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Fairness in coffee value chains: organizational solutions for the self-governance of small producers

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Introduction: This research aims to identify key organizational mechanisms that enable small coffee producer associations to create equitable and sustainable alternatives to conventional supply chains, which are characterized by strong inequities and asymmetries. Through an in-depth case study of northern Colombia, this study reveals how collective organization and equitable decision-making processes can transform power dynamics, allowing small-scale producers to retain greater value and establish economic, social, and environmental sustainability.

Methods: Building on a comprehensive theoretical framework of fairness—encompassing distributive, procedural, interactional, and environmental dimensions—the research employs a mixed-methods approach combining quantitative data from 40 coffee producers regarding their perceptions of fairness with qualitative insights from semi-structured interviews with producers and technicians cooperating within the case study.

Results: The central finding demonstrates that producer-led collective governance structures directly strengthen self-determination and enable small-scale farmers to challenge dominant supply chain inequities. Specifically, the study reveals that equitable decision-making processes are the critical mechanism through which coffee associations successfully retain value and achieve sustainability across multiple dimensions.

Discussion: This research makes an original contribution by empirically demonstrating how producer associations can serve as viable organizational models for transforming global agricultural value chains. By empirically demonstrating that grassroots collective action provides a robust alternative to conventional approaches to supply chain sustainability, the study offers concrete evidence of the potential for small-scale producers to effect meaningful change in the coffee industry.

KEYWORDS

coffee, agro-food chains, fairness, governance, sustainability, equity

1 Introduction

Coffee is one of the most traded agri-food commodities globally, with steady growth in recent decades (Panhuysen and De Vries, 2023). Despite this expansion, the coffee supply chain remains affected by significant socio-economic inequalities (Sachs et al., 2019; Utrilla-Catalan et al., 2022). The cultivation of coffee is concentrated in tropical and subtropical regions, areas with the necessary

climatic and phytogeographic conditions for its growth. Environmentally, coffee production poses challenges in these regions, including deforestation, soil erosion, hydrogeological instability, and contamination of water bodies and soils (Barreto Peixoto et al., 2023). Although the adoption of sustainable farming practices has somewhat mitigated these impacts in recent decades, local communities and ecosystems continue to bear the brunt of coffee production (Utrilla-Catalan et al., 2022; Baquero-Melo, 2023; Quiñones-Ruiz and Salcedo-Montero, 2023). At the same time, the distribution of value across the supply chain remains highly unequal, with those at the production end receiving only a small share of the economic benefits (Quiñones-Ruiz and Salcedo-Montero, 2023). Previous studies have highlighted structural asymmetries within the coffee supply chain, where large players exert significant influence, particularly in shaping bargaining processes, government regulations, industry practices, and the establishment of industrial standards (Ponte, 2019; Samoggia and Fantini, 2023). Their concentrated power marginalizes smaller stakeholders, leading to a system where value creation and decision-making are largely controlled by a few dominant entities mostly based in European or North American countries: a dynamic characteristic of global value chains (Miatton and Amado, 2020; Gereffi, 2018; Ponte, 2019) (Figures 1, 2). Additionally, the coffee industry is highly vulnerable to price volatility, which further threatens the economic stability of small-scale producers (International Trade Centre, 2021; Samoggia and Fantini, 2023). The challenging conditions faced by small-scale producers ripple down to the most vulnerable actors in the supply chain, intensifying labor exploitation among rural workers (Baquero-Melo, 2023) and further marginalizing female agricultural workers, whose labor often goes unpaid (Quiñones-Ruiz and Giraldo-Liévano, 2022).

This dynamic synthesizes what Daviron and Ponte (2005) define as the “coffee paradox”: despite the steady growth of global coffee trade, the value retained by coffee-producing countries has significantly declined since the 1989 end of the regulatory framework of the International Coffee Agreement (ICA) and the subsequent wave of liberalization in the coffee industry. While origin countries once retained around 30% of the total value, this share has dropped to less than 10% (Panhuysen and Pierrot, 2018). Although comprehensive data on concentration in the industry remains limited, existing research highlights that about 5–7% of this value reaches primary producers. Instead, the share of value is captured in the high-value-added stages of the supply chain—importing, roasting, and retailing—processes that predominantly occur in importing countries (Miatton and Amado, 2020). These dynamics

clearly illustrate what scholars have long described as the unequal exchange between raw materials-producing countries in tropical countries and those specializing in manufacturing, services, and retail in importing countries (Arghiri, 1972; Amin, 1977; Hicckel et al., 2022).

Given this structural imbalance and the scarcity of studies assessing its actual impacts, it is crucial to explore initiatives that challenge the dominant model and foster more equitable and sustainable supply chains beyond certification standards (e.g., Fairtrade/Organic). The primary objective of this study is to explore innovative value chain approaches and organizational strategies that promote fairness in value distribution while enhancing value for small producers in origin countries through a case study approach. The research examines the key dynamics and challenges faced by a coffee producers’ association during its expansion over the past decades, leading to its significant role in global coffee supply chains. Likewise, the study analyzes the association’s internal structures and relationships to understand how they contribute to its resilience and long-term success as well as how they reach a higher degree of fairness. The case study analyzed is Red Ecolsierra (“La Red”), an association of small-scale producers based in the Sierra Nevada de Santa Marta, one of the Colombian regions characterized by its organic production.

2 Theoretical framework

Fairness constitutes the central theoretical framework for this study. Often associated with equity and social sustainability, fairness is embedded in several Sustainable Development Goals (SDGs) of the United Nations’ 2030 Agenda. Recent literature identifies three primary dimensions: distributive, procedural, and interactional fairness (Samoggia and Beyhan, 2022). Distributive fairness concerns equitable allocation of tangible outcomes within the agro-food chain among stakeholders (Adams, 1965). Procedural fairness examines the processes achieving these outcomes, including negotiation mechanisms and actors’ perceptions of fairness (Thibaut and Walker, 1978). Interactional fairness assesses treatment of individuals within supply chains, considering courtesy, dignity, transparency, and respect (interpersonal fairness), plus access to decision-making information (informational fairness) (Bies and Moag, 1986; Samoggia and Beyhan, 2022; Samoggia et al., 2023). These three dimensions interact crucially to ensure social and economic sustainability by balancing benefits and burdens among all stakeholders.

