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Impact of Collective Trademarks in Mexican artisanal cheesemakers

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Abstract

Processes related to Collective Trademarks (CTMs), and the state of social friendship, productive support, and strategic networks, were studied for three different artisanal cheesemaker groups: *Queso Bola de Ocosingo* with an inactive CTM, *Queso de Poro de Balancán*, with an active CTM, and *Quesillo de Reyes Etla*, with a CTM undergoing its negotiation process. The influence of negotiation and operation of CTMs as consolidation strategies of three Mexican artisanal cheesemakers was analyzed through a mixed investigation involving in-depth interviews, social network analysis, and quantitative information. The research indicated that networks are small with scarce interaction among the actors, and, where collective strategies have not been induced, the networks are more disconnected and show a higher proportion of isolated nodes. It is concluded that, when collective strategies come from external actors without the necessary accompaniment, they tend to fail because their actions are supported by temporal actors, impacting social relations among cheesemakers.

Keywords: cheese, local organizations, milk products, producer organizations, smallholder producers

Impacto de las Marcas Colectivas en los productores de quesos artesanales mexicanos

Resumen

Los procesos relacionados con las Marcas Colectivas (MC), las relaciones de amistad, el apoyo productivo y las redes estratégicas fueron estudiados para tres grupos de productores de quesos artesanales: el Queso Bola de Ocosingo con una MC inactiva, el Queso de Poro de Balancán con una MC activa, y el Quesillo de Reyes Etla con una MC en proceso de negociación. Se analizó la influencia de la negociación y el funcionamiento de las MC en la consolidación de las redes sociales de tres grupos de queseros artesanales mexicanos. Se realizó una investigación mixta que incluyó entrevistas a profundidad, análisis de redes sociales e información cuantitativa. Los resultados indicaron que las redes son pequeñas, con escasa interacción entre los actores, y en lugares donde no se han inducido estrategias colectivas, las redes están más desconectadas y con mayor proporción de nodos aislados. Se concluye que, cuando las estrategias colectivas provienen de actores externos sin el acompañamiento necesario, tienden a fallar porque sus acciones son apoyadas por actores temporales, afectando las relaciones sociales entre los productores de queso.

Palabras clave: queso, organizaciones de productores, organizaciones locales, pequeños productores, productos lácteos

Introduction

Protected Designation of Origin (PDO) and Collective Trademarks (CTMs) have been used as mechanisms to valorize local products. It is believed that they can counterweigh devalorization and loss of local products. Still, their recurrent use by government institutions in vertical constructions and implementations, without considering the particular conditions of each group, results in PDOs and CTMs that stop functioning or are left in the hands of few actors (Agudelo López et al., 2017; Bowen, 2010), while still having an impact on the dynamics of the original groups.

The use of PDO has been more frequent in Europe. What began as a strategy to protect consumers from fraudulent products became a marketing strategy to position quality and other characteristics that link products and territory (León Guzmán, 2012; Tregear et al., 2007). Cheeses are one of the most important products in Geographic Indication records in Europe; however, 70 % are produced solely in Italy, France, Spain, and Portugal (Dias & Mendes, 2018; The European Commission, 2020).

In Latin America, the situation is different; the popularization of PDO in 1990 occurred almost a century later compared to Europe, and was mainly used as a strategy to access international markets (León Guzmán, 2012). Some of the few products that have obtained a PDO are alcoholic beverages, and a few types of cheeses —some have an PGI instead.— The best known are *Turrialba cheese* in Costa Rica, *Queijo do Serro* and *Queijo Canastra* in Brazil, and *Paipa* and *Caquetá* in Colombia (Agudelo López et al., 2017; Wilkinson et al., 2015).

Despite having cheeses with strong territorial links, in Mexico, no PDO has been granted. According to some authors, this deficit is due to the inexperience of Instituto Mexicano de la Propiedad Industrial (IMPI) [Mexican institute of industrial property] to manage quality signs that protect the knowledge and linkage of agri-food products with the territory. An instance is the PDO application for *Cotija cheese* in 2005, which ended up as a CTM, even though it provides weaker protection (Barragán & Linck, 2015; Pomeón, 2007). The use of CTM in Mexico was so widespread that by 2016, 152 had already been granted; four of them for artisanal cheeses (Biblioteca de Publicaciones Oficiales del Gobierno de la República, 2018). Little is known about their functioning, contribution to add value to local products, and group cohesion.

Not in every case, there is a direct relation between PDO and local economic development by adding value (Vakoufaris, 2010); some studies have documented the effects of PDO on cheeses focused on the appropriating capacity of seal management and operation.

In the case of *Comté cheese*, the active participation of the community was decisive to protect and defend traditional know-how, and to promote the development of local small production units, instead of industrialized production systems (Bowen, 2010). Other cases are the *Ladotyri Mytilinis cheese* from Greece and the *Lancashire* from Great Britain. However, this sort of local and collective development has not been possible in other cases because the integrated participation of all chain actors has not occurred. This is especially the case of small cheesemakers, who traditionally keep the strongest links with the territory (Tregear et al., 2007; Vakoufaris, 2010). The same strategy does not work as well in all the cases as environmental and sociocultural conditions are diverse, and their success depends on the capacity of local actors.

Furthermore, CTM also evokes the origin of products, and their essence is the procedures, somewhat common, established in certain rules of use, and the commitment of producers authorized to use and respect these (Silva & Peralta, 2011). In this sense, managing and operating

them is also complex because these depend on the ability of the stakeholders to act collectively (Martín Cerdeño, 2006; Silva & Peralta, 2011), and, in turn, this capability is noticed in the state and behavior of their social networks.

Social networks as social capital resources

Social network studies have been widely used to understand and explain collective dynamics, primarily due to the methodological contribution to analyze social capital (Stone, 2001). Many of the works currently reported and related to the valorization of social capital are based mainly on indicators built from the analysis of social networks (Bauermeister, 2015; Crespo et al., 2014; Enríquez-Sánchez et al., 2017; Gallent, 2015; Teilmann, 2012; Zarazúa et al., 2012).

In this article, social capital is understood as the capability of the actors to act collectively to the extent they mobilize the resources available (Atria, 2003; Flores & Rello, 2003). Social networks and trust in their various manifestations, and also regulations and institutions are the main resources, which, once set into motion, allow the development of collective actions (Atria, 2003; Flores & Rello, 2003; Uphoff, 2000), such as CTM operation. Through this strategy, relationships are built from interactions between members (Silva & Peralta, 2011), although relationships can also be destroyed in cases where the strategies do not function as expected.

