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Sustainable Organizational Capabilities and Cooperation Networks in Cacao and Dairy Value Chains in the Colombian Amazon

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Abstract

Cooperation plays a central role in the sustainability of agricultural value chains. This study analyzes cacao and dairy producer organizations in the Department of Caquetá, Colombia, with three objectives: to characterize their current organizational status, to understand legal representatives' perceptions of the role of cooperation in strengthening their organizations, and to examine the structure of cooperation networks across different stages of the value chains. A qualitative approach was adopted, based on structured interviews, participatory network-mapping workshops, and secondary data analysis. The results show that cacao organizations exhibit higher levels of institutional consolidation than dairy organizations. Representatives' perceptions indicate that in cacao, cooperation is primarily oriented toward administrative and strategic strengthening, whereas in dairy it is concentrated on production, budgeting, and marketing. Network analysis reveals a predominance of linking-type cooperation, characterized by vertical relationships with external actors, which enhances access to resources but also generates dependency. Overall, network structure and the prevailing types of cooperation influence organizational autonomy and collective performance in Amazonian contexts.

Keywords: cooperation; social networks; sustainability; value chains; cacao; dairy; Colombian Amazon; Caquetá



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1. Introduction

Cooperation constitutes a central mechanism through which agri-food systems build sustainability, particularly in territories characterized by institutional fragility, market volatility, and environmental pressure. In community-based producer organizations, cooperation is not merely an operational practice; it is the relational foundation that enables collective action, shared decision-making, and long-term organizational viability. Through cooperation, producers coordinate production, pool resources, negotiate collectively, and access technical and financial support that would otherwise remain unattainable at the individual level [1–6].

Rather than approaching cooperation solely as a derivative outcome of social capital, this study understands it as a dynamic relational process embedded in organizational

structures and territorial networks. In agricultural value chains, cooperation shapes how actors interact, how information circulates, and how collective strategies are formulated. It directly influences bargaining power, adaptive capacity in the face of climate change and deforestation, and the ability of organizations to reposition themselves in evolving markets [1–5].

Previous literature has addressed cooperation within the broader framework of social capital, distinguishing structural and functional perspectives [5–10]. The structural approach highlights how network architecture—density, centrality, and actor positioning—conditions opportunities for collaboration and innovation [5–7]. The functional perspective emphasizes how repeated interactions reduce transaction costs, facilitate contractual arrangements, and promote technological adoption [8–10]. While these approaches have often been examined independently, together they show that cooperation is simultaneously shaped by network configuration (who connects with whom) and by the purposes those connections serve (why and for what actors collaborate).

In community-based organizations, cooperation operates across multiple organizational dimensions: strategic planning, marketing, administrative management, production processes, environmental management, and value addition [11–15]. It enables the consolidation of associative structures, strengthens institutional capacity, and fosters mechanisms of collective learning and reciprocity [16–19]. In this sense, cooperation can be understood both as an outcome of prior relational dynamics and as a driver of organizational strengthening.

In agri-food systems, cooperation is often examined through the types of ties that structure relationships among actors. These include bonding ties (strong connections within homogeneous groups), bridging ties (horizontal connections across different groups), and linking ties (vertical relationships connecting actors with different levels of power and resources) [20–26]. These typologies provide an operational way to analyze how cooperation circulates within and across value chains. Bonding-type cooperation strengthens internal cohesion and peer learning; bridging-type cooperation facilitates horizontal exchange of knowledge and resources; and linking-type cooperation connects producer organizations to external institutions, markets, and financial mechanisms [3,4]. A balanced configuration of these forms of cooperation is essential for building resilience and promoting systemic transformation in rural territories.

To analyze cooperation empirically, structural network measures—such as size, density, centrality, betweenness, and modularity—help describe how relational patterns are configured and how influence is distributed within networks [20–30]. These measures do not merely capture abstract connectivity; they reveal the conditions under which cooperation may foster organizational autonomy or, conversely, generate dependency, fragmentation, or concentration of power.

Empirical studies in cacao agroforestry systems show that local associations and cooperatives rely on cooperative arrangements to access differentiated markets, certifications, and quality assurance mechanisms [31,32]. In livestock systems, dairy cooperatives and cattle associations promote joint commercialization, collective natural resource management, and the adoption of sustainable technologies [33–35]. However, important gaps remain in understanding how cooperation networks are generated and sustained in territories experiencing strong pressure from agricultural expansion and deforestation [36,37].

These gaps are particularly relevant in the Colombian Amazon. Conventional dairy production has historically relied on extensive systems with low technological innovation, while cocoa agroforestry has emerged as a cooperation-driven alternative supported by national and international actors as a strategy to reduce deforestation and strengthen rural livelihoods [38,39]. Yet this transition has not been homogeneous, and the transformation

of livestock systems toward more sustainable silvopastoral models remains uneven [40–42]. In a context where annual forest loss averaged 123,000 hectares between 2018 and 2022 [43], understanding how cooperation operates within producer organizations becomes critical for identifying pathways toward more sustainable territorial governance [44–47].

From this perspective, this study conceptualizes cooperation as a relational resource expressed through networks that connect producers, organizations, and institutions [22–26]. The analytical framework is guided by three research questions: (1) What is the current state of producer organizations in the cacao and dairy value chains? (2) What are the perceptions of legal representatives regarding the role of cooperation in strengthening their organizations? and (3) What network structure represents the cooperation relationships across different stages of the value chains? These questions allow us to articulate organizational analysis with the relational dimension of cooperation and the structural configuration of territorial networks.

The study proposes two hypotheses: first, that cooperation strengthens as organizational principles become more consolidated; and second, that network structure—particularly density and the diversity of circulating resources—conditions the intensity and scope of cooperation within value chains.

2. Materials and Methods

2.1. General Description of the Study Area

Our research was conducted in the municipalities of La Montañita and Belén de los Andaquíes, located in the Andean–Amazonian foothills of Caquetá Department, Colombia (see Figure 1). Both municipalities are part of the 170 prioritized territories with Special Development Territorial Plans, established after the 2016 Peace Agreement. This is a condition that has guided the arrival of technical cooperation aimed at sustainable value-chain development and peacebuilding. In demographic terms, in the 2018 National Census, Caquetá reported a population with high effective rurality, a feature that shapes both the labor supply and the agri-food system structure. At the municipal scale, Belén de los Andaquíes registered 9075 inhabitants and La Montañita 14,714 in 2018, reflecting territories with low population density and a strong dependence on agricultural activities [47–50].

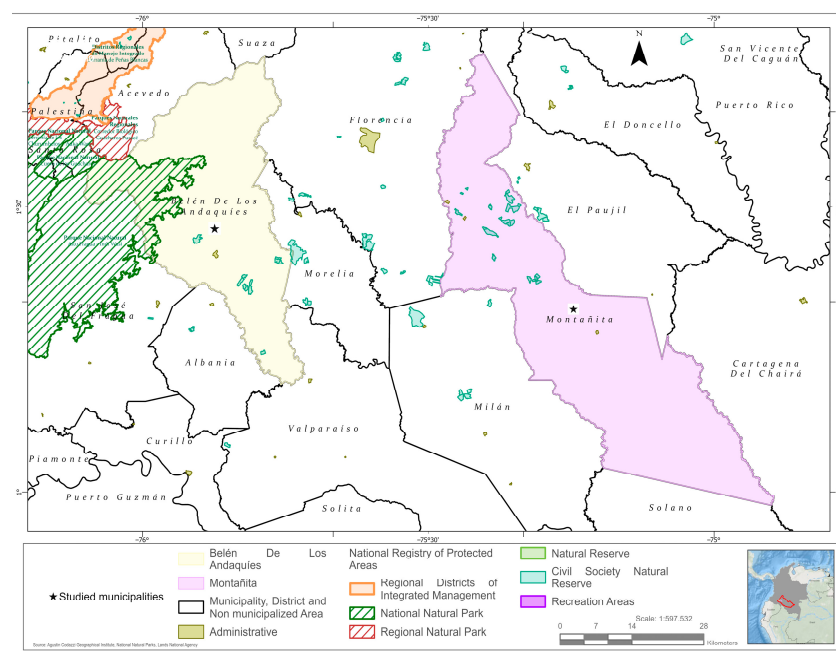


Figure 1. Study area. Source: Authors' elaboration, 2026.

