



DYNAMICS OF INSTITUTIONAL RURAL SOCIAL NETWORKS AND THEIR CONTRIBUTION TO SOCIAL CAPITAL IN A COLLECTIVE OF *THEOBROMA CACAO* L. PRODUCERS

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Abstract:

Farmers of *Theobroma cacao* L. from the municipality of Belén de los Andaquíes, affiliated with ASOPROABELEN, have managed to establish various internal and external social networks that have strengthened their organic cacao production system, undertaking exercises in organization and both national and international marketing of the cacao bean. However, despite their significant organizational and financial achievements, there is no clear understanding of whether these relationships with institutions have enhanced their stock of social capital as an organized collective. This research focuses on the study of this group's institutional rural social networks and their contribution to social capital. It is a quantitative study; data were collected through questionnaires, and surveys tabulated in spreadsheets and then processed using Excel and the UCINET software version 6.0. Among the most important findings, the collective that participated in the research has built institutional social networks from which they have obtained various benefits. However, these relationships tend to be short-lived and lack continuity.

Keywords: social networks, links, social capital, cocoa growers

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DINÁMICA DE LAS REDES SOCIALES RURALES INSTITUCIONALES Y SU APOORTE AL CAPITAL SOCIAL EN UN COLECTIVO DE PRODUCTORES DE *THEOBROMA CACAO L*

Resumen

Los cultivadores de *Theobroma cacao L.* del municipio de Belén de los Andaquíes, afiliados a ASOPROABELEN, han logrado establecer diversas redes sociales internas y externas que han permitido fortalecer su sistema de producción de cacao orgánico, desarrollando ejercicios de organización y comercialización nacional e internacional de la almendra. No obstante, a pesar de sus grandes logros organizativos y financieros, no se tienen claridades acerca de si esos relacionamientos con instituciones, que han logrado establecer ha favorecido su acervo de capital social como colectivo organizado. Esta pequisa, se detiene en el estudio de las redes sociales rurales institucionales de este colectivo y su aporte al capital social. Es una investigación de tipo cuantitativa, los datos se produjeron a partir de cuestionarios y encuestas tabuladas en hojas de cálculos y después procesadas en el programa Excel y también el software de redes UCINET versión 6.0. Dentro de los hallazgos más importantes se tiene el colectivo participante de la investigación ha construido redes sociales institucionales a partir de las cuales han obtenido diversos beneficios, sin embargo, el relacionamiento resulta muy corto y sin continuidad

Palabras Claves: redes sociais, links, capital social, cacaicultores

DINÂMICA DAS REDES SOCIAIS RURAIS INSTITUCIONAIS E SUA CONTRIBUIÇÃO PARA O CAPITAL SOCIAL EM UM COLETIVO DE PRODUTORES DE *CACAU THEOBROMA L*

Resumo:

Os produtores de *Theobroma cacao L.* do município de Belén de los Andaquíes, afiliados à ASOPROABELEN, conseguiram estabelecer várias redes sociais internas e externas que lhes permitiram fortalecer seu sistema de produção de cacau orgânico, desenvolvendo ações de organização e comercialização nacionais e internacionais. a amêndoa. No entanto, apesar de suas grandes conquistas organizacionais e financeiras, não há clareza sobre se essas relações com as instituições que conseguiram estabelecer favoreceram seu estoque de capital social como coletivo organizado. Esta investigação detém-se no estudo das redes sociais rurais institucionais deste grupo e no seu contributo para o capital social. É uma pesquisa do tipo quantitativa, os dados foram produzidos a partir de questionários e pesquisas tabulados em planilhas e posteriormente processados no programa Excel e também no software de rede UCINET versão 6.0. Entre os achados mais importantes, o grupo participante da pesquisa construiu redes sociais institucionais das quais obteve diversos benefícios, porém, a relação é muito curta e sem continuidade.

Palavras chave. compromisso com o trabalho; demandas de trabalho; latitude de decisão; estresse no trabalho; bem estar.

1. INTRODUCCIÓN

Cocoa is not one of the most common production systems on the farms of Caqueteños, nor does it cover the largest areas established on rural properties. Furthermore, there is no clarity and certainty about the established extensions, whether in growth or production. Charry et al. (2017) highlighted this after conducting an exhaustive analysis of the cocoa chain in Caquetá:

FEDECACAO reported that, in 2016, the department had 1,350 ha planted; in contrast, the National Agricultural Census recorded 2,088 ha for the same period (DANE, 2016), and the Departmental Agriculture Secretariat of Caquetá (2017), in the Municipal Agricultural Assessments (EVA), reported more than double (approx. 4,300 ha). On the other hand, the chain stakeholders and the region's main associations estimated in 2017 that there were about 1,700 ha established (p.7).

