

Research paper

Making specialty coffee and coffee-cherry value chains work for family farmers' livelihoods: A participatory action research approach

Johanna Jacobi^{a,*}, Derly Lara^b, Sebastian Opitz^c, Sabine de Castelberg^c, Sergio Urioste^d, Alvaro Irazoque^d, Daniel Castro^b, Elio Wildisen^e, Nelson Gutierrez^b, Chahan Yeretian^c

^a Federal Institute of Technology (ETH), Zurich, Switzerland

^b Universidad Surcolombiana (USCO), Neiva, Colombia

^c Zurich University of Applied Sciences (ZHAW), Wädenswil, Switzerland

^d Slow Food Bolivia, La Paz, Bolivia

^e University of Bern, Switzerland

ARTICLE INFO

Keywords:

Coffee
Coffee-cherry
Participatory market chain approach
Family farming
Value chain analysis

ABSTRACT

Coffee provides a livelihood to millions of smallholder farmers, but comes with serious challenges as incomes are often meagre and the climate crisis threatens most coffeegrowing areas. Specialty coffee markets reward quality, which can increase farm-gate prices, and may enhance shaded and diversified coffee-farming systems. In origin countries such as Colombia and Bolivia, specialty coffee is typically exported, whereas lower-quality coffee is marketed for domestic consumption. Local demand for specialty coffee is growing, however, and coffee-cherry products are increasingly traded and consumed. This bears potential for retaining more value in origin countries and among farmers. However, how farming families can better profit from specialty coffee and its by-products, such as dried coffee cherries (also known as cascara or sultana), remains poorly understood. We applied a value-chain analysis combined with institutional analysis and the Participatory Market-Chain Approach (PMCA) to investigate the impact of specialty coffee and coffee-cherry products on farming families' livelihoods in Colombia and Bolivia. We embedded the research in an institutional analysis and development framework to identify actors and value chains, costs and benefits for farmers, and livelihoods. Then, we adopted an action research approach to bring the different actors together and co-create value-chain improvements for green coffee, roasted coffee, and coffee cherries. Our approach included: (1) interviews, surveys, participant observation, and document analysis; and (2) events, videos, courses, competitions, and a recipe collection for coffee-cherries. We found that direct sale of green coffee to international customers, and sale of roasted coffee in local markets or in farmer-owned coffee shops were the most beneficial value-chain models for coffeegrowing families. The action research approach generated tangible results in terms of product development, value-chain organization, and educational organization. Government and private-sector support should consider the functioning of the entire sector and the social-ecological outcomes from production to consumption.

1. Introduction

Coffee production worldwide is at risk: On one hand, the accelerating climate crisis is gravely harming coffee production – especially the more sensitive *C. arabica* varieties – and will likely worsen: 55–62 % of current coffee areas are projected to cease being suitable for coffee production by 2050 (Bunn et al., 2015; de Sousa et al., 2019). Meanwhile, the coffee leaf rust disease has caused severe yield loss in the Americas since 2011 (Ward et al., 2017), pushing farmers to grow more resilient Arabica

varieties of the many *Catimors* and *Sarchimors*. On the other hand, the high volatility of the global coffee market – including prolonged periods of depressed market prices – has resulted in farm-gate prices that are often too low for farmers to make a living. These trends show that farming families themselves continue to bear the brunt of coffee-production risks on their own. An estimated 95 % of coffee farmers are smallholders (ITC, 2021). As a consequence, the threats to production have a direct impact on farmers' livelihoods. When farmers see no more future in coffee farming, they may cease to grow the crop and

* Corresponding author.

E-mail address: jjacobi@ethz.ch (J. Jacobi).

<https://doi.org/10.1016/j.wdp.2023.100551>

Received 5 August 2023; Received in revised form 25 November 2023; Accepted 26 November 2023

Available online 15 December 2023

2452-2929/© 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

production can suddenly collapse. For example, Bolivia experienced a 30 % decline in the volume of its coffee production between 2013 and 2014, with many producers switching to the more profitable coca leaf – a development from which its coffee sector has yet to recover (FAO-STAT, 2023). Even price premiums and safety nets from certified coffee are sometimes not enough to cover farmers' production costs (Estevez et al., 2018).

Both product quality and ecosystem quality strategies have been developed to make coffee farming work for rural families while adapting to climate change (Verburg et al., 2019). Diversified coffee agroforestry systems are crucial to increase resilience to drought, winds, heavy rains, temperature extremes, hailstorms, and other climatic events, as well as pests and diseases (Perfecto et al., 2009). Diversified agroforestry also offers answers to food insecurity and market insecurity by increasing the variety of products to be sold as well as to be consumed by farmers (Jacobi, 2016) and is associated with coffee productivity and quality (Moreaux et al., 2022). Further, the use of shade trees on coffee farms can have positive effects on coffee yields and bean quality (Somporn et al., 2012; Torrez et al., 2023).

In recent years, there has been a rise in alternatives to globalized commodity-coffee value chains, such as certified production (e.g. Fair Trade or Organic) and specialty coffee (Hernandez-Aguilera et al., 2018). Specialty coffee is often defined as coffee that is graded over 80 points on a 100-point scale of the Specialty Coffee Association (SCA) cupping form based on its sensory attributes, defects, and overall quality, using standardized quality parameters and procedures (SCA, 2015). Relatedly, alternative forms of organizing coffee value chains have emerged such as direct-trade platforms (Guimarães et al., 2020), or the "relationship coffee model" (Hernandez-Aguilera et al., 2018). These developments seem urgent, as current globalized coffee value chains are highly unequal and dominated by a small number of actors (Grabs & Ponte, 2019; Panhuysen & Pierrot, 2020). At the same time, there is evidence of growing demand for coffee – in particular for specialty coffee – in many origin countries themselves, including Bolivia and Colombia. This growing demand also includes coffee by-products, such as the dried coffee fruit (hereafter 'coffee-cherry') after separating it from the coffee seed in the depulping process.

Farmers' involvement in specialty coffee markets can contribute to improvements in rural livelihoods and agroecological production (Jha et al., 2012; Hernandez-Aguilera et al., 2018). However, investment in specialty coffee can also cause increased deforestation in the case of full-sun coffee monocultures and increase the use of agrochemicals under conventional systems of production (Schuit et al., 2021). Further, in Bolivia, crop diversity has declined on coffee farms engaging in specialty coffee (Compigne, 2018). In Colombia, very few farmers – only about two percent – have been able to profit from the specialty coffee market to date (Gutierrez Guzman et al., 2019). Whether and how rising demand for specialty coffee can be sustainable in economic, ecological, and social terms remains an open question.

In this study, we investigated the impacts of specialty coffee chains on smallholder farmers in two study areas, the Yungas of La Paz in Bolivia and the Huila Department in Colombia. Specifically, we sought to answer the following research questions:

- How are different specialty coffee and coffee-cherry value chains in Bolivia and Colombia organized in terms of actors, interrelations, and profits?
- What are the implications of specialty coffee and coffee-cherry value chains for smallholder livelihoods in Bolivia and Colombia?
- What value-chain improvements, including policy reorientations, could help to enhance the most beneficial types of specialty coffee and coffee-cherry value chains?

We conducted a two-stream empirical research study: (1) value chains and livelihoods; and (2) action-research with multiple coffee actors. The research took place in 2017–2020 in Bolivia and Colombia.

Both countries are renowned for their excellent coffee and simultaneously confront the multiple coffee crises of depressed prices, coffee leaf rust, and climate change.

2. Concepts and methods

2.1. Case study areas

Our research draws on case studies in Bolivia (region of the Yungas, which is the coffee region of the La Paz Department and encompasses the Nor Yungas and sur Yungas provinces) and in Colombia (Department of Huila, where 35 out of the 37 municipalities produce coffee) in the framework of a research project financed by the Swiss Network for International Studies (SNIS). The transdisciplinary project brought together four public universities (two in Switzerland and one each in Bolivia and Colombia); one small local coffee company in each context (Café Munaipata in Bolivia and Café Murg in Colombia); and Slow Food Bolivia.

Colombia is the world's third-largest coffee producer after Brazil and Vietnam. In Colombia there are around 550,000 coffee-growing families (FNC 2022). Ninety-six percent are small-scale producers with an average of 1.3 ha of coffee cropland. Coffee is produced in 22 of the country's 32 departments, and an estimated 25 % of the rural population are coffee growers. The coffee sector contributes around 15 % of the country's agricultural GDP, and 75 % of coffee-growing areas are planted with varieties tolerant to coffee leaf rust (Gutierrez Guzman et al., 2019).

In 2021, coffee production in Bolivia covered 25,548 ha and equalled 23,451 t (FAOSTAT 2023). Although the country contributes less than one percent of world coffee production (ICO, 2017), the coffee sector is critically important to over 17,000 farming families, in addition to 12,000 people (and their families) involved in the transportation, processing, and commercialization of coffee (MDRyT, 2013).

Production decreased in 2012 due to the coffee leaf rust (FAOSTAT, 2023), but export values remained stable overall due to increased sales of certified and specialty coffees. In the Yungas region, which accounts for 96 % of Bolivia's coffee production (MDRyT, 2013), the average coffee farm size is 8.3 ha. Farms of this size are generally not limited to coffee production, however, as the region is characterized by agricultural mosaic landscapes featuring a wide variety of crops. These include coca leaf, citrus and other fruits, manioc and maize, which are all scattered around the hills and parchments of primary forest. The average area under coffee production is 1.6 ha, and only one third of coffee producers have coffee as their main crop. Two thirds also produce coca leaves, the primary crop of many coffee producers (Rojas et al., 2017).

For the present study, we mainly drew on best-practice examples and local expert knowledge. We sought to understand the fast-growing opportunities presented by local and national markets as well as their impacts on farmers' livelihoods. The transdisciplinary, transformation-oriented approach characterizing our research is not new. Participatory action research (PAR) seeks to co-create knowledge and collective action among researchers and other societal actors, especially those whose knowledge has been marginalized historically (Wakeford & Rodriguez, 2018). PAR is based on complexity thinking in social-ecological systems (Robledo et al., 2023; Rogers et al., 2013). It has a long tradition in connection with agroecological research in particular (Méndez et al., 2013, 2017). We drew on PAR elements to co-create the respective knowledge and action together with diverse stakeholders from the coffee sector. Moreover, based on the action research outcomes, we identified recommendations and best-practice examples from Colombia and Bolivia that indicate how improvements might be achieved and what institutions, policies, and participatory actions are needed at different levels.

2.2. Analytical framework

For the purpose of investigating the links between specialty coffee and farmer livelihoods, we combined a value-chain approach (Gereffi et al., 2005; Kaplinsky & Morris, 2001) – differentiated by quality, more or less direct trade, and national vs. international markets – with the Sustainable Livelihoods Framework (UNDP, 2017) to understand farming economics in a multi-dimensional way, including the related actors and their power to influence the value chain. Our value-chain approach takes an actor-centred focus (Grabs & Ponte, 2019) and incorporates elements from the participatory market chain approach, or PMCA, developed at the CIP International Potato Center in Peru. The PMCA focuses on sustainable rural development. It has the key principles of focusing on commercial innovation, market-chain competitiveness, and collaboration through engagement with diverse stakeholders, as well as engaged facilitation (often by researchers) that decreases over time as stakeholders assume more responsibility and ownership of the process (Bernet et al., 2006, Horton et al., 2020).