Historically, cattle ranching has been the economic backbone of both the department and these municipalities. According to the Caquetá Agricultural Extension Plan (2020–2023), the departmental herd reached 2.38 million heads in 2019; disaggregated to the local scale, Belén de los Andaquíes reported 31,882 heads and La Montañita 89,177 in the same year, with an average of 60,530 heads per municipality, underscoring the structural weight of this activity in the territory [51]. This pattern coexists with incipient processes of agricultural diversification: the departmental portfolio reports 16 crop lines in La Montañita and 10 in Belén, confirming the existence of opportunities for transitioning toward more sustainable production systems [47,51].

In parallel, cacao cultivated under agroforestry arrangements has consolidated over the last decade as both a socio-economic and environmental alternative to cattle rearing and illicit crops. At the departmental level, Caquetá reported 4756 hectares (ha) planted and 3006 tons of production. At the municipal scale, Belén de los Andaquíes recorded 242 ha and 88 tons of production, while La Montañita reported 86 ha [41,48,49]. Local dynamics have been strengthened by organizational processes: in Belén, initiatives such as ASPROABELÉN have facilitated access to differentiated markets and quality improvements, whereas in La Montañita, associations such as AGROSOLIDARIA have advanced in organic and agroecological production schemes aligned with conservation goals, zero deforestation, and sustainable agriculture in the Amazon.

From an environmental perspective, Caquetá articulates the Andean–Amazonian transition, with altitudinal gradients connecting Andean, sub-Andean, and lowland forests, and major river basins such as Caguán, Caquetá, and Orteguaza [51]. The territory integrates a mosaic of national protected areas and local conservation figures, including the Municipal Natural Parks (PMN, *Parques Municipales Naturales*) and Civil Society Nature Reserves (RNSC, *Reservas Naturales de la Sociedad Civil*), which are key for carbon storage, ecological connectivity, and water regulation. Belén de los Andaquíes encompasses approximately 46,500 ha under formal protection, including PMN and the National Natural Parks System (PNN, *Parques Nacionales Naturales*). La Montañita does not include PNN within its jurisdiction but hosts an increasing number of RNSC totaling at least 390 ha [50]. Within this context, cacao agroforestry and silvopastoral ranching emerge as productive transition strategies compatible with forest conservation and deforestation reduction [42].

2.2. Methodology

This study adopted a qualitative research design. Information was collected through interviews in which organizational principles were assessed and scored, as well as through participatory workshops aimed at mapping social networks. In addition, secondary data sources were analyzed to complement and contextualize the findings. Data collection was carried out in November 2023 in both municipalities (La Montañita and Belén de los Andaquíes).

The study was conducted in accordance with established ethical protocols, ensuring that all participants provided written informed consent prior to their involvement. No georeferenced data at the farm or individual level were collected, in order to safeguard the privacy, confidentiality, and security of the participating organizations and actors.

2.2.1. Study Population and Interviews

Producer organizations linked to the cacao and dairy value chains in the study area were selected. In total, the study worked with 10 producer organizations: 5 cacao organizations (3 in Belén de los Andaquíes and 2 in La Montañita) and 5 livestock organizations (all located in La Montañita). No livestock organizations were identified in Belén de los Andaquíes at the time of the research.

The selection of organizations was based on prior dialogs with cacao and dairy producers in the territory, who identified those organizations with the longest trajectory, greatest experience, and highest level of consolidation within each value chain. The selection also considered practical and contextual criteria, such as the willingness and accessibility of legal representatives to engage in dialogue, as well as the security conditions necessary to conduct the fieldwork.

The organizations varied in their years of establishment, with cacao organizations averaging 20 years of operation, and livestock organizations averaging 6 years. The names of the organizations analyzed and their years of establishment are presented in Appendix A.

2.2.2. Structured Interviews

Structured interviews were conducted with the legal representatives of each of the 10 producer organizations. The interview was implemented through a structured data-collection form composed of closed-ended questions, designed to assess organizational performance across 11 principles of organizational sustainability (following references such as Groot et al. [17]): administrative management, annual budget, agroindustry, environment (natural resource management and use), finances, legal compliance, marketing, operative planning, production processes, strategic orientation and planning, organizational aspects, and strategies for value addition and transformation.

The interviews included questions related to 70 indicators distributed across these principles (see Table 1 for the complete list of variables). Within each principle, questions were incorporated to identify cooperative actions and working relationships among actors aimed at achieving organizational objectives. All indicators were designed to capture the representatives' perceptions regarding the level of compliance or achievement of each indicator, assessed on a four-point scale: (0 = no compliance, 1 = low compliance, 2 = moderate compliance, 3 = high compliance).

Table 1. Variables for the analysis of producer organizations.

Organizational Principles	Variables
1. Administrative	Frequency of assemblies; internal regulations; accounting records; monitoring minutes; institutional partners; fiscal auditing; technical support for financial development; diversity of working committees; contributions of institutional actors to committees; meetings and capacity-building sessions.
2. Annual budget	Annual budget amount; budget planning; budget execution practices; adaptation of the budget to organizational needs; teamwork in budget management.
3. Agroindustry	Practices of transformation and value addition; collection centers; agricultural product quality; skilled personnel; technological assistance; risk management plans; external financing; honorarium payments; input purchases; institutional support for processing.
4. Environment	Forest and natural resource quality; sustainable management practices; clean agricultural and livestock production practices; agrochemical use; certifications; best practices; waste management; environmental management plans; institutional support for conservation and sustainable production.
5. Finances	Balance sheets and disclosure to members; profit and loss statements; cost accounting by product; records of social contributions; bank account management; cooperation among partners for financial management.
6. Legal compliance	Legal recognition of the organization; tax payments; tax declarations; mutual support among members for tax obligations.
7. Marketing	Access to markets, clients, and competitors; purchase and sales information; commercial partners; export plans and certifications.

Table 1. *Cont.*

Organizational Principles	Variables
8. Operative plan	Execution of the Annual Operating Plan (AOP); budget management; cooperation strategies to implement the AOP; cooperation among members.
9. Organizational	Member commitment; quality of human relations; organizational statutes; formalization of the organization; functions manual; staff remuneration; inclusion policies for women and youth; alliance-building policies; institutional alliances; cooperation with local, regional, and national actors.
10. Production	Knowledge of production and post-harvest processes; production sustainability; innovation; production volume; technology and equipment; good management practices; technical assistance; institutional support; production infrastructure.
11. Strategic planning	Organization's mission and vision; principles and values; strategic plans; SWOT analysis (strengths, weaknesses, opportunities, and threats); cooperation among members.