Regarding the extensions in production, the figures also differ significantly, as the Departmental Agriculture Secretariat of Caquetá (2017) reported an area of 1,434 ha; Agronet (2014), 1,693 ha; and DANE (2016), 1,715 ha, respectively. The 2016 EVA reported 1,768 ha in the production stage, while farmers believe that of the 1,700 ha established, probably 600 to 700 ha are in production.

Nevertheless, despite the numerical uncertainties about the established cocoa area, it is clear that around 1,200 families are connected to this cultivation system whose legal income comes from the sale of cocoa beans. This has also allowed the establishment of institutions that cohere, empower, and generate regional identities, such as organized groups of growers and municipal committees of cocoa growers.

However, studies on the cocoa chain in the department have been primarily oriented towards statistical reports, numerical data, evaluations of agronomic performance, pests, diseases, fertilizations, carbon capture, etc., needing to pay more attention to the social and institutional analyses in which the crop is involved. In

Table 1, some of the most recent examples can be seen:

Table 1. Recent research related to *Theobroma cacao* in Caquetá

Document	Author
Sectoral Strategy for the Cocoa Chain in Caquetá, with an Agro-environmental and Zero Deforestation Focus	Charry, et al., (2017)
Agronomic performance of three cocoa clones in the nursery stage in the Colombian Amazon.	Sarmiento et al., (2011)
Morphological characterization of five clones of <i>theobroma cacao</i> l. in Cartagena del Chairá, Caquetá.	Bermúdez et al., (2015)
The cocoa strategy for the economic recovery of peasant families displaced by violence in the department of Caquetá.	Yáñez (2009)
Response of cacao (<i>Theobroma cacao</i> L.) seedlings to organic matter applications, liming, and phosphate addition in an oxisol of Caquetá.	Sánchez (1983)
Non-destructive estimation of the leaf weight and leaf area in cacao (<i>Theobroma cacao</i> L.)	Suárez et al., (2018)
Contribution of production systems to income generation in cocoa-	Velandia et al., (2005)

growing families, Department of Caquetá.	
ICA in Caquetá works to keep cocoa crops safe and healthy	ICA (2018)
Cacao clone will help reforest 25,000 hectares in the department of Caquetá in 2025	EMIS (2019)
Liming effect on macronutrient intake for cacao (<i>Theobroma cacao</i> L.) in the Colombian Amazon	Rosas et al., (2019)
Relationship between pH and nutrient availability for cocoa in an entisol of the Colombian Amazon.	Rosas et al., (2017)

Source: own elaboration

While this information is vital for decision-making regarding the crop, other matters, such as socioeconomic, political, cultural, and organizational conditions, could also contribute to the consolidation and success of the sector.

Similarly, various cocoa planting initiatives have been carried out with the farmers' resources and through projects from Municipalities, Provincial Governments, the Cocoa Growers Association-ACAMAFRUT, and various civil society organizations and international cooperation. This interaction of the department's cocoa sector with institutions, governmental and non-governmental entities has enabled the construction of work, friendship, and cooperation networks. From these networks, significant levels of trust have emerged, now formalized in the ASPROABELEN association.

ASPROABELEN is the association of cocoa growers in Belén de los Andaquíes. It is a non-profit organization founded on August 10, 2014, to represent and defend

the guild interests of associates and affiliates before official and private entities. This is achieved by promoting activities and programs that aim for the integral guild development of the associates, promoting participation in advisory, encouragement, and training, and introducing technological improvements in the various sectors pursued by affiliates and associates (USAID, 2020, p.1). Starting with 35 members, it now has 22 active members. Thanks to this association, the cocoa growers of Belén de los Andaquíes have established relationships with various institutions, some of a technical nature and others of a communal or organizational nature. Similarly, cocoa's technical, productive, and commercial matters have facilitated direct relationships between farmers, promoting the concept of neighborhood, path, and community.

In this way, internal and external relationships drive cocoa's technical, social, economic, and political reality. However, although there is clarity about the existence of these relationships, it is unknown whether, internally within the organization and among the peasants, there are power and influence networks of one actor over the others or if they constitute an open and democratic network. On the other hand, it is still being determined whether the institutions that have worked with this group have generated more social capital or, on the contrary, have caused harm, creating distrust and fragmentation. It is essential to remember that social capital and society's mobilization processes constitute the sustainable bases upon which territorial construction is built (Barbera et al., 2021).

Consequently, the research question is: What is the contribution of the institutional rural social networks in which *Theobroma cacao* L. growers from Belén de los Andaquíes participate in consolidating their social capital?

Now, considering that the study of rural social networks has gained importance over time, being one of the approaches often used to trace the internal and external connections of individuals and collectives, the need for this information is crucial. It allows an understanding of behavioral realities hidden at first

glance in groups and communities. Furthermore, these realities are responsible for how its members relate and whether some communities progress greatly or, on the contrary, the work developed with them becomes demotivating and draining.