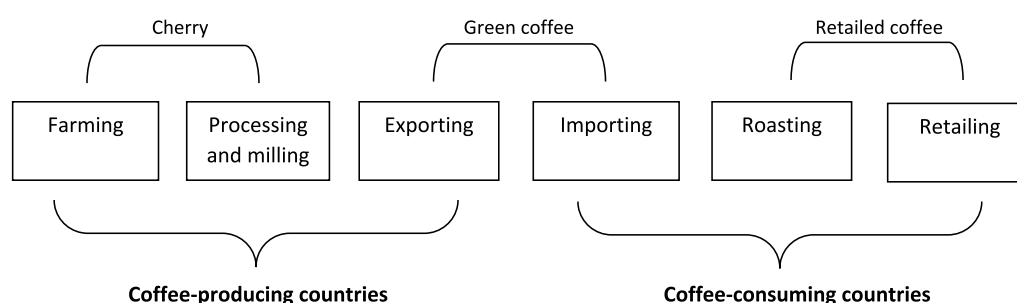
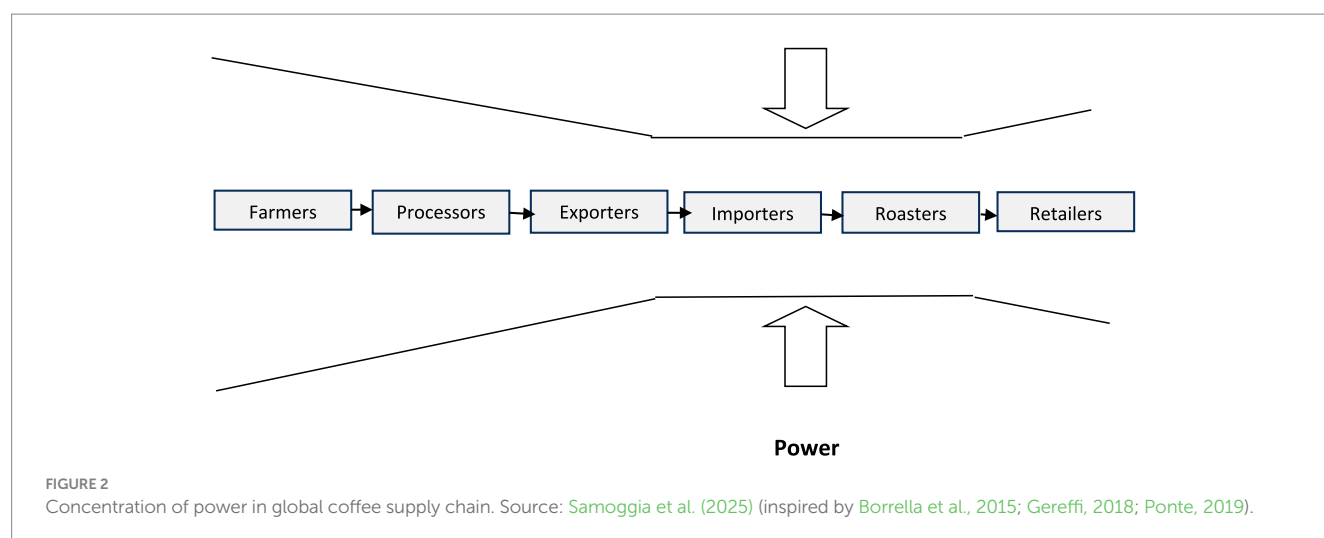


FIGURE 1
Global coffee supply chain. Source: Samoggia et al. (2025).



However, growing evidence suggests that these dynamics are deeply interconnected with environmental factors. The concept of socio-ecological systems, developed by scholars over the past 30 years within the broader framework of complex systems theory (Holling, 2001; Preiser et al., 2018) captures the interdependence of social, economic, and environmental dimensions (Holling, 2001; Giampietro et al., 2009; Preiser et al., 2018; Berkes, 2017). This interconnectedness manifests in global value chain imbalances, where economic gains often override environmental protection, depleting natural resources essential for agriculture (Berger, 2008; Altieri and Nicholls, 2017; Dudley and Alexander, 2017). This creates environmental pressures on ecosystems and rural livelihoods in the origin counties, challenging long-term sustainable development (Martinez-Alier, 2002; Borrás and Franco, 2024; D'Alisa and Demaria, 2024). Without well-structured regulatory frameworks, environmental sustainability initiatives may reinforce power imbalances, enabling dominant actors to leverage sustainability for competitive advantage (Grabs and Ponte, 2019; Ponte, 2019; Samoggia and Fantini, 2023). These consequences impact vulnerable actors within value chains, further entrenching social and economic inequalities (Hochedez, 2022; Caviedes, 2021; Fantini, 2023; Murray et al., 2023; Samoggia et al., 2025). This study adopts a comprehensive framework that integrates distributive, procedural, and interactional fairness with environmental fairness. Figure 3 illustrates coexisting fairness conceptions. The figure traces the gradual incorporation of new dimensions of fairness as they emerged in the literature: starting with a distributive view (Adams, 1965), followed by procedural fairness (Thibaut and Walker, 1978), interactional dimension (Bies and Moag, 1986), later divided into informational and interpersonal fairness (Greenberg, 1990), and most recently, the environmental dimension (Food Ethics Council, 2020). Table 1 summarizes the different types of fairness and their specific applications within coffee value chains.

3 Description of the case-study

This research examines an association of small coffee producers based in Santa Marta, northern Colombia, name Red Ecolsierra (La Red). This case study was selected for the distinctive characteristics of

the association's project and the challenging context in which it operates. Founded in 1997 as a grassroots initiative by coffee producers from the Sierra Nevada region, the association emerged to promote sustainable production and social development. The area's high climatic variability makes it particularly well-suited for cultivating high-quality Arabica coffee (Rangel and Orlando, 1995). Culturally and historically, the region is intertwined with its indigenous communities, including the Arhuacos, Koguis, Wiwas and Kankuamos (Ulloa, 2011).

The social and infrastructural conditions of the area face several challenges. Many villages remain isolated, with limited and poorly maintained infrastructure, forcing local communities to manage upkeep themselves. The lack of social services further hinders development, contributing to youth migration. These difficulties are compounded by a history of armed conflict: since the 1980s, the civil war caused widespread displacement among coffee producers. Although many families began returning after the demobilization of the Tayrona Resistance Bloc (BRT) in 2006, armed groups continue to operate in some areas. Following the initiation of 'socio-legal conversations' by Gustavo Petro's government in August 2024, the situation has experienced a degree of stabilization; however, substantial uncertainties and challenges remain (Schanznig, 2024).

In this complex scenario, La Red was established to foster social development and environmental sustainability through a focus on traceability and quality. Certified as both organic and fair trade, it has been recognized for its role in mitigating the impacts of war and strengthening rural resilience (Schanznig, 2024; Ecolsierra, 2018).

The association's development has unfolded in several strategic phases. To strengthen the supply chain, a coffee and honey processing workshop was established in 2013, followed by the creation of the export company Ecolsierra Export SAS in 2014 (Schanznig, 2024; Ecolsierra, 2018). The most recent phase, launched in 2022, introduced two key initiatives: the "plan de finca," designed to optimize farm management, and the "complemento generacional," which seeks to encourage youth participation and bridge the generational gap.