We adopted elements of the PMCA by (1) characterizing the actors and value chain(s) via market-chain surveys, and (2) co-creating products and market options with farmers and other actors in thematic focus groups. The value chains were embedded in the different actors’ livelihood strategies. The livelihoods of the farming families involved in the value chains in question have been analysed in two related studies, one in Bolivia (Compigne, 2018) and one in Colombia (De La Torre & Castro, 2021).

To address the justified critiques of simplified value-chain analyses – namely, that these analyses assume linear flows of goods, finance, and knowledge – we used a participatory, actor-centred approach to value chains that is comprehensively expressed in the PMCA. To account for the considerable differences in stakeholder power and interest in coffee value chains (Ponte and Grabs, 2017), we also carried out an actor-interest analysis (Chevalier & Buckles, 2008).

Building on the work of Elinor Ostrom (Ostrom, 1990), institutional

analysis in sustainability transformation research defines institutions as norms and rules. It embeds socio-economic actors in a framework of rules-in-use, attributes of community, and biophysical conditions – in this case, value chains and related livelihoods – in order to better understand their forms of organization and their outcomes. We embed our value-chain and livelihood analysis in an adapted “institutional analysis and development framework” to integrate these different aspects in our overall analysis (Ostrom, 2011). We conceptualize the different coffee value chains as “action arenas”, and view people’s livelihoods as outcomes (Fig. 1).

2.3. Methods

2.3.1. Overview of methods and sampling

Our study combines in-depth qualitative and broader quantitative empirical methods with an action-research approach (Wakeford & Sanchez Rodriguez 2018), enabling deep, explanatory insights into coffee value chains and smallholder livelihoods, and providing opportunities to engage in transformative change together with concerned actors. Table 1 provides an overview of the methods and sample size of our value-chain analyses, livelihood and quality analyses, as well as relevant policy analyses in both Colombia and Bolivia. In the following subsections, we explain the data sources, selection of participants, and data analysis for each component of the research.

2.3.2. Value chain survey, interviews, and thematic focus groups

The quantitative (survey) and qualitative (interviews and participant observation) research on diverse value-chain actors from production to consumption provided the basis for elaboration of the value-chain types and calculation of the cost–benefit analysis. The transcribed interview and observation data were processed by means of qualitative data analysis software (NVIVO 11) in order to extract the information on the variables of interest such as producer–buyer relationships and farm-gate prices. We also conducted an online survey on coffee beverage

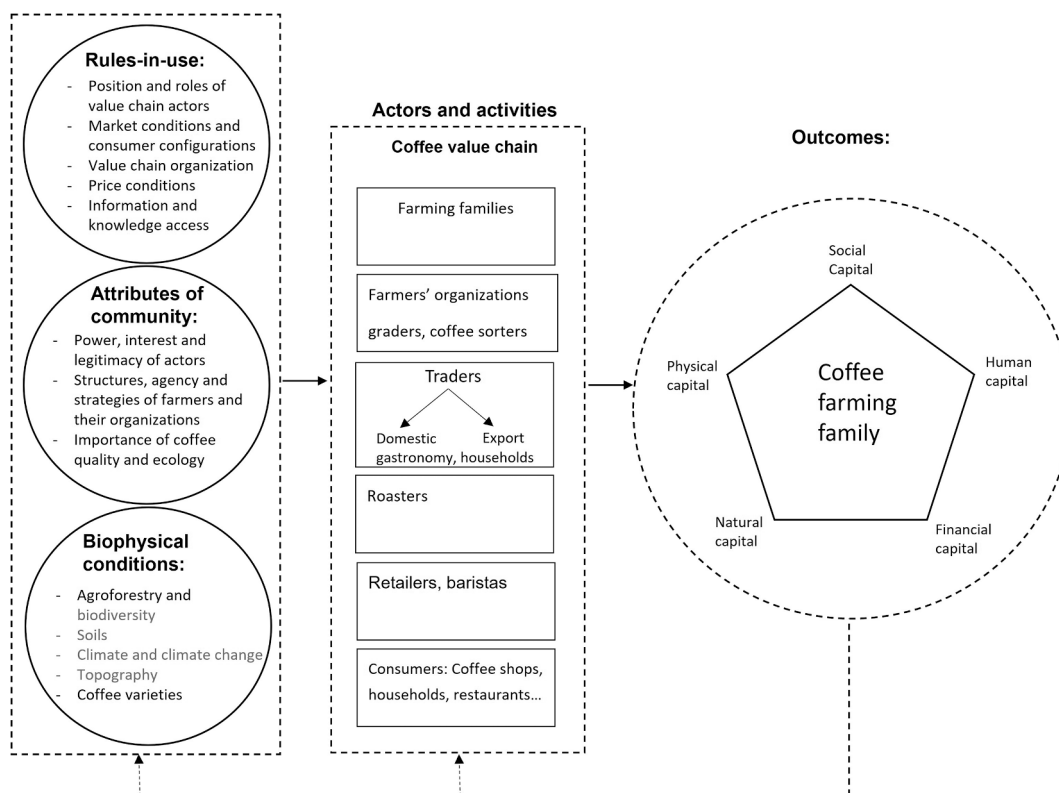


Fig. 1. Analytical framework: Intersecting actors, value chains, and farmers’ livelihood outcomes in an adapted Institutional Analysis and Development framework (based on Ostrom, 2011).

Table 1

Overview of methods and sample size of the parallel research approach in Huila, Colombia, and the Yungas of La Paz, Bolivia.

Methods	Colombia	Bolivia
Value-chain analysis (actor analysis, value chain mapping, quantitative market analysis including survey), comprising elements from the Participatory Market Chain Approach (Bernet et al., 2006; Devaux et al., 2013) and cost-benefit analysis, including actor-interest-power-legitimacy analysis (Chevalier and Buckles, 2008)	Data from the State Secretary of Agriculture and Mining Semi-structured interviews (N = 43) Online consumer survey (N = 307) Semi-structured interviews and participant observation with eight families (45 days in total). Seven families produced specialty coffee, one conventional coffee	Data from National Institute of Statistics (INE) and the Ministry of Rural Development and Land (MDRyT) Semi-structured interviews (N = 73) Online consumer survey (N = 236) Semi-structured interviews and participant observation with four families (researcher spending one week with each family) . The four families were producing specialty coffee
Livelihood analysis (financial capital, human capital, social capital, natural capital and physical capital), including vulnerability factors (DFID 1999)	Two multi-stakeholder workshops for product development and promotion, cuppings and competition of coffee and coffee-cherry beverages	Two multi-stakeholder workshops for product development and promotion; videos on coffee-cherry processing, recipe collection, cuppings and competition of coffee and coffee-cherry beverages
Action research component from the Participatory Market Chain Approach (Bernet et al., 2006; Horton et al., 2020)		

preferences in Bolivia (N = 236), Colombia (N = 307), and Switzerland (N = 222) to identify differences and similarities in coffee-purchasing preferences. We shared the online surveys in coffeeshops and restaurants. The empirical methods were complemented by official statistics on exports and imports, prices and production quantities from FAO-STAT, as well as official national-level statistical sources. The questionnaires can be found on an open repository (<https://doi.org/10.5281/zenodo.10198676>) (Jacobi, 2023).

We organized two workshops with focus groups from the coffee sector in each country, one on coffee and one on coffee cherries. The workshops included cuppings, analyses of markets, and consultation about possible products and ways of marketing. In addition, new Bolivian products such as tea and flour made from coffee-cherry were presented in Colombia. The results were analysed by elaborating value-chain maps (Supplementary Materials 1 and 2) with the information from the workshops, and by collecting, testing, and making a booklet of coffee-cherry recipes (Jiménez et al., 2021a) and another one on good practices in coffee-cherry post-harvest management (Jiménez et al., 2021b).

The information on different actors was processed via CLIP analysis (collaboration/conflict, legitimacy, influence, power) according to Chevalier and Buckles (2008). Bolivian and Colombian coffee experts grouped the actors into categories according to their level of legitimacy, influence, and power using Likert scales from 0 (low) to 2 (high). Afterwards, the actors were assigned to different categories, ranging from “dominant” (high power, interest, and legitimacy) to “influential” (high legitimacy and power, but low interest), “respected” (high legitimacy, but low power and interest), “vulnerable” (high interest and legitimacy, but low power), “marginalized” (high interest, but low power and legitimacy), “forceful” (high interest and power, but low legitimacy), and “dormant” (high power, but low interest and legitimacy).

Power was understood as the ability of stakeholders to influence others and use specific resources to achieve goals. The resources considered were economic wealth, political authority, ability to use force, as well as access to information and means of communication. Each stakeholder was assigned one value for each power resource: high

(2), middle (1), or low/no power (0). Afterwards, the average value of the four power resources was calculated in order to rank each group of stakeholders according to their net power (high, middle, or low/no power). Legitimacy was defined based on the extent to which other parties recognized – by law or local customs – the rights and responsibilities of particular stakeholders. The legitimacy of each stakeholder group was divided into one of three categories: high, middle, or low/no legitimacy. Interests were defined as the gains or losses that stakeholders might experience in a prospective situation. Stakeholder interests were categorized according to whether they would be affected positively (2), not influenced (1), or negatively influenced (0) by an increase in consumption of specialty coffee in the national market (Chevalier & Buckles, 2008).

2.3.3. Livelihoods analysis

In line with the Sustainable Livelihoods Guidance Sheets by DFID (1999) and previous studies on agroforestry and smallholder farming in the Yungas of Bolivia (Jacobi, 2016; Jacobi et al., 2017), we observed and evaluated a variety of key indicators. For *social capital*, we observed support (e.g. family, buyers, government), social networks (e.g. in local community), relationships with buyers (trust, long-term relationships, or no regular buyers), and involvement in local governance. *Human capital* was assessed by asking about and observing employment types (permanent or temporary employees, family labour), education level, health issues and health insurance, and knowledge and experience in coffee production. *Physical capital* was assessed based on housing infrastructure, transport possibilities, tools and machinery, processing infrastructure, and agricultural inputs (organic and synthetic). *Natural capital* comprised agrobiodiversity in terms of crop species and varieties, and agroforestry in terms of mixed crops and shade cover. *Financial capital* consisted of income diversity (additional income sources to coffee), coffee prices and receipt of fair prices without delays, and access to credit or other financial help (e.g. advances from buyers). All indicators were rated using a five-point Likert scale (1 = very low, 5 = very high). The observational notes and interviews were coded according to specified livelihood capitals and respective indicators using the qualitative data analysis program Atlas.ti. For the *vulnerability context*, we performed an inductive content analysis of notes and quotes using Atlas.ti, focusing in particular on coffee prices and climate change, but also on context factors that arose during participant observations and interviews.

2.3.4. Action research design

We adapted the PMCA to our project dynamic by placing a stronger emphasis on action research than on product development – partly because some participating actors already had products in development, meaning that we did the analysis and co-creation simultaneously in Phase 2. As a result, instead of using Phase 3 for the development of market-driven innovations, we utilized it for reflection, improvement, and dissemination of the innovations to policymakers, restaurants, and other actors that might be interested in specialty-coffee and coffee-cherry products (see Fig. 2).

