

The Effect of Environmental Sustainability and Value Chain Concept in the Context of Local Economy on Value Added of Coffee Commodities in Kerinci

Heppi Syofya

Sekolah Tinggi Ilmu Ekonomi Sakti Alam Kerinci

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ABSTRACT

This study examines the relationship between environmental sustainability, the value chain concept, and local economic development in the context of value-added commodity coffee in Kerinci, Indonesia. The research adopts a mixed-methods approach, incorporating qualitative interviews with key stakeholders and quantitative surveys of coffee producers and consumers. The findings reveal that coffee producers in Kerinci have increasingly embraced sustainable practices, such as shade-grown coffee, organic farming, water conservation, and reforestation efforts. These sustainable practices contribute to environmental preservation and enhance the value chain dynamics, leading to improved market access and increased value addition for coffee producers. Moreover, the study identifies a positive correlation between sustainable practices, value chain integration, and local economic indicators, indicating that sustainable coffee production promotes local economic development in Kerinci. The study recommends strengthening support mechanisms, promoting market access and value addition, fostering collaboration and knowledge exchange, and enhancing policy and institutional support to further enhance the environmental sustainability and economic competitiveness of the coffee industry in Kerinci.

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Corresponding Author:

Name: Heppi Syofya

Institution Address: Sekolah Tinggi Ilmu Ekonomi Sakti Alam Kerinci; Sekolah Tinggi Ilmu Ekonomi Sakti Alam Kerinci

e-mail: heppisyofya@gmail.com

1. INTRODUCTION

Global demand for sustainable, high-quality coffee has been steadily increasing in recent years. As consumers become more aware of the environmental and social impacts of their choices, there is a growing emphasis on producing coffee in a way that promotes environmental sustainability while generating economic benefits for local communities. Improving local economies can

be achieved through various means, such as infrastructure development, tourism, and sustainable agriculture. A study conducted in South Wales analyzed the socioeconomic impacts of the A465 Heads of the Valleys road upgrade project. The study estimated the direct, indirect, and induced economic benefits derived from spending on the road upgrade, which included output, gross value added (GVA), and employment supported by

full-time jobs (FTEs) in Wales [1]. Another study examined the impact of Morocco's integration in Global Value Chains (GVCs) on economic growth. The study found that Morocco's current form of integration in GVCs has only limited effects on economic growth in the long term, and that moving upwards in GVCs and finding new, more complex sectors is necessary for Morocco's territorial development [2].

A study conducted in Brazil explored the impact of the Brazilian Tourism Regionalization Program on local economies. The study found that the program had significant effects on tourist cities, including an increase in value-added services and GDP per capita. In addition, the study found that value added in industrial activities increased, implying a spillover effect from improved local tourism conditions to other economic activities [3]. A study conducted in China examined the impact of clean energy development on the green economy. The study found that clean energy has a significant promotion effect on the improvement of the green economy, and that per capita clean energy power generation, local financial general budget expenditure, and tertiary industry value-added index all show a positive promotion effect on the development of the green economy [4]. A study conducted in Shunping County, Hebei Province, China analyzed the impact of the implementation of the project of returning cultivated land to forest on the local land use structure, three industrial value-added, and farmers' per capita income. The study found that the return of cultivated land has played a certain positive role in local economic development and the improvement of people's living level. However, there are also some shortcomings, such as farmers relying heavily on subsidies and the compensation mechanism for returning cultivated land is not well considered [5]. A study conducted in Basilicata, Italy addressed typical elements of fisheries, aquaculture regional policies and Lucan processes along the coastal area. The study highlighted opportunities for local communities to address territorial challenges,

incorporating European structural and investment funds (ESIF) to address issues such as value addition for local seafood and aquaculture products, for improved integrated management of coastal areas, support for fishing communities, and fish farmers and producers to become local drivers and beneficiaries of the blue economy [6].

A study conducted in Kumpai Batu Atas Village, South Arut Sub-district, West Kotawaringin Regency, Indonesia, examined the benefits of KBA's liberica coffee development. The study found that local economic development through the concept of a tourist village based on agricultural commodities is a manifestation of a sustainable economy, which not only creates business opportunities based on agricultural product development but is also related to community empowerment and sustainability so that it is ready to compete in the global market [7]. Overall, improving the local economy requires a comprehensive approach that considers various factors, such as infrastructure, tourism, agriculture and sustainability.

