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The Sustainable Transformation of a Specialty Coffee Supply Chain in Jamaica

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ABSTRACT

The specialty coffee industry has shown steady growth over the past two decades. With the emergence of new consumption patterns, specialty coffee markets have continued to expand with the incorporation of sustainably sourced coffee within their standards. This paper focuses on the specialty coffee supply chain of the Jamaica Blue Mountain green coffee, where concerns have arisen regarding the 1) socio-economic issues of its farmers, 2) inconsistent production levels and 3) the ability of the regional environment to continue supporting coffee production. As the supply chain tries to shift to more sustainable modes of production to address these concerns, it becomes imperative to identify the factors that may facilitate and prohibit these changes in the system; and to understand the relationship between said factors and the structures in which they are embedded. This study shows that the drivers of the sustainability transformation include the private interests of actors within the supply chain, technical services provided by government agencies and initiatives by non-governmental organisations. However, change may be inhibited by information regarding sustainability being asymmetrically distributed among supply chain actors, the absence of an explicit directionality of sustainability goals for the local coffee industry, and limited financial resources among smallholder coffee farmers, along with weak physical infrastructure.

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INTRODUCTION

The global coffee supply chain consists of a network of producers, retailers, distributors, and service providers in various countries. Within these networks are processes that involve harvesting coffee cherries in coffee-producing countries and exporting processed green coffee beans to non-producing countries where they are transformed into a final form for consumption as a brew in a cup or can (Gereffi & Korzeniewicz, 1994; ICO, 2020; Pelupessy, 2007). The two main coffee species, Robusta coffee (*Coffea Canephora*) and Arabica coffee (*Coffea Arabica*) are traded

globally within two major markets, the specialty and commodity market. Specialty coffee became differentiated from those in the commodity market by representing those coffee beans of the highest grade (including high-quality blends) of limited availability; with a distinct flavour; of a single origin; and with increasing significance, sustainably produced (International Trade Centre, 2011; Lewin et al., 2004; Pelupessy, 2007; Raveendran & Murthy, 2021).

According to Linton (2008), the specialty coffee industry created a niche for sustainability to satisfy the environmental, economic, and social interests of its powerful stakeholders. Thus, several initiatives have emerged intending to address the sustainability concerns related to the coffee sector. The focal point

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has been assembling a system for the implementation, administration, and monitoring of social and environmental standards throughout the product supply chain, particularly at the production level (Krishnan, 2017). These private standards, certifications, and labelling have become increasingly important to communicate to consumers claims of quality as well as social and environmental conditions of production (Jaffee, 2012). While some scholars have acknowledged the socio-economic benefits these standards offer to actors in the supply chain (Tellman et al., 2011; Kangile et al., 2021), other scholars highlight how “the idea of sustainability has been reduced to a set of standards and certifications for managing reputation, quality and supply chain risk” (Levy et al., 2016). This reduction is characterised by numerous limitations which include token participation, co-optation, and dilution by large economic interests whose behaviour they were designed to restrain.

Regardless, the specialty coffee market has become increasingly important due to its steady growth rate and its projected potential that activists and consumers envision will address harmful environmental practices and provide better socio-economic benefits to farmers (Linton, 2008). Accordingly, as the specialty coffee industry confronts the deficiencies of the conventional modes of production within coffee supply chains, it requires a transformation towards sustainability or debatably the appearance of such, of these systems using the niche market of sustainable coffee. This need for a transformation towards sustainability exists in a larger sphere of global sustainability discourse, where interest lies in moving forward from describing problems of rising global temperatures; diminishing biodiversity; increasing financial inequality; and reduced human well-being; to determining how to solve these challenges and identifying the most suitable pathways of sustainable development and societal change (Rosenberg, 2022; Patterson et al., 2017). Against this background, the objective of this paper is to use aspects from the sustainability transformation field to assess the factors that enable or hinder the progression of the JBM coffee supply chain towards more sustainable modes of production. This investigation is approached through the analytical lens of the political economy of food systems.