3. Results

3.1. Value chains and actors

3.1.1. Value chain types

We identified four main types of value chains in both countries (see Table 2): (1) Coffee production organized entirely by producer organizations (cooperative or association) from cultivation until sale as green beans; (2) low or inferior quality coffee or coffee from farmers who were not organized, commonly purchased by intermediaries that often paid more than cooperatives (though less quickly); (3) sale of coffee via direct trading schemes that have grown in connection with export markets; and, more recently, (4) sale of coffee in domestic markets. For the

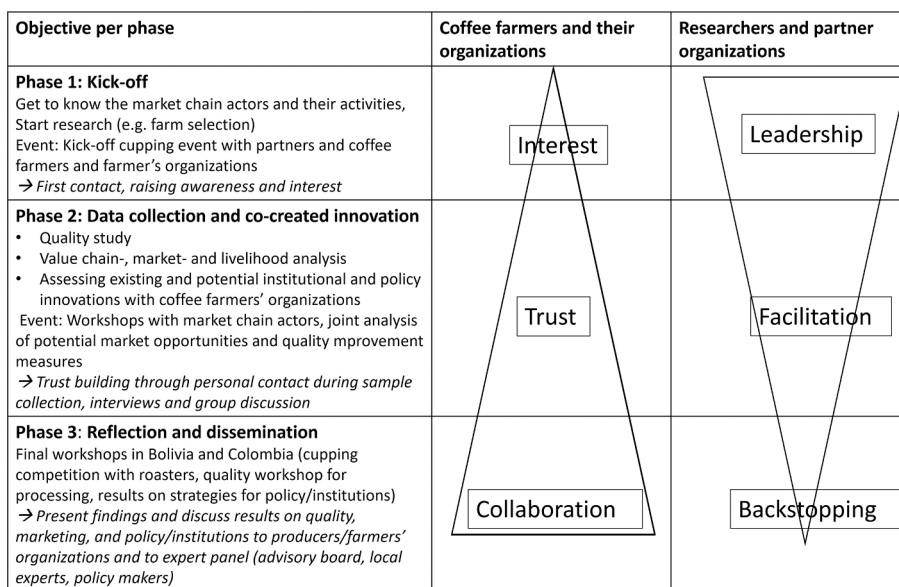


Fig. 2. Action research design following the Participatory Market Chain Approach (Bernet et al., 2006, Horton et al., 2020).

Table 2

Typology of value chains identified in the coffee sectors of Bolivia (Yungas region, La Paz Department) and Colombia (Huila Department).

Type of value chain	Bolivia (La Paz Department)	Colombia (Huila Department)
Producers' organizations	Coffee cooperatives or producers' associations, the most common value chain type for certified coffee in Bolivia.	Coffee cooperatives or associations (export and domestic market): the most common value chain type, linked to the National Coffee Federation
Intermediaries	Commercialization through intermediaries who often buy parchment coffee directly on the farm.	Often buying directly on the farm (when farmers have difficulties with transport), only parchment coffee since farmers do not usually have the infrastructure for hulling
Direct trade for export	Direct trade between producers and roasters, facilitated by exporters/importers	Price settlement on the basis of the National Coffee Federation and the physical and sensorial analysis by the exporter. Not very widespread since many producers do not yet fulfil the requirements of the exporters
Direct trade for the national market	Direct trade between producers and coffee shops/roasting industries	Direct trade between producers and coffee shops/roasting industries

purpose of this study, we distinguished between “commodity coffee” (up to 80 points on quality scale) and “specialty coffee” (over 80 points). This cut-off is not always strictly maintained in practice: Borderline specialty coffee is sometimes called “commodity plus” and sold at commodity prices, with premium prices only being paid for coffee rated over 83 points.

3.1.2. CLIP analysis

Following Hellin and Meijer (2006), we grouped the actors we identified into three main groups: (1) *Value chain actors*, including producers, cooperatives, associations (in Bolivia also Economic Peasants' Organizations or OECAs), input suppliers, traders, transporters, roasters, green coffee sorters (known as “palliris” in Bolivia, most of

whom are women), quality control specialists such as Q-graders and other sensory experts, baristas, coffeeshops, wholesalers, retailers, exporters, and consumers; (2) *enabling environment actors*, including social organizations, research and education organizations, public institutions, and NGOs; and (3) *service providers*, including financial institutions, exporting companies, coffee quality laboratories, and extension services. [Supplementary Material 1](#) contains a list of actors in the Bolivian coffee sector. [Supplementary Material 2](#) contains a stakeholder list and map of the Colombian coffee sector.

The CLIP analysis revealed different patterns in Bolivia and Colombia based on our mapping and classification of actors by power, interest, and legitimacy (see Fig. 3).

Dominant actors in Colombia included, above all, the long-standing National Coffee Federation (FNC), which regulates coffee commercialization in Colombia as well as coffee exports, and is present in all of the country's rural coffee-growing areas. Bolivia has no comparable body of national representation for coffee farmers. Bolivia's “Federación de Caficultores Exportadores de Bolivia” (FECAFEB) represents the producers' organizations, while independent farmers are represented by the “Asociación Nacional de Productores de Café” (ANPROCA). Interviews indicated that both of these Bolivian organizations have a strong influence on governance and are considered dominant (e.g. for their role in the annual national coffee cupping competition “Taza Presidencial”); however, the relationship between them is rather competitive and is characterized by a lack of cooperation at the policy level. In Colombia, established educational organizations such as “Servicio Nacional de Aprendizaje” (SENA) and the “Centro Nacional de Investigaciones de Café” (CENICAFE) also had a dominant role, as well as large roasting industries and related coffeeshops (Juan Valdez). These actors were categorized as dominant based on their knowledge, innovation, and service; likelihood to benefit from a domestic consumption increase; as well their ability to influence coffee value-chain development with resources such as equipment and the capacity to transform coffee.

Forceful actors have interests and power but lack legitimacy. In Bolivia, these included roasters, intermediaries, exporters, and traders. In Colombia, they included cooperatives, coffee mills, and input providers (transnational companies). Common to these actors is that they often act as price-setters, and are distinguished by the power this affords. Additionally, the cooperatives in Colombia have the capacity to buy large quantities of beans and have the required processing facilities, as well as possessing influence and recognition within the value chain. In

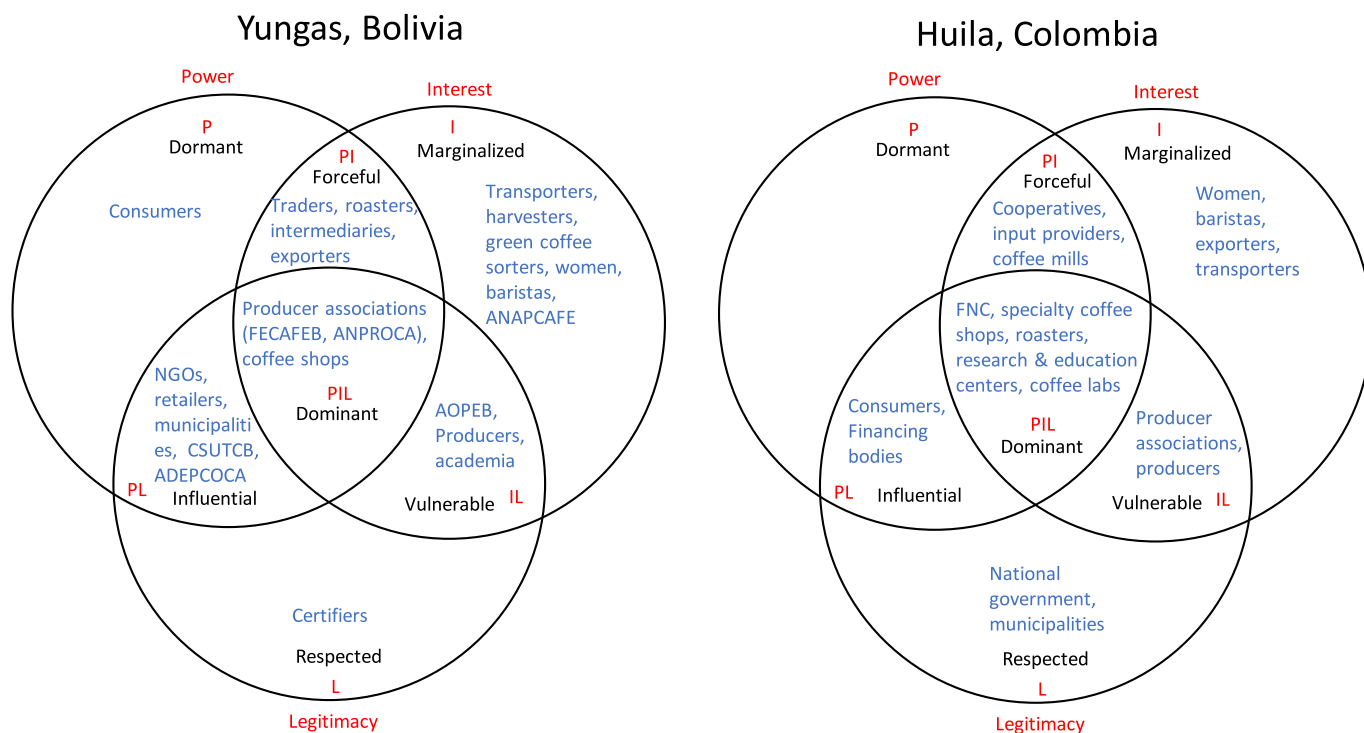


Fig. 3. Identified actors in the coffee sectors of Bolivia and Colombia, categorized according to our CLIP analysis (Chevalier and Buckles, 2008). P = power, I = Interest, L = Legitimacy.

Bolivia, intermediaries are often not formally registered or regulated – and, in the case of roasting industries, often not well-regarded by other actors of the value chain, particularly by producers. Producers’ associations perceived intermediaries and private industries as competitors. Between the late 1950s and early 1980s, coffee exports were concentrated in the hands of a few export companies that bought directly from producers. Due to a lack of adequate policies to regulate the market and increase the competitiveness of producers, the gap between farm-gate prices and export prices gradually increased. This led to a change in the structure of the export supply, which, from the 1980s onwards shifted to the advantage of producer associations (Soux, 2016). This resulted in tensions that continue to characterize the relationship between producers and intermediaries to this day.

Influential actors (with legitimacy and power, but low interest in the sector) in Bolivia included the peasant workers’ organization CSUTCB and the coca organization ADEPCOCA. These social organizations do not focus on coffee, but as many coffee producers are members, they have enough collective power and representative power to channel producer demands to different governmental agencies and international donors. NGOs, along with retailers and also municipal governments, were also described as powerful and legitimate, but as they focus on many products and topics besides coffee, they have a limited interest in the sector. In Huila, Colombia, a distinct picture emerged with consumers being classified as influential (cf. “dormant” in Bolivia), in addition to financing bodies such as the Banco Agrario, a governmental financial organization that serves the rural sector. This bank enjoys significant recognition and influence in coffee production, but its profits do not mainly depend on the coffee sector. Coffee traders – some of whom work independently and only as intermediaries, as well as others who process and export coffee – were distinguished by their purchase of high volumes of dried parchment coffee, as well as wet coffee and coffee cherries. These actors have the infrastructure required to dry the coffee, in contrast to many coffee growers. Finally, traders tended to purchase coffee directly from the farms or nearby, paying growers immediately and in cash.