2.2.3. Participatory Network Mapping Workshops

We conducted three participatory workshops using the Net-Map technique [52] to construct social network maps for each value chain. The Net-Map methodology is a participatory tool that enables stakeholders to visualize and analyze social networks by collectively identifying actors, the types of relationships among them, the resources (capitals) that flow through these relationships, and the influence levels of different actors.

Workshop structure and participants:

- La Montañita—Dairy workshop: 8 participants (3 women, 5 men) from different livestock associations.
- La Montañita—Cacao workshop: 12 participants (7 women, 5 men) from different cacao associations.
- Belén de los Andaquíes—Cacao workshop: 14 participants (5 women, 9 men) from different cacao associations.

Each workshop lasted one and a half days. Participants were selected to represent different producer associations within each value chain, ensuring diverse perspectives and experiences. Only producers who were members of formal organizations participated, to gather shared perceptions and build consensus on network structures.

In each workshop, participants collectively mapped the social networks for three stages of their respective value chains: production, processing, and commercialization. For each stage, we posed a guiding question, and workshop participants then:

1. Identified all relevant actors (individuals, organizations, institutions).
2. Specified the types of relationships among actors.
3. Indicated what capitals or resources flow through each relationship (e.g., financial resources, knowledge, norms, raw materials, technical assistance).
4. Assessed the scale of intervention for each actor (local, regional, national, international).
5. Reached consensus through group discussion when perceptions differed.

The guiding questions used to construct the networks were:

- Production stage: Which actors cooperate to promote sustainable production processes in the municipality?
- Processing stage: Which actors cooperate to foster sustainable food processing in the municipality?
- Commercialization stage: Which actors cooperate to develop the marketing of raw materials and processed products sustainably?

Visual network maps were created on large poster boards during the workshops, with actors represented as nodes and relationships as connections between them. For more detailed information on the workshop methodology (see Guáqueta-Solórzano & Ayazo-Berrocal (2024) [53].

2.2.4. Secondary Data Sources

Secondary sources were also reviewed to contextualize our findings within broader economic, policy, and territorial frameworks. These sources included the Municipal Development Plans, the Rural Agricultural Planning Unit (UPRA), the National Federation of Cattle Ranchers (FEDEGAN), and the National Federation of Cacao Growers of Colombia (FEDECACAO). These documents helped us to understand how producers interact at the local scale with national-level entities.

2.3. Data Analysis

2.3.1. Organizational Capacity Index

Based on the information collected through the structured form, an index called the Organizational Capacity Index (OCI) was developed. Its construction relied on 70 indicators derived from the interviews (see Table 1). This index aims to represent the assessments made by the legal representatives regarding the status of the indicators examined. In addition, the narratives obtained for each assessed aspect were retrieved and analyzed to gain a more comprehensive understanding of the situation and level of development of each organization.

Given the qualitative orientation of this study and the limited number of organizations analyzed, the OCI should be interpreted as an exploratory analytical tool designed to facilitate comparative understanding across cases, rather than as a statistically inferential measure. Its purpose is to support qualitative interpretation and sectoral comparison, not to produce generalizable or predictive results.

The indicators assessed in the structured interviews were originally measured on a four-point ordinal scale ranging from 0 (no compliance) to 3 (high compliance). Given that the OCI aggregates variables across different organizational principles, normalization was required to ensure comparability and proportional weighting of all indicators within the index.

First, all variables were normalized using a Min–Max re-scaling scheme to transform the original 0–3 scale into a standardized range between 0 and 1 (where 0 represents the lowest score and 1 the highest). This procedure allows for consistent aggregation of indicators without altering their relative differences.

The OCI was calculated for each organization and then summarized to obtain an overall index for each sector using the following formula:

$$OCI = \sum_i^1 OP_i$$

where the OCI is the result of summing the OP_i averages (the average of all variables analyzed under each Organizational Principle). The calculation of each OCI component is expressed as follows:

$$OP = \frac{1}{n} \sum_i^1 x_{ik}$$

where OP (Organizational Principles) is the result of averaging the total sum of the normalized variables (i) for each criterion (k).

The OCI ranges from 0 to 11, corresponding to the total number of principles evaluated. We calculated individual OCI scores for each organization and aggregate indices for the cacao and dairy value chains.

The index does not aim to provide any type of statistical representativeness. Rather, its purpose is to present the level of compliance with essential criteria required for an organization to be sustainable and to enable comparison between the value chains. The narratives obtained through the dialogs provided a more comprehensive overview of the organizations' strengths and weaknesses, complementing the index results.

2.3.2. Cooperation Analysis

To examine the relationship between cooperation and organizational performance, we selected cooperation-related variables derived from the interviews, linked to actions or working relationships aimed at achieving institutional objectives. This information made it possible to identify the legal representatives' perceptions regarding the contribution of cooperation both within the organization and externally in achieving organizational goals.

2.3.3. Social Network Analysis

Finally, the social network structure was analyzed using data from the participatory workshops. The networks were constructed to visualize the external relationships that producer organizations build and that may contribute to their development and strengthening. The network maps created during the workshops were digitized and analyzed using specialized software. Network metrics such as network size, density, modularity, and degree of centrality were calculated. We understand network size as the number of nodes or actors in the network; density as the number of connections or ties among nodes; modularity as the heterogeneity of relationships among all nodes, reflected in the extent to which the network is divided into distinct clusters or communities; and centrality as the importance of key nodes or actors within the network.

From these networks, we specifically selected actor centrality metrics to determine the extent to which producer organizations exert influence across different stages of the value chain. This analysis also made it possible to reflect producers' perceptions regarding the relative importance of certain organizations within the network.

Based on these metrics, three forms of cooperation were identified, expressed through bonding, bridging, and linking relationships [29,30].

3. Results

3.1. Characteristics of Dairy and Cacao Organizations

The comparison of the Organizational Capacity Index (OCI) for the two sectors shows better performance for cacao organizations compared to dairy organizations. On average, cacao producer organizations reached an index score of 8.60, with values concentrated between 6.66 and 10.45. ASPROABELÉN (10.45), COMUCAN (9.39), and AGROSOLIDARIA (9.15) stand out as the highest-scoring cacao-producing organizations. In contrast, dairy organizations presented an average index of 6.35 with greater dispersion, ranging from 2.37 to 8.90. Among these, while ASOAGROEMPT (8.90) and Lácteos La Arboleda (8.82) showed competitive performance, ASMUJSAN (2.37) exhibited marked lags. Overall, the data suggest that cacao organizations show more consistent performance and achieve higher levels of comprehensive performance, whereas the dairy network is more heterogeneous, with underperforming cases that condition its average (Table 2).

Table 2. Total Organizational Capacity Index score for cacao and dairy organizations in Caquetá, Colombia.

Dairy Organizations	OCI Score
ASMEGO	6.46
ASOMUFEN	5.22
ASMUJSAN	2.37
ASOAGROEMPT	8.90
LACTEOS LA ARBOLEDA	8.82
Cacao Organizations	OCI Score
COMUCAN	9.39
COPROPENEYA	7.36
CORPOCABEL	6.66
ASPROABELEN	10.45
AGROSOLIDARIA	9.15

See Appendix A (Table A1) and the Abbreviations for the full names of the organizations studied.

Important contrasts were also identified between cacao and dairy organizations across most of the organizational principles evaluated.

