

Chapter 18

Blockchain for Social Impact: Enhancing Traceability and Economic Fairness in the Coffee Supply Chain

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ABSTRACT

As customer demand and regulations drive the coffee industry towards greater traceability and sustainability, coffee farmers in producing countries continue to face challenges in capturing the intangible value-added in their products. This chapter examines the implementation of blockchain technology to address economic and social challenges faced by producers in the coffee industry. The findings demonstrate that blockchain implementation holds promise in reducing information asymmetry in the supply chain, establishing stronger customer-farmer connections, and generating various economic and social benefits for coffee farmers. However, blockchain-enabled third-party verification remains relatively uncommon in current practice. Several challenges must be effectively addressed to realize the full potential of blockchain and foster a more transparent, equitable, and sustainable coffee supply chain.

1. INTRODUCTION

Coffee is the first thing many people reach for in the morning, providing a jolt of caffeine to help kick-start their day. The world drinks approximately 3 billion cups of coffee every day (International Trade Centre [ITC], 2021, p.xxii), making it the most consumed hot drink globally (Food and Agriculture Organization of the United Nations [FAO], 2023). The coffee market is expected to grow annually by 4.47%, reaching global revenues of \$540.8 billion by 2025 (Statista, 2023). The worldwide coffee demand has been steadily increasing since the 2000s, due in part to the increasing consumption in emerging economies and the increasing demand for specialty coffee in developed countries (FAO, 2023).

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However, as we enjoy coffee's invigorating aroma and taste, we rarely think about how the coffee beans come from farms to our cups. Behind the aromatic beverage, there are 25 million farmers and families whose lives depend on this plant (International Coffee Organization [ICO], 2019), with smallholder farmers accounting for 95% of the coffee-producing population (Voorra et al., 2022, p.2). The escalating costs of coffee production also cast severe social and economic consequences on local coffee producers (Fiocco et al., 2023). Among the smallholder farmers worldwide, at least 5.5 million farmers live below the international poverty line of \$3.20 a day (ITC, 2021, p.3).

The coffee industry has been moving towards sustainability, differentiation, and traceability, and customers are willing to pay more for specialty coffee, but the benefits from the expansion of the coffee industry are not trickling down to the poorest coffee producers (Daviron & Ponte, 2005). The industry has been facing the Coffee Paradox (Daviron & Ponte, 2005), and there has been an asymmetric income distribution among stakeholders along the coffee supply chain. Coffee roasters in the consuming countries that are closer to the final customers capture the highest margin as they concentrate on marketing and branding, benefitting from the intangible and symbolic quality attributes of the coffee (Daviron & Ponte, 2005; ITC, 2021; Lewin et al., 2004). Higher margins have been created along the entire coffee supply chain, but not on an equal basis. Value in the coffee supply chain is disproportionately concentrated in developed countries' marketing stage. According to Miatton and Amado (2020, p.3), in the Colombian coffee supply chain, coffee producers represent the largest segment, but they receive the lowest profit margin (See **Table 1**).

Table 1. Share of population and captured value of stakeholders in the Colombian coffee supply chain

Stakeholders in the value chain	Share of captured value	Share of value chain population
Producers	5%	89%
Mills/Processors	2%	5%
Exporters	9%	1%
Transporters/Shippers	7%	1%
Importers	32%	1%
Roasters	45%	3%

The Fairtrade movements, which started to gain popularity in the late 1980s, are meant to address this power inequality by guaranteeing a minimum income for coffee farmers, but the initiatives face several challenges. The biggest problem of the Fairtrade certification is the lack of power control of FairTrade International and TransFair USA over maintaining the integrity of Fairtrade principles as profit-oriented corporations increasingly acquire the Fairtrade label for their products (Jaffee, 2014). The lack of transparency further hinders public verification of Fairtrade information and the possibility to hold institutions accountable. Jaffee (2014) identified this problem as "the danger of reducing the qualifications of products to simple signs" (p.216). Addressing these externalities, as suggested by Weber et al. (2020), is crucial to enhancing the sustainability of the coffee supply chain.

To solve the Coffee Paradox and the information asymmetry inherent in the coffee supply chain, Daviron and Ponte (2005) asserted that it is essential to promote consumer knowledge of the coffee and the places of production, rather than brand recognition by itself, while increasing transparency and

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