Respected actors in Colombia included the national government,

afforded high legitimacy due to its role as a regulatory actor, as well as municipalities. In Bolivia, certifying bodies were also categorized as respected. While much of Bolivia’s coffee exports are organic and Fair Trade certified, coffee is not the only crop that is certified. The role of certifiers is limited to auditing the farms. This constrains their influence in the sector, but they remain recognized for their authority to grant the certifications.

Vulnerable actors in Colombia included the over 140 registered coffee farmer associations in the Huila department. Their limited financial resources and infrastructure constrained their power in the value chain (in contrast to cooperatives). In Bolivia, by contrast, associations were categorized as dominant due to their remaining control over a significant part of the export market as well as the related networking of many producers. However, Bolivian coffee farmer associations still face limitations in terms of infrastructure and capacities. Vulnerable actors in Bolivia further included the Organic Producers’ Association (AOPEB) as well as academia; they both possess high interest and legitimacy, but have little power to influence decisions due to financial constraints and limited geographical reach. Finally, in both Bolivia and Colombia, independent coffee producers are especially vulnerable: While they are legally recognized in both contexts and viewed as important by other value-chain actors, their influence in the decision-making processes remains limited. Their high dependence on selling coffee to sustain their households also makes them vulnerable to external shocks such as climate change effects, pests and diseases, and market volatility.

Marginalized actors in both countries included the many service providers in the coffee value chain: harvesters, transporters, green coffee sorters, and even baristas and some exporters (the latter only in the Colombian case). As many of these service providers are women – especially harvesters and sorters – we distinguish them as a group in this category. Women also play an essential role in production (Copa-Escalante, 2007). In Bolivia, women have maintained coffee plantations as an additional source of income, as many men switched to other economic activities after the coffee leaf rust crisis hit the country in 2012. It was estimated that women were involved in the coffee production

activities of 80 % of the producing families and had an increased participation in the producer cooperatives (Rojas et al., 2017). The participation of women in the sorting of green coffee is also important to note. In Bolivia, most producer associations do not have optical sorters for this task, so the work is done manually by women referred to as *palliris*, a term from the Aymara language meaning “she who selects”. Despite performing a highly specialized, demanding job, their salary is well below the minimum wage. In our interviews, one *palliri* said that she chose this job because it is flexible and allows her to carry out other activities such as looking after her children or attending school meetings. Many *palliris* have been in the business since they were young, and have become experts in sorting green coffee.

All these actors possess high interest, but very limited capacities to influence governance due to low legitimacy and power. ANAPCAFE – the organization of baristas, roasters, and coffee cuppers in Bolivia – was also categorized as marginalized because it had a high interest in the sector, yet low recognition by other actors who regarded them as a competitor at the organizational level; this even though they do not represent producers, but rather downstream actors in the value chain. Since data were collected for this study, ANAPCAFE has become increasingly involved in the sector, particularly in the organization of events to promote the consumption of specialty coffee and in the training of young baristas and cuppers.

Dormant actors in Bolivia were consumers, since they have major potential to impact the Bolivian specialty coffee market, yet their interest and awareness are only slowly emerging and they have no legal representation in the coffee sector. Although per capita consumption is only 0.31 kg per year (ICO, 2022), it is estimated that six out of ten Bolivians consume coffee frequently, but with a preference towards soluble and “torrefacto” coffee (Vásquez, 2015). In addition, though many participants labelled themselves “coffee lovers” in our surveys, few actions have been taken at the government level to boost consumption, possibly because coffee is not a staple food product. At the same time, there have been increasing initiatives driven by specialty coffee shops aimed at boosting domestic consumption of local and specialty coffee.

3.1.3. Cost-benefit analysis

In both countries, producers achieved their maximum profits – that is, more than USD 5/lb – when selling roasted specialty coffee. In practice, however, specialty coffee premiums were only achieved in Bolivia when coffees obtained a score of 83 or higher (Table 3). Despite minor variance in prices obtained for roasted coffee in different value chains, sale of roasted coffee was by far the most profitable way of marketing (Table 3 and Table 4), obtaining over USD 9/lb in direct trade in Huila, Colombia. Even the sale of roasted lower quality or commodity coffee was relatively profitable, with producers making profits of USD 2.4/lb to USD 4/lb in these cases. Sale of green coffee was ranked third in terms of profitability, whether for the domestic market or for export. Producers in Bolivia achieved profits of between USD 1/lb and 3 USD/lb for both qualities of green coffee, whereas producers in Colombia only achieved profits below USD 1/lb for green coffee – sometimes significantly below – even for specialty coffee. Considering that the average farm-gate price at the time of our study our study was USD 1.54/lb in the national market and USD 1/lb in the international market (NASDAQ, 2018), in some cases producers were forced to sell their lower-quality green coffee at a loss. Table 5.

On a typical smallholder farm in Bolivia with 1–3 ha devoted to coffee cultivation, the costs of production break down as follows: 53 % of the production costs are attributable to labour (including family work); 30 % are expenditures for external inputs such as fertilizer and energy; and 17 % are direct costs for basic services, administrative and financial fees, and incidentals. Based on these numbers/estimations, an average production cost of USD 1/lb of parchment coffee was calculated, or USD 0.84/lb excluding family labour.

The average production cost of Colombian coffee in Huila was

Table 3

Cost-benefit analysis for different value chain types in the yungas of la paz, bolivia (prices in usd).

Value chain type	Quality	Concept	Price paid per lb	Costs	Benefit
Producers' associations for export	Specialty coffee (>83 score)	Parchment coffee	1.18	1.00	0.18
		Coffee-cherry, dry	0.27	0.85	(-0.58)
		Green coffee	2.69	1.25	1.44
		Roasted coffee	10.96	5.38	5.57
Commercialization through intermediaries for export	Commodity coffee (<83 score)	Parchment coffee	0.61	1.00	(-0.39)
		Coffee-cherry, dry	0.12	0.85	(-0.73)
		Green coffee	2.18	1.25	0.93
		Roasted coffee	7.83	5.38	2.44
Direct trade between producers and exporters/importers	Specialty coffee (>83 score)	Parchment coffee	0.93	1.00	(-0.07)
		Coffee-cherry, dry	0.32	0.85	0.53
		Green coffee	3.00	1.25	1.75
		Roasted coffee	11.84	5.38	6.46
Direct trade between producers and coffee shops/roasting industries for the domestic market	Specialty coffee (>83 score)	Parchment coffee	2.99	1.00	1.98
		Coffee-cherry, dry	0.34	0.85	(-0.51)
		Green coffee	4.00	1.12	2.88
		Roasted coffee	11.73	5.38	6.35
Commercialization through intermediaries for export	Commodity coffee (<83 score)	Parchment coffee	2.30	1.00	1.30
		Coffee-cherry, dry	0.29	0.85	(-0.56)
		Green coffee	2.80	1.12	1.68
		Roasted coffee	8.14	5.38	2.75

calculated to be USD 1.02/lb of parchment coffee (Table 4). The families producing specialty coffee were able to build long-term commercial relationships with buyers, whereas families that produced commodity coffee relied more on the international coffee market. Commodity coffee producers possessed much less bargaining power vis-à-vis coffee traders as they provided interchangeable goods in terms of quality. Commodity coffee producers commonly had to work on other farms for additional income. Families who belonged to a farmers' association experienced faster payments from buyers (exporters/international clients) to farmers in comparison with families involved in a farmers' cooperative. However, the cooperatives provided other services to support the farmers such as educational subsidies as well as credits for the purchase of tools and fertilizers. Even though farm-gate prices were 30 to 40 % above average for specialty coffee – such as *Caturra*, *Colombia*, *Castillo*, and *Catimor* – cooperative farming families maintained additional income sources to complement their earnings. When production was oriented towards more exclusive varieties such as *Geisha*, *Tabi*, or *Pink/Yellow Bourbon* – which fetched high prices (60–80 % above average), but required particular care – the farming families in question dedicated

Table 4
Cost–benefit analysis for different value-chain types in Huila, Colombia (average prices in USD).

Value-chain type	Quality	Concept	Price/ lb	Costs/ lb	Benefit
Producers' associations and cooperatives for the domestic market and specialized coffee shops	Specialty coffee (>80 points)	Parchment coffee	1.18	1.02	0.16
		Green coffee	1.55	1.22	0.33
		Roasted coffee	6.50	1.46	5.04
Commercialization through intermediaries	Commodity coffee (<80 points)	Parchment coffee	0.93	1.02	(-0.09)
		Green coffee	1.23	1.22	0.01
		Roasted coffee	5.42	1.46	3.96
Producers' associations and cooperatives for export	Specialty coffee (>80 points)	Parchment coffee	1.0	1.02	(-0.02)
		Green coffee	1.35	1.22	0.13
		Roasted coffee	7.22	1.46	5.76
Direct trade between producers and exporters/importers	Commodity coffee (<80 points)	Parchment coffee	0.96	1.02	(-0.06)
		Green coffee	1.26	1.22	0.04
		Roasted coffee	5.42	1.46	3.96
	Specialty coffee (>80 points)	Parchment coffee	1.57	1.02	0.55
		Green coffee	2.07	1.26	0.81
		Roasted coffee	10.84	1.53	9.32
Specialty coffee (<80 points)	Parchment coffee	1.09	1.02	0.55	
	Green coffee	1.84	1.26	0.58	
	Roasted coffee		1.53		

their time exclusively to the production of coffee as their main source of income.

Selling roasted coffee via direct export was more profitable compared to the sale of roasted coffee marketed by coffee cooperatives. Direct trade coffee must have a certain quality in order to make up for transport costs, as the export of roasted coffee occurs by air and the shipping costs are considerably higher. However, we also found that exporting roasted coffee is not much more profitable than selling roasted coffee in the national markets.

3.1.4. Consumer survey

Our online consumer survey showed that 87 % of the respondents consumed coffee regularly in Colombia, and 60 % in Bolivia. In Bolivia, most of the coffee consumed was imported – primarily instant coffee. In Colombia, most of the coffee consumed was Colombian – mainly traditional “tinto” coffee, a colloquial term for standard, low-price filtered or instant black coffee. Among respondents in Bolivia, 114 identified as specialty coffee consumers and 122 did not; for Switzerland, the numbers were 123 and 99 respectively; and for Colombia 207 and 100.

Among specialty coffee consumers, taste was the most important factor in all three countries, followed by ecological information about coffee production in Bolivia, on the one hand, and price and presentation in Colombia, on the other. In Bolivia and Switzerland, specialty coffee consumers displayed higher environmental consciousness than non-specialty coffee consumers regarding ecosystem integrity (organic certification and agroforestry, not tested in Colombia, Wildisen, 2021). Conventional coffee consumers cared less about taste or the manner of

Table 5
Main action research outcomes in the two study areas in Bolivia and Colombia.