Social networks, as a fundamental resource of social capital, are defined as structures that describe links (bonds) among a defined group of individuals (nodes), and under specific environmental conditions. It is expected that interaction among actors contributes to individual and collective development (Borgatti & Halgin, 2011; Ennis & West, 2010; Lin et al., 1981; Wasserman & Faust, 1994).

In network studies, it is fundamental to define the network and its boundaries (Borgatti & Halgin, 2011; Wasserman & Faust, 1994). Considering that a person, as a social individual, has multiple relations with his/her social surroundings (family, friends, acquaintances, or fellow-workers), network analysis must also follow definable criteria to denote the study boundaries in terms of actors and their relations (Crespo et al., 2014; Ennis & West, 2010; Lin et al., 1981; Wasserman & Faust, 1994). In such a sense, to study social networks, two types of bonds are distinguished: i) those of union or strong, and ii) those with bridge gaps or weak links. The former are specially produced by relatives, friends, or actors with common interests, indicating tighter links. The latter project the network outwardly, connecting various groups of actors, with possibilities to develop according to environmental conditions (Borgatti & Halgin, 2011; Ennis & West, 2013). In this research, strong networks were considered, i.e., created by actors with common interests, such as the CTM management and operation as a collective strategy to valorize Mexican artisanal cheeses.

Furthermore, the links and activities developed, make room for various sorts of networks that can be considered in a group of producers. That is why in some studies, the integration of different kinds of networks is observed, constructed *ad hoc,* according to the objectives of the research, and as a function of those questions asked to the actor to analyze a particular situation (Crespo et al., 2014; Enríquez-Sánchez et al., 2017; Grass Ramírez et al., 2015). This impedes comparisons with one another, even though the title could be the same.

Ostrom and Ahn (2003) claimed that social networks are related to trust and are attributes of the individuals; in addition, Luna and Velasco (2005) considered three kinds of trust: i) calculated or

strategic, generated as a function of expected benefits from a certain relationship; ii) personal or normative, based on the existence of shared beliefs and values and constructed out of kin or friendship relationships, and iii) technical or cognitive, which recognizes personal capacities. Thus, the study of social networks could be carried out as a function of friendship, technical, or productive support networks, where the qualities of a certain actor as a trustable, technical, or strategic referent, are recognized, and networks potentially liable to be constructed among actors — that are friends or not— could help strengthen a family business.

Mexican artisanal cheeses

The economic and social importance of Mexican artisanal cheese manufacture has been underlined in various studies as a unifier in the dairy chain, as an employment generator, and as an essential income source for those families dedicated to the activity; likewise, some causes leading to the loss of participation of these cheeses in local markets, and even the disappearance of some varieties, have been documented (González-Córdova et al., 2016; Villegas de Gante et al., 2014).

In the Atlas of Genuine Mexican Cheeses (Villegas de Gante et al., 2014), the agro-industrial chains for 31 Mexican artisanal kinds of cheese were identified, and a SWOT analysis was carried out on Mexican artisanal cheeses. Results showed that in half of the cases, there were weaknesses of the social relations between the chain actors associated with the insufficient capacity for cooperation and articulation within the links and between the actors (Agudelo-López, 2015). This, added to the absence of support institutions (Grass Ramírez et al., 2015), are part of the causes of the scarce development in the Mexican artisan cheese industry. Added to the above, is the temporary nature and supply of government programs; most of them are short training programs usually related to technical quality in cheese production, holding in some cases, fairs. These have been important to spread most of the Mexican artisanal cheeses and are usually supported by local governments (Villegas de Gante et al., 2014). They are of interest in government programs because these are short lasting, they do not involve permanent accompaniment, formal support is relatively easy to get, they do not require a strong social structure among the main actors (they can participate individually), and they allow showing the concrete actions of governments.

This kind of support has, however, not benefited *Bola de Ocosingo*, *Cotija de Michoacán y Jalisco*, *Poro de Balancán,* and *Crema de Chiapas,* four Mexican artisanal cheeses that have achieved a CTM with the support of local or state government agencies, universities, or public research centers. Their functioning is questionable because, once the CTM is obtained, supporting institutions withdraw, relations among actors change, producers lose interest, and, in some cases, they stop using the trademark (Agudelo López et al., 2017; Villegas de Gante et al., 2014). Given the above, the following research question is asked: *does the CTM management positively influence the consolidation of social networks in the groups of Mexican artisanal cheesemakers?*

To answer this question, first, the CTM management and operation processes must be understood, and then, this knowledge must be related to the existence or not of strong social networks. Accordingly, the aim of this research was to document the management and operation processes of CTMs and assess the effect of these on social networks in three groups of Mexican artisanal cheesemakers.

Materials and methods

Case studies

Three case studies focused on artisanal cheese production were selected, because they are at different CTM negotiation and operation stages: i) *Queso Bola de Ocosingo (QBO)* has been produced for more than 90 years, mainly in Ocosingo, Chiapas, by ten cheesemakers (Agudelo & Cesín, 2013); they received the CTM in 2005, and it is currently not functioning; ii) *Queso de Poro de Balancán (QPB)* has been produced for more than 60 years in the Ríos region that belongs to the Tenosique, Balancán and Emiliano Zapata municipalities in Tabasco (Villegas de Gante et al., 2014); currently, there are 11 cheese factories in producer associations with a CTM since 2012; and iii) *Quesillo de Reyes, Etla (QRE)* has been produced mainly in Reyes Etla, in the State of Oaxaca for more than 130 years (Villegas de Gante et al., 2014); nine cheesemakers and three livestock farmers are associated in this group, and they have been negotiating the CTM since 2014; they already have the first draft of the rules of use.

Data and methods

In-depth interviews were carried out to document the CTM management and operation processes. Moreover, a census was performed for each case. A validated survey was applied, including open and closed questions to obtain demographic and production data and information related to complete network mapping (Hanneman & Riddle, 2005) at three levels: friendship, production support, and strategic.

According to Lin et al. (1981), social networks must have definable limits. In this study, social networks produced by the union or by having strong ties were analyzed, while the limit was defined as relationships that take place between the cheesemaker in the interview and the other actors of the production chain, such as non-associated cheesemakers, suppliers, clients, and advisers. Three sorts of networks were considered: i) friendship networks, built on relationships between cheesemakers and other actors deemed as friends; ii) production support networks, built on the relationships of cheesemakers with other actors whom they usually ask for technical information regarding cheesemaking; and, iii) strategic networks, built on mentioning actors as friends or not, who might help strengthen the family business.