Rural Social Network Analysis Approach -ARS

The social network theory draws from disciplines such as psychology, sociology, anthropology, and mathematics, which are believed to underpin its formalization and graph theory.

Lozares (1996) initially posits that, within the social network analysis approach, the social structure is a starting point to examine models of specific relationships that assemble social units, connecting individual and collective actors. The SNA approach aims to interpret the behavior of the actors, considering their positions, roles, and attributes within a social collective.

For Galván (2007), the network approach provides an analytical framework for examining micro-networks of interpersonal relationships that shape macro structures, encompassing large-scale social systems. Social Network Analysis (SNA) scrutinizes actors and the interdependence of their actions. The ties between actors form channels for transferring resources, which may or may not be tangible.

However, despite the broad spectrum of approaches to studying the rural environment, research involving farmer collectives often primarily addresses the technical-productive dimension, overlooking the social foundation underpinning the development process and mechanism. Similarly, it's forgotten that farmers aren't closed, isolated, negentropic islands; instead, they are surrounded by various organizations and institutions with which they maintain strong or weak, negative or positive ties. Their mode of interaction significantly determines the success or failure of undertaken ventures.

Cocoa farmers from Belén de los Andaquíes have different histories of how they came to this crop. While

part of ASPROABELEN, the organization that represents them, and having shared interactions with certain institutions or entities, it doesn't mean the relationships are of the same caliber and type. They also undertake internal tasks that foster relationship dynamics and strengthen the collective.

The information generated will undoubtedly address the collective needs of cocoa farmers to recognize their social reality. Amid the daily grind of managing the crop and cocoa beans, each farmer focuses on their tasks and individual property situations. Nonetheless, there's always a demand for consistent and effective information channels for farm-level decision-making. Knowing the dynamics of the networks in which each participates will undeniably allow them to identify the most effective information channel and determine which actor or institution channels and disseminates information.

In addition to the above, based on the findings obtained, organizations interacting with cocoa farmers can redefine actions with the collective. Clarity will be achieved on aspects to improve, correct, redirect, or strengthen, all in the pursuit of an efficient relationship and the implementation of operational plans, aiming for a congruent accumulation of social capital.

2. METHODOLOGY

The municipality of Belén de los Andaquíes is located in the southwest of the Caquetá Department, being part of the Andean-Amazonian foothills. The cocoa-growing community is affiliated with the Association of Alternative Agroforestry Producers of Belén de los Andaquíes - ASPROABELEN; there are 22 active members situated across 5 rural districts within the municipality.

This dissertation is grounded in the empirical-analytical research paradigm, given that reality is a particular situation that can be fragmented and studied through variables and sections. The research subject acknowledges the existence and separation of the object, with few elements left to subjectivity, as the study variables are quantified by the actors themselves (Gutiérrez, 2021).

The Method

Social and Productive Characterization of the Cocoa-growing Households Under Study

For characterization, a socioeconomic survey was administered to the determined sample, which in this case was 100% of the active member population of ASPROABELEN; the household member consulted was the cultivator in charge. The survey covered five chapters: 1. Social and family information of the household; 2. Community Institutional Information; 3. Organization and Associativity; 4. Cocoa production system; 5. Economic aspects of the household.

Determination of the Sample

Using the formula for determining the sample in finite populations,

$$n = \frac{N\sigma^2Z^2}{(N-1)e^2 + \sigma^2Z^2}$$

And with a maximum allowed error of 3% and a confidence level of 97%, it was determined that 22 surveys should be conducted.

The collected data was systematized in an Excel database, and from this, the respective variable crossovers and graphics for analysis were generated.

Analysis of institutional social networks in which cocoa-growing households participate

The Rural Social Networks Analysis (ARS) approach was used, which, according to Williner, Sandoval, Frias, and Pérez (2012), involves studying relationship patterns between different nodes or actors in a defined network. This type of analysis uses matrix and graph language to make their representation more comprehensible. Thus, actors are described in light of their relationships with others, not based on their attributes.

Then, following the methodology proposed by Hanneman and Riddle (2005) in their work "Introduction to Social Network Methods," information was gathered in the field through estimative questionnaires. This data was consolidated into asymmetrical binary, symmetrical, and attribute matrices. Subsequently, with the assistance of the UCINET network software, the respective graphs and structural and interaction analyses were developed, as detailed below for each case.

Network of relationships between actors and institutions in the study area: A questionnaire was completed with each actor, including fields for the producer's name and the name of the institution they relate to. This information was consolidated into a symmetrical binary adjacency matrix, where matrices from each producer were combined, recording the existence or non-existence of a relationship with each identified institution. This data was processed in UCINET, and the institutional social network involving cocoa-producing households was generated. An ensuing structural and interactional analysis was performed.