This paper learns from Patterson et al. (2017) in defining sustainability transformations as “fundamental changes in structural, functional, relational, and cognitive aspects of socio-technical-ecological systems that lead to new patterns of interactions and outcomes”. An additional perspective purported by Weber et al. (2020) explained that transformations towards sustainability involve fundamental changes in the personal, physical, and political spheres of human interactions with the environment. For coffee production systems, numerous studies have been conducted dissecting the elements necessary to facilitate these changes. Some case studies have found that at the niche level, the beliefs, attitudes, awareness and/or values shared by actors in the coffee production system are critical to transforming practices and relations among the system’s actors that facilitate more sustainable modes of production (Akenroye et al., 2022; Hager et al., 2021; Nguyen & Drakou, 2021; Rosenberg, 2022). Scholars such as Sott et al. (2020) and Kangile et al. (2021) observed that among coffee farmers, transitioning to more sustainable agricultural practices requires the successful adoption of new behaviours, technologies, and institutional reforms. As Feola et al.

(2015) explained, “farmers are the agents undertaking adaptation and sustainability policies and programs, so their behaviour influences how and with what success these programs are realized on the ground”. At the regime level, Valbuena et al. (2021) & Tellman et al. (2011) observed in specific Latin American countries, that changes in system-level dynamics, state-based policies and politics can directly affect the pathways and advancement of transformations towards sustainability at the niche level in coffee production systems. These studies present evidence that transformations may be led by technology, the market, the state and/or citizens. Schmitz and Scoones (2015) argued that this observation serves as a guide to uncovering key drivers of change and the circumstances under which sustainability transformations may happen while focusing on the actors within the system, their interests, and associated networks.

This paper rests on the premise that the Jamaica Blue Mountain (JBM) green coffee supply chain is currently undergoing a transformation, one that involves a shift from a reliance on conventional practices and patterns associated with coffee production to the incorporation of sustainable modes of production. The JBM supply chain has produced green coffee beans that have profited immensely from the differentiated markets for specialty coffee. The coffee is grown in a specific geographic microclimate on a mountain range located in the eastern section of the island of Jamaica. The coffee is a typica arabica variety that grows on the steep terrains of the mountain between elevations of 550 m up to 1600 m (Mighty, 2015). Ninety-three per cent of the coffee produced in Jamaica is done in this region. It is one of the largest sources of the island’s agricultural foreign exchange, earning US\$16.5 million for 668,965 kg of green beans exported in its 2012/2013 crop year (CIB, 2014); and contributes to the livelihoods of approximately 5000 coffee farmers and their families. The coffee earns one of the highest unit prices for its exports among arabica coffee globally. In 2018, the average global export price for arabica coffee was US\$2.93/kg, yet importers paid US\$25.7/kg for JBM coffee. It is produced in small volumes, contributing only 0.01% to the international supply, with 70% being sold to Japan. This Japan-Jamaica trading relationship of the JBM coffee commenced during the mid-1970s. However, it was not until the mid-1990s that an average of approximately 589,670 kg of coffee started steadily being exported to the Japanese Market. The Japanese importing firms developed the Blue Mountain name within their market and established it as a luxury product (Schroeder, 2009). The limited availability of this single-origin coffee, its unique flavour and strict quality regulations eventually positioned the JBM coffee among the best within the specialty coffee market.

Despite decades of success of the JBM beans in the specialty market, current research conducted by Birthwright (2017), Guido et al. (2018), Guido et al. (2020), Mighty (2015), Mighty (2016) & Rhiney et al. (2020) have provided evidence indicating socio-economic, climatic, and political factors threatening the competitive advantage the coffee holds in the specialty coffee market. Sustainability concerns included the earnings instability of the coffee farmers due to high production costs and fluctuating farmgate prices of their coffee cherries (Mighty 2016; Guido et al., 2020). There are issues of environmental conservation on the coffee farms, as well as concerns around climatic change causing a rise in temperatures which have facilitated an increase in drought periods, as well as outbreaks of pests and diseases, the most dominant being