Each producer was asked the following question to map the friendship network: "*of all the people related to the cheese-manufacturing activity, whom do you consider a close person or a friend you can trust to solve your personal problems*?" For the support network, the following question was asked: "*of all the people related to the cheese manufacturing activity, whom do you look for when you have a technical problem related to cheese manufacturing?,*" and for the strategic network, the question was the following: "*of all the people related to the cheese-manufacturing activity, whom do you consider as a strategic actor that can help you improve the family business?* Actors present in the social structures in all three cases correspond to producers that belong to an association (PR), referred producers not registered in the cheesemaker association (PRR), suppliers (PV), and clients (CL). Questions were framed in a specific context of the relationship between the actors; therefore, there could be an inevitable subjectivity that cannot be measured, becoming a limitation in the study.

Networks were plotted as a function of three attributes: i) perception of each actor regarding the progress in the negotiation or operation of the CTM, evaluated in an ordinal scale from 1 to 3 (1: bad; 2: poor or stagnated; and 3: good), and represented in the shape of the node (1: circle; 2: triangle, 3: box; actors represented with a square are referred to, i.e., those reported by the cheesemakers but not interviewed); ii) proportion of milk dedicated to the of the CTM cheese production (existing in *QPB*, not functional in *QBO*, and in process in *QRE*), which depicts its importance in the production unit (cheese producers who dedicate a large proportion of milk to the cheese manufacture of the CTM, have more incentives to relate with their colleagues; and iii) the relative importance of the producer in the total cheese production of the association or producer group (represented as a function of the node size; larger nodes represent the most important CTMs of cheesemakers). Larger producers are expected to have greater prestige inside the networks.

Data processing for network analysis was done using UCINET 6, version 6.288 (Borgatti et al., 2002). Network indicators calculated with this software are presented in table 1.

Table 1. Indicators for the analysis of the social skill of the networks

Indicator	Definition	Source
Size	The total number of nodes in the network.	Hanneman (2001)
Number of connections	The sum of social connections among the actors (nodes) in the network.	Wasserman and Faust (1994)
Degrees	The sum of the connections found for a single node. Out-degrees are the sum of connections coming out of the node towards other nodes in the network. In-degrees are the sum of connections a node receives from the other nodes.	Hanneman (2001)
Isolated nodes	Unconnected nodes, without inward or outward connections.	Wasserman and Faust (1994)
Density	The proportion of actual connections of the total number of possible connections.	Borgatti et al. (2002); Hanneman (2001); Wasserman and Faust (1994)
Centralization index	Degree (number of connections received or initiated by a specific node), divided by the maximum possible degree; it varies from 0 to 100%. A centralization index with a value of zero (0) indicates that all the actors are connected with each other, and no actor centralizes the network. A value of one hundred (100) indicates that all inward and outward connections are concentrated in one actor, implying, in turn, high dependence of the network on this actor to function properly.	Borgatti (2005); Freeman (1978); Wasserman and Faust (1994)

Source: Elaborated by the authors

The following key actors were identified using the KeyPlayer software: i) disruptor actors (also known as structurer actors) are those capable of fragmenting the network because they can reach the highest number of nodes through direct connections or short routes, and ii) harvest actors are prestige actors referred by the highest number of nodes as friends, technical referents, or important strategic allies, i.e., these have the highest number of in-degrees (Borgatti, 2006; Borgatti & Dreyfus, 2003).

For the analysis of the general characteristics of producers and production units, parametric and non-parametric statistical tests were used, according to the measuring scale of the variable and its distribution. Variance analyses were made with Tukey's test for mean separation, applying Chi-square for dichotomous variables, and Kruskal Wallis for variables that did not fulfill the normality criterion; the statistical package SPSS 22 was used to carry out the analyses.

In addition, in-depth interviews were carried out to document the process and also the current state of negotiation and operation of the CTMs as valuing strategies.

Results

General characteristics of producers

Men and women manufacture artisanal cheeses in Mexico, and some gender specificities may be found. In this study, *QPB* is manufactured mainly by men, *QBO* primarily by women, and *QRE* by both women and men. Producers in all three cases are middle-aged and older, and, unlike other artisanal cheeses producers in the country, educational levels are higher, with an average of 13 years of schooling. It is also important to mention that in all three cases, more than 50 % of their income comes from cheese manufacture (table 2).

Table 2. Socio-productive characteristic of artisanal cheesemakers

Variable	Cheese type			
	QPB	*QBO*	*QRE*	Statistical estimate
Gender (%)				
Male	63.6	40	58.3	$X^2 = 1.289$
Female	36.4	60	41.7	
Age (years)	51.7 ± 13.7	57.9 ± 9.18	49.7 ± 8.3	$F = 1.693$
Schooling (years)	13.2 ± 7.15	13.6 ± 7.55	12.9 ± 5.92	$F = 0.027$
Time as an association member (years)	9.4 ± 1.57^{b}	2.5 ± 1.55^{a}	3.6 ± 0.51^{a}	$F = 56.435$ ***
Founding associates (%)	45.5	60	58.3	$X^2 = 0.556$
Time as a cheese producer (years)	15.2 ± 11.66^{a}	32.6 ± 15.53^{b}	27.4 ± 13.46^{ab}	$F = 4.616$ *
Time of operation of the cheese factory (years)	30.3 ± 24.55^{a}	31.4 ± 26.9^{a}	72.4 ± 45.03^{b}	$F = 5.535$ **
Monthly production (kg)	936.4 ± 959.6	1063.7 ± 1434.3	923.3 ± 1383.9	$H = 1.04$
Proportion of production dedicated to the CTM cheese (%)	70 ± 25^{a}	40 ± 30^{ab}	32 ± 30^{b}	$F = 4.571$ *
Sale price of the CTM cheese per kilogram+	7.6 ± 1.1^{ab}	8.5 ± 0.8^{b}	6.5 ± 0.7^{a}	$F = 10.149$ **
Proportion of income obtained from cheese manufacturing (%)	51 ± 36	65.5 ± 32	63 ± 38	$F = 0.516$
Monthly gross income+	5,270.4 ± 3,063.6	5,152.0 ± 4,356.1	3,648.0 ± 2,898.5	$F = 0.790$

Means with a common letter are not statistically different. Significance: $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

+ In US Dollars. Exchange rate: 18.2064.