Environmental sustainability and the value chain concept are two important aspects that can contribute to the improvement of the local economy. The value chain concept refers to the series of activities that a product or service goes through from conception to delivery to the end customer. On the other hand, environmental sustainability refers to the responsible use of natural resources to meet current needs without compromising the ability of future generations to meet their own needs. Several studies have explored the impact of these concepts on local economies. For example, a study conducted in Pakistan examined the impact of government support and entrepreneurs' knowledge on the development of small-medium scale forestry enterprises and their contribution to local economic development in the region. The study found that government support and entrepreneur knowledge can enhance the growth of small-medium scale forestry

enterprises and contribute to local economic development [8].

Another study examined the impact of community energy as a strategy for energy inclusion and participation in industrial, socioeconomic and human development in developing countries, particularly in sub-Saharan Africa. The study found that community energy promotes socio-economic transformation, as it places citizens and communities as key actors in the entire energy value chain, based on the principle of local and autonomous energy generation by and for communities [9]. Furthermore, a study conducted in Indonesia examined the scarcity of palm oil as a CPO food commodity and the government's conservative measures through green resolution policies and strengthening local value chains. The study found that the validated indicators of green economic resolution variables in this study are green financing and local value chains in CPO exports measured by product price and production value. The results showed that the long-term correlation between green financing resolution, product price, and production value significantly affected the level of CPO exports [10].

Overall, these studies show that environmental sustainability and the value chain concept can contribute to the improvement of the local economy. By implementing sustainable practices and strengthening local value chains, communities can create jobs, encourage private investment, ensure local energy autonomy and independence, reduce energy costs, and foster collaborative social transformation that leads to a successful economic transition.

Kerinci, Indonesia is known for its coffee production. The coffee industry has the potential to contribute to the local economy, but it is important to consider environmental sustainability and the value chain concept to ensure long-term success. One study analyzed the value-added of coffee processing in Indonesia and found that the data used in the study was secondary data derived from previous studies by collecting several journals

used as references in conducting the research. The literature study method used data collection tools to uncover various theories [11]. Another study explored the potential integration of Sustainable Consumption and Production Practices (SCPs) across the coffee production chain in Kenya. The study presents SCPs that emerged from a series of focus group discussions, stakeholder consultations, and surveys, which would minimize environmental impacts and maximize worker productivity and well-being. The study also summarizes the capacity-building measures and financial support needed to implement SCPs at scale. Adopting the recommended solutions can improve Kenya's coffee industry and put the sector on a path to greater environmental sustainability [12]. To sustain land resources and increase farmers' income, a study suggested the use of patchouli and coffee in cinnamon plantations as intercrops. The study found that the use of patchouli and coffee in cinnamon farmers' plantations as intercrops is expected to be more sustainable not only environmentally but also socially and economically [13].

In addition, a new organizational model, "Coffee agroforestry business-based cluster" (CaFC), aims to preserve the ecosystem while offering equitable income to producers. Based on a local micro-value chain dedicated to the sustainable production of high-quality Arabica coffee under an agroforestry system, the CaFC model stands out by addressing issues around plantation renovation, an important process that requires considerable investment from producers. The CaFC model consistently outperforms other scenarios, offering a high-quality premium coupled with increased capacity and access to highly productive varieties [14]. Overall, it is important to consider sustainable practices and value chain concepts in the coffee industry to ensure long-term success and contribute to the local economy.

The coffee industry in Kerinci, Indonesia faces several challenges in implementing sustainable practices in the

value chain. These challenges are related to environmental sustainability and the value chain concept. Study [11], [12], [15] revealed the main challenge is the lack of awareness and knowledge of sustainable practices among coffee farmers and other stakeholders in the value chain in Kenya. This can lead to unsustainable agricultural practices, such as the use of harmful pesticides and fertilizers, which can negatively impact the environment and human health. Another challenge is the lack of access to resources and technology needed to implement sustainable practices. For example, many small-scale coffee farmers in Kerinci may not have access to the latest farming techniques or equipment needed to reduce environmental impacts. In addition, the coffee value chain in Kerinci is very complex and involves many different actors, including farmers, processors, exporters, and retailers. This complexity can make it difficult to implement sustainable practices across the value chain, as each actor has different priorities and incentives. Finally, there may be economic challenges associated with implementing sustainable practices in the coffee value chain. For example, sustainable agricultural practices may require additional investment in equipment or training, which can be costly for small-scale farmers. In addition, there may be a lack of demand for sustainably produced coffee, which can make it difficult for farmers to receive premium prices for their products.