the coffee berry borer (*Hypothenemus hampei*) and the coffee leaf rust disease (*Hemileia vastatrix*). These conditions are further exacerbated by the long-term impact of other natural disasters such as hurricanes and tropical storms on farming operations (Birthwright, 2017; Guido et al., 2018; Guido et al., 2020; Rhiney et al., 2020). Also critical is the social responsibility of actors in the local coffee industry (Daviron & Ponte, 2005); where there exist deficiencies in the state agency channels used for dissemination of information related to climate change, new agricultural practices and patterns among all actors in the production system (Guido et al., 2018).

MATERIALS AND METHODS

Data Collection

This study is based primarily on data collected from 28 stakeholders in the JBM supply chain, from February – May 2022. The participants were chosen using both purposive and snowball sampling techniques. Semi-structured interviews were conducted, supplemented by secondary data retrieved from the Jamaica Agricultural Commodities Regulatory Authority (JACRA) (an agency under the country's Ministry of Agriculture and Fisheries) and existing academic research previously conducted in the JBM region. Three interview guides were designed to collect data from the coffee farmers, non-governmental participants in the supply chain, and local government officials. For government officials, additional questions to the guided interview questions were formulated and sent via email to clarify answers that were initially provided. All the coffee farmers interviewed were asked to anonymously complete a questionnaire which also collected basic demographic data. There were 24 semi-structured interviews and one focus group interview conducted. To supplement in-person data collections, telephone calls and online meetings were held to talk to participants who were unable to meet face to face due to the COVID-19 pandemic and time limitations.

Data Analysis

The data were analysed firstly by grouping the respondents by the interview guide used for their semi-structured interviews. After which similarities were identified among the responses of the participants based on each question, as well as making notes of outliers. Common themes were identified and categorised to then represent the drivers and inhibitors of the sustainability transformation.

RESULTS AND DISCUSSION

Demographic characteristics of the sample

The participants of the study included two coffee processors involved in the processing and export of green coffee; two government agencies, one that possesses regulatory authority in the coffee industry and another that assists in the provision of extension services; a representative from a local fertiliser company; two local NGOs involved in the coffee industry; one coffee estate and 20 coffee farmers. Of the 20 farmers interviewed, 16 of them were males, while the remaining four were females. Seven of the farmers

were within the age range of 65 and over, six were within the 55-64 age range, four in the 45-54 age range and three in the 35-44 age range. Regarding education, nine of the farmers did not go beyond a secondary level education, four did not pass the all-age level (an intermediate level between primary and secondary), four completed only primary education and three went to the tertiary level.

Drivers of the Sustainability Transformation

Schilling et al. (2018) proposed the resilience of sustainability transitions (RST) as a theoretical concept to aid the understanding of factors that would affect the success of sustainability transitions. This concept integrates resilience and transition thinking, identifying progress, stability, and adaptability as key dimensions to comprehend the dynamics of the sustainability transition. They posited that one of the fundamental components of progress within the sustainability transformation of a system is the drivers of the transition. For this discussion, drivers refer to those factors that enable the progression of the transformation of the supply chain towards more sustainable modes of production. One observation made from the analysis of the data was that sustainability held different meanings to different actors within the supply chain. This was further exhibited in how they chose to implement practices and methods they deemed to be sustainable. According to their private interests, three participants made economic investments in the use of sustainability certification schemes to signify their efforts towards transforming their operations in the system to be more sustainable. The coffee estate acknowledged that in accordance with their company's procurement policy they selected the Rainforest Alliance certification, which has improved the efficiency of their farm management and their ability to grasp their CO₂ emissions. The coffee processor explained that the Starbucks Coffee and Farmer Equity practices program was used as their company sells coffee to the local Starbucks stores, while an organic farmer expressed an objection to interrupting the natural processes of the environment with the use of chemical fertilisers. And instead, indicated an investment in shifting away from the conventional pattern of the local industry in using drums of chemicals in the coffee growing process, to creating and using organic fertilisers, compost, and pesticides. In another observation, it was found that the technical services provided by government agencies under the country's Ministry of Agriculture and Fisheries are critical to the communication of information to the actors within the production system. Coffee farmers interviewed explained that one major channel through which they acquired their knowledge of shading the coffee plants was the training workshops with these agencies, namely JACRA and the Rural Agricultural Development Authority. Though restricted by "reduced extension services and insufficient financial resources for sustainable coffee cultivation research" as posited by Willis & Johnson (2020), these services are still imperative to the current knowledge transfer of sustainable agricultural practices to actors in the production system.