The governance structure of La Red is defined by a set of formal documents outlining its constitution, structure, and operational regulations. These include the bylaws, the producer family handbook, and the organic production plan. The bylaws establish the association's

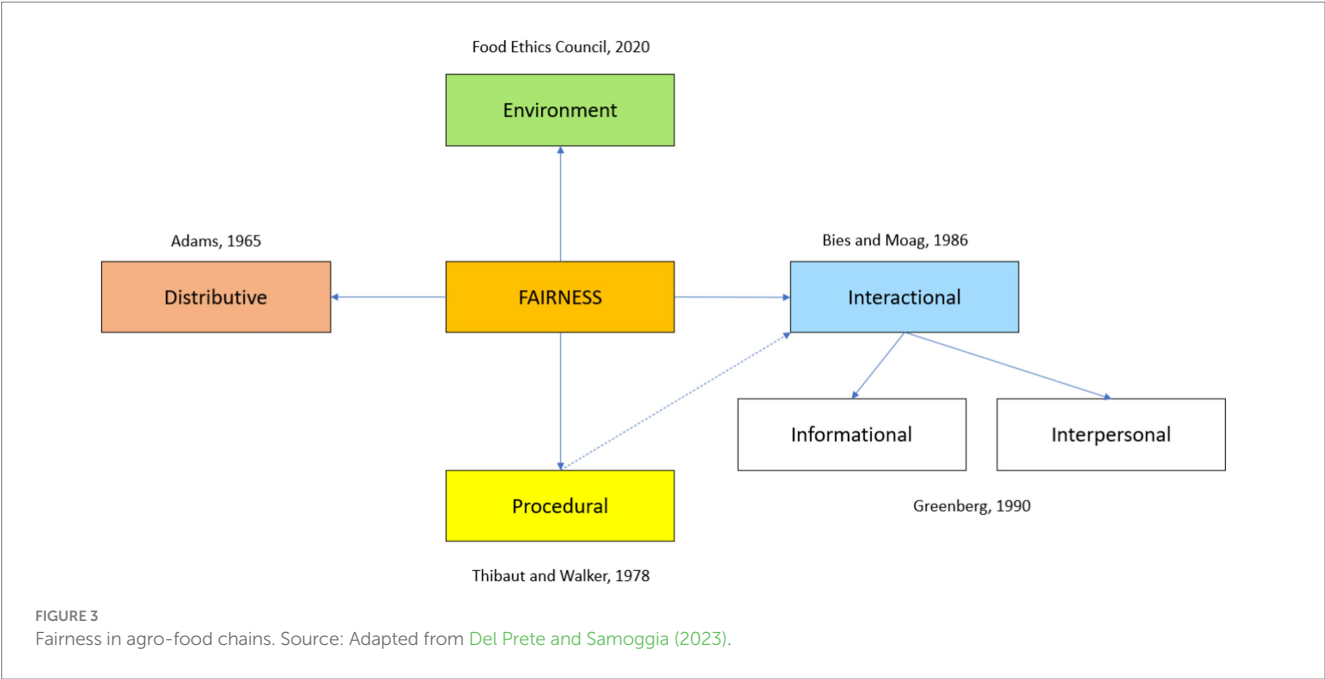


TABLE 1 Fairness applications in coffee chains.

Type of fairness	References	Applications in coffee chains
Distributive fairness	Adams (1965)	Equitable distribution of economic benefits. For example: increased value share for farmers, typically the most economically vulnerable actors in coffee chains.
Procedural fairness	Thibaut and Walker (1978)	Transparency in pricing mechanisms and value distribution processes among all stakeholders. Strengthened bargaining capacity for traditionally marginalized actors (i.e., small farmers) through information access and collective negotiation structures.
Interactional fairness	Bies and Moag (1986), Samoggia and Beyhan (2022) and Samoggia et al. (2023)	Equitable treatment of supply chain participants and transparent access to governance processes and decision-making mechanisms.
Environmental fairness	Hochedez (2022), Caviedes (2021), Murray et al. (2023) and Samoggia et al. (2025)	Fair sharing of environmental costs and benefits among all supply chain participants.

identity, area of operation, social objectives, and cooperative principles. They also regulate the network’s structure, composed of grassroots groups, and define the roles of governing bodies such as the board of directors, committees, and general manager. The development plan serves as a strategic guide, coordinating activities, setting priorities, and fostering social innovation. Additionally, the producer family handbook governs membership rules, interactions with certification systems, and compliance penalties, while a separate environmental management manual ensures adherence to sustainability practices (Schanznig, 2024; Ecolsierra, 2018). The number of associates grew over the years and now counts 320 producers (Figure 4).

The organizational supply chain foresees that producers deliver their coffee to designated *agencias de compra*, which are collection points spread across the Sierra Nevada de Santa Marta. At these locations, the coffee is weighed and assessed for quality before payment is issued. The price fluctuates daily based on the New York Stock Exchange, with additional premiums for organic and Fairtrade certification.

Ecolsierra follows a democratic and participatory decision-making process. Major decisions are made by the general assembly, which consists of delegates from grassroots groups (each representing 5–10 families). While the board of directors and general manager