QPB: *Queso de Poro de Balancán; QBO*: *Queso Bola de Ocosingo, QRE*: *Quesillo de Reyes, Etla*

Source: Elaborated by the authors

As it can be observed, *QPB* producers have been associated longer, but they have been cheese producers for a shorter time (a characteristic they share with *QRE* producers), and, like *QBO* producers, they dedicate a more significant milk portion to the production of the CTM cheese. *QRE* producers have the oldest factories (more than 120 years in the activity) and the lowest sale price compared to the *QBO* producers that share all their characteristics with either one or the other group.

As in all three cases, between 10 and 12 liters of milk are required to produce one kilogram of cheese; the characteristics of each territory may account for the difference in price between *QBO* and *QRE*. According to the interviewed cheesemakers, in Oaxaca, the cheeses that imitate *Quesillo* and are manufactured in other states and introduced into Oaxaca, force artisanal cheese producers to lower their prices to meet this competition. In the case of *QBO*, because the number of

producers is small and they do not have to face imitation problems —since it was not mentioned in the interviews— the cheese can easily be sold at a higher price.

Case study 1. *Queso Bola de Ocosingo* (*QBO*)

Negotiation and operation of the CTM

The CTM originated as an initiative of *Secretaría del Campo* (SC) [Country Secretariat] that belongs to the municipality. Aligned with development proposals for the State of Chiapas to promote its products, the SC gathered ten producers, members of families traditionally engaged in cheesemaking, under the idea that a denomination of origin (DO) would allow them to value the cheese and obtain economic resources from the government, resulting very appealing to cheese producers. During this SC process, they approached *Instituto Mexicano de la Propiedad Industrial* (IMPI), looking for advice regarding marks and patents. The IMPI recommended negotiating a CTM, because it was a much more straightforward procedure, since it does not require the formulation of an Official Mexican Regulation, and its management remains in the hands of producers; the CTM was obtained in 2005. The same suggestion was offered to *QPB* producers, who were also looking for a DO to protect and value their cheese.

Another important actor in the CTM administration was *Universidad Tecnológica de la Selva* (UTS) [Technological University of la Selva], which gave support in creating the rules of use and recommended a uniform elaboration of the cheese that would represent all the producers. This was not achieved in practice, especially because some families disputed the origin of the cheese. During the first three years of the CTM operation, each partner was committed to supplying certain quantities of cheese to be marked with the CTM label, but without including any reference to whom had elaborated it. In an interview, a producer stated that the role of the university was only important in the design of the rules of use. However, after the CTM was granted, the institution stopped supporting the collective processes, which the producers criticized, since they were convinced to create a single brand, but they were left alone in the process.

Although producers accepted a label that represented everyone with a CTM, in the local market, each producer continued supplying his/her own clients with his/her own label. Conversely, the CTM cheeses were sold in regional and national fairs, and to Mexico City clients. To prevent individual cheese brands from being sold and to strengthen the CTM, in compliance with the recommendation given by UTS with the support from SC and *Secretaría de Desarrollo Social* [Secretariat for Social Development], in 2009, producers obtained resources for the project with which they built a factory for the joint production of the CTM cheese.

However, the only thing that changed was that the producers contributed with part of their milk, instead of providing cheese; they agreed on who would coordinate the activities in the factory. This situation went on for about three years until 2011, when they jointly decided —without any accompaniment of the institutions that had helped them obtain the CTM— to close the factory and temporarily suspend the CTM management. This occurred because they did not have enough milk to supply their individual productive needs and the collective ones. In 2015, the CTM should have been renewed at IMPI, but it was not; moreover, the equipment of the factory was distributed among the five cheese dairies left. Currently, producers still sell the cheese in local and regional markets, and even some supply specific niches in Mexico City, but they do it individually.

Social networks and key actors

The social networks identified were very small with scarce interaction among actors, a feature that can be observed in the friendship network fragmentation and in the majority of isolated nodes in the productive support network. The strategic network shows higher interactions among producers (figure 1).

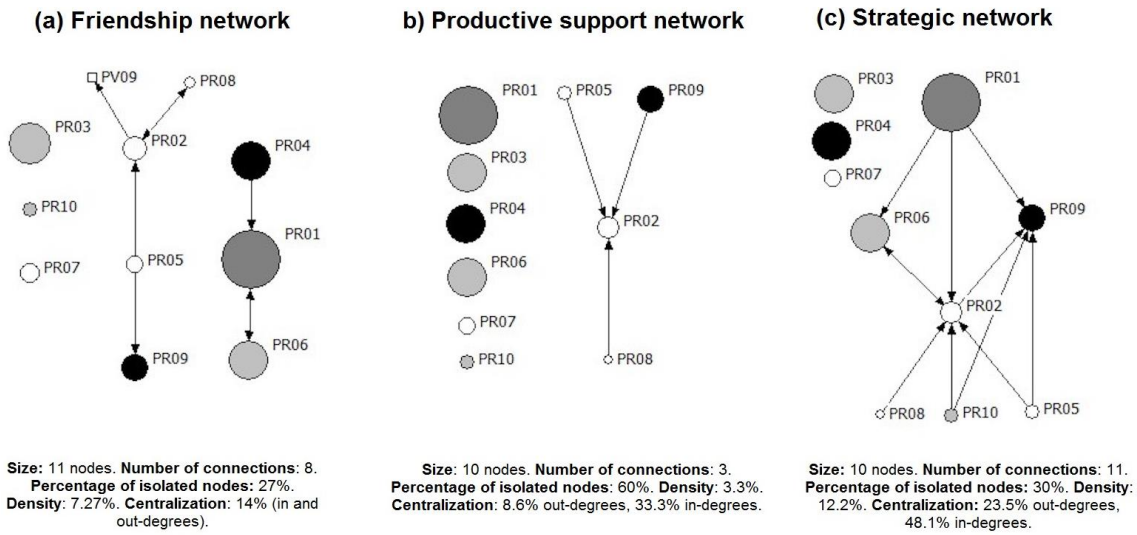

Figure 1. Social networks of *Queso Bola de Ocosingo* (QBO) producers.
Source: Elaborated by the authors

The low density of the networks reflects the scarce interactions among actors, with 0.7, 0.3, and 1.1 direct relationships on average in the friendship, productive support, and strategic networks, respectively. This may be a consequence of excluding producers from using the CTM (only 50 % of the cheesemakers finalized the CTM operation), and the malfunctioning of collective activities, generated strong divisions among them. Even so, the cheesemakers recognize the existence of their colleagues as strategic potentials to help improve their production unit.