The institutional network between actors and institutions in the study area – technical assistance: An attribute matrix for technical assistance was created. Producers rated the technical assistance service received from each affiliated institution on a scale of 1 to 3 (poor, fair, excellent). The respective network was developed based on these ratings and the data from the symmetrical binary adjacency matrix.

The institutional network between actors and institutions in the study area – transparency and access to information: Producers rated their perception of transparency and access to information from institutions they relate to on a scale of 1 to 3, with 1 being the least transparent and 3 being the most transparent. The respective network was established using these ratings and the symmetrical binary adjacency matrix.

3. RESULTS:

Social and productive characterization of the cocoa-producing households under study.

The participant population consists of the families of 22 cocoa farmers from the municipality of Belén de los Andaquíes. Regarding their family composition, it can be said that they are small families, with an average of 2.8 people per family. The majority have only completed the early years of secondary school, or at best, only finished primary school.

The farms are located in 15 hamlets of the municipality of Belén, with no more than 2 farms per hamlet. The average area of these properties is 36 hectares, with a maximum of 85 hectares and a minimum of 1.5

hectares. This average is consistent with the national landscape, where according to Sarmiento (2015), land ownership is highly concentrated, with 78.03% in the hands of small farmers and plots not exceeding 10 hectares. However, the author adds, these lands represent "only 5.95% of the agricultural, livestock, forestry, and agro-industrial surface of the country and they form part of the 80% of the small farmers in the country who own less than a Family Agricultural Unit (UAF), that is, they have very small plots." (Segrelles, 2018, p.25).

Santana (2019), quoting former President Pumarejo, explains that property rights in Colombia are problematic because their distribution is inequitable and unstable. There has also been an issue of granting property rights with the involvement of illegal actors using coercive, political, and legal means to specify and enforce these rights.

50% of land ownership is credited by a purchase-sale document, a public deed with 41%, and an adjudication title with 9%. This situation limits access to bank loans and, in some ways, participation in collective benefit projects. The number of owners with public deeds matches the number of people with bank relations, which in this case is 9. Fortunately, no other forms of debt were recorded, such as loans from relatives or predatory "gota a gota" loans.

Financing machinery, infrastructure improvements, genetic material, technology, etc., are limitations faced by agricultural producers in the country. Loans are only possible for those with formal land ownership. Financial entities do not lend based on documents, titles, or purchase-sale promises, distancing small farmers from being competitive (Beck, 2009). For Sánchez (2021), these limitations are more pronounced for the poorest farmers; for this author, poverty doesn't allow effective credit demand, not to mention incentives. According to the BID (2010):

"To have these dynamics in more and more farms, restrictions on access to credit for rural producers need to be removed. At the same time, it's necessary to better distribute the benefits derived from technology,

to close the productivity gaps between large and small producers" (p.15).

The years of residence in the territory vary since property owners have been in the territory for many years - up to 50 years - and others who have just arrived - 1 year. With this disparity, ranges of stay in the territory were elaborated, and depending on the number of years, the number of families was located (Table 2):

Table 2. Years of permanence in the territory of the families in the study.

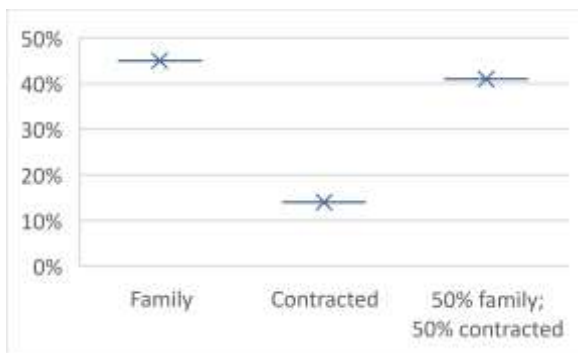
Range in years of stay in the territory	Families	Decade in which they arrived
From 1 to 9	3	2010-2020
From 10 to 18	5	2000-2010
From 19 to 27	3	1990-2000
From 28 to 36	1	1980-1990
From 37 to 45	5	1970-1980
From 46 to 54	5	1960-1970

Source: own elaboration

The decade in which they arrived can be seen in *Table 2*; the year of arrival in the territory by the study participants is quite varied. However, a trend can be identified: between 3 and 5 new families have arrived in the territory per decade. Notably, during the decade of 1990-2000, only one family's arrival in the territory was recorded, and from 2000-2010, only three families arrived. According to Vásquez (2015), between the years 1988 and 2012, there was a period he termed "contemporary violence." The coca boom drove migration to the Caquetá and Caguán river areas, which subsequently increased the power of the FARC in these regions of the country and heightened tension between the State and Civil Society. At that time, Belén de los Andaquíes and cocoa cultivation were not seen as attractive options.