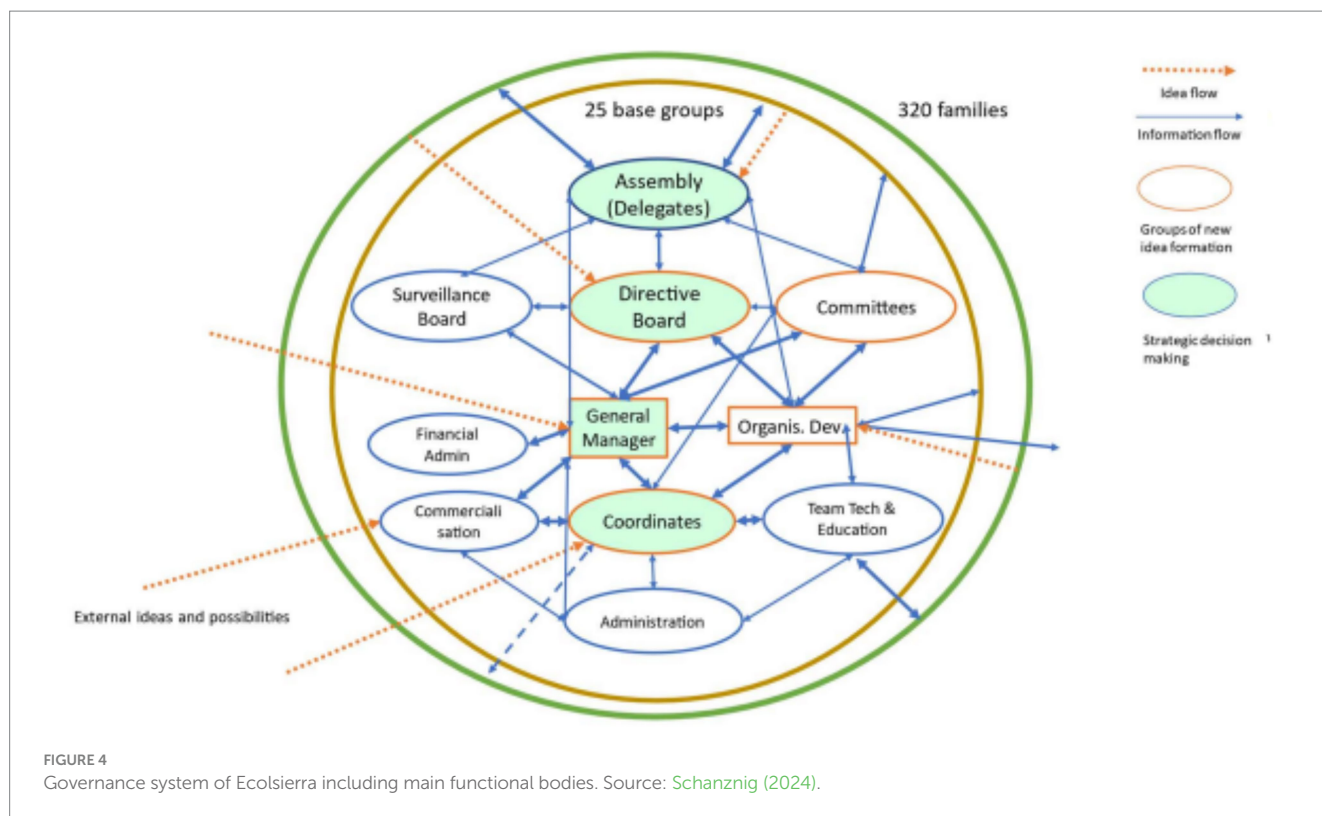
prepare proposals, final approval always rests with the delegates, who vote according to the cooperative’s bylaws. The cooperative uses planning tools, such as the development plan, to guide its actions and coordination. Assemblies are held twice a year and include all core group delegates, though they remain open to all cooperative members.

4 Methods

The study was conducted through field research in two phases. The first phase employed a qualitative and ethnographic approach carried out in May–June 2024, and the second phase adopted a quantitative approach, gathering data through a structured questionnaire administered in September–November 2024.

4.1 First phase—Qualitative and ethnographic analysis

This phase aimed to deepen the understanding of La Red’s organizational dynamics, historical trajectory, and the challenges



faced by its associated producers. Using qualitative and ethnographic methods, the study examined how internal relationships, decision-making, and problem-solving strategies have influenced the association's development and resilience over time.

To achieve this, six interviews were conducted with technicians, managers, and producers from La Red, on farms, at the organization's headquarters and during international coffee fairs and events (e.g., meetings, general assemblies). The qualitative data gathered provided key insights into the association's structure, evolving challenges, and the mechanisms supporting its sustainability and role within the coffee value chain.

This information also played a crucial role in refining the quantitative questionnaire for the second phase. Additionally, data on the association's growth trends, membership evolution, and geographical context were collected, helping to frame the broader environmental, economic, social, and political dimensions of the study. Regarding the mode of data collection, all respondents were informed in advance about the research methodology and objectives. In line with best practices for ensuring data privacy, all interviews and the subsequent questionnaire were conducted under strict conditions of anonymity, guaranteeing the highest level of confidentiality for participants. All subsequent data elaboration adhered fully to these confidentiality standards.

4.2 Second phase—Quantitative analysis

4.2.1 Sample and questionnaire

The second phase focused on analyzing innovative value chain approaches and organizational strategies that promote fairness in value distribution and enhance value for small producers in

coffee-producing countries. Specifically, it aimed to assess how producers perceive and experience different elements of fairness within La Red, including equity in pricing, decision-making participation, resource access, and value distribution. Understanding these perceptions provided insights into how La Red's structure and strategies influence producers' sense of fairness and how the different types of fairness interact.

To achieve this, a quantitative analysis was conducted through a structured questionnaire administered to 40 Red Ecolsierra producers, either on their farms or during La Red membership meetings. Participants were recruited through convenience sampling during cooperative's meetings based on member availability. Despite geographic accessibility challenges in remote farming areas, the final sample achieved representativeness across key demographics: age, gender, farming experience, and farm size. The questionnaire underwent pilot testing with five farmers before administration to the remaining 35 participants. The survey gathered data on different dimensions of fairness outlined in the theoretical framework, along with sociodemographic factors (age, gender) and economic variables (years in business, farm size in hectares, average annual production in tons). By identifying patterns and correlations, this phase complemented the qualitative insights from the first phase, offering a deeper understanding of how La Red's fairness-driven strategies impact small producers and their engagement in the value chain. When adequate questions were measured using a five items Likert scale ranging from 1 to 5, with 1 = 'Strongly disagree', 2 = 'Somewhat agree', 3 = 'Neither agree nor disagree', 4 = 'Somewhat agree' and 5 = 'Strongly agree'.

To ensure a solid theoretical foundation, the research study adapted the IEED-Oxfam questionnaire (Buxton and Tait, 2012) to the Red Ecolsierra context. This questionnaire, widely recognized in food studies,

aligns with the present study’s theoretical framework. While it originally covered three fairness types (Distributive, Procedural and Interactional), the research added four questions addressing Environmental Fairness, so to reflect the study’s theoretical model. This resulted in 19 variables, each linked to a specific question (Table 2).

4.2.2 Data elaboration

Data elaboration phase includes various steps. First, overall and fairness type averages were calculated to assess producers’ perceptions of fairness. Then, an exploratory factor analysis (EFA) was conducted to identify underlying latent factors of fairness perceptions. This method extracts key factors from a correlation matrix based on Kaiser’s criterion and a scree plot (retaining factors with values > 1). The extracted factors were then rotated using Varimax rotation to maintain independence. Then, factor loadings were detected, excluding variables with values below 0.6. This process initially yielded five latent factors. To refine the findings, a second exploratory factor

TABLE 2 Questionnaire organized by fairness types adopted in the research.

