segments – clearly affects the level of agreement on the future regulation of "Prosciutto di Parma" as a GI. The first segment composed by members producing mainly PDO product and giving strong importance to the origin of meat advocate for the establishment of a "high-quality" PDO or for a PDO with stricter controls and standards, such that the quality of their product can be effectively differentiated from the second segment of Consortium members. Vice versa, the second segment of producers composed by members producing mainly non-PDO "Prosciutto Tipo Parma" would prefer that a PGI label that allows prosciutto coming from foreign meats was introduced, either in substitution to or parallel with the current PDO label.

Therefore, from these exploratory results it is clear that such a group heterogeneity and segmentation in the level of agreement on the future regulation of "Prosciutto di Parma" GI may create problems of governance of collective action within the Consortium.

VI. CONCLUSIONS

Different characteristics, resources and strategies of individuals within a group may affect the effectiveness of collective action both in agricultural and non-agricultural settings [28, 25, 30, 32, 26, 27, 29, 31]. In this study based on the case of "Prosciutto di Parma" PDO Consortium, we found that group heterogeneity – when creating segmentation within the organization – also influences the level of cooperation among the members of a producer group regulating and governing GIs. Therefore, this study provides evidence that increasing group heterogeneity may represent a new challenge for the sustainability and profitability of Geographical Indications. As the level of agreement and cooperation among the members of the organization decreases, then transaction costs may arise and limit the incentive of the members of participating to the collective action. In the case of "Prosciutto di Parma" Consortium members that mostly product PDO product and give more importance to the origin of the raw materials seem to be looking for viable ways to take individual actions, such as attempting to build their individual brands, rather than keeping relying on collective action, such as promotion of the PDO in order to effectively signal the quality of their product. In fact, from the perspective of Consortium members that attempt to compete in tangible quality rather than in operational efficiency, the current PDO regulation does not differentiate their product from the other members of the Consortium, which on the contrary are lobbying for less restrictive standards in terms of origin of the raw material supplied to reduce production costs.

Results from this study are explorative in nature as a broad spectrum of questions have been posed to the Consortium members to identify which characteristics, resources and strategies have a significant affect on the level of cooperation on the future regulation of a GI. However, if the results are consistent with further confirmatory analysis, then important managerial implications for the governance of the "Prosciutto di Parma" Consortium and other similar organizations regulating a GI can be drawn. Specifically, managers of producer groups regulating GIs – jointly with researchers – should investigate how to tackle the challenge of increasing group heterogeneity within their organization in two main directions. A first element to explore should be how to effectively reduce the level of heterogeneity within the organization by either limiting the access of external members with different characteristics within an already established group or providing incentives to members to uniform their strategies. Second, should be explored how to maintain cooperation within the organization and to preserve only the necessary elements of collective action if in presence of a highly heterogeneous groups.

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Authors' Email Addresses:
Domenico Dentoni: domenico.dentoni@adelaide.edu.au
Davide Menozzi: davide.menozzi@unipr.it
Maria Giacinta Capelli:
mariagiacinta.capelli@nemo.unipr.it