In strategic planning, cacao organizations demonstrated strengths in formulating their mission, vision, and organizational principles, as well as in conducting strategic diagnostics (SWOT analysis) for commercialization and in fostering cooperation among members, while dairy organizations showed greater dispersion and weaknesses in these aspects.

In terms of marketing, cocoa organizations performed better in accessing specialized markets (such as organic production), obtaining organic and sustainability certifications, and establishing commercial partnerships. In contrast, dairy production remains more closely linked to traditional and local markets, with limited access to information on sales and purchases.

Regarding the annual operating plans, cacao organizations reported more consistent budget management and greater cooperative efforts to implement their plans, whereas dairy organizations revealed limitations in execution and coordination. In terms of the annual budget, cacao demonstrated progress in planning and adapting the budget to members' needs, as well as in teamwork for its management, compared to dairy organizations, which showed weaknesses in planning and budget execution practices.

The results for administrative and organizational management confirmed the cacao organizations' advantage, which reported more frequent assemblies, clearer regulations, a diversity of committees, and inclusive gender and youth policies. Dairy organizations, by contrast, tend to be more informal, relying on specific leadership and with lower levels of formalization in manuals and statutes.

With regard to legal compliance, cacao organizations exhibited more consistent practices in tax declarations and payments, while dairy organizations displayed lags in tax formalization. For finance, cacao stood out for having more complete and transparent financial statements, and sharing accounting records with members, compared with dairy organizations, where basic accounting and limited use of financial tools prevailed.

For production, cacao excelled by incorporating technological innovation, sustainability practices, better post-harvest processes, and greater access to technical assistance. Cattle

organizations, although associated with silvopastoral systems, showed a more conventional approach, lagging in productive infrastructure.

In the environmental dimension, cacao organizations integrated more sustainable management practices, reduced agrochemical use, implemented environmental management plans, and accessed organic certification. In contrast, dairy organizations faced greater limitations in certification and conservation planning.

Finally, for agroindustry and value addition, cacao demonstrated greater progress in cocoa bean handling practices and access to technological assistance, although with shortcomings in transformation activities. Dairy organizations remained at low levels of industrialization and were dependent on primary sales, except for Lácteos La Arboleda, which is engaged in cheese production and other dairy by-products.

The comparative analysis by organizational criteria allows for a deeper understanding of the differences observed between the two value chains. In the case of cacao, greater coherence and stability can be identified in areas such as finance, legal compliance, production, and strategic planning, suggesting more consolidated processes and more standardized organizational practices. In contrast, the dairy value chain displays a greater diversity of organizational situations, with uneven performance across several of the principles assessed.

This heterogeneity is particularly evident in areas such as marketing, annual operating plans, and agroindustry, where some organizations demonstrate significant progress while others continue to face structural limitations. Although both value chains show efforts to comply with legal requirements and strengthen financial management, cacao organizations tend to exhibit greater internal consistency, whereas dairy organizations still include lagging cases and more unstable organizational trajectories. Scores are particularly low for women's dairy organizations.

These differences can be partly explained by the historical trajectory of each value chain. Cacao organizations have accumulated longer experience and have been the recipients of international cooperation funding and capacity-building projects, which have enabled them to consolidate learning processes, strengthen their internal structures, and establish more solid management mechanisms. In contrast, dairy organizations are more recent and remain in earlier stages of institutional consolidation, which influences their current levels of formalization, internal coordination, and organizational articulation.

Perceptions of the Role of Cooperation Across Organizational Principles

The interviews conducted with legal representatives provide insight into how cooperation is interpreted, valued, and experienced within organizations in each value chain. Rather than emerging uniformly across all organizational principles, cooperation takes on differentiated meanings depending on the level of institutional consolidation, historical trajectory, and predominant challenges within each sector.

In cacao organizations, cooperation is described as a structuring axis of organizational life. Representatives emphasize that strategic planning processes, the formulation of mission and vision, internal diagnostics, and the definition of collective goals largely depend on consolidated cooperative dynamics. Cooperation is associated with the capacity to hold regular assemblies, deliberate collectively, make joint decisions, and monitor agreements through formal mechanisms such as meeting minutes and committees. In this sense, cooperation is not perceived merely as an instrumental practice but as an organizing principle that strengthens internal cohesion and collective identity.

Furthermore, representatives from cacao organizations highlight that cooperation has been crucial for advancing administrative formalization and legal compliance processes. Tax management, financial reporting, and the sharing of accounting information with members are described as achievements made possible through a collective organizational

culture that prioritizes shared responsibility and teamwork. Cooperation is also perceived as facilitating articulation with external actors—such as technical support institutions, specialized buyers, and certification bodies—thereby strengthening institutional capacity and expanding market opportunities.

In productive and environmental dimensions, cooperation is understood as enabling knowledge exchange, the adoption of sustainable practices, and access to technical assistance. However, representatives often note that progress in these areas has been gradual and contingent upon prior organizational consolidation. Consequently, in the cacao sector, cooperation is perceived as a transversal element that permeates multiple organizational dimensions, although its most visible expression lies in governance structures and strategic planning.

In contrast, in dairy organizations, cooperation is interpreted in a more focused and pragmatic manner. Representatives tend to associate it primarily with addressing immediate productive and financial challenges. Cooperation is described as essential for managing inputs, improving technical processes, accessing production-oriented assistance, and organizing annual budgets. In this sector, the meaning attributed to cooperation is strongly linked to operational efficiency and short-term economic sustainability.

While some leaders acknowledge the importance of strengthening strategic planning and organizational formalization, these aspects appear in the interviews as ongoing challenges rather than consolidated practices. Cooperation in these dimensions is perceived as intermittent or dependent on specific projects, rather than as a fully institutionalized and structural practice. Moreover, several representatives mention that organizational dynamics often rely on leadership figures, which can limit the broader institutionalization of transversal cooperative practices.

Regarding legal compliance and administrative management, perceptions within the dairy sector reflect efforts toward formalization but also acknowledge limitations in technical capacity and process systematization. Cooperation manifests in specific initiatives, yet it does not always translate into stable mechanisms of long-term institutional strengthening.

Taken together, the narratives reveal that cooperation fulfills different functions in each value chain. In cacao, it is conceived as a driver of cohesion, strategic planning, and institutional strengthening, producing a more integral and structural effect on organizational development. In the dairy sector, by contrast, cooperation is primarily oriented toward resolving productive and budgetary needs, reflecting a more operational and less transversal character.

These differences not only reflect distinct understandings of cooperation but also divergent organizational trajectories. While cacao organizations have built more institutionalized cooperative practices over time, dairy organizations remain in earlier stages of consolidation, where cooperation is still articulated around specific functional areas rather than functioning as an overarching organizing principle.

3.2. Social Networks: Actors and Cooperation in the Studied Value Chains

3.2.1. Cacao Value Chain in the Municipalities of Belén De Los Andaquíes and La Montañita

The structural analysis of the cacao value chain reveals marked differences between the two municipalities (Figure 2). In Belén, cooperation networks are broader and concentrated around central actors, particularly ASPROABELÉN, while in La Montañita, networks are smaller but denser, with frequent connections among COMUCAM, COPROPENEYA, and COMCAP. For detailed network metrics, see Appendix B.1. The cooperation networks are structured around the circulation of knowledge, technical assistance, financial resources, norms, marketing channels, and raw materials. These flows shape the interactions among

actors and define the functional dynamics of the value chain. A detailed description of the network actors and the types of capital exchanged can be found in Appendices B.2–B.4.