Distributive fairness (DF)
1. La Red is transparent about its negotiating position.
2. La Red acknowledges that both parties benefit from doing business together.
3. You are satisfied with the payment arrangements (method and terms) offered by La Red.
4. You are satisfied with the income you receive from selling your coffee to La Red, considering production costs.
5. The premium price you receive from La Red for following certification requirements fairly compensates your time and effort.
6. You receive an adequate additional compensation for quality (quality premium).
Procedural fairness (PF)
7. You have sufficient opportunities to express your opinions to La Red.
8. La Red is aware of the challenges and problems you face.
9. You are informed about how La Red determines the price you receive for your coffee.
10. La Red is transparent when explaining decisions that may affect your business or coffee sales.
Interactional fairness (IF)
11. La Red provides the information you need to produce coffee according to the required specifications.
12. La Red justifies any changes in decisions that affect your business or farm.
13. La Red treats you with respect and dignity.
14. La Red is accessible and available for communication.
15. You do not feel that treatment differs based on gender.
Environmental fairness (EF)
16. Organic farming provides economic benefits for your farm.
17. Organic farming offers additional non-economic benefits (e.g., good water management, soil conservation, waste management).
18. La Red recognizes your commitment to sustainable farming through higher prices and technical support.
19. La Red provides technical advice (agronomic and environmental) to help protect soils and forest ecosystems.

Adapted from Buxton and Tait (2012).

analysis was run using only the variables with values above 0.6, leading to a final model with 4 factors and 13 key variables.

Finally, binary regressions were conducted on the 13 dichotomized selected variables (0 = below average, 1 = above average for each variable) and dichotomized sociodemographic variables (gender coded as 0 = female, 1 = male; 0 = below average, 1 = above average for the remaining variables) to identify correlations. After a collinearity analysis, “age” was excluded while “years in business” was retained. The flowchart of the quantitative analysis steps is shown in Figure 5. Statistical elaborations were carried out using the software IBM SPSS.

5 Results

5.1 Sample characteristics

The sample showed a predominance of men (75%) over women (25%). Most respondents were between 40 and 60 years old, with an average age of 45.6 years. Regarding experience in coffee farming, 55% of respondents had been in the industry for over 20 years, while a significant portion (27.5%) had been growing coffee for more than 30 years. Farm sizes ranged from 2 to 10 hectares, consistent with expectations for an association of small producers, with an average farm size of 5.5 hectares. Finally, the average coffee production per farm was 3.88 tons, with an average yield of 0.69 tons per hectare.

5.2 Producers’ fairness perceptions

Fairness values were consistently high across all questionnaire’s items, aligning closely with the founding principles and bylaws of the association. Nearly all items received an average response above 4, with the only exception being the item related to the adequacy of the premium price, which scored slightly lower (3.60) but remained at an appreciable level. The average values calculated for each type of fairness (items average for each type of fairness) were as follows: 4.23 (Distributive fairness), 4.55 (Procedural fairness), 4.66 (Interactional fairness) and 4.33 (Environmental fairness) (Table 3).

5.3 Exploratory factor analysis

5.3.1 First exploratory factor analysis

The first exploratory factor’s KMO measure of sampling adequacy was 0.7, and Bartlett’s sphericity test yielded a *p*-value of <0.001, demonstrating the sampling validity. Regarding the five factors identified in this first stage, Table 4 presents the total explained variance, with a good cumulative value of 76.19.

In the rotated component matrix, the distribution of individual fairness types across the five factors was well-balanced. 13 variables over 19 had a value > 0.6 in the rotated component matrix and were then maintained in the second analysis (Table 5).

5.3.2 Second exploratory factor analysis

The second exploratory analysis was performed on the 13 variables identified in the first step. The results demonstrated high robustness, with a KMO sampling adequacy measure of 0.72 and a highly significant Bartlett’s sphericity test (*p* < 0.001), confirming the

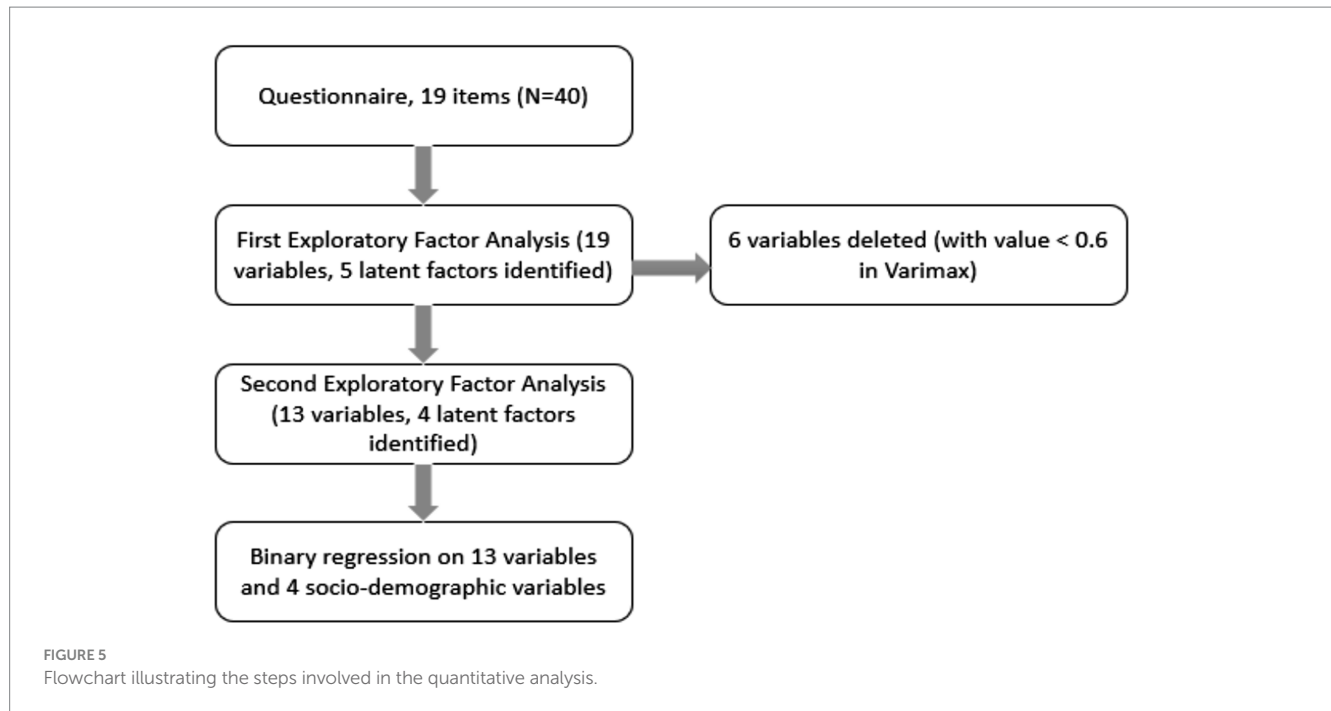


TABLE 3 Average values for each type of fairness.

Type of fairness	Average value (40 respondents)
Distributive fairness	4.23
Procedural fairness	4.55
Interactional fairness	4.66
Environmental fairness	4.33

TABLE 4 First exploratory factor analysis: identified factors and their respective percentage of variance.