It is essential to notice in the productive support and strategic networks, that the centralization indices are higher because most of the in-degrees are concentrated in a few nodes, mainly PR02, PR01, and PR09. PR02 is a prestige actor in both the friendship and productive support networks, as well as a structurer (disruptor) in all the networks. PR01 is an actor of prestige and structurer in the friendship network, and PR09 is a prestige actor in the strategic network.

In all three networks, PR02 is the one receiving more bonds; however, this actor was not a CTM partner, and, by the color and size of the node, he/she is not a technically important actor (provides 20 % of the milk to the elaboration of the CTM cheese and barely participates with 7.3 % of its total production). The social importance of this actor may be because he/she was not involved in the problems derived from the CTM management; besides, the results suggest that technical attributes are not necessarily linked to social prestige. This was verified with PR01, who provides 60 % of the milk to the elaboration of *QBO*; this actor is the main producer, contributing with 25 % of his/her production (large-sized node), and is a CTM partner; socially, this actor has no importance except in the friendship network in which he/she participates, appearing connected

mainly by out-degrees with other members of the CTM, especially with PR06 in the strategic network. This actor does not reciprocate even though they are kin.

Case study 2. *Queso de Poro de Balancán* (*QPB*)

Negotiation and operation of the CTM

The CTM idea came from an employee of the State's government, that saw the great potential of the cheese as a business. He successfully grouped the cheese dairies to form a producer association, becoming president after finishing his labor as a public servant. Simultaneously, with the support of *Fundación Tabasco* [Tabasco Foundation], the producers received training related to DO, CTM, and association figures.

As expressed in the in-depth interviews, cheesemakers benefitted from a project funded by *Consejo Nacional de Ciencia y Tecnología* (CONACYT) [National Council for Science and Technology], enabling them to afford the application process of the CTM. This process started in 2008 and concluded in 2012. Unlike the procedure followed by *QBO*, the one of *QPB* functioned as an 'umbrella' mark. Each producer went on with his/her mark, but under the shelter of the CTM seal as quality warrantor. However, according to the interviewed producers, producers' operation reflected the president's intentions of obtaining personal benefits over the collective needs. This implied a deviation of funds and the nonfulfillment of the agreed commitments regarding the issues to which the project would be dedicated. This situation ended with the expulsion of the president from the association and with a deterioration of the social structure among the partners. Once a new president was elected, his main task consisted in justifying the exertion of 60 % of the project's resources; with a leadership description different to the former one, he was able to make the most out of the remaining 40 % to achieve the collective objective of "strengthening the production of *Queso de Poro de Balancán*" through the CTM, training, and technology transfer activities.

Regarding the operation of the CTM, the first two years delivered positive results. As this was the first CTM in Tabasco, it gave them the prestige to promote the cheese inside and outside the State, and, thus, better sales were obtained. Nevertheless, due to the bad reputation resulting from the management of the previous president, the lack of support from local and state public entities continued, and CTM promotion and positioning activities were suspended. The CTM entered a standstill period, because in spite of being the goal of the CTM to be an umbrella brand, when vouching for individual labels, only one producer used it to support his/her product. The rest continued using their own labels without including that of the CTM.

Social networks and key actors

Despite internal conflicts in the association, the social networks show a larger number of interactions compared to those of the CTM of *Queso Bola de Ocosingo*. The presence of suppliers is more important, as is that of other referred producers (PRR- cheesemakers not registered in the association, and some *QPB* producers) and clients (figure 2). The existence of PRR cheesemakers occurs because when the interview was conducted, there were reports of links with producers that were not in the association or who left it when the first president was expelled.

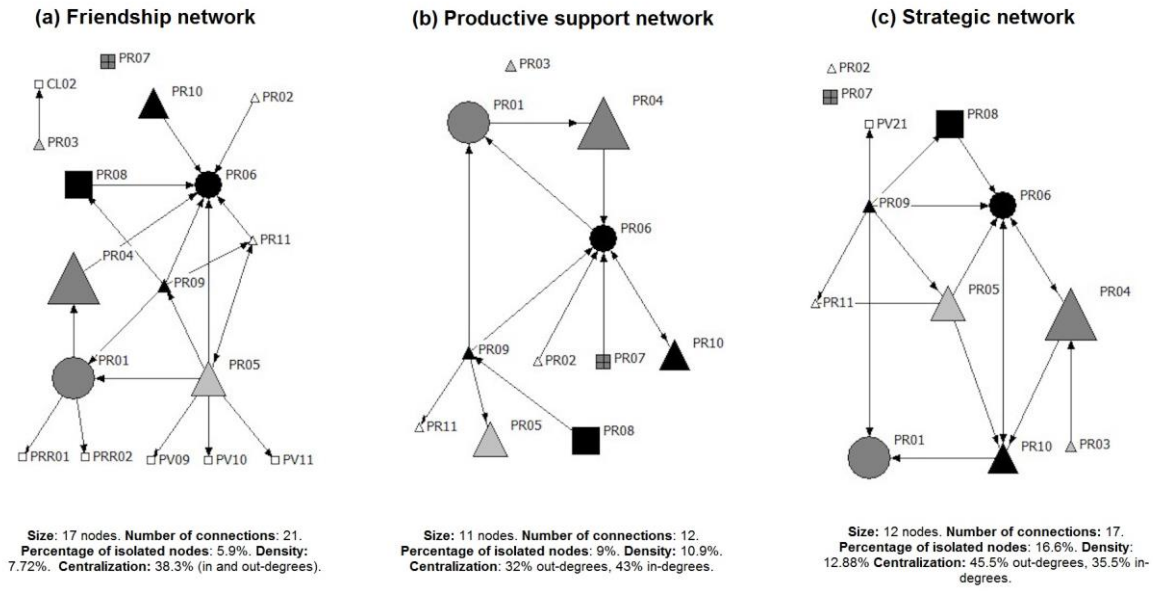

Figure 2. Social networks of *Queso de Poro de Balancán* (*QPB*) producers.
Source: Elaborated by the authors

Direct connections in these networks are greater than those in *QBO*, with 1.2, 1.1, and 1.4 for the friendship, productive support, and strategic networks, respectively. Centralization indices are also higher, indicating that most of the connections concentrate on a few actors, being PR06 the most prestigious actor in all three networks (considered the most referred friend by most nodes, the main technical referent, and an important strategic actor). He is also the main structurer actor of the productive support and strategic networks. PR06 is a key actor in the social structures of the group. As he is the second president of the association, he was able to consolidate a reputation as a reliable person; further, this actor also enjoyed technical importance, as he provided 80 % of the milk to the production of the CTM cheese, and contributed with 11 % of his production to the group.