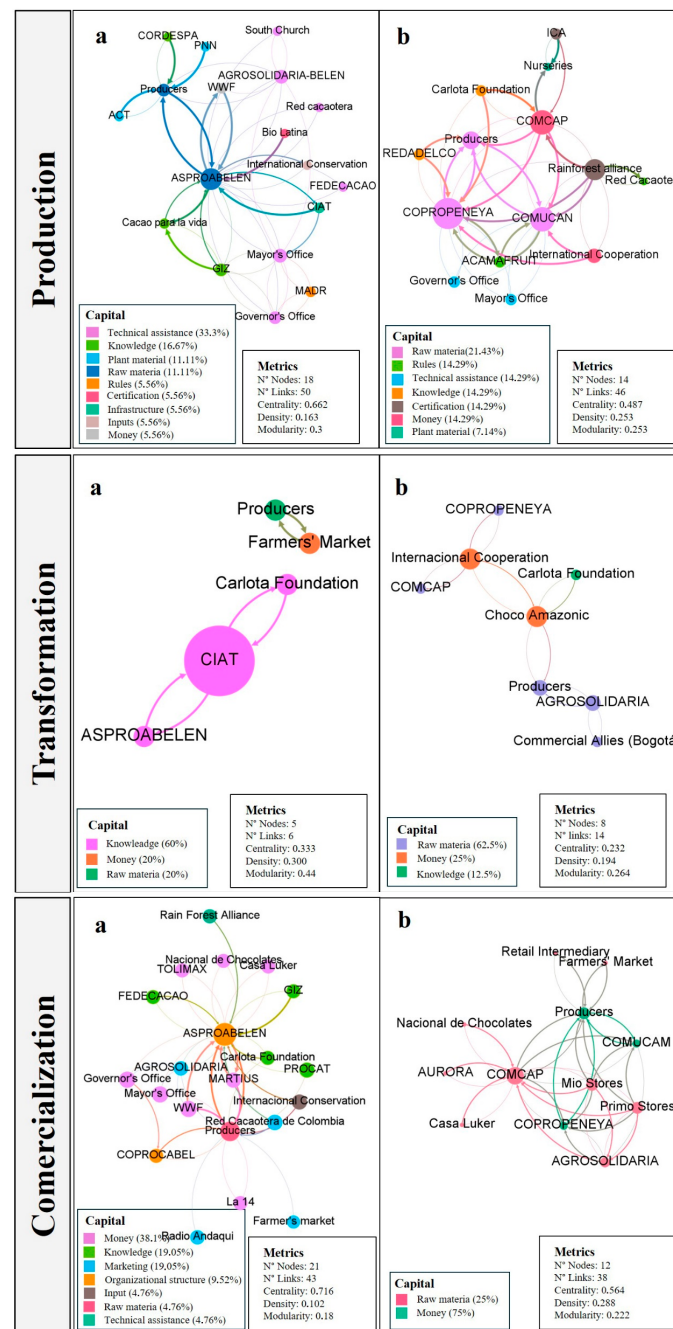


Figure 2. Social networks in the cacao value chain in the municipalities of Belén de los Andaquíes and La Montañita, Caquetá, Colombia. Note: Each color represents the different capitals that flow. Note: Panel (a) shows the networks, capitals, and metrics for the municipality of Belén de los Andaquíes, and Panel (b) for the municipality of La Montañita.

The cacao value chain's productive stage comprises three types of actors: input suppliers, cacao producers, and governmental and non-governmental development agencies. Input suppliers provide raw materials for cacao cultivation and cocoa bean processing. They can be classified into two groups: (1) suppliers of plant material (nurseries), fertilizers, and organic inputs; and (2) suppliers of tools and technologies for cultivation. Cacao producers in both municipalities are smallholder organic farmers (less than 3 ha per production system) who cultivate cacao under agroforestry systems.

In Belén, the productive network includes 50 actors and presents a centrality of 0.662, dominated by ASPROABELÉN, which coordinates flows of technical assistance, knowledge, and plant material, in collaboration with institutions such as the National Learning Service (SENA) and the Departmental Secretariat of Agriculture. The density (0.163) is moderate, and the modularity (0.3) indicates subgroups organized around input suppliers. In La Montañita, with 14 actors, the network is denser (0.253) but less centralized (0.487), mainly articulated by producers' associations such as COMUCAM, COPROPENEYA, and COMCAP, with flows of raw materials, norms, and technical assistance distributed more horizontally.

Regarding the processing stage, this includes two types of actors: producer organizations and local entities promoting cacao processing. Producers and organizations trained in cacao processing produce chocolate bars and traditional drinking chocolate. Local promotion entities contribute knowledge related to cacao transformation, perform organoleptic profiling to assess the grain's potential for chocolate production, and add value through local brands. In Belén, this stage comprises five actors and shows a density of 0.300 and a centrality of 0.333, concentrated in the ChocoAmazonic enterprise, which provides specialized knowledge, financial resources, and raw materials to local associations. In La Montañita, the network includes eight actors, with a lower density (0.194) and centrality (0.232), where COMCAP plays an intermediary role, although network fragmentation (modularity 0.264) limits the circulation of social capital typologies.

The commercialization stage comprises three types of actors: producer organizations, buyers of dry beans at local, national, or international levels, and governmental and non-governmental development agencies. In Belén, the commercialization network includes 21 actors and reaches the highest centrality (0.716), dominated by ASPROABELÉN, which channels financial resources, knowledge, and marketing in partnerships with certification agencies such as BioLatina and international organizations such as Rainforest Alliance. The density (0.102) is low, indicating less frequent relationships, while modularity (0.18) shows a network structured around external markets. In La Montañita, the network is composed of 12 nodes; it is denser (0.288) and less centralized (0.564), organized mainly by the Agricultural Marketing Cooperative of Caquetá (COMCAP), which channels financial resources and raw materials but with fewer commercial partners. In both municipalities, Nacional de Chocolates and Casa Luker are the main buyers of cacao beans and maintain direct relationships with producer organizations.

3.2.2. La Montañita Municipality's Dairy Value Chain

The structural analysis of La Montañita municipality's dairy value chain shows that cooperation networks are configured heterogeneously across the productive, processing, and commercialization stages (Figure 3). Overall, local producer associations, processing companies, and support institutions constitute the main interaction nodes where resource and service flows are concentrated. For detailed network metrics, see Appendix C.1. The predominant social capital circulating in these networks is raw materials (cattle and milk), technical knowledge, financial resources, and environmental regulations, which sustain production and sanitary management as well as commercialization processes and sustainability initiatives. A detailed description of the actors participating in each stage and the social capital mobilized is presented in Appendices C.2–C.4. Cattle production in La Montañita is mainly oriented toward milk and dairy products, and for this reason, we focus on this specific agri-food value chain.