At the niche level, this study also identified the initiatives of local NGOs that enable the sustainable transformation of the JBM coffee supply chain. The national association of coffee growers, along with a small farmers' group were NGOs engaged in improving the economic viability of coffee farmers by diversifying their economic activities in the coffee value chain. This entails

offering opportunities beyond simply growing and selling coffee cherries to exporting their own processed coffee beans. For coffee farmers to be able to export their coffee, they would have to secure a coffee dealer's licence which required a production capacity of at least 6000 boxes of coffee cherries per crop year. Smallholder coffee farmers were unable to meet this prerequisite as individuals, as the average smallholder farmer produces 20-30 boxes of coffee cherries per 0.4 hectares. Thus, by organising through the association they were granted the licence as a collective, this allowed the association to distribute sub-licences to small farmers for them to export their coffee. Another NGO identified was the local chapter of an international women's coffee community. They prioritise training women coffee farmers in the Blue Mountains in areas of soil and environmental management, pest and disease management, and good agricultural practices in harvesting and post-harvesting activities.

Inhibitors of the Sustainability Transformation

Schilling et al. (2018) further discussed that another crucial component to the progress within the sustainable transformation of a system was resistance, which may negatively affect the progress of the transition by slowing it down or preventing it. Thus, the inhibitors of the sustainability transformation could be categorised as factors hindering the transformation of the supply chain to more sustainable modes of production. In the analysis of the responses provided regarding the definition of sustainability, the coffee farmers were the participants with the slowest rate of adoption regarding awareness of what sustainability is and how it applies to their livelihood needs. This was based on the specific responses which stated they had either never heard of the term and its relation to coffee farming, or they have heard it before but acknowledged that they do not understand it. It was inferred from this observation that sustainability information was asymmetrically distributed among actors in the production system thereby posing as a hindrance to the system's sustainability transformation. Concisely, some coffee farmers were not in a position where they were equally informed on sustainability as the other actors in the production system. As previously stated, a major channel by which information is relayed to farmers was through the extension services provided by government agencies. However, JACRA currently provides only three extension officers to serve roughly 5000 coffee farmers in the Blue Mountains. This can be further corroborated by the research conducted by Guido et al. (2018) who found that the JBM coffee farmers' access to existing information on weather and climate activities was limited due to underdeveloped dissemination channels. This included the extension services of the coffee board which were restricted by human and financial resources. They also highlighted the need for capacity building for farmers, many of whom were unable to pass the secondary level of education, a phenomenon which was also represented in the education level data of this study's sample of coffee farmers. As a second inhibitor, it was found that there was an absence of an explicit directionality of sustainability goals for the coffee industry. Currently, there are no direct laws or policies mandating the use of sustainable practices among all stakeholders within the coffee industry. The operations of the Jamaican coffee board are legislated under the 2017 JACRA Act, for the development, regulation, promotion, and standardisation of the

agricultural commodities industry, which includes coffee. Still, there is no proposed direction detailed within this act toward the sustainable transformation of the coffee industry. Furthermore, I refer to a report conducted by Shik et al. (2017) which described that the Jamaican coffee sector prioritised policies related to input distribution and extension services. Although there exist the Environmental Codes of Practice for the coffee industry, published in 2001; this document has yet to be updated based on new knowledge or initiatives implemented by the coffee industry board over the years that would incorporate new sustainable practices to communicate to stakeholders in the production system.