Factor	% Variance	% Cumulative variance
1	44.094	44.094
2	11.746	55.839
3	7.770	63.610
4	6.665	70.275
5	5.916	76.190

validity of the sampling. Ultimately, four factors were identified. Table 6 displays the total explained variance, which reached a strong cumulative value of 73.2%.

In the rotated component matrix, the distribution of individual fairness types across the four factors was well-balanced (Table 7). The first factor was primarily associated with IF, the second encompassed a mix of various fairness types, the third was dominated by DF, and the fourth showed a strong prevalence of EF. To assess the reliability and consistency of the identified factors, Cronbach's Alpha was then calculated. The results showed a value of 0.8 for the first factor, 0.84 for the second, 0.76 for the third, and 0.7 for the fourth—all indicating a strong level of reliability.

Based on the identified items, individual factors were interpreted and assigned specific labels.

- **First factor:** respectful, supportive and transparent relationship. This factor explains the highest variance (40.6%), includes key aspects of producers' perceptions of value chain fairness. In particular, it includes the association's timeliness in providing information about decision-making changes (IF), respectful treatment of producers (IF), and readiness to offer support for any challenges they face (IF). This factor highlights the association's respectful, transparent, and supportive approach toward La Red's members.
- **Second factor:** participatory attitude and long-term perspective. This factor contributes 14.15% to the variance. It includes mutual economic benefits between the association and producers (DF), opportunities for members to express concerns and opinions in meetings (PF), full transparency in decision-making (PF), and appreciation of non-economic benefits from organic farming (EF) and reflects the association's commitment to transparency and participation, in economic matters as well as in ensuring the long-term sustainability of agroecosystems.
- **Third factor:** producers' satisfaction with pricing and information transparency. It accounts for 10.13% of the variance and encompasses pricing transparency (DF), member satisfaction with revenues (DF), and the provision of essential information to achieve high-quality production (IF). This factor reflects producers' satisfaction with La Red price management and information-sharing within the association, ensuring them receive fair compensation and access to resources for quality production.
- **Fourth factor:** support for sustainable organic farming and environmental conservation. It explains 8.3% of the variance and includes the association's awareness of producers' challenges (PF), technical support for high-value organic production (EF), and guidance on managing coffee cultivation to protect surrounding forest ecosystems (EF). This factor highlights the association's crucial role in promoting sustainable organic farming, ensuring both environmental conservation and long-term agricultural viability.

TABLE 5 Rotated component matrix.

Item/Statement classified by type of fairness	Component				
	1	2	3	4	5
DF 1 (La Red is transparent about its negotiating position)				0.789	
DF 2 (La Red acknowledges that both parties benefit from doing business together)		0.697			
DF 4 (You are satisfied with the income you receive from selling your coffee to La Red, considering production costs)				0.705	
PF 7 (You have sufficient opportunities to express your opinions to La Red)		0.726			
PF 8 (La Red is aware of the challenges and problems you face)	0.687				
PF 10 (La Red is transparent when explaining decisions that may affect your business or coffee sales)		0.707			
IF 11 (La Red provides the information you need to produce coffee according to the required specifications)				0.702	
IF 12 (La Red justifies any changes in decisions that affect your business or farm)	0.794				
IF 13 (La Red treats you with respect and dignity)	0.650				
IF 14 (La Red is accessible and available for communication)	0.863				
IF 15 (You do not feel that treatment differs based on gender)					0.843
EF 16 (Organic farming provides economic benefits for your farm)			0.656		
EF 17 (Organic farming offers additional non-economic benefits)		0.798			
EF 18 (La Red recognizes your commitment to sustainable farming through higher prices and technical support)			0.797		
EF 19 (La Red provides technical advice to help protect soils and forest ecosystems).			0.813		

The item numbers correspond to those listed in Table 2.

TABLE 6 Second exploratory factor analysis: identified factors and their respective percentage of variance.

Factor	% Variance	% Cumulative variance
1	40.603	40.60
2	14.153	54.76
3	10.125	64.88
4	8.301	73.18

5.4 Multiple binary regressions on socio-demographic and economic variables and questionnaire variables identified through exploratory factory analyses

The binary regressions conducted on the various socio-demographic characteristics and the factors identified through exploratory analyses did not yield statistically significant results, as all *p*-values exceeded the maximum 0.05 significance threshold (Table 8). This result is significant in itself and may be attributed to two main factors. First, since the study focuses on an association of small producers, socio-demographic and economic differences within the sample may not be particularly pronounced, as also reflected in the descriptive frequencies. Second, the producers' perceptions and values expressed by the interviewees are not directly linked to these socio-economic characteristics. Instead, their responses seem influenced by other factors: most notably, as suggested by the qualitative analysis in a later section, a sense of belonging to a collective project that transcends individual characteristics and personal economic interests. The qualitative information gathered in the first data analysis provides further insights into these findings, offering a deeper understanding of the underlying dynamics, as discussed below.

5.5 Key findings from the qualitative analysis

Overall results confirmed that La Red's chain organization and value distribution are driven not only by economic factors but also by a strong social dimension. Many interviewees expressed deep appreciation for their involvement in the association, emphasizing that their satisfaction went beyond financial returns. Many respondents described La Red as a crucial reference point in the region, successfully uniting small and isolated producers into a stronger collective actor. Several interviewees described their involvement with the association as a 'turning point', an 'important alliance', and an 'opportunity for growth in a challenging market'.

This collaboration has enhanced their bargaining power and created a dynamic space for cooperation, where issues, skills, and knowledge are shared and mutually defined, and where each farmer can express opinions, criticisms, and proposals. Many producers viewed this as a form of empowerment. While some acknowledged that "certain aspects could be improved and better organized," all interviewees described their decision to join the association as a "good" or "very good choice." Moreover, several producers, in particular women, stressed the equality of treatment between men and women, without gender discrimination.

Regarding the context, La Red operates in a region with significant infrastructural deficiencies, where conflict among military, paramilitary, and guerrilla forces hindered local development until the Peace Agreement. Some producers highlighted how, through its organizational and social activities, La Red helped mitigate these conflicts while also addressing logistical challenges. The establishment of the *agencias de compra*—collection points spread across the Sierra Nevada—has partially compensated for poor road conditions and the lack of transportation available to small producers.

TABLE 7 Rotated component matrix.