Action research contents	Yungas de La Paz, Bolivia	Huila, Colombia
Main issues identified and prioritized in starting workshops with coffee farmers, roasters, gastronomy, retailers, scientists, and policymakers	Ways to enhance the production and market access of specialty coffee and coffee cherry products	Ways to improve living conditions in rural areas through developing local specialty coffee markets
Explored topics	Ways to make coffee attractive besides coca and over imported coffee	Opportunities in sub-products (coffee cherry) development and marketing
Long-term goal	Supporting the local coffee/coffee cherry market and livelihoods	Supporting the local coffee/coffee-cherry market and livelihoods
Product development	Specialty coffee with improved quality; coffee-cherry drinks and other recipes	Coffee drips Cold brew drinks Coffee capsules
Value chain (re) organization	Sustainable and productive coffee cultivation systems	Opportunities in specialty coffee markets
Research, education, and training	Research centre founded	Master's programme co-designed and started Strengthen the coffee cluster of the department Promote the realization of new barista/brewing contests.
Next (open) steps	Encourage local initiatives focused on promoting the consumption of specialty coffee	Strengthen the coffee value chain in Colombia through scientific, technological, and social innovations
	Strengthen production and post-harvest aspects with farmers to improve productivity and product quality	Focus on sustainable coffee production under agroforestry
	Encourage the development and production of shell products for the local market	Promote the consumption of quality coffee
	Work on the integration of institutional actors for the formulation of new policies and actions	Transformation from a vision of green coffee production to one of coffee processing and commercialization
		Development of resistant varieties

production and did not value criteria such as price transparency. In Bolivia, this can partly be explained by consumer preferences for instant coffee or coffee strongly roasted with sugar (Vasquez, 2015). In addition, per capita consumption is relatively low compared to other countries, such that investment is also low in comparison with other food products. Regarding certification, specialty coffee consumers in Bolivia valued coffee from agroforestry systems more than organic coffee. Certified organic coffee in Bolivia is almost entirely destined for export markets, so domestic supplies are quite limited. However, some coffee brands certified under “ecological production” – a participatory guarantee system (PGS) in Bolivia – are sold domestically (Jacobi et al., 2022). Specialty coffee consumers surveyed in Switzerland, by contrast, did not consider agroforestry-based production in their buying decisions. Among roasters we surveyed, fair prices and direct collaboration opportunities with producers were the highest-ranked purchase factors, whereas environmental criteria and organic certification were the lowest-ranked factors. In the course of our research, we witnessed a growing tendency among local specialty coffeeshops – in Bolivia as well as in Colombia – to work directly with independent producers, thus

circumventing intermediaries. Under such direct schemes, we observed collaboration mechanisms such as technical assistance for the production and processing of coffee as well as provision of training to producers – as baristas, in roasting, and in cupping – in addition to higher prices paid to producers overall.

3.2. Farmers' livelihoods

3.2.1. Huila, Colombia

Out of eight families we interviewed in Colombia, seven produced specialty coffee and one family produced commodity coffee. This latter family displayed the lowest livelihood results by far (see Family 1 in Fig. 4). Most families produced dried parchment coffee as machinery was expensive and knowledge on transformation was low. Only two families produced and sold roasted coffee, including one family that ran its own coffeshop and another that roasted part of its coffee harvest for local markets and sold the rest as green coffee. These two families displayed some of the best livelihood results, and also obtained good prices for their green coffee. Remarkably, all the families we interviewed invested in further education on coffee, including coffee cupping, coffee production entrepreneurship, preparation of coffee beverages by alternative methods, and coffee roasting. Families who relied on common coffee varieties – that is, *Caturra, Colombia, Castillo, and Catimor* – also maintained off-farm income sources. Those who grew special varieties – that is, Geisha, Tabi, Pink and Yellow Bourbon – earned higher incomes and tended to rely exclusively on coffee farming. Specialty coffee production was associated with higher incomes: On average, specialty coffee farmers received twice the FNC-defined market price. We noted a clear trend towards specialty coffee and direct trade relationships among interviewed families making direct contracts with roasters. Farmers' associations were helpful in this. **Natural capital:** Seven out of the eight families produced agroforestry coffee, three with a dense shade tree cover, and four in a semi-shade system. According to these families, the use of trees alongside coffee plants helped to improve the physical and chemical properties of the soil by increasing soil organic matter. As the majority of coffee plantations in Huila are in the hillside area with steep slopes, trees also prevent erosion and reduce the risk of landslides in the rainy season. One family grew coffee as a full-sun monoculture. This family associated shade trees with reduced yields and hence profits. Most families combined different agricultural systems – shaded plots as well as semi-shaded plots – viewing it as beneficial in light of adverse

climate conditions, for example by boosting resilience, soil fertility, organic matter, erosion control, and more. Some families used non-toxic pesticides or homemade biopesticides; awareness of pesticide toxicity was high. **Social capital:** Families that produced specialty coffee generally enjoyed high credibility and interest among buyers: In this Colombian setting, buyers have access to coffees with special characteristics they desire and are willing to pay a premium for, which in turn benefits the producer. Families who produced specialty coffee also enjoyed higher social recognition in the community. These producers were regularly visited by their neighbours, who asked them for advice regarding processes and practices to produce specialty coffee. **Human capital:** Three families that produced specialty coffee employed workers on fixed contracts. The other families only hired temporary labour during the harvest season. The one family that grew conventional coffee solely relied on family labour. Education beyond the primary level and technical degrees (e.g. from SENA) were rare, leaving producers in vulnerable positions in terms of their bookkeeping and bargaining power. The specialty coffee farmers were in a contributory health insurance system in contrast to the family producing conventional coffee. **Financial capital:** While all the interviewed families earned some form of off-farm income to sustain the household, specialty coffee producers received higher prices and engaged in long-term commercial partnerships. All interviewed families had debts with the Agrarian Bank of Colombia. **Physical capital:** Whether they produced specialty coffee or not, all the families possessed basic machinery and equipment. However, not all the families owned a vehicle, limiting their ability to transport their goods. The family that grew commodity coffee stated that it did not have sufficient resources to build a house of good material and that it had a small number of rooms for the household members.

3.2.2. Yungas, Bolivia

All four families studied in Bolivia produced specialty coffee (Fig. 4). The involvement of farmers in specialty coffee value chains had a positive impact on **financial capital** (income generation), **social capital** (networks and political engagement), **human capital** (knowledge and experience), and **physical capital** (transport, infrastructure). The only exception was **natural capital**: For three of the families, there was a negative relationship between natural capital and engagement in specialty coffee value chains. The intensification of coffee cultivation on these specialty coffee farms included a shift from traditional agroforestry systems to full-sun monocultures, leading to more deforestation

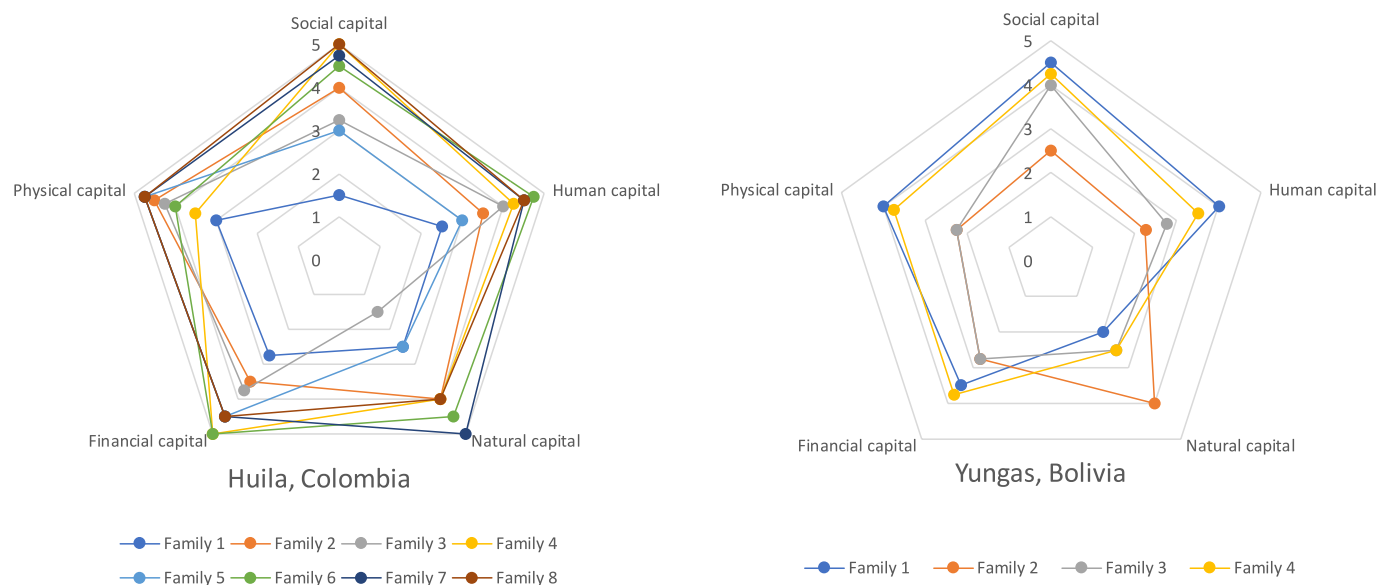


Fig. 4. Left side: Livelihood assets of eight families in Colombia. Family 1 produced commodity coffee, while the other families engaged in the specialty coffee market. Right side: Livelihood assets of four specialty coffee farming families in the Yungas of Bolivia (based on results from Compigne, 2018).

and greater use of synthetic fertilizers and pesticides. Thanks to increased income from sales of high-quality coffee, the four Bolivian families in our study were able to increase their **physical capital** in terms of tools and infrastructure, as well as their human capital by hiring more labour and accessing more opportunities for capacity building. This resulted in an increased cultivation area and use of more external inputs to improve productivity. Despite improvements in **financial capital**, none of the households displayed holistic improvements with respect to their overall situation: Indeed, not all livelihood capitals improved as a result of engagement in specialty coffee value chains. Even when producers' financial capital increased, other financial aspects – such as access to credit or having the ability to cover household expenses (e.g. health and education) – remained poor. A lack of financial planning and related knowledge due to insufficient training prevented these farmers from making better use of their increasing incomes. An important context factor influencing the financial capital of all families observed was related to the historical, economic, and cultural context of the Yungas region regarding the coca leaf (*Erythroxylum coca*). Livelihoods often relied more on coca than on coffee production (Compigne, 2018), and while it causes deforestation, soil degradation and highly hazardous pesticides are commonly used on coca bushes, its cultural significance is high (Jacobi et al., 2018). In terms of **social capital**, all four families that sold specialty coffee had a very close relationship with their buyers, who helped them with technical and sometimes financial support to improve quality and productivity. They were better positioned in the community than other coffee farming families interviewed during the study. One of the main limitations that producers faced was lack of access to basic services such as education, healthcare, and sanitary facilities, but this related more to overall institutional constraints than to the participation of such families in specialty coffee value chains. The coverage and quality of basic services in the coffee-growing regions, especially regarding education and health – remains very limited. While access to these services was poor, producer families involved in specialty coffee value chains were in a better position in terms of human capital than those who were not. Their superior financial capital enabled them to supply at least part of the resources needed to finance their healthcare and education. Nevertheless, all the families were vulnerable to health-related costs (accidents, severe illness). These typically had to be covered with family savings or by selling assets such as land, as it was difficult to obtain loans to pay for such costs.