The labor employed on the farms ranges from family to hired labor, and in some cases, a combination of both. The former is more common, while the latter is less representative. There were no cases where 100% of the labor was only contracted or greater than family labor. The prevalence of family labor in cocoa cultivation is consistent nationwide. According to the National University of Colombia, by 2010, cocoa already involved more than 2000 families in the country, characterized by the high demand for family labor (Biogestión, 2011). With access to better technology, agricultural workers could reduce the workdays spent on cultivation and undertake other income-generating activities on their farms (Espinoza, 2016).

Figure 1. Type of labor force participation Household economic aspects



Source: own elaboration

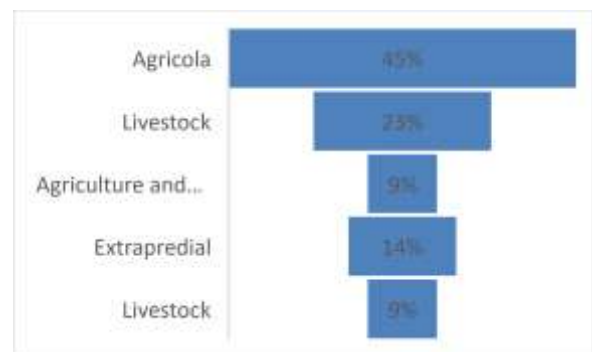
The production activities undertaken by the research participants on their lands are agricultural (45%), livestock (23%), mixed farming (9%), cattle raising (9%), and off-farm (14%). Like any rural production unit, they see diversification of production as a means to diversify their diet and income. However, this is contingent on individual farmers' interests and resource availability, determining their potential benefits per hectare (Dufumier, 1990).

Upon detailed inquiry about these broad categories, it was identified that the farm incomes originated from the sale of cacao, cacao and banana, milk and cacao, cattle farming, fish, fish and cacao, cacao, coffee, and sacha inchi, and sales of cheese, banana, and cacao.

Consistent with these findings, Sánchez et al. (2015) note that cacao cultivation aligns with a peasant production system, where the cacao farmer relies on their on-farm labor for sustenance (SIC, 2012). However, their economic stability hinges on a combination of subsistence farming, commercial crops, and other means that diversify their income.

Figure 2 illustrates the income-generating on-farm activities within their productive area, along with their respective participation percentages:

Figure 2. Income-generating activities on farms



Source: own elaboration

Concerning expenses, basic livelihood activities such as food, credit, farm work, and clothing are listed. The average monthly income is one million five hundred forty-three thousand two hundred eighty-eight pesos (\$1,543,288), and the average monthly expenditure is one million eight hundred twenty-eight thousand forty-six pesos (\$1,828,046). Table 3 shows the consolidated relationship between income, expenses, and self-consumption, where as a result of the exercise, there is a balance in the red of three hundred and twenty-four thousand two hundred and sixty-four pesos:

Table 3. Average ratio of total property expenses and income

	MONTHLY	ANNUAL
Property expenses	\$ 1.828.046	\$ 21.936.555
Revenues	\$ 1.543.288	\$ 18.519.455
Self-consumption	\$ 257.736	\$ 3.092.836
Income for the year		-\$ 324.264

Source: own elaboration

The presence of family labor is of great importance and is reflected in what is achieved for self-consumption; when the producer "frees" his food in some way, it can be said that there is subsistence. The result in red is that they must look for work to strengthen this extra-dial income. For Ellis (2000), access to livelihood capital are those that allow man to achieve survival, where although cash is interesting, it is not everything (Gutiérrez et al., 2009; Nielsena, 2013); because it requires exchanges, work outside the farm, monetary transfers, materials used within the farm, family labor, self-consumption and other non-cash elements that allow sustaining the standard of living of a family (Hernández, 2019).

Cocoa production system

The cacao area of the farms under study covers 40 hectares, distributed across 41 plots, with an average farm size of 1.8 hectares and 1.9 plots, respectively. These are relatively new crops, with ages ranging between 0.6 and 8 years, averaging 5.19 years. The cultivation type is predominantly intercropped with other species (91%). However, there are still two farms with monoculture crops.

Regarding the condition of the crops, it was found that 17 are in production with management, 4 in production without management, and 1 not in production; the latter corresponds to farm number 4, which is 0.6 years old.

Out of the established 40 hectares, 71.5%, meaning 15,566 trees, are in production. Meanwhile, the remaining 9,775 trees were reported to be in the growth stage. It's worth mentioning that the same farm can have both plots in production and growth. Of this total

number of growing trees, 4,125 trees should already be in production since their ages range between 4, 5, 6, and up to 8 years, and yet they are still reported in the growth stage. The average production of these trees is 170 kg/ha/year, a yield well below the national average, with a total production of 4.8 tons/ha/year across the 28.6 hectares in production.