Item/Statement classified by type of fairness	Component			
	1	2	3	4
DF 1 (La Red is transparent about its negotiating position)			0.810	
DF 2 (La Red acknowledges that both parties benefit from doing business together)		0.799		
DF 4 (You are satisfied with the income you receive from selling your coffee to La Red, considering production costs)			0.686	
PF 7 (You have sufficient opportunities to express your opinions to La Red)		0.601		
PF 8 (La Red is aware of the challenges and problems you face)				0.614
PF 10 (La Red is transparent when explaining decisions that may affect your business or coffee sales)		0.608		
IF 11 (La Red provides the information you need to produce coffee according to the required specifications)			0.741	
IF 12 (La Red justifies any changes in decisions that affect your business or farm)	0.726			
IF 13 (La Red treats you with respect and dignity)	0.863			
IF 14 (La Red is accessible and available for communication)	0.878			
EF 17 (Organic farming offers additional non-economic benefits)		0.767		
EF 18 (La Red recognizes your commitment to sustainable farming through higher prices and technical support)				0.727
EF 19 (La Red provides technical advice (agronomic and environmental) to help protect soils and forest ecosystems)				0.771

The item numbers correspond to those listed in Table 1.

TABLE 8 Multiple binary regressions on socio-demographic/economic variables and factors.

Variables	Factor 1—Respectful, supportive and transparent relationship		Factor 2—Participatory attitude and long-term perspective		Factor 3—Farmer satisfaction with pricing and information transparency		Factor 4—Support for sustainable organic farming and environmental conservation	
	B	p	B	p	B	p	B	p
Gender (0 = F; 1 = M)	−0.140	0.866	0.404	0.603	0.377	0.621	0.291	0.709
Years of farming (avg value = 24 years)	0.748	0.306	−0.608	0.384	−0.218	0.749	−0.409	0.554
Farm size (avg value = 5.5 Ha)	−0.133	0.858	0.647	0.353	0.675	0.337	0.944	0.191
Production (avg value = 3.88 tons)	0.368	0.624	0.404	0.570	−0.315	0.653	−0.549	0.443

Most respondents also recognized La Red’s role in providing technical support to ensure sustainable farming and promoting a long-term vision for agriculture centered on soil health and ecosystem regeneration. Some producers highlighted that this long-term perspective distinguishes La Red from other actors in the industry. Expressions such as ‘La Red gives us tools to take better care of the land,’ ‘with La Red we think about the present with an eye to the future,’ and ‘we feel safe because of continuous support in crop management’ were recurrent in several interviews, reflecting the perceived value of the association’s support.

The qualitative analysis results align with the findings from the quantitative and factorial analyses. Both approaches highlight a positive evaluation of key aspects such as transparency, participation in decision-making, mutual respect, responsiveness in addressing and resolving issues, technical support, and the recognition that environmental sustainability is essential for ensuring long-term economic viability.

6 Discussion

6.1 Revisiting the theoretical framework: interactions and combined effects of fairness types

The study contributes to the consolidation of the conceptualization of fairness. The results revealed consistently high scores across all types of fairness, reflecting a strong appreciation from nearly all respondents. As elaborated in the preceding section, the values exhibited a considerable degree of homogeneity. However, a notable observation is that the individual latent factors identified and validated through factor analyses include various variables that span across multiple types of fairness. This finding suggests a partial divergence between the theoretical classifications of fairness and the empirical data analyzed.

While the theoretical distinction between different types of fairness remains essential and undeniably valuable for analytical purposes, the research findings indicate that these categories are more flexible and

interconnected than the framework suggests. Except for Factor 1, where Interactional Fairness clearly dominates, the factors are composed of a blend of elements from various types of fairness. This does not imply that the theoretical framework is flawed, but rather that it can be refined to better reflect the connections between the fairness types.

As shown in Figure 6, the four types of fairness are interconnected, rather than being isolated, with mutual influences that can amplify or diminish the effects of individual factors. In the dynamic process of analysis and synthesis central to this research, fairness emerges as a cohesive phenomenon. While the theoretical distinctions between different types of fairness remain useful for analytical purposes, in practice, these categories overlap and interact. This is evident in the four identified factors through the factor analysis, which each integrate multiple dimensions of fairness, highlighting a more fluid and interconnected reality.

This insight aligns with the concept of the socio-ecological system, referenced in the theoretical framework, which emphasizes the inherent interdependence of social, economic, and environmental dimensions (Holling, 2001; Giampietro et al., 2009; Preiser et al., 2018; Berkes, 2017).

6.2 The transition to alternative supply chain models: a question of self-governance

The research findings support that building other models in the coffee sector—exemplified by La Red experiment—is not solely an

economic challenge. While securing higher revenues for producers, and improving product quality remain the core objectives of the association, achieving these goals requires a multidimensional transformation, encompassing changes in social dynamics within the association, its connection to the local territory, and its capacity to develop a model with economic, social, and political dimensions.

This model seeks to rebalance power relations within the value chain by prioritizing participation, transparency, and open communication in decision-making processes while fostering economic development through sustainable practices, transparent business practices and a long-term perspective. In this regard, the dynamics upon which La Red is built can also be interpreted as a process of self-determination and self-governance in its original meaning: dynamics through which members of the association strengthen their capacities and awareness, enabling them to drive real change in their socio-economic environment (Tengland, 2007; Freire and Macedo, 2014; Fantini, 2016). Indeed, the concept of *empoderamiento*—which can be translated as ‘self-determination’ or ‘self-governance’—was frequently mentioned, either explicitly or through related terms, in the interviews conducted. Producers and association members emphasized that, beyond securing significantly higher prices for coffee and other products, the association’s greatest success lies in its ability to actively involve members in shaping a value chain model distinct from conventional, dominant structures. This model is built on principles of fairness