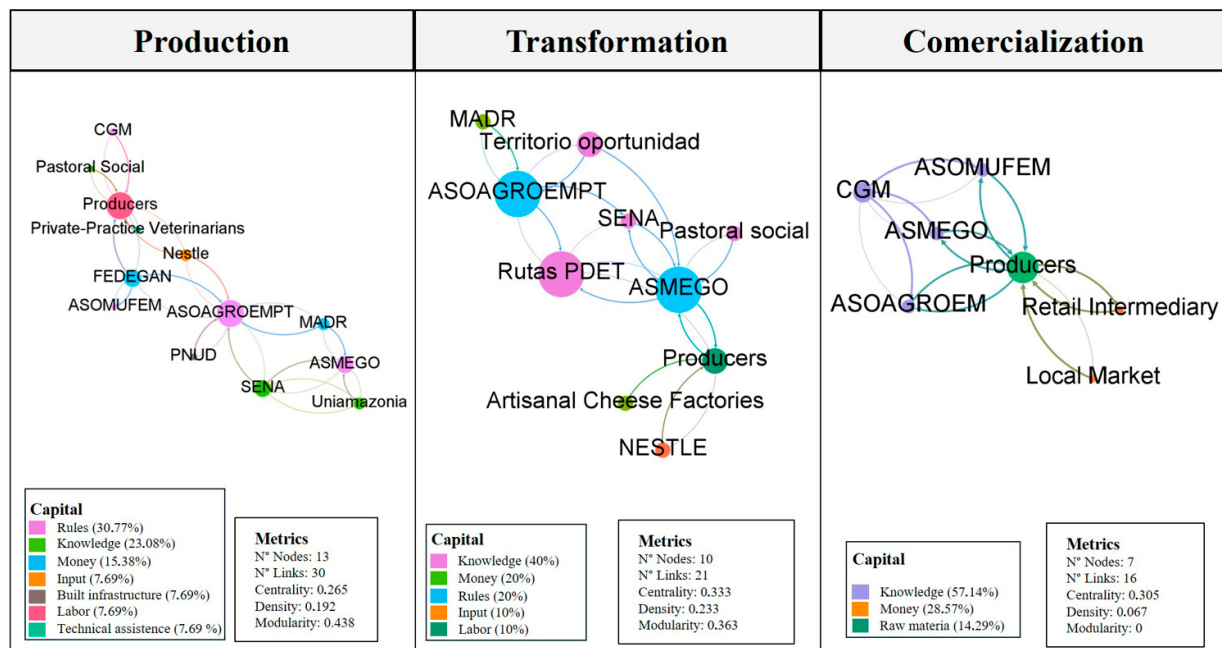


Figure 3. Social networks in the dairy value chain in the municipality of La Montaña, Caquetá, Colombia. The colors of the nodes correspond to the type of capital provided by each actor, and the color of the arrow symbolizes the direction of the capital.

In the production stage, the network brings together 13 actors with moderate density (0.192) and low centralization (0.265). This reflects frequent interactions among women's grassroots associations, such as ASMEGO, ASOMUFEN, and ASMUJSAN, along with input suppliers and technical assistance entities. The modularity (0.438) reveals the existence of specialized subgroups in which raw materials (cattle and forage) and technical knowledge in production management circulate. While this diversity of linkages favors specialization in production, the relationships between associations and suppliers should be stronger.

It is important to note that dairy associations have diversified over the past five years, including producer organizations composed mainly of women. Most of these organizations were created within the framework of the project "Building Rural Entrepreneurial Capacities, Trust, and Opportunity—El Campo Emprende", promoted by the Colombian Ministry of Agriculture, which aimed to form associative groups in territories affected by internal armed conflict. These organizations are distributed throughout La Montaña municipality; however, those located in the mountainous areas receive less attention and support and have fewer strategic partners. The mountain associations are, in turn, situated in more fragile ecosystems, and some lack land tenure rights, which hinders their access to resources such as technical assistance and credit for implementing more sustainable production systems.

In addition to producers and their associations, the productive segment also includes input suppliers and governmental and non-governmental development organizations. The latter provide essential materials for dairy production, including veterinary supply stores and vendors of milking equipment, forage, feed supplements, water troughs, and other tools for pasture maintenance. Governmental and non-governmental development entities promote dairy production, invest in productive projects, and support local producers and organizations through technical assistance, genetic improvement, and marketing initiatives. However, their contribution remains limited in terms of organizational strengthening, a factor that is closely linked to the low levels of organizational development observed in the sector.

The processing stage focuses on actions to support milk processing and the production of cheese and other dairy by-products. It involves 10 actors, with the highest density in the dairy network (0.233) and greater centralization (0.333). Associations such as ASOA-GROEMPT and local veterinary service companies concentrate on the linkages, mobilizing technical knowledge and financial resources aimed at animal care. The modularity (0.363) indicates the persistence of functional blocks in which suppliers and associations work closely together, although this concentration also generates the risk of excessive dependence on central actors.

The commercialization stage is the weakest. With seven actors, its density is very low (0.067), and modularity is nonexistent. Although centralization reaches a medium value (0.306), relationships are concentrated in a few buyers and processors, such as Lácteos La Arboleda, which acts as the central actor in channeling financial resources and raw materials (milk). The limited interconnection between associations and companies restricts marketing-channel diversification and reduces producers' bargaining power, who remain highly dependent on a small number of buyers.

Relationships among actors in this stage are established exclusively for commercial purposes. There are no actors seeking to promote new commercial alliances outside the municipality or even the department to add value to milk or to promote production under silvopastoral systems that could directly contribute to ecosystem and biodiversity conservation. Vertical relationships predominate, and financial resources are the main capital flowing because of commercial transactions.

3.2.3. Typologies of Cooperation Networks in the Cacao and Dairy Value Chains

The comparative analysis of the cacao and dairy value chains shows that both are primarily structured around linking-type cooperation. In the processing and commercialization stages of cacao, as well as in all three stages of the dairy chain (production, processing, and commercialization), networks with low density and high centralization were identified, indicating that linkages between producer organizations and support actors are configured in a vertical and unidirectional manner. These interactions are mainly oriented toward the transfer of financial resources, technical assistance, and specialized knowledge, providing immediate benefits for accessing incentives and modernizing production. However, network metrics show that the concentration of relational power in a few external actors limits horizontality and generates dependency dynamics that restrict organizational autonomy and their capacity to influence intervention planning.

In the case of cacao, in addition to linking-type cooperation, bonding-type cooperation was clearly identified in the production stage and incipiently in the commercialization stage. This is reflected in the formation of cohesive and relatively closed groups among actors with similar levels of influence. This type of cooperation provides benefits in terms of trust, mutual support, and local coordination; however, its scope for redistributing benefits and engaging with more powerful actors remains limited.

In contrast, the dairy value chain is characterized by the predominance of linking-type cooperation across all stages, which translates into relationships with low diversity of horizontal ties and strong concentration in external support actors. This pattern presents significant challenges, as the high dependency on external incentives and technical assistance exposes associations to institutional fragility if such resources were to disappear. Nevertheless, a distinctive element compared to cacao is the role of actors such as Pastoral Social, which, in addition to providing technical and financial assistance, accompany families in social and psychological dimensions. This approach strengthens forms of cooperation oriented toward care, equity, and family resilience—dimensions that are often less visible in other productive chains.

Overall, the results indicate that while the cacao value chain exhibits a certain diversification in its forms of cooperation—combining both linking- and bonding-type dynamics—the dairy value chain retains a more homogeneous and vertically oriented structure, predominantly based on linking-type relationships. Notably, the absence of bridging-type cooperation suggests limited cross-fertilization and collective learning among organizations. A common challenge for both value chains lies in overcoming the vertical dynamics that sustain the subordination of local organizations to more powerful actors, thereby constraining the development of more horizontal and sustainable cooperation networks. Nonetheless, the external provision of financial, technical, and knowledge resources remains a crucial factor supporting the continuity of productive activities, economic stability, and—particularly in the dairy sector—the strengthening of social dimensions that foster community cohesion.