In addition to these hindrances, limited financial resources of smallholder coffee farmers and weak physical infrastructure to support farming operations were factors found to be impeding the progression of the supply chain's transformation towards sustainability. These factors compromise the economic viability of the actors who represent the majority in the supply chain. The Blue Mountain coffee production system comprises 78% of smallholder coffee farmers who occupy farmlands that are less than three hectares. Their coffee cherries are sold to local processors in 27.6 kg boxes that generate four kilograms of green beans. Smallholder farmers interviewed reported earning an income of as low as US\$20/J\$3,000 per box of coffee cherries in the past, in comparison to their current earnings of US\$52/J\$8,000 for the ongoing crop year, which they explained is still insufficient in covering their production costs. They explained that this situation has caused several farmers to leave the industry. In 2015, there were approximately 7000 farmers in the Blue Mountain region (CIB, 2015), currently, that number has decreased to roughly 5000.

One of the major inputs to the farming operations of farmers is chemical fertilisers. According to the major supplier of fertilisers to the local coffee farmers, their raw materials are paid for in United States dollars. As the Jamaican dollar continues to devalue against this currency, their increase in operating cost will cause the price of fertiliser to rise (regardless of the added burden of increasing trends in fertiliser costs). One farmer indicated paying US\$33/J\$5000 per a 50 kg bag of fertiliser in 2021, as opposed to the current price indicated by farmers at US\$79/J\$12,000 per 50 kg. On average these farmers fertilise their farms three times per year for three years until the coffee-bearing period. In the analysis of the data provided by all smallholder coffee farmers interviewed, their earnings for one harvesting period per 0.4 hectares of land is approximately US\$1,060/J\$160,000, while their production costs per year may amount to US\$1,132/J\$171,000 at minimum. Excluded from those costs are other chemical inputs such as fungicides and leaf sprays that farmers also invest in, as they have been plagued by the coffee leaf rust disease and the coffee berry borer. In response to their small profits and limited productivity, some farmers have explained that to supplement the income they gain from the coffee cherries, they intercrop other cash crops such as pumpkins, callaloo, corn, bok choy, lemons, and sweet peppers among others, to sell at the open-air markets. The productivity of these coffee farmers is severely hampered by the size and location of their farms. Their small-sized farms positioned on the steep terrains of the mountain range prevent these farmers from using heavy machinery, forcing them to rely on simple hand tools, the most technical ones being the power saw, the weed whacker, and the mist blower. Consider also that some of these farms are in deep rural areas that lack proper roadways. Some depend on dirt tracks using donkeys to assist in

the transportation of their coffee cherries. Farmers explained that this affects the transportation of coffee cherries to the depots where they are to be sold. This situation is further exacerbated by constant rainfall, inducing land slippage and landslides that block roadways, adding to the challenges that farmers must contend with regarding existing physical infrastructure (Guido et al., 2018).

Amidst these constraints in resources and physical infrastructure, some of these farmers do not possess ownership of

CONCLUSIONS

The metamorphosis of the Jamaica Blue Mountain green coffee supply chain towards more sustainable modes of production has been triggered by interrelated socio-economic, climatic, and political concerns in its production system. It is assumed that a clear directionality of sustainability goals effectively communicated to and adopted by stakeholders in the local coffee industry may aid in the progression of the system's transformation. The resistance to such a transition may have various unknown outcomes, evident, however, is that inaction to the concerns of the production system will disproportionately affect the livelihoods of smallholder coffee farmers more than any other actor in the study.

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- the land on which they farm. One participant explained that several coffee farmers are squatting on government lands, they have no titles and can be removed at any point in time. The smallholder's fate is connected to these various factors creating what policy scholars refer to as a wicked problem, and it is further compounded by endogenous and exogenous shocks that frequent the JBM coffee production system (Birthwright, 2017; Guido et al., 2020).
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