3.3. Outcomes of the action research

While the action research procedure that accompanied the project from the beginning was the same in both countries, in this section we discuss them separately because of differences in results and paths to be followed. We conducted two multi-stakeholder workshops in each context: One at the start, and one towards the end of the two-year project. These activities had a similar design in both contexts, beginning with input presentations, collection of ideas, prioritization, and a SWOT analysis. After gathering and analysing all data, results and recommendations were shared, validated, and reflected in a final workshop. However, what happened in between – the second step in Fig. 2 on co-creating innovations – differed greatly in the two settings: While coffee-cherry products played an important role in Bolivia, in Colombia the focus was on strengthening small specialty coffee businesses that supplied coffee for the local market. Coffee-cherry was not yet of importance in the coffee sector, even though one workshop group developed and exchanged recipes and tried different coffee-cherry products.

3.3.1. Huila, Colombia

The first workshop at the Universidad Surcolombiana in Neiva, Huila, marked the start of our joint activities. The participants formed two groups, one to work on marketing strategies for specialty coffee and the other to focus on coffee-cherry products with an emphasis on

product development such as cold drinks, flour, and marmalades. The aim was to promote coffee-cherry products as organic “superfoods” and to develop a strategy to further improve post-harvest management of natural coffees which are highly appreciated in the specialty market, but take longer to dry and are susceptible to mould, so bear high risks when it comes to ensuring quality. Differences between the different varieties and processes were discussed in detail at the final workshop with coffee farmers and students in Neiva in August 2019. There, coffee farmers and roasters requested a course on cupping and fermentation that was organized by the Colombian and Swiss academic partners of the project. This was followed by several farm visits and on-farm courses on best practices in cultivation systems and on enhancing green coffee quality, in addition to on-farm cuppings (Fig. 5). In the last phase of the action research, a master's-level course in “Coffee Science and Technology” at the Universidad Surcolombiana was developed, which Swiss partners have continued to support with regular backstopping and inputs to courses upon request.

3.3.2. Yungas, Bolivia

The project team launched the action-research activities together with the local project partner Slow Food Bolivia in a one-day workshop in La Paz. We invited stakeholders from the national and the local government as well as coffee farmers, technicians, roasters, and representatives from the gastronomy sector. In addition to the significant participation of diverse actors from the coffee value chain, a remarkable project achievement was securing the joint participation of ANAPCAFE, ANPROCA, and FECAFEB – three organizations that often struggled to work together.

In the product development and marketing workshop, one group focused on creating a strategy for coffee-cherry products. As a result, they eventually engaged in the longer-term co-creation of a recipe book together with chefs (Jiménez et al., 2021a), a book on good agricultural practices (Jiménez et al., 2021b), as well as three educational videos about coffee-cherry farmers, products, and small businesses (Fig. 6). For specialty coffee, a strategy to improve overall quality along the value chain was developed. Here, the participants agreed that markets existed, but they felt that quality – especially related to bean selection and drying – was a problem. One conclusion was that the multi-phase National Coffee Programme run by the central government in recent years could focus more on quality, for example by providing credits for infrastructure or education programmes following the model of SENA in Colombia. These results were shared with the Ministry of Rural Development and Land in the form of a policy brief (Urioste, 2018) and discussed with representatives of the National Coffee Programme in several meetings. This governmental support programme for farmers was praised by the team for its focus on organic and agroforestry coffee, but the selection of varieties was criticized (mainly promoting the Castillo variety, with little focus on diversity or Typica landraces).

Building on the alliances formed and initiatives defined in this initial workshop, the Faculty of Technology of UMSA founded a “Coffee Excellence Centre” in collaboration with the University of Bern in Switzerland, beginning their work in 2019 with two studies on roasting machines and post-harvest management. Slow Food Bolivia organized a campaign to identify and promote coffee-cherry products over the course of a year. Together with ANAPCAFE, they organized a coffee-cherry tasting event with local consumers in La Paz, also featuring a cooking competition and video presentations at the cafeteria “La Sultana” (the term for coffee-cherry in Bolivia), which eventually opened in La Paz independent of the project, but was linked with Slow Food Bolivia.



Fig. 5. Left side: product development workshop in Neiva with different stakeholders from the coffee sector. Right side: barista course in the town of Pitalito in the frame of the action research (Images: Cesurcafé).



Fig. 6. Left side: Video on coffee-cherry production in the Yungas of La Paz. Right side: Coffee-cherry beverage tasting at Munaipata farm near Coroico. Footage: Azafran, Bolivia.

4. Discussion

4.1. Situation and links between specialty coffee value chains, institutions, and livelihoods

In this study, we explored two different scenarios. On the one hand, we conducted research in Colombia, where coffee has a centuries-old tradition, organizations and markets are well-established and institutionalized, and the country is internationally known for its large Arabica production – encompassing both commodity and specialty coffees – enabling relatively good market access for farmers. On the other hand, we carried out research in Bolivia, where production steeply declined despite increasing international recognition and cultivation of highly sought-after coffees (Loofbourow, 2021), a situation from which the sector is only slowly recovering. At the same time, especially in the cities, awareness of specialty coffee appeared to be growing in Bolivia with a new coffee culture gradually emerging. Still, coffee production was on a downward trend during our research there. In Colombia, the world's fourth-largest producer and second-largest exporter, the coffee market was experiencing strong oscillations, but displayed an overall upward trend both in terms of cultivation area and productivity (FAO-STAT, 2023). Commodity parchment coffee was only profitable in direct trade relations; even when the coffee quality was rated > 80 points, production costs (USD 1.02/lb) in Colombia at the time of our research were higher than the prices (USD 1.00/lb) paid by intermediaries (Table 4).

In both contexts, however, we identified a mainly positive relationship between farmers' participation in specialty coffee value chains and their livelihoods. As commodity coffee often did not cover production costs, farmers tended to shift either towards other income sources or towards specialty coffee. Specialty coffee was found to generate superior returns when farmers: (1) sold their coffee to associations who resold it

to exporters who had international clients; (2) sold it directly to national and international clients, or (3) roasted the coffee and sold it domestically. In all three scenarios, there were fewer intermediaries in the chain who determined the price and increased overall costs. It appears that when producers sell coffee directly to roasters or roast it and sell directly to consumers, they can increase their bargaining power to achieve a better price for their specialty coffee and must not rely entirely on mainstream market prices. In some cases, farmers received high returns when selling their parchment coffee to cooperatives in both countries. However, this required good negotiation skills on the part of cooperatives regarding the cupping score.

We observed a much better farmer–buyer relationship in specialty coffee value chains. Close long-term relationships result in better bargaining power for farmers, higher expertise in cultivation, and post-harvest processing of coffee that secures better prices. However, despite the positive impact of specialty coffee on livelihoods, not all livelihood capitals improved equally, and especially health and education remained poor, highlighting the vulnerability of farmers in low- and middle-income countries. In Bolivia, where standards of living are generally lower than in Colombia (The World Bank, 2022), farmer families still struggle with limited access to healthcare, education, and sanitary facilities and are especially vulnerable to health-related costs. In Colombia, farmers producing specialty coffee were part of a contributory health system and were less vulnerable to health-related costs.

One worrying trend observed in our research was that of harmful conventional agricultural practices linked to specialty coffee cultivation, including deforestation to grow specialty coffee (Compigne, 2018). In Bolivia, larger coffee businesses advised farmers to establish full-sun monocultures and to apply synthetic fertilizers and pesticides for greater short-term productivity. This trend decreased the natural capital of families, for example by degrading soils and biodiversity (Compigne,

2018). The families in Huila who produced specialty coffee had comparatively good livelihood results. However, most of their coffee production was without shade, and land was frequently deforested to make room for new coffee plots. Growing coffee in full-sun also affected food production on the farm, which forced farmers to buy food from external sources. In general, relying solely on coffee production increases families' risk of income loss as a result of crop failures. It also reduces the buffer capacity and other ecosystem benefits associated with shaded environments, for example in terms of adaptation and mitigation to climate change (Perfecto et al., 2019). A positive association between biodiverse coffee farms and quality definitions based on harvest and cupping has been reported (Vogt, 2020; De Leijster et al., 2021), as well as higher profitability compared to full-sun systems, despite reduced yields (Jezeer et al., 2017). Studies also report conflicting effects related to increased labour in plantation management, higher incidence of fungal diseases (Le et al., 2021), and difficulties in harnessing the non-monetary benefits of shade systems (Jha et al., 2011; Koutouleas et al., 2022). Overall, coffee farmers tend to receive the smallest share of the aggregate value of coffee, whereas they bear most of the associated risks of climate impacts, pests and diseases, labour shortages, and price fluctuations. The potential economic benefit of these services often remains obscure to farmers because producers are infrequently directly rewarded for these services (Grabs & Ponte, 2015; Fromm, 2023). Our Swiss consumer survey revealed that coffee origin in agroforestry systems was not a purchasing criterion among coffee consumers in Switzerland. Ideally, consumers, roasters, traders, and others would consider criteria other than just sensory quality, including the ecosystem quality in production areas as well as social justice aspects. Here, it will be interesting to observe, whether and how the new Specialty Coffee Association's Coffee Value Assessment protocols increases such awareness when coffee is not only valued for its descriptive and affective attributes, but also for extrinsic factors such as sustainability aspects (SCA 2023).

Other studies have found that diversification of crops and tree species, and coffee varieties is key to sustainable coffee farming. For example, Babin (2015) found that farm diversification and agroecological practices were more important than the price premium offered by Fair Trade markets in supporting coffee production and farmers' livelihoods. Ward and Nicholls (2017) found that diversification of coffee varieties is an important strategy to mitigate against coffee leaf rust and climate change impacts. As the substitution of coca with other crops such as coffee has failed given the continued cultural and economic importance of coca for producer families in Bolivia (Jacobi et al., 2018), the diversification of coffee farms with other crops that generate income – such as coca, food crops, and shade trees – should be more actively advanced as an economic and ecological adaptation strategy.

4.2. Potential of specialty coffee and coffee-cherry products

While Bolivia's local population displays a high preference for instant coffee as reported by newspaper inquiries (Vasquez, 2015), in recent years the country has undergone a third-wave of development in the coffee sector. It has experienced a boom in the number of specialty coffeeshops in major cities as well as gradual growth of local roasteries offering Bolivian specialty coffees – in some cases even in main coffee-production areas (Estevez et al., 2018; Urioste et al., 2021).

The PMCA approach has been applied to the coffee sector by others in the past. Horton et al. (2020) developed a women's coffee brand for local sales in San Martin, Peru, which inspired other actors to launch their own specific brands. Application of the PMCA approach in Peru also resulted in technical changes in coffee processing and significantly increased sales. Similar to our case, it had no direct positive effect on cultivation practices and natural capital, however. This appears to require another approach or an additional approach. Cooperatives and other enterprises who deliberately foster agroforestry and support sustainability certifications – especially participatory guarantee systems –

have been important in this regard (Jacobi et al. 2022).

Coffee-cherry use in traditional teas is well-established in Bolivia, where it provides an additional income for farmers. In Colombia, by contrast, coffee-cherry use for culinary purposes only just began in recent years, but there is a possibility that demand for sultana tea or baking goods may become a trend in the local gastronomy. Study participants highlighted the potential to market coffee-cherry beverages as healthy, energizing alternatives for persons who do not drink brewed coffee, based on the natural caffeine and antioxidant content of coffee cherries.