4. Discussion

The findings of this study show that cooperation is expressed differently in the cacao and dairy value chains in Caquetá, both in their organizational dynamics and in the configuration of their networks. In line with Chang et al. [11], who emphasize that collaborative relationships complement formal institutions, our results indicate that, in the case of cacao, cooperation is primarily articulated through strategic planning and administrative management. This is consistent with Ton et al. [19], who demonstrate that cacao associations strengthen their collective capacities when cooperation is integrated into processes of strategic orientation and institutional consolidation.

In contrast, dairy organizations display a different pattern: cooperation is concentrated in productive and financial dimensions, particularly in production management and annual budgeting, while it has less influence on internal governance and legal compliance. This finding aligns with Mumba et al., Forero Camacho et al., and Durana et al. [33–35], who note that dairy associations tend to prioritize productive efficiency and resource management but face challenges in achieving organizational consolidation.

The difference between both value chains is also related to their trajectories of institutional support. Cacao has been promoted by national and international cooperation agencies as an alternative to reduce deforestation and replace illicit crops, strengthening value addition processes and access to differentiated markets [38,39]. In contrast, live-stock production has not received comparable support, limiting productive transformation and commercial diversification in the dairy sector [40–42]. In a context of sustained forest loss [43], these differences influence opportunities for innovation and organizational sustainability [44–46].

The structural analysis of networks confirms these trends. In cacao, cooperation is channeled through central nodes that facilitate technical assistance, certifications, and market access, although with limited horizontal density in productive and commercial stages, which may create vulnerability to external changes [5,6]. In the dairy value chain, interactions are more distributed at the production stage, but commercialization is concentrated in a few dominant actors, restricting diversification and reproducing structural dependency.

The types of cooperation further deepen this comparison. In both value chains, linking-type cooperation predominates, particularly in processing and commercialization in cacao and throughout the dairy chain. These vertical relationships, oriented toward the transfer of financial resources, specialized knowledge, and technical assistance, facilitate productive modernization but also generate dependency on external actors. In cacao, bonding-type cooperation is also observed in the productive stage and, incipiently, in commercialization, reflecting internal cohesion, trust, and mutual support. In the dairy chain, by contrast, vertical cooperation is dominant, and the diversity of horizontal ties remains limited.

Overall, the results suggest that while cacao is moving toward a more integral model of cooperation—articulated with institutional strengthening and value addition—the dairy sector maintains a more focused form of cooperation aimed at addressing immediate productive needs. Strengthening horizontal linkages and diversifying cooperation nodes could enhance organizational autonomy in cacao, whereas in dairy it is essential to expand commercialization networks and advance formalization and governance. Promoting bridging-type cooperation through experience exchanges and collective learning processes could strengthen weaker organizational principles in both value chains [1,2,5–7].

This study contributes to the literature by shifting the analytical focus from social capital as an abstract construct to cooperation as an observable relational process embedded in organizational principles and network structures.

5. Conclusions

This study demonstrates that cooperation emerges as a key relational mechanism influencing organizational sustainability within the cacao and dairy value chains in Caquetá. Rather than an abstract attribute, cooperation operates as a dynamic relational process that permeates organizational principles and materializes in specific network structures that shape collective performance and organizational autonomy.

The findings reveal clear differences between the two value chains. Cacao organizations show higher levels of institutional consolidation, with cooperation oriented toward strategic and administrative strengthening, fostering greater organizational coherence and planning capacity. In contrast, dairy organizations exhibit more recent and heterogeneous trajectories, where cooperation is primarily concentrated in productive and budgetary dimensions, with more limited influence on governance processes and institutional consolidation.

Legal representatives' perceptions confirm that cooperation fulfills differentiated roles depending on the organizational context. In cacao, it is associated with strategic vision, internal cohesion, and positioning in differentiated markets; in dairy, it is linked mainly to productive efficiency and access to immediate resources. These differences reflect not only varying levels of institutional maturity but also unequal trajectories of external support and accumulated organizational experience.

Network analysis indicates a predominance of linking-type cooperation, characterized by vertical relationships with external actors that facilitate access to financial resources, technical assistance, and markets. While this form of cooperation contributes to productive modernization, it may also reinforce dependency dynamics and constrain organizational autonomy. The still limited presence of horizontal ties (bonding and bridging) restricts the diversification of learning processes and the internal circulation of benefits within value chains.

In relation to the proposed hypotheses, the findings suggest that cooperation tends to strengthen as organizational principles become more consolidated, as observed in the cacao value chain. Furthermore, network structure, particularly density and the diversity of circulating resources, conditions the intensity and scope of cooperation. More diversified and less centralized networks appear to expand opportunities for strengthening cohesion, autonomy, and long-term sustainability.

Overall, advancing toward more resilient value chains in Amazonian contexts requires not only access to external resources but also the strengthening of more horizontal, diversified, and territorially embedded forms of cooperation. Achieving this balance emerges as a key challenge for policies and support strategies aimed at consolidating more autonomous and inclusive rural organizations.

While this study is based on a limited number of organizations, its purpose was not statistical generalization but in-depth qualitative understanding of cooperation dynamics within specific territorial contexts. The Organizational Capacity Index (OCI) reflects the perceptions of legal representatives, which provides valuable insight into internal organizational processes, although it may not capture all perspectives within each association. Similarly, the network structures represent collectively constructed mappings developed during participatory workshops, offering a grounded view of relational dynamics rather than an exhaustive census of all existing ties. These characteristics are consistent with the qualitative and exploratory orientation of the research and strengthen its contextual depth. Future research may explore the gender-based barriers that help explain the lower OCI scores observed in women's organizations, the conditions under which linking cooperation supports organizational autonomy—for instance, by facilitating access to higher-value or differentiated markets—rather than reinforcing dependency, and the ways in which cooperation evolves across different stages of organizational maturity.

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Informed Consent Statement: All participants provided written informed consent prior to their involvement in the study. They were informed about the study's purpose, procedures, potential risks, and benefits, as well as their right to withdraw at any time without penalty. Confidentiality and anonymity of participant data were assured and maintained throughout the research process. The authors confirm that informed consent for participation was obtained from all participants.

Data Availability Statement: The data presented in this study are available on request from the corresponding author due to privacy reasons.