PR08, PR09, and PR10 provided more than 90 % of their milk to the elaboration of the CTM cheese, and together with PR04, PR01, PR05, and PR10, contribute with more than 70 % of the total cheese production in the association, being technically more important than PR06. Nonetheless, combined with his social importance, PR06 is the most influential actor in the association. However, his scarce out-degrees (zero (0) in the friendship network, one (1) in the productive support network, and two (2) in the strategic network, reflect his wearing out as the group leader.

PR05 is also an important actor; he/she is the main structurer in the friendship network, providing 40 % of the milk to elaborate the *QPB* and participating with 14.5 % of its total production. Although he/she received barely three in-degrees (one in each network), this is probably due to the geographical location of his/her production unit (60 kilometers away from Balancán), making him/her the actor with the lowest access to other producers.

Case study 3. *Quesillo de Reyes Etla* (*QRE*)

CTM negotiation

QRE producers have been negotiating the CTM since 2012, but unlike the other two cases, their collective activities began before that year. Following an initiative of a local government, in 2011, nine producers gathered to resume the realization of the fair called *Feria del Queso y del Quesillo* (carried out only once in 2003) with the objectives of reactivating cheese production, promoting the authentic *Quesillo*, and differentiating it from imitations produced mainly in Puebla and Chiapas, and sold at a lower price in the local market of Oaxaca. Given the good results obtained with the fair, these producers decided to seek support from government programs to continue with it, and preserve the productive activities.

These cheesemakers approached the possibility of obtaining a CTM with the help from universities, which have supported them previously with training programs related to CTM and DO. One of these institutions proposed the producers to begin negotiating the CTM as a strategy to differentiate the product from imitations, presenting the first version of the rules of use in 2015. Like the *Queso de Poro de Balancán* CTM, this one would function as an umbrella mark sheltering the personal label of cheesemakers.

Presently, the fair is the most important collective activity, and the administration of the CTM, according to most producers, is at a standstill. Meanwhile, the problem of imitation-cheese sales has permeated their productive activities. Paradoxically, because they are not able to meet the demand generated by the affluence of visitors during the three-day event, most of the cheesemakers sell, besides the authentic *Quesillo*, imitation cheese, for which they get at a lower price; further, they do not inform the costumers about the differences concerning the quality of each of the two products. They consider that the CTM would help them value it internally and avoid entering the game of imitators and deceiving the consumer, besides improving the *QRE* market conditions.

Social networks and key actors

Like the *QPB* networks, the one for *QRE* shows a higher number of interactions among the actors, involving the association's cheesemakers, suppliers, and clients (figure 3). This is the reason why direct connections per actor are higher compared to *QBO*, with 1.4, 0.7, and 1.3 for the friendship, productive support, and strategy networks, respectively.

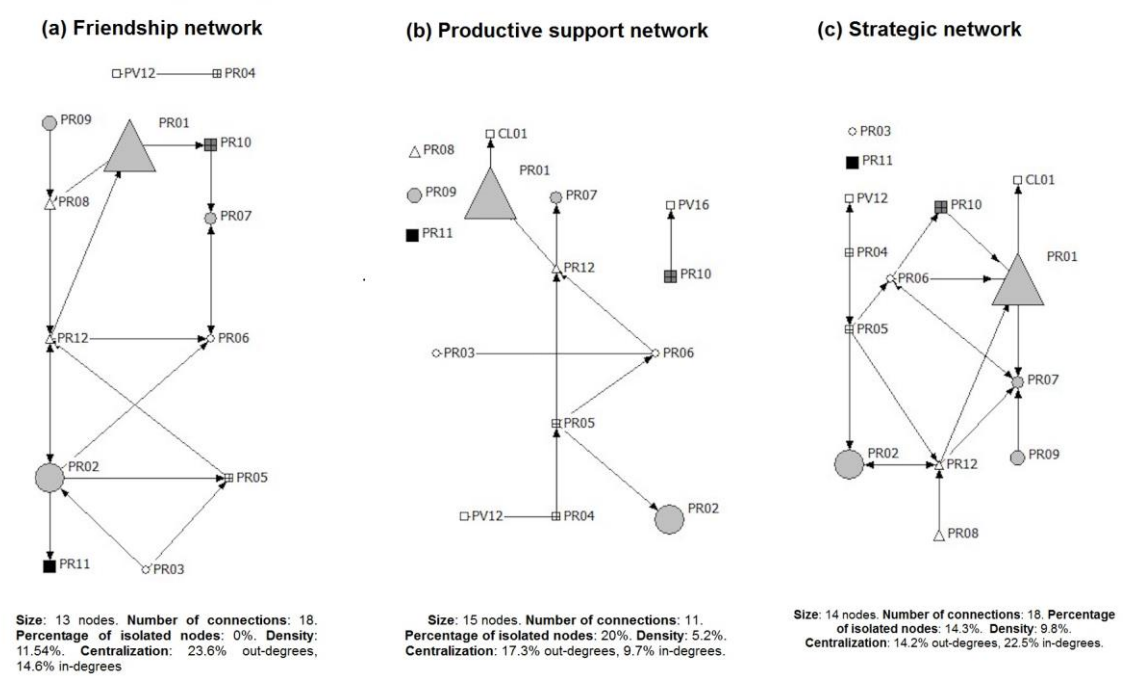

Figure 3. Social networks of *Quesillo de Reyes Etla* (*QRE*) producers.
Source: Elaborated by the authors

In the network structure that is more dispersed compared to the other two cases, and with lower centralization indices than those found in *QPB*, a greater distribution of the relationships is observed among the nodes, reflected in a larger number of key actors identified: two cheesemakers (PR07 and PR12) and two livestock farmers (PR05 and PR06).