Natural process coffees (unwashed) are valued in the specialty coffee scene, yet Colombia and Bolivia predominantly produce washed coffees. The diversification of processes and knowledge on the production of natural process specialty coffees could be key steps towards establishing a new niche market and adapting to climate change by using substantially less water.

Regarding what is needed to make coffee- and coffee-cherry value chains work for family farmers, encouraging examples exist. For instance, the Salvadoran Coffee Council (Consejo Salvadoreño de Café) collaborated with the direct-trade online platform Al Grano to increase direct trade of coffee from El Salvador. However, for innovative niche examples to provide broader sustainable and fair alternatives – both for the national and international market – they must expand their influence on conventional trade models. For this to happen, alternatives should not only be market-oriented, but also policy-oriented, as explored in the next section.

4.3. Supportive conditions for value-chain improvements

In the literature, PMCA action research was found to be successful under the following conditions: (1) when the agricultural and policy environment favoured agricultural innovation and value chain development; (2) the value chain offered significant scope for value addition or cost reduction; and (3) the PMCA was implemented with a high degree of fidelity to its basic principles in the context of a broader development effort. The active involvement of diverse stakeholders – not only smallholder producers, but also entrepreneurs and relevant service providers along the value chain – was crucial to stimulating innovation (Horton et al., 2020). Since (2) was given in our contexts, priorities for support could be (1) by policymakers and (3) by policymakers and organizations concerned with sustainable development. Our study showed that coffee farmers often come to regard coffee not simply as a cash crop, but as an important part of their identity. This includes knowing coffee, consuming it, and through this knowledge engaging in as much of the value chain as possible. Most importantly, farmers should be able to cup their own coffee and judge the quality themselves. For this and for taking over larger parts of the value chain,

capacity-building opportunities concerning coffee quality are growing – much faster in Colombia than in Bolivia. In Colombia, interested actors can learn everything from coffee farming to barista skills, for instance at SENA. In our study, we found higher profits for farmers and better livelihood results in cases where families processed their own coffee in a wet mill and were involved as entrepreneurs in coffeeshops. Based on this, we conclude that opportunities for further education and training to enhance farmers' participation in other segments of the coffee value chain should be placed high on the policy agenda. Farmers should also be supported in processing and selling other products for added income, such as sultana or fruits, herbs, and other products from diversified agriculture.

To efficiently support the national coffee sector, decision-makers need to focus on quality and sustainability in their programmes and seek to bring together the widely dispersed actors involved. Two goals of corresponding support on behalf of coffee farmers should be: (1) enabling them to obtain prices for their goods that are higher than their production costs; and (2) increasingly participating in more value-chain stages, going beyond just production and processing. Important

strategies to motivate coffee farmers and enable them to make a living would include investing in young coffee producers to improve their marketing and sensory skills. SENA in Colombia may serve as such an example for other places. Also important are policies to ensure minimum prices and access to financing. We recommend that governments take advantage of developing national markets and protect their coffee sector from low-quality coffee imports that undermine domestic production and consumption of locally produced coffee, for instance when serving coffee at their own events.

The PMCA also clearly faces limits: Power asymmetries persist in the coffee sector despite quality differentiation and greater degrees of farmer self-organization and direct-trade opportunities (Grabs and Ponte, 2015). The broader political economy context of coffee markets must be critically considered in coffee value chain research. Family farmers all over the world, including many coffee farmers, have organized to claim their right to food, land and water, and to exchange knowledge and skills on agroecological farming in the world's largest civil society organization La Via Campesina. This and other forms of organizing have given rise to the 2018 United Nations Declaration on the Rights of Peasants and other People Working in Rural Areas (UNDROP). Without linking to this broader context, research on coffee farming is unlikely to be able to answer questions on the sustainable development of the global coffee sector.

5. Conclusions

Our results from Bolivia and Colombia clearly show positive income effects for farmers participating in specialty coffee value chains, particularly those involved in direct-trading schemes or who roast and sell their coffee on national markets. Nonetheless, in terms of livelihood impacts, many aspects have not sufficiently improved. Further, specialty coffee value chains tend to be exclusive and require significant livelihood capitals to begin with. As a result, these value chains do not automatically benefit marginalized coffee producers and poor families.

Overall, the participation of small farmers in specialty markets remains a niche. The producers' organizations, which represent the biggest share of production, are more focused on established certified markets for export. Private enterprises (both national and international) account for most of the specialty markets, though most of them source at least part of their coffee from small farmers. Very few producers have managed to break into the specialty markets, although initiatives such as 'Taza Presidencial' in Bolivia and the national market (specialty coffee shops) have attracted some producers to this value chain.

The development of specialty coffee value chains does not automatically translate into more sustainable production methods or less deforestation – on the contrary, most of the community and private enterprises we studied used conventional production methods in full-sun coffee plantations, which extends to the producers delivering coffee to these companies. This particularly applies to specialty coffee marketed domestically, where demand for sustainable coffee and sustainable certification schemes remains weak. For specialty coffee value chains to work for family farmers, cup quality definitions must consider social and ecological impacts from production to consumption.

CRedit authorship contribution statement

Johanna Jacobi: . **Derly Lara:** . **Sebastian Opitz:** . **Sabine de Castelberg:** Funding acquisition, Project administration, Writing – original draft, Writing – review & editing. **Sergio Urioste:** . **Alvaro Irazoque:** Investigation, Methodology, Writing – original draft. **Daniel Castro:** . **Elio Wildisen:** Investigation, Methodology, Writing – original draft. **Nelson Gutierrez:** . **Chahan Yeretizian:** Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Resources, Software, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.wdp.2023.100551>.

References

- Babin, N. (2015). The coffee crisis, fair trade, and agroecological transformation: Impacts on land-use change in Costa Rica. *Agroecology and Sustainable Food Systems*, 39(1), 99–129. <https://doi.org/10.1080/21683565.2014.960549>
- Bernet T., Thiele G. and Zschocke T., 2006. Participatory Market Chain Approach (PMCA) – User Guide. International Potato Center (CIP) – Papa Andina, Lima, Peru. Available at: <https://cipotato.org/wp-content/uploads/2014/09/003296.pdf>, accessed 20 July 2023.
- Bunn, C., Läderach, P., Ovalle Rivera, O., & Kirschke, D. (2015). A bitter cup: Climate change profile of global production of Arabica and Robusta coffee. *Climatic Change*, 129(1–2), 89–101. <https://doi.org/10.1007/s10584-014-1306-x>
- De La Torre, J. V., & Castro, D. (2021). *Estructuración de un programa de educación para el trabajo y el desarrollo humano que permita fortalecer la participación de los caficultores en la cadena de valor del café en el departamento del Huila* (p. 250). Tesis de Maestría en Gerencia Integral de Proyectos: Universidad Surcolombiana, Neiva, Colombia.
- Chevalier, J. M., & Buckles, D. J. (2008). *Participatory Action Research. Theory and Methods for Engaged Inquiry* (2nd Edition.). Routledge.
- Compigne, I. (2018). *High Quality Coffee Value Chains for Smallholder Livelihoods in the Yungas of La Paz Bolivia*. Centre for Development and Environment: University of Bern and ISARA, Lyon.
- Copa-Escalante, E. (2007). El rol de la familia, en especial de la mujer en la Producción, certificación y comercialización del café en Caranavi, Bolivia [Centro Agronómico Tropical de Investigación y Enseñanza]. <https://repositorio.catie.ac.cr/handle/11554/5602>.
- de Sousa, K., van Zonneveld, M., Holmgren, M., Kindt, R., & Ordoñez, J. C. (2019). The future of coffee and cocoa agroforestry in a warmer Mesoamerica. *Scientific Reports*, 9(1), 8828. <https://doi.org/10.1038/s41598-019-45491-7>
- Devaux, A., Ordínola, M., Mayanja, S., Campilan, D., & Horton, D. (2013). *The Participatory Market Chain Approach: From the Andes to Africa and Asia. Papa Andina Innovation Brief 1* (p. 4 pp.). Lima, Peru: International Potato Center.
- De Leijster, V., Santos, M. J., Wassen, M. W., Camargo García, J. C., Llorca Fernandez, I., Verkuil, L., et al. (2021). Ecosystem services trajectories in coffee agroforestry in Colombia over 40 years. *Ecosystem Services*, 48, Article 101246. <https://doi.org/10.1016/j.ecoser.2021.101246>
- Estevez, C. L., Bhat, M. G., & Bray, D. B. (2018). Commodity chains, institutions, and domestic policies of organic and fair trade coffee in Bolivia. *Agroecology and Sustainable Food Systems*, 42(3), 299–327. <https://doi.org/10.1080/21683565.2017.1359737>
- Food and Agriculture Organization of the United Nations FAO. (2023). FAOSTAT. Food and Agriculture Organization of the United Nations. <https://www.fao.org/faostat/en/#home>. Accessed 5 June 2023.
- Federacion Nacional de Cafeteros de Colombia (FNC) (2022). IG Informe del Gerente, 90 Congreso Nacional de Cafeteros. Available at: <https://federaciondefcateros.org/app/uploads/2022/12/Informe-del-Gerente-D.pdf>, accessed 28.6.2023.
- Fromm, I. (2023). Reducing Inequalities in the Coffee Value Chain: Threats and Opportunities for Small-Scale Farmers in Central America and East Africa. In P. J. Stanton & P. R. Caiazza (Eds.), *Agricultural Value Chains - Some Selected Issues*. IntechOpen. 10.5772/intechopen.110191.
- Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), 78–104. <https://doi.org/10.1080/09692290500049805>
- Grabs, J., & Ponte, S. (2019). The evolution of power in the global coffee value chain and production network. *Journal of Economic Geography*, 19(4), 803–828. <https://doi.org/10.1093/jeg/lbz008>
- Guimarães, E. R., dos Santos, A. C., Leme, P. H. M. V., da Azevedo, A., & S. (2020). Direct trade in the specialty coffee market: Contributions, limitations and new lines of research. *Revista Eletrônica de Negócios Internacionais: Internext*, 15(3), 34–62.
- Gutierrez Guzman, N., Lara Figuera, D. C., Castro, D. M., Yeretizian, C., de Castelberg, S., Jacobi, J., et al. (2019). *Análisis de Stakeholders y Mapeo de Cadenas de Valor del Café*. Neiva: en Colombia Universidad Surcolombiana.
- Hellin, J., & Meijer, M. (2006). Guidelines for value chain analysis. *Food and Agriculture Organization of the United Nations*. <https://www.fao.org/3/bq787e/bq787e.pdf>.
- Hernandez-Aguilera, J. N., Gómez, M. I., Rodewald, A. D., Rueda, X., Anunu, C., Bennett, R., et al. (2018). Quality as a Driver of Sustainable Agricultural Value Chains: The Case of the Relationship Coffee Model: Quality as a Driver of Sustainable