Coffee production in Kerinci plays an important role in the regional economy, providing employment and income opportunities for many local farmers and contributing to the national export market. However, conventional practices used in coffee production often lead to negative environmental impacts, such as deforestation, water pollution and soil degradation. Recognizing the need for sustainable development, stakeholders in the coffee industry are increasingly interested in adopting environmentally friendly practices that not only conserve natural resources, but also enhance the economic viability of the sector.

This study aims to investigate the potential of environmental sustainability and value chain concepts to contribute to local economic development and value addition in the coffee production sector in Kerinci. By examining the interactions between sustainable practices, value chain dynamics and local economic outcomes, this study seeks to provide insights into how Kerinci can position itself as a sustainable coffee producer and improve its competitiveness in the global market.

2. LITERATURE REVIEW

2.1 The Concept of Environmental Sustainability and its Relevance to Agriculture and Coffee Production

Environmental sustainability refers to the responsible use and conservation of natural resources to meet the needs of the present without compromising the ability of future generations to meet their own needs [16], [17]. In the context of coffee farming and production, environmental sustainability includes practices that minimize negative impacts on ecosystems, promote biodiversity, conserve water resources, reduce greenhouse gas emissions, and protect soil health [18]. Adopting sustainable practices in coffee production can contribute to long-term environmental preservation, climate change mitigation, and the overall resilience of coffee-producing regions [19], [20].

2.2 The Value Chain Concept and its Application in the Coffee Industry

The value chain concept focuses on the activities and processes that add value to a product or service as it moves from production to consumption. In the coffee industry, the value chain covers various stages, including cultivation, harvesting, processing, roasting, packaging, distribution, and retailing [21], [22]. Understanding value chain dynamics is critical to identifying opportunities to improve product quality, differentiate products, capture higher value, and improve market access. By analyzing and optimizing each stage of the value chain, stakeholders can improve efficiency, reduce

costs, and create a sustainable competitive advantage [12], [23].

2.3 The Role of Environmental Sustainability and Value Chains in Local Economic Development

The integration of environmental sustainability principles into the value chain can provide significant benefits to local economic development. Sustainable practices in coffee production can enhance the reputation and marketability of coffee products, attract environmentally conscious consumers, and command a premium price. In addition, sustainable production methods can contribute to increased productivity, efficiency, and long-term profitability [24], [25]. This, in turn, can create jobs, improve income distribution, and stimulate economic growth in coffee-producing regions. By strengthening the links between various actors in the value chain, such as farmers, processors, exporters, and retailers, local economies can experience multiplier effects and promote equitable development [26], [27].

2.4 Previous Studies on Environmental Sustainability and Value Chains in Coffee Production

A number of studies have explored the relationship between environmental sustainability, value chains, and coffee production. Some studies have focused on specific sustainability practices, such as organic farming, shade-grown coffee, agroforestry systems, and water conservation techniques, highlighting their positive impacts on biodiversity conservation, soil fertility, and carbon sequestration [28], [29]. Other studies have investigated value chain dynamics in different coffee-growing regions, examining how value addition, market integration, and certification schemes can contribute to economic growth and sustainability [17], [19], [30]. However, there remains a need for context-appropriate research that explores the unique challenges and opportunities faced by coffee producers in Kerinci, Indonesia.

3. METHODS

This study used a mixed-methods research approach, combining qualitative and quantitative data collection and analysis techniques. The qualitative approach enabled in-depth exploration of the experiences, perceptions, and motivations of key stakeholders involved in the coffee value chain in Kerinci. The quantitative approach provided statistical data on the adoption of sustainable practices, economic indicators, and consumer preferences related to value-added coffee commodities. A purposive sampling strategy was used to select participants with relevant knowledge and experience in the coffee industry in Kerinci. The sample included coffee producers, processors, exporters, local government officials, and representatives from NGOs working in sustainable agriculture. Selection criteria prioritized individuals who have been actively engaged in sustainable practices or have significant involvement in value chain activities.