PR12 was the main structurer in the friendship network, and he/she enjoys the greatest prestige in the productive support network, justified by his/her 40-year experience as a cheesemaker, and by the seniority of his/her family's cheese dairy (150 years); this, together with being the current president of the association, makes him/her a socially key actor. PR07 was referred to as the main actor of prestige and a structurer in the strategic network; although he/she only has 15 years as a cheesemaker, his/her family has seniority in cheese dairy production (150 years). This actor was referred to by his/her colleagues, as a producer that prioritizes cheese quality, being one of the few that has not sold imitation cheese in fairs.

Among the livestock farmers, PR06 stands out as the most reliable person in the friendship network; this may be due to his/her ability to build personal relations with others, as he/she offers veterinary services. PR05 is the main structurer in the productive support network because he/she is linked to important nodes, such as PR12 and PR06, and he/she allows the connection of PR02 and PR04, who would be isolated in his/her absence.

Regarding the most important technical actors, none coincide with those socially most referred. PR01, PR10, and PR11 are the actors who dedicate the highest percentage of milk to *QRE* manufacture (46 %, 50 %, and 100 %, respectively), expressed in the darker shade color of the node, while most of the *Quesillo* that is manufactured among the association's cheesemakers is provided by PR01 and PR02 (50 % and 25 %, respectively), expressed in the larger size of the node.

Discussion

All the networks assessed are small social networks, built mainly by producers with little interaction among them, probably related to how the collective processes were gestated. If what was initially wanted for *QBO* and *QPB* was to achieve a PDO, the CTM was a half-way result of the process. This is similar to what happened with *Queso Cotija* that through suggestions of IMPI, only got the CTM, interpreted at that point as a half victory, since they did not obtain the PDO (Barragán & Linck, 2015) or the CTM, just as most of the cheesemakers that started the process (Barragán & Torres, 2014).

The results of the current research suggest that despite protecting Mexican artisanal cheeses through PDO, it is also necessary to consider that if a CTM does not function properly, even if its administration is simpler than that of a DO, the latter would be an unlikely solution to the cheese devaluation problem. This is because artisanal cheeses, due to their production characteristics, have a restricted capacity to reach the market, usually local, where the seals are not as important, beyond the bonds of trust between producers and consumers. Bowen (2010) studied the PDO for Tequila in Mexico, and found that the strategy does not work for all the actors, especially for small tequila producers, which, owing to their characteristics, commercialize their products in the local market. In this sense, having the reputation and the cheeses' territorial link is not enough to ensure the functioning of these quality seals. Social cohesion between the actors is needed to defend collective interests over those of individuals.

According to Ostrom (2011), the collective work operation implies, among other things, that the common resource is sufficiently important for the actors to be an incentive for working together. In all the three cases studied, more than 50 % of the family revenues come from cheese dairy, indicating its economic importance for the families and the region where they are elaborated (Villegas de Gante et al., 2014), and should be enough to propitiate collective actions. Nonetheless, in the cheese dairies, other types of cheese are also elaborated as a strategy to facilitate the sale in local markets, and the CTM is only one of these, and it is not always the one that is primarily produced in the production units (especially in the cases of *QBO* and *QRE*).

The CTM as a common strategy for those producing *QBO* was not important because the supporting institutions, in this case, Universidad de la Selva, did not consider the importance of the family history in cheese production when proposing a single brand to protect individual production. Given this, its failure, marked in the networks by the form of the node, and by not renewing it in 2015, was due, on the one hand, to a greater weight assigned by the producers to the individual history of each family in the elaboration of the cheese, so no cheesemaker wanted to give up his/her own mark and prioritize the CTM cheese. Further, neither wanted to stop elaborating other types of cheese; thus, the CTM became just another mark to compete against, especially for resources, as each producer provided milk to supply their individual needs, and only if there were surpluses, these were sent to the factory, as it was sold outside of the municipality. On the other hand, the CTM's failure was due to the lack of continuity in the accompaniment of the supporting institutions that made a vertical creation out of the CTM, that is, a goal in itself (Agudelo López et al., 2017). Thus, for *Secretaría del Campo* to fulfill the state's policy programs, it only needed to report the CTM as an accomplishment, rather than strengthening the cheese's productive process. This took the cheesemakers to the temporary use of resources, wearing them out (Sgarbi Santos & Menasche, 2015); hence, producers continued on their own, distanced from each other and even from their relatives.

The importance of the family nucleus and kin relationships has been outstanding in the know-how transmission processes and in the permanence of the Mexican artisanal cheeses (Cervantes Escoto et al., 2013; Grass Ramírez et al., 2015). However, in the case of *QBO,* these relationships deteriorated, as observed in the absence of connections in all the networks between PR08 and PR09, who are siblings and CTM associates. PR08 withdrew three years after the CTM had been obtained (its use was stopped in 2011); five years later, these actors are still distanced. The same thing happened to PR02 and PR10, who are cousins and do no relate as friends or technically; PR10 was in the CTM, but he/she withdrew with PR08, arguing arbitrariness in the management practices of the directive committee, and, in the end, his/her dissatisfaction was reflected in his/her distancing from relatives and other cheesemakers. Given the above, this group's social structures are the most deteriorated in all the three cases analyzed.

The other two cases, even though their social structures are also small, presented a higher number of interactions. In the interviews, *QPB* producers state that the CTM is important; they feel proud of it because they participated actively in its negotiation. However, the lack of support from institutions, the impact of an adverse leadership, and the little commitment of the other producers, converged in its halting (64 % of the nodes are represented with triangles), to the point that only one producer uses this label accompanying his/her personal label. This situation, added to finding that *QBO* producers sold the CTM cheese to external markets, while individually they continued supplying the local demand, is a reflection of the unnecessary use of the CTM in local markets, where informal relationships of trust between producer and consumer prevail (Sgarbi Santos & Menasche, 2015).

Additionally, in the case of *QPB*, some cheesemakers were neither part of the association nor the CTM; further, some of them were referred to in the networks as PRR, because they were never part of it or because they left with the first president. This situation, in turn, weakened the association. Therefore, it was unable to act as a collective when asking for governmental support or other agencies to strengthen its structure, adding to the stagnation and restrictive positioning of the CTM.