- Agricultural Value Chains: The Case of the Relationship Coffee Model. *Business Strategy and the Environment*, 27(2), 179–198. <https://doi.org/10.1002/bse.2009>
- Horton, D., Devaux, A., Thiele, G., Hareau, G., Ordinalo, M., López, G., Mayanja, S., and Bernet, T. (2020). Collective action for inclusive value-chain innovation: Implementation and results of the Participatory Market Chain Approach. Social Sciences Working Paper No. 2020-1. Lima, Peru: International Potato Center. <http://doi.org/10.4160/02568748CIPWP20201>.
- International Coffee Organization ICO. (2022). Historical Data on the Global Coffee Trade. Available at: http://www.ico.org/new_historical.asp?section=Statistics, accessed 22 June 2023.
- International Trade Centre ITC (2021). The Coffee Guide. ITC, Geneva. Available at: <https://intracen.org/file/itccoffee4threport20210930webpagespdf,a> accessed 19 June 2023.
- Jacobi, J. (2016). Agroforestry in Bolivia: Opportunities and challenges in the context of food security and food sovereignty. *Environmental Conservation*, 43(4), 307–316.
- Jacobi, J., Mathez-Stiefel, S.-L., Gambon, H., Rist, S., & Altieri, M. (2017). Whose Knowledge, Whose Development? Use and Role of Local and External Knowledge in Agroforestry Projects in Bolivia. *Environmental Management*, 59(3), 464–476. <https://doi.org/10.1007/s00267-016-0805-0>
- Jacobi, J., Lohse, L., & Milz, J. (2018). El cultivo agroecológico de la coca en sistemas agroforestales dinámicos en los Yungas de La Paz. Available at: *Acta Nova*, 8(4), 604–630 http://www.scielo.org.bo/scielo.php?script=sci_arttext&pid=S1683-07892018000200008&lng=es&nrm=iso.
- Jacobi, J., et al. (2023). Questionnaires. *Making specialty coffee and coffee-cherry value chains work for family farmers' livelihoods: A participatory action research approach*. Available at Zenodo. <https://doi.org/10.5281/zenodo.10198676>
- Jacobi, J., Toledo Vázquez, D. G., Solar Alvarez, J. M., & Bürgi Bonanomi, E. (2022). “First we eat and then we sell”: Participatory guarantee systems for alternative sustainability certification of Bolivian agri-food products. *Agroecology and Sustainable Food Systems*, 47(1), 72–99. <https://doi.org/10.1080/21683565.2022.2131692>
- Jezeer, R. E., Verweij, P. A., Santos, M. J., & Boot, R. G. A. (2017). Shaded Coffee and Cocoa – Double Dividend for Biodiversity and Small-scale Farmers. *Ecological Economics*, 140, 136–145. <https://doi.org/10.1016/j.ecolecon.2017.04.019>
- Jha, S., Bacon, C. M., Philpott, S. M., Rice, R. A., Méndez, V. E., & Läderach, P. (2011). A review of ecosystem services, farmer livelihoods, and value chains in shade coffee agroecosystems. *Integrating agriculture, conservation and ecotourism: examples from the field*, 141–208. https://doi.org/10.1007/978-94-007-1309-3_4
- Jiménez, M. J., Fernández Valdez, Y. C., Jacobi, J., Yeretzian, C. (2021a). Coffee cherry flavour. 17 recipes with sultana. Slow Food Bolivia, La Paz. Available at: https://digitalcollection.zhaw.ch/bitstream/11475/21771/3/2021_Jimenez-et-al_Sultana-Recipe-Book.pdf, accessed 20 July 2023. DOI: 10.21256/zhaw-21771.
- Jiménez, M. J., Fernández Valdez, Y. C., Jacobi, J., Yeretzian, C. (2021b). Sultana: good practices and other curiosities. Slow Food Bolivia, La Paz. Available at: <https://digitalcollection.zhaw.ch/handle/11475/21770>, accessed 20 July 2023. DOI: 10.21256/zhaw-21770.
- Kaplinsky, R., & Morris, M. (2000). *A handbook for value chain research* (Vol. 113). Brighton: University of Sussex, Institute of Development Studies.
- Koutouleas, A., Sarzynski, T., Bordeaux, M., Bosselmann, A. S., Campa, C., Etienne, H., et al. (2022). Shaded-coffee: A nature-based strategy for coffee production under climate change? A review. *Frontiers in Sustainable Food Systems*, 6, Article 877476.
- Le, Q. V., Cowal, S., Jovanovic, G., & Le, D.-T. (2021). A Study of Regenerative Farming Practices and Sustainable Coffee of Ethnic Minorities Farmers in the Central Highlands of Vietnam. *Frontiers in Sustainable Food Systems*, 5. <https://doi.org/10.3389/fsufs.2021.712733>
- Looftbourou, S. (2021). Specialty Coffee In Bolivia: The Growth of an Industry. *Roast Magazine*, 107. <https://www.roastmagazine.com/issues/107>.
- de Desarrollo, M., & Rural y Tierras MDRyT.. (2013). *Resultados del Censo Nacional del café 2011–2012*. Ministerio de Desarrollo Rural y Tierras de Bolivia.
- Méndez, V. E., Bacon, C. M., & Cohen, R. (2013). Agroecology as a Transdisciplinary, Participatory, and Action-Oriented Approach. *Agroecology and Sustainable Food Systems*, 37(1), 3–18. <https://doi.org/10.1080/10440046.2012.736926>
- Méndez, V. E., Caswell, M., Gliessman, S. R., & Cohen, R. (2017). *Integrating Agroecology and Participatory Action Research (PAR): Lessons from Central America*. *Sustainability*, 9(5).
- Moreaux, C., Meireles, D. A. L., Sonne, J., Badano, E. I., Classen, A., González-Chaves, A., et al. (2022). The value of biotic pollination and dense forest for fruit set of Arabica coffee: A global assessment. *Agriculture, Ecosystems & Environment*, 323, Article 107680. <https://doi.org/10.1016/j.agee.2021.107680>
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.
- Ostrom, E. (2011). Background of the Institutional Analysis and Development Framework. *The Policy Studies Journal*, 39(1), 7–27.
- Panhuyzen, S., & Pierrot, J. (2021). Coffee Barometer: 2020. Available at: <https://hivos.org/document/coffee-barometer-2020/>, accessed 19 June 2023.
- Perfecto, I., Hajian-Forooshani, Z., Iverson, A., Irizarry, A. D., Lugo-Perez, J., Medina, N., et al. (2019). Response of Coffee Farms to Hurricane Maria: Resistance and Resilience from an Extreme Climatic Event. *Scientific Reports*, 9(1), 15668. <https://doi.org/10.1038/s41598-019-51416-1>
- Perfecto, I., Vadnermeer, J., & Wright, A. (2009). *Nature's matrix: Linking agriculture, biodiversity conservation and food sovereignty*. Earthscan.
- Robledo Abad, C., Bieri, S., Eschen, R., Fuerst, S., Jacobi, J., Jiménez, E., et al. (2023). Promising practices for dealing with complexity in research for development. *GAI - Ecological Perspectives for Science and Society*, 32(1), 115–124. <https://doi.org/10.14512/gai.32.1.8>
- Rogers, K. H., Luton, R., Biggs, H., Biggs, R., & Oonsie, B., Blignaut, S., Choles, A. G., Palmer, C. G., & Tangwe, P. (2013). Fostering Complexity Thinking in Action Research for Change in Social-Ecological Systems. *Ecology and Society*, 18(2). <https://www.jstor.org/stable/26269310>.
- Rojas, M., Condori, V., Santa Maria, S., & Espinoza, J. G. (2017). *Determinación del incremento del volumen de producción y la estructura de ingresos, costos a nivel de la finca familiar para los rubros productivos priorizado en la ENDIC y el PAPS II en el Trópico de Cochabamba y Yungas de La Paz* (p. 95). La Paz: Fundación DECMA - NIRAS.
- Specialty Coffee Association SCA (2015). SCAA Protocols. Cupping Specialty Coffee. Available at: <https://www.scaa.org/PDF/resources/cupping-protocols.pdf>, accessed 19 June 2023.
- Specialty Coffee Association SCA (2023). SCA Coffee Value Assessment. Available at: <https://sca.coffee/value-assessment>, accessed 20 July 2023.
- Schuit, P., Moat, J., Gole, T. W., Challa, Z. K., Torz, J., Macatonia, S., et al. (2021). The potential for income improvement and biodiversity conservation via specialty coffee in Ethiopia. *PeerJ*, 9, e10621.
- Somporn, C., Kamtuo, A., Theerakulpisut, P., & Siriamornpun, S. (2012). Effect of shading on yield, sugar content, phenolic acids and antioxidant property of coffee beans (Coffea Arabica L. cv. Catimor) harvested from north-eastern Thailand. *Journal of the Science of Food and Agriculture*, 92(9), 1956–1963. <https://doi.org/10.1002/jsfa.5568>
- Soux, M. L. (2016). Apuntes para una historia del café en los Yungas paceños. *Historia - Revista de la Carrera de Historia UMSA*, 37, 43–74.
- The World Bank (2022). World Development Indicators. <https://datatopics.worldbank.org/world-development-indicators/>.
- Torrez, V., Benavides-Frias, C., Jacobi, J., & Speranza, C. I. (2023). Ecological quality as a coffee quality enhancer. A review. *Agronomy for Sustainable Development*, 43(1), 19. <https://doi.org/10.1007/s13593-023-00874-z>
- United Nations Development Programme UNDP (2017) Guidance Note. Application of the Sustainable Livelihoods Framework in Development Projects. United Nations Development Programme. Available at: file:///C:/Users/jjacobi/Downloads/UNDP_RBLAC_Livelihoods-Guidance-Note-EN-210July2017.pdf, accessed 28.6.2023.
- Urioste, S. (2018). Café Boliviano: Una taza con calidad de altura. Policy Brief, Swiss Network for International Studies and Center for Development and Environment, University of Bern.
- Urioste, S., Chasin, F., & Crespo, J. (2021). *When coffee met the Andes: A brief history of Bolivian Coffee* (p. 23). Issue: Standart.
- Vasquez, W. (2015). Seis de cada diez bolivianos consumen café con frecuencia. Available at: http://www.la-razon.com/index.php?url=/suplementos/financiero/bolivianos-consumen-cafe-frecuencia-financiero_0_2355364607.html, accessed 20 June 2018.
- Verburg, R., Rahn, E., Verweij, P., Van Kuijk, M., & Ghazoul, J. (2019). An innovation perspective to climate change adaptation in coffee systems. *Environmental Science & Policy*, 97, 16–24. <https://doi.org/10.1016/j.envsci.2019.03.017>
- Vogt, M. A. B. (2020). Developing stronger association between market value of coffee and functional biodiversity. *Journal of Environmental Management*, 269, Article 110777. <https://doi.org/10.1016/j.jenvman.2020.110777>
- Wakeford, T., & Rodríguez, J. S. (2018). *Participatory action research: Towards a more fruitful knowledge*.
- Ward, R., Gonthier, D., & Nicholls, C. (2017). Ecological resilience to coffee rust: Varietal adaptations of coffee farmers in Copán. *Honduras. Agroecology and Sustainable Food Systems*, 1–18. <https://doi.org/10.1080/21683565.2017.1345033>
- Wildisen, E. (2021). *Behind the taste. Assessing environmental justice of specialty coffee value chains in Bolivian and Swiss coffee markets*. Institute of Geography, University of Bern. Master thesis.