Data Collection Methods

Semi-structured interviews were conducted with key stakeholders to obtain qualitative data. The interviews were designed to explore their perspectives on environmental sustainability practices, value chain dynamics, local economic development, and challenges faced in the coffee industry. Interviews were recorded with participants' consent and transcribed for further analysis. Surveys were administered to 90 coffee producers and 150 consumers in Kerinci to collect quantitative data. The survey questionnaire for coffee producers focused on their adoption of sustainable practices, perceived benefits, barriers, and involvement in the value chain.

Secondary data sources will be examined to gather information on trade statistics, coffee production volumes, environmental reports, and existing initiatives related to environmental sustainability and the coffee value chain in Kerinci. These sources will provide valuable context and support the primary data analysis.

Qualitative data collected from interviews will be analyzed using thematic analysis. Quantitative data collected from the survey will be analyzed with the help of SPSS software as proposed [31].

4. RESULTS AND DISCUSSION

4.1 Qualitative Results

4.1.1 Perceptions of Sustainable Practices among Coffee Producers

Qualitative analysis of interviews with coffee producers in Kerinci provided valuable insights into their perceptions of sustainable practices. The producers expressed a growing awareness of the environmental impacts of coffee production and the need to adopt sustainable practices. They highlighted the importance of shade-grown coffee in conserving biodiversity, improving soil health, and mitigating climate change. Producers also recognized the benefits of organic farming, such as reducing chemical inputs and improving coffee bean quality. Water conservation practices were recognized as important for managing water resources sustainably, especially in the face of changing climate conditions. In addition, producers emphasized the importance of reforestation efforts in restoring ecosystems and providing shade for coffee plants. These qualitative findings support the quantitative results showing a high level of adoption of sustainable practices among coffee producers in Kerinci.

4.1.2 Value Chain Integration and Collaboration among Stakeholders

Interviews with stakeholders involved in the coffee value chain highlighted the importance of value chain integration and collaboration to promote sustainability and economic development. Stakeholders highlighted the need for strong linkages between coffee producers, processors, exporters, and buyers to ensure smooth coordination and information flow. They emphasized the value of direct relationships and partnerships based on trust and shared goals. Stakeholders also emphasized the role of certification, such as Fair Trade and organic

certification, in facilitating market access and premium prices for Kerinci coffee. They recognized the importance of collective action, through farmer cooperatives and industry associations, in addressing common challenges and negotiating better terms in the value chain. These qualitative findings provide insights into the collaborative efforts and value chain dynamics that contribute to sustainable coffee production and economic development in Kerinci.

4.1.3 Challenges and Barriers to Sustainability in the Coffee Industry

Interviews revealed several challenges and barriers faced by coffee producers in adopting sustainable practices and integrating into the value chain. Limited access to financial resources was identified as a significant barrier, which prevents some producers from investing in sustainable infrastructure and technologies. Lack of technical knowledge and expertise is another challenge, especially for small-scale producers who may not have access to training and capacity-building programs. Market access was also identified as a barrier, with some producers facing difficulties in reaching premium markets and getting a fair price for their coffee. In addition, inadequate infrastructure, such as roads and processing facilities, pose challenges to efficient value chain operations. These qualitative findings highlight the need for targeted support, capacity-building initiatives, and infrastructure development to overcome barriers and promote sustainability in the coffee industry in Kerinci.

4.1.4 Opportunities for Collaboration and Knowledge Exchange

Interviews with stakeholders identified several opportunities for collaboration and knowledge exchange to promote sustainability in the coffee industry. Stakeholders expressed interest in sharing best practices, experiences, and lessons learned from sustainable coffee production. They emphasized the need for knowledge-sharing platforms, workshops, and training programs to enhance the capacity of coffee producers in sustainable farming techniques.

Collaborative initiatives among stakeholders, including government agencies, NGOs, and private sector actors, were seen as valuable for bringing together resources, expertise, and market access opportunities. Stakeholders also recognize the potential for promoting sustainable coffee tourism, which can contribute to local economic development and environmental conservation. These qualitative findings underscore the importance of collaboration, knowledge exchange, and collective action to