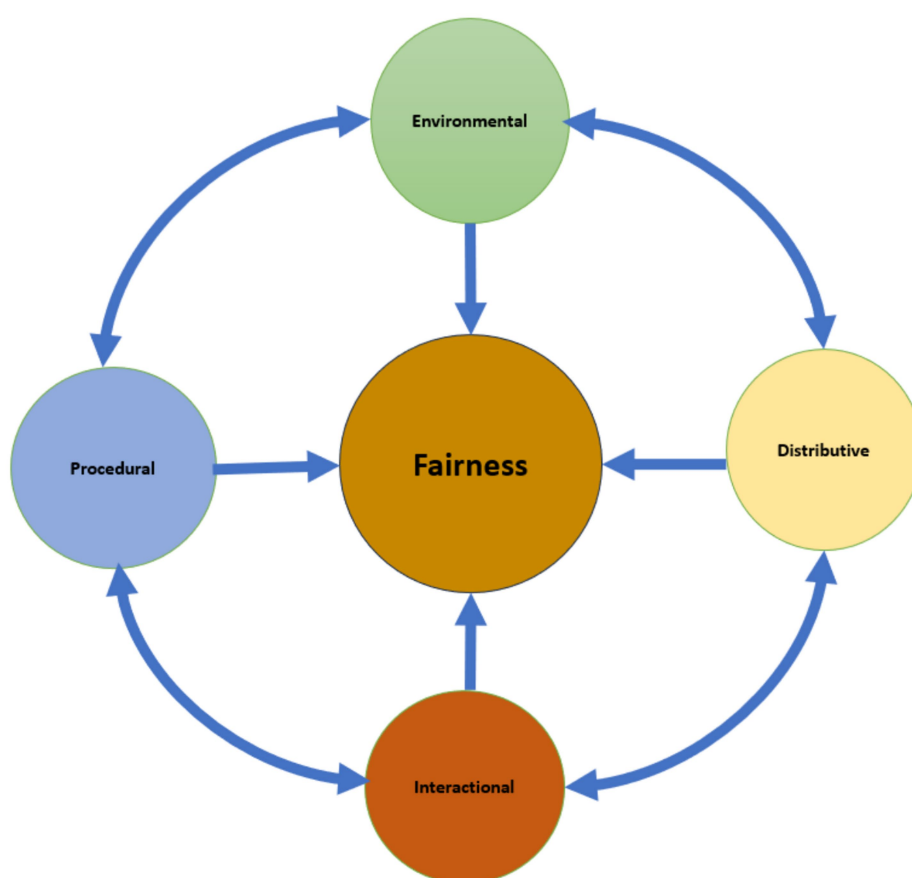


FIGURE 6
Modified theoretical framework based on the analysis results.

and mutual support, which, as confirmed by quantitative analysis, are embedded in a self-sustaining system. It strengthens various dimensions of equity, even in the face of significant challenges such as acquiring bargaining power, countering the influence of more dominant chain actors—which, as [Grabs and Ponte \(2019\)](#) suggest, can manifest as bargaining, institutional, demonstrative, or constitutive power—and addressing infrastructural constraints.

The findings confirm the initial theoretical premises regarding socio-ecological systems, aligning with the concept of “emergent properties” in complex systems ([Preiser et al., 2018](#)). These properties arise from the interactions and interdependencies within the system, reinforcing each other in a self-sustaining manner ([Funtowicz and Ravetz, 1994](#); [San Miguel, 2023](#)). The interplay among different types of fairness observed in this study mirrors patterns identified in socio-ecological research, highlighting the interconnected nature of these dimensions.

Moreover, the findings on value retention among producers within La Red offer a tangible illustration of a model that—despite some limitations—demonstrates relative success in fostering more equitable supply chains. This case study contributes empirical evidence to ongoing debates on the distribution of value and power in global value chains ([Gereffi, 2018](#); [Grabs and Ponte, 2019](#); [Ponte, 2019](#)), reinforcing calls for more inclusive and just arrangements.

6.3 Beyond the concept of business model

The concept of a business model defines how an organization creates, distributes, and captures value, encompassing the strategies and structures that enable a business to gain a competitive advantage ([George and Bock, 2009](#); [DaSilva and Trkman, 2014](#)). This idea has gained widespread recognition in recent decades, particularly with the rise of the new economy. However, in the case of La Red this concept shows some limitations.

Defining value solely in monetary terms fails to capture other crucial factors that contribute to the project's success and long-term viability. While economic sustainability remains essential, La Red demonstrates that value is built through broader social and environmental commitments. Operating in a region affected by decades of conflict, limited infrastructure, and producer isolation, within an ecologically fragile landscape where preserving forest health and hydrogeological stability is vital, the association needed a model capable of evolving alongside its territory—one that is not just economic but also social and political. Its strength lies precisely in this multidimensionality, reflecting broader trends in other tropical countries ([Martins, 2020](#); [Artner and Yin, 2023](#)).

This approach is based on three key pillars: empowering producers and local communities with knowledge and skills to reduce asymmetry and dependence in global value chains ([Grabs and Ponte, 2019](#); [Ponte, 2019](#)), redistributing value within local communities rather than prioritizing pure capital accumulation ([Martinez-Alier, 2002](#); [Borras and Franco, 2024](#)), and adopting agricultural practices that protect and regenerate agroecosystems rather than overexploiting and depleting them ([Gudynas, 2023](#); [Chagnon et al., 2022](#)). This threefold perspective challenges the conventional corporate framework by positioning La Red as a model for how approaches—rooted in grassroots initiatives, self-organization, and participatory processes—can evolve alongside their territories. It demonstrates that such models can achieve higher returns while balancing economic viability with long-term social and environmental resilience, treating environmental

and social considerations as the foundation for sustainable, community-driven economic activity.

6.4 Limitations of the present study and insights for further research

Along with its strengths, this study also presents certain limitations. The first concerns the sample size: expanding it further could provide a more detailed and large-scale verification of the results. A second limitation relates to the time scale of the study. Although the interview period was sufficiently wide and appropriate for this research, extending the timeframe or conducting multiple surveys over different periods could offer valuable insights into how perceptions evolve over time. Another potential avenue for further research is the replication of this study across multiple case studies in different geographical areas, incorporating a comparative and territorial approach ([Morales et al., 2022](#)). This would help determine the extent to which the findings of the present study are widely applicable.

Despite these limitations, this study provided an original perspective on supply and value chain mechanisms, by using a mix of qualitative and quantitative approaches. The research aimed to capture the complexity of this case study. Additionally, the adaptation of the questionnaire and the incorporation of environmental fairness—one of the study's key original contributions—effectively captured the multi-dimensional nature of La Red Project, providing a more comprehensive understanding of its impact. Collectively, these findings offer fresh perspectives on supply chains and open avenues for further research.

7 Conclusion

This study develops an analytical framework for examining producer-led value chains, showing how La Red's organizational model reinterprets supply chain governance through collective ownership and participatory decision-making. The research indicates that small-scale producers can design alternative market structures that balance economic viability, environmental sustainability, and social equity, thereby questioning assumptions about the inevitability of unequal trade relationships.

The findings suggest relevant implications for trade policy and development practice. Evidence of producer-led governance offers policymakers reference points for supporting cooperative structures that participate competitively in international markets while also fostering social cohesion and environmental responsibility. The identification of specific fairness dimensions provides development organizations with practical criteria for assessing and strengthening similar initiatives in different contexts.

More broadly, the study illustrates that structural change in global value chains can emerge from grassroots innovation. La Red model highlights principles—such as collective bargaining, transparent pricing, and shared decision-making—that have potential to inform alternative approaches to international trade. For practitioners and policymakers concerned with inequalities in global agriculture, these findings offer both conceptual grounding and practical avenues for supporting producer-led market initiatives. Policy frameworks may benefit from considering institutional support for such collective arrangements, given their capacity to contribute to more equitable and sustainable trade practices.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

Author contributions

AF: Methodology, Investigation, Validation, Data curation, Writing – original draft, Writing – review & editing, Conceptualization, Formal analysis, Visualization. AS: Visualization, Funding acquisition, Writing – review & editing, Conceptualization, Investigation, Validation, Formal analysis, Project administration, Methodology, Supervision. LB: Writing – original draft, Investigation, Data curation. XQ-R: Validation, Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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