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Acronyms and Abbreviations

ADR	Agencia de Desarrollo Rural
AOP	Annual Operating Plan
ASMEGO	Asociación de Mujeres Ganaderas de la Montañita [Association of Women Livestock Farmers of La Montañita]
ASOMUFEN	Asociación de Mujeres de Fenicia [Association of Women of Fenicia]

ASMUJSAN	Asociación de Mujeres de San José del Fragua [Association of Women of San José del Fragua]
ASOAGROEMPT	Asociación Agropecuaria El Porvenir de Tres Esquinas [Agricultural Association El Porvenir de Tres Esquinas]
ASPROABELÉN	Asociación de Productores de Belén de los Andaquíes [Producers' Association of Belén de los Andaquíes]
CIAT	Centro Internacional de Agricultura Tropical [International Center for Tropical Agriculture]
COMUCAN	Cooperativa Multiactiva Cacaotera del Municipio de San Vicente del Caguán [Multiactivity Cooperative of Cacao Growers in the Municipality of San Vicente del Caguán]
CGM	Comité Ganadero de La Montaña [Municipal Committee of Cattle Ranchers of La Montaña]
COPROPENEYA	Cooperativa de Productores de Cacao de la Peneya [Cacao Producers Cooperative of the Peneya]
CORPOCABEL	Corporación de Productores de Cacao de Belén de los Andaquíes [Cacao Producers' Corporation in Belén de los Andaquíes]
DANE	Departamento Administrativo Nacional de Estadística [National Administrative Department of Statistics]
FEDECACAO	Federación Nacional de Cacaoteros de Colombia [National Federation of Cacao Growers of Colombia]
FEDEGAN	Federación Colombiana de Ganaderos
IDEAM	Instituto de Hidrología, Meteorología y Estudios Ambientales [Institute of Hydrology, Meteorology and Environmental Studies]
OCI	Organizational Capacity Index
OP	Organizational Principles
PMN	Parques Municipales Naturales [Municipal Natural Parks]
PNN	Parques Nacionales Naturales [National Natural Parks System]
RNSC	Reservas Naturales de la Sociedad Civil [Civil Society Nature Reserves]
SINCHI	Instituto Amazónico de Investigaciones Científicas [Amazonian Institute for Scientific Research]
UPRA	Unidad de Planificación Rural Agropecuaria [Rural Agricultural Planning Unit]

Appendix A

Table A1. Acronyms and full names of the organizations studied, their sector, and year of establishment.

Acronym	Full Name	Sector	Year of Establishment
AGROSOLIDARIA	National Agrosolidaria Association (local chapter)	Cacao	2010
ASPROABELÉN	Association of Alternative Agroforestry Producers of Belén de los Andaquíes	Cacao	2014
COMUCAN	Committee of Cacao Growers in Agroforestry Systems of the Municipality of La Montaña	Cacao	2008
COPROPENEYA	Committee of Cacao Producers in Agroforestry Systems of Unión Peneya	Cacao	2011
CORPOCABEL	Committee of Cacao Producers in Agroforestry Systems of Belén de los Andaquíes	Cacao	2008
ASMEGO	Association of Women Entrepreneurs Generating Opportunities	Cattle	2019
ASMUJSAN	Women Entrepreneurs of San Isidro	Cattle	2022
ASOAGROEMPT	Association of Women Entrepreneurs of El Triunfo	Cattle	2016
ASOMUFEN	Association of Women of Fénix de la Cordillera	Cattle	2022
LÁCTEOS LA ARBOLEDA	Dairy processing company	Cattle	2000

Appendix B

Appendix B.1

Table A2. Metrics by stage of the cacao value chain and predominant capitals in the networks.

Stage	Municipality	Nodes	Centrality	Density	Modularity	Capitals
Productive	Belén de los Andaquíes	50	0.662	0.163	0.30	Technical assistance; knowledge; plant material
	La Montañita	14	0.487	0.253	0.253	Raw materials; norms; technical assistance
Processing	Belén de los Andaquíes	5	0.333	0.300	0.44	Knowledge; financial resources; raw materials
	La Montañita	8	0.232	0.194	0.264	Raw materials; financial resources; knowledge
Commercialization	Belén de los Andaquíes	21	0.716	0.102	0.18	Financial resources; knowledge; marketing
	La Montañita	12	0.564	0.288	0.222	Financial resources; raw materials

Appendix B.2

Table A3. Input suppliers in Belén de los Andaquíes and La Montañita, Caquetá.

Actor	Role	Capital Belén	Capital Montañita
Nurseries	Centers for reproduction and sale of plant material		Plant material
Iglesia del Sur	Finances the purchase of organic inputs and tools for sustainable production	Inputs	
Agrosolidaria	Supplier of organic inputs to small producers	Inputs	Knowledge

Appendix B.3

Table A4. Producers and producer organizations in Belén de los Andaquíes and La Montañita.

Actor	Role	Capital Belén	Capital Montañita
Producers	Cacao production under agroforestry systems	Raw materials	Raw materials
ASPROABELÉN	Association in Belén responsible for collection, commercialization, and export of organic cacao	Raw materials	
COMUCAM	Committee in La Montañita responsible for buying, collecting, and selling dry cacao		Raw materials
COPROPENEYA	Committee in Unión Peneya responsible for buying, collecting, and selling dry cacao		Raw materials
COMCAP	Association in Doncello responsible for national and international cacao trading		Financial resources

Appendix B.4

Table A5. Governmental and non-governmental entities supporting the cacao value chain in Belén de los Andaquíes and La Montañita.

Actor	Role	Capital Belén	Capital Montañita
BioLatina	Support for organic certification processes	Certification	
Cacao Network	Provision of technical assistance and training spaces in organic production and certification	Technical assistance	Norms
CIAT	Provision of technical assistance and productive infrastructure to the most committed producers	Productive infrastructure	
FEDECACAO	Provision of technical assistance to small producers	Technical assistance	
Fundación Carlota	Support for improving productive activities and searching for commercial opportunities		Knowledge
Fundación Natura	Financing of inputs and plant material for small producers	Inputs	
GIZ	Financing of salaries for technicians in local organizations to provide technical assistance	Knowledge	
Government of Caquetá	Financing of technical assistance and training in harvest and post-harvest management	Technical assistance	Technical assistance
MADR	Support for sustainable production and financing for inputs, machinery, and infrastructure	Financial resources	
Municipalities	Financing for grassroots organizations to provide technical assistance to small producers	Technical assistance	Technical assistance
Rainforest Alliance	Support for organic certification processes	Certification	
REDADELCO	Support for sustainable production processes		Knowledge
WCS	Manager and financier of training spaces in sustainable production, conservation agreements, and biodiversity studies on cacao farms	Knowledge	
WWF	Financing of technical assistance in sustainable production and deforestation reduction	Knowledge	

Appendix C

Appendix C.1

Table A6. Metrics by stage of the dairy value chain in the municipality of La Montaña.

Stage	Nodes	Relationships	Centrality	Density	Modularity
Production	13	30	0.265	0.192	0.438
Processing	10	21	0.333	0.233	0.363
Commercialization	7	16	0.306	0.067	0.000

Appendix C.2

Table A7. Input suppliers for cattle.

Actor	Role	Capitals
Private veterinarians and local supply stores	Suppliers of inputs for animal care and pasture management	Inputs, technical assistance

Appendix C.3

Table A8. Cattle producers and organizations.

Actor	Role	Resources
ASOFUMEM	A women's organization dedicated to milk production and commercialization	Norms
ASOAGROEMPT		
ASMEGO		
COMOGAN	Cattle committee of La Montaña, responsible for strengthening production and managing commercial alliances	Knowledge
Producers	Responsible for producing milk and dairy products for sale and self-consumption	Raw materials

Appendix C.4

Table A9. Governmental and non-governmental entities promoting cattle production.

Actor	Role	Resources
Estar Protegido	Commercial channel and financing of inputs for improving milk management	Inputs
FEDEGAN	Financing of municipal programs for technical assistance, vaccination, and genetic improvement	Financial resources
Ministry of Agriculture	Support for sustainable production and financing for inputs, machinery, and productive infrastructure	Financial resources
SENA	Training in sustainable production, silvopastoral grazing systems, and accounting management for civil society organizations	Knowledge
UNDP	Provides financing to grassroots organizations to provide technical assistance to small producers and promote conservation initiatives	Financial resources
University of the Amazon	Creation of training spaces in cattle production under silvopastoral systems	Knowledge

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