QRE producers consider that the CTM could help them valorize their product that is probably the most imitated in the country, so that, internally, they would not resort to selling inferior quality cheeses, and would not offer them as if they were authentic *Quesillo*. This would harm the prestige of the product and the reputation of cheesemakers (Crespo et al., 2014). Moreover, externally, they would be able to differentiate the product from those introduced from other states. However, the details of the CTM progress were hardly known by the associates; some members (33 %) considered that the CTM negotiation was going well, represented in the networks as boxes; the remaining, evaluated it as bad and not so good; this reflects an absence of timely information flows which, if corrected, could energize the interactions in the networks (Borgatti & Halgin, 2011; Lin, 1999). Furthermore, the experience in the country of four CTMs achieved for artisanal cheeses, none of which is functioning, including the one for *QPB* that is at a standstill, should call the attention of both producers and support institutions to reformulate the strategy or outline objectives that consider the CTMs limitations in local markets (Agudelo López et al., 2017).

The operation of quality stamps linked to origin demands is continuously working in their defense, i.e., watching that it is not used by producers alien to the association, and promoting and constructing social structures among actors (Macías & González, 2015). This requires a tremendous amount of economic and social resources as well as time, scarce in most small-scale producer organizations. Cheese-manufacture, being the primary source of revenue, consumes most of the time of producers; that is why they are rapidly worn out when they participate in collective projects.

This is aggravated by a deficit in economic resources to cover the needs related to the development and invigoration of these projects, and, in the face of a lack of permanent institutional accompaniment, at least until achieving the stability in the operation of these seals, producers have to assume related expenses; the CTM, hence, stops being attractive, especially when the costs are higher than the benefits. This is important, if local governments are in charge of managing CTMs, as was the case of *QBO*. Support after attaining a brand is critical for its consolidation in the community because if there is no collective appropriation, it is more challenging to continue with the project when external agents leave.

Furthermore, as noticed in the case of *QBO*, the use of public resources was the incentive to associate and then, the cause of the deterioration of social relationships between cheesemakers, as individual interests prevailed over collective ones, i.e., to promote the CTM jointly. This was also noticed in *QPB*, with the first president's intentions, who prioritized his own interests. Something similar happened among the cheesemakers from Aculco (State of Mexico, Mexico), where the collective action strategy was dominated by family power structures with individualist interests (Crespo et al., 2014).

By plotting the networks in function of the milk percentage used by each producer to produce CTM cheese (node size) and comparing it with harvest actors (social prestige), interesting results were found in the three cases analyzed. The most centralized network was *QPB*, with the presence of a key actor with technological and social weight (without being the largest producer). This relationship was not so evident in the other cases. In *QBO*, PR01 is a technically outstanding producer, but he/she does not have enough social force compared with PR02; and in *QRE*, the important technical actors were different from the social ones. In this last case, although the activity is developed as much by men as by women (table 2), gender seems to play a vital role in the social structure. The most important social actors are men, while 75 % of the identified technical actors were women. This can be explained by practices related to regional uses and customs, such as self-government forms developed in indigenous communities, where most of the posts are filled by mature and renowned persons of the community, especially men (Carlsen, 1999). Thus, the findings in the identification of key actors suggest that technical attributes are not always ideal for identifying the most influential producers in a group.

Enríquez-Sánchez et al. (2017) found that production scale and geographical distance influenced the social structures of the producers of *Queso Crema de Chiapas*. However, in the current network study presented here, no clear tendencies are observed in the most powerful connections. In *QRE*, PR01 and PR02 contributed 75 % of the total cheese production, and they are not connected directly in any of the networks. In *QBO*, 71 % of the production was provided by four producers; some were linked in the friendship and strategic networks, but isolated in the productive support network. Likewise, 71 % of the *QPB* production was endowed by four actors (PR04, PR01, PR05, and PR10), and while a higher number of them were connected in the networks, they were all linked to PR06 in at least two of the networks analyzed. This is probably because the production scale, except for *QRE* producers, is not as large as the one found in the cheesemakers of Chiapas.

Regarding the geographical distance, in other studies, it was not decisive to propitiate social bonds among producers (Crespo et al., 2014; Grass Ramírez et al., 2015); this suggests that social structures should be analyzed as a function of the particular conditions of each environment. For example, in *QPB* producers, the location of the production units could influence the social relating of actors (45 % of the producers are located more than 15 km away from the Balancán municipality); PR04 and PR05 outstand other actors, being even more critical productively

compared to PR06; together, they could propitiate further relating in the networks. In the other two study cases, 100 % of the cheese dairies are located in urban areas.

Finally, it is essential to mention the high percentage of isolated nodes found in the networks, especially in *QBO*; this may reflect a rupture in the relation among the cheesemakers, affecting information flows. This, in turn, and according to Crespo et al. (2014), prevents the union of all members in collective action. As it is the result of the CTM failure in the *QBO* as a collective strategy, this situation should be considered when planning possible interventions in the group. Also, a lower percentage of isolated nodes in the friendship network suggests that actions can still be carried out to strengthen the productive activity of cheesemakers, while understanding that personal relations are the basis for generating other types of interactions (Enríquez-Sánchez et al., 2017).

Conclusions

The particularities detected in each case allowed understanding the impact on the social structures of CTMs, from their negotiation as a starting point, as valorization strategies, and confirming the episodic character of each case. The failure of the CTM of *Queso Bola de Ocosingo* allows inferring that if it is promoted or managed by external actors without appropriation by cheesemakers, internal conflicts arise and internal (strong) social networks deteriorate.

The negotiation of the CTM of *Queso de Poro de Balancán* as a result of a project operation in which an external actor (former government employee) —who later formed part of the group— sought individual benefit, provoked the wearing out of important actors for the association, and the CTM eventually ceased. However, the social structure among producers is not as deteriorated as in the case of *Queso Bola de Ocosingo*, and it is still possible to strengthen it. Nevertheless, to do this, it is necessary to activate all the actors' participation, linking those who are geographically isolated.

Two advantages are observed in *Quesillo de Reyes Etla* compared to the other two studied cases. First, the group had a collective start by its own initiative (it was not induced), and second, there are two links in the association, both socially important in the networks. These become more solid social relating conditions that are barely distinguishable in the *Queso de Poro de Balancán*, but could still be strengthened by promoting women's greater social participation, given that they are technically important actors.

As verified in this research, it is necessary to develop valorization strategies conceived from the very internal dynamic, as CTMs vertically created from government offices with no appropriation by the producers cease working when resources run out.

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All the authors made significant contributions to the document and agree with its publication; further, they all declare no conflicts of interest in this study.

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