Following the typology of cacao-growing households proposed by Hernández (2019) for the department of Meta, it could be said that, given the characteristics of these farms and this production system, the households predominantly meet the conditions of cacao and young-type households:

Cacao growers are rural families with an average of 7.7 years of experience in cultivation. The income from the sale of cacao beans represents 33.61% of the total household income, approximately half of what it represents for cacao farmers. The established cacao area averages 1.64 hectares (p.40).

"Y" young cocoa farmers

Young cocoa farmers are families who, on average, have 4.1 years of experience in cocoa cultivation, although 80% of the producers have less than 2 years of experience. The area established for cocoa cultivation is 1.8 ha. Still, it needs to represent economic income for these families, as the crops are less than 2 years old and thus have yet to start the production cycle (p.40).

With the variation in their experience, even if it ranges between 0 and 4 years, the vast majority have already had some production experience and have generated a few revenues from it. Even though they might meet the age criteria for the crops to be classified as "cocoa farmers," they diverge from the yield and areas allocated for this purpose. This explains why, even though cocoa is important, it is only just emerging since 14 out of the 22 families have less than 4 years of experience with cultivation.

Pest and Disease Management

Pest and disease control in cocoa cultivation is generally carried out monthly, followed by bi-weekly application, and very few carry out controls every week or with a frequency equal to or greater than two months. Producers also asserted that their pest and disease control is predominantly mechanical, followed by biological control, with only one instance where both measures were combined. This description of management and phytosanitary attention deviates from the technical recommendations of good agricultural practices, which suggest implementing preventative actions every week in winter and bi-weekly in summer.

Regarding applying fertilizers, a significant portion of producers (7) admitted not performing any fertilization. Only two (2) claimed to fertilize twice a year, and where the most agreement on the application was semi-annually, twice a year (10 producers). In less frequent scales, fertilization occurs more than three times a year. According to Corporación PBA (2012) and CORPOICA (2000), the most crucial nutrient needs for the crop are during the first five years, after which the absorption rate is maintained. It's suggested that fertilization be carried out at least annually, following the corresponding guidelines from soil analyses. The findings regarding fertilization are not very encouraging or promising in terms of yield per hectare per year.

Analysis of institutional social networks in which cocoa-growing households participate

According to Velasco et al. (2019), the concept of development in local economies has been changing in recent years, with organization and associativity being an alternative to dynamize agricultural production models to more efficient models that work to meet modern requirements and for them, producers organizations are not closed spaces, but on the contrary, they seek to relate to various institutions seeking economic, technical or scientific support for their cause, although their forms of relationship change along the way.

The cocoa growers expressed that they have relationships with 21 organizations, including NGOs, cooperation agencies, government agencies,

educational institutions, and unions. The following are the networks between actors and institutions, their perception of the service they provide regarding technical support, and finally, their perception of transparency and compliance with plans.

Network relationships between actors and institutions in the study area

Rural producers not only have internal ties and engage with their peers, but they also interact externally with governmental or private institutions. This wealth of relationships and potential cooperation networks they might be part of allows a collective to strengthen its social capital. For this reason, networks are conceived as an organizational model to articulate, among other things, innovation systems. Following Sebastián (2000):

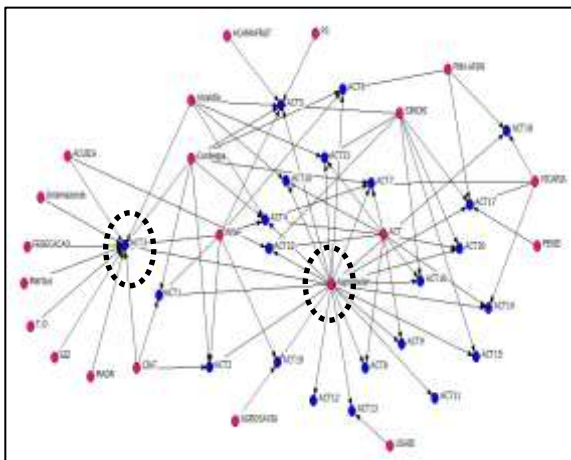
"Cooperation networks can be defined as associations of stakeholders aimed at achieving jointly agreed-upon outcomes through participation and mutual collaboration... they operate on the basis of combining efforts to achieve objectives" (p.97).

In *Figure 3*, one can observe the cooperation networks that the participating producers of the study have built with 21 organizations. In fuchsia, one can identify the institutions with which the cocoa actors interact, and in blue, each of these actors. Structurally, it is found that it is a network with a low density of 8.9% and a centralization of 42%.

Regarding interactions, the actor with the most connections towards him is Actor #3, who claimed to have received support from 16 institutions, holding the indegree centrality. Generally speaking, the actors have received support from at least three institutions.

However, in terms of outdegree centrality - based on the number of actors who expressed having received support from this institution - ASPROBELEN, the association of which the cocoa producers are part, achieved it. In this order, the most prestigious institutions were successively ACT, SINCHI, CORDESPA, and WWF (*Figure 3*):

Figure 3. Network of relationships between actors and institutions in the study area.



Source: own elaboration

Institutional network among actors and institutions in the study area - technical assistance

Technical assistance has been a crucial factor in the technification of the Colombian countryside, aiming to improve competitiveness and enhance the quality of life for agricultural peasants (Maza-Avila et al., 2019). In this context, the cocoa producers of ASPROABELEN collaborate with regional institutions, seeking precisely the exchange of technical knowledge and technologies to bolster the development of their production system.

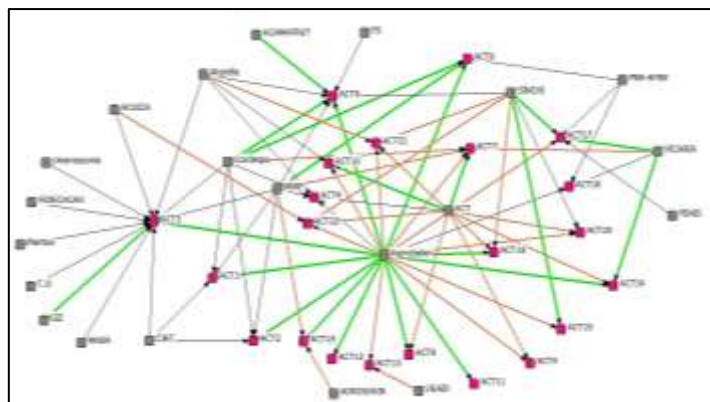
Figure 4 displays the institutional network in which the study participants are involved and their rating regarding technical assistance service. Actors are identified in pink boxes, while institutions are presented in gray boxes. Green links between an actor and an institution indicate the rating the former gave to the latter concerning the technical assistance service provided by the institution: red for poor, gray for average, and green for good service.

ASPROABELEN, besides being the institution interacting with the largest number of actors, is also the highest-rated by the vast majority of its linking nodes. However, some institutions, like ACT and the Mayor's Office, received mixed reviews, ranging from average to poor. Similarly, some actors find no value in any institutions, such as actor #22, who rated the technical

assistance service from all the institutions he worked with as abysmal.

Considering that some of the institutions were only recognized by one actor and this actor either rated them very highly or very poorly—like AGROSAVIA, PENIS, GIZ, UNIAMAZONIA, MADR, T.O, among others who only interact with one actor—it wasn't possible to weigh or generalize these results.

Figure 4. Institutional network among actors and institutions in the study area-technical assistance



Source: own elaboration

The institutional Network in which the cocoa farmers and institutions participate can be classified as an innovation network, following Callón (2001), as a techno-economic network. One of their objectives is facilitating technology, knowledge, and market aspects.

The findings identified in the Network presented in Figure 5 coincide with how the projects benefiting the members of ASPROABELEN are executed. Within the agreements made within the project, it is usually agreed that the organization is in charge of technical assistance, and the institutions implementing the project work in conjunction with the association and develop the other activities inherent to the project. This also indicates the associates' significant level of trust in their organization.

Law 607 of August 2, 2000, defines direct rural technical assistance as: "a public service of obligatory character and subsidized in relation to small and

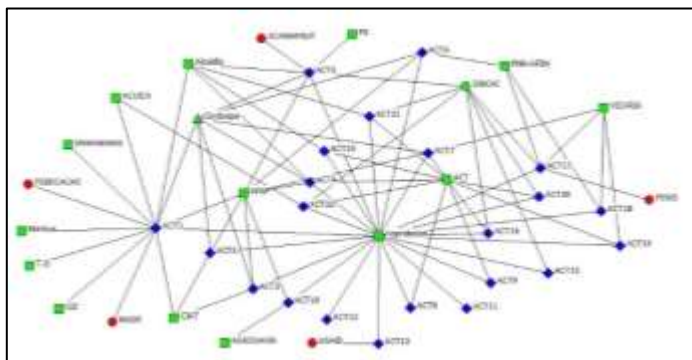
medium rural producers, the provision of which will be the responsibility of the municipalities in coordination with the departments and national entities" (p.1). According to Huertas (2002), technical assistance aims to guide farmers in incorporating various techniques into their crops to improve production and productivity.

However, the municipal administrations, and in this order, the UMATAS, due to their low administrative, operational, and financial capacity, fail to comply with this task (Lugo, 2008) fully. This explains why the service provided by the Municipality of Belén has been rated by the participating producers in the study as poor, and the State increasingly shifts this responsibility to rural organizations, which, through projects, obtain this service.

Institutional network among actors and institutions in the study area-transparency and access to information

Lizcano (2013) states that transparency is a basic pillar in contemporary society; in turn, it is an objective in the development of each citizen; if a high level of transparency is achieved in the institutions, a better political, social, and economic fabric is achieved in their relationships.

Figure 5. Institutional network among actors and institutions in the study area - technical assistance



Source: own elaboration

In Figure 5, one can observe the level of transparency and access to information that, in the actors' view, characterizes the institutions with which they interact – institutions in green and red and actors in blue. The shapes indicate how open the institution is regarding

transparency and providing access to its information. Organizations represented by circles are those that the actors believe are very secretive in providing access to the information they hold: ACAMAFRUT, MADR, SINCHI, PENIS, and FEDECACAO. Conversely, the institution perceived as the most open in sharing information about its projects was CORDESPA – represented by a triangle. The rest were given an average rating – depicted in squares.

Furthermore, concerning their presence in the area, it was found that institutions like USAID, MADR, FEDECACAO, PENIS, and ACAMFRUT – shown in red – are the ones least present in the region. The actors believe they execute projects, not processes.

Trust in institutional cooperation networks is mostly mediated by the open access granted by participating organizations to the actors they engage with regarding the details of the projects they undertake. Similarly, the level of transparency they maintain, both in terms of technical and organizational information and financial details for said purpose. In the case study discussed, the vast majority are transparent, with moderate access to information.

The variety of organizations with which cocoa producers interact is high. However, trust levels are mostly average, as is their perception regarding transparency in terms of information. Notably, CORDESPA stands out due to its high rating for transparency and access to information; it is a private corporation that has worked in this area for 13 years.

4. DISCUSSION AND CONCLUSIONS

Thus, 21 actors belonging to a formal organization, in this case, ASOPROABELEN, are associated with 22 institutions thanks to cocoa cultivation. The greatest technical trust is placed in their organization, which they also rated with a medium level in terms of access to information, transparency in project management, and a strong presence in the area. Additionally, the highest score in terms of trust and transparency is given to another local organization that has been in the territory for over 10 years.

Now, if social capital, following Putnam (1995), is based on the inherent attributes of social organization,

including norms, mutual trust, and networks, which facilitate coordination, cooperation, and reciprocity of communities, and if this capital, in his opinion, resides especially in groups as an aggregation of individual contributions, it is clear that while some organizations present in the area have managed to maintain these attributes with farmers, others have not.

Esparcia et al. (2016) suggest that social capital consists of three elements: structure (interactions, relationships, networks); content (mutual trust, solidarity, reciprocity, values); and the subject (Esparcia et al., 2016; following Portes, 1998). These authors take into account the specifics in defining subjects as social class (Bourdieu), social structure (Coleman), or collective (Putnam), meaning institutions, associations, or organizations.

Thus, social capital can be understood through different dimensions: the social dimension refers to the individual or collective position on the social scale; the spatial dimension involves individuals and collectives with their abilities and social positions; and the temporal or dynamic dimension implies changes in that social position and therefore in the stock of social capital of individuals, groups, or territories (Esparcia et al., 2016).

In this way, each dimension of social capital, defined based on the type of relationship, corresponds to a type of capital. Bonding social capital is based on relationships between individuals with common characteristics or belonging to the same group while bridging and linking social capital correspond to relationships between individuals with different characteristics external to the community (Lozares et al., 2011, cited in Esparcia et al., 2016).

Cocoa actors precisely exhibited a bridging social capital characterized by horizontal ties, which, although weak with most organizations due to their limited presence in the territory, facilitate mediation and external alliances that allow the group to access new benefits, enhancing information exchange. However, following Ayavari-Nina (2017), one cannot guarantee a large stock of such social capital since there is a clear

collaboration network, trust could be more evident, and effective norms for accessing information and transparency are needed in most cases.

Following Zambrano et al. (2012), some evidence of social capital includes collective members experiencing a better quality of life, which involves empowerment and active participation in decision-making. Ultimately, social capital consists of inherent assets emerging from social relationships and participations and their correlations, and these characteristics have yet to be significantly generated by institutional relationships in the cocoa actors studied.

Most organizations with which the participating cocoa farmers associate have been present in the territory for short-term projects or programs, allowing specific actions but not linked to a general support process.

There is a significant difference in how actors relate to local and private institutions versus governmental institutions, both national and local. The trust, credibility, and perception of transparency were always lower in the latter.

Farmers believe in local institutionalism; therefore, the best-rated institutions were those with which they felt identified, supported, and clear in their actions, coupled with the trust from their long history in the territory.

The relationships established by cocoa farmers with institutions breathe life into an institutional network in which they participate as individual actors; relationships that, although weak, short-lived, poorly planned in the territory, with weak communication channels, and sometimes with overlapping functions, have yielded gains in terms of social capital, allowing them to access benefits for the improvement of their crops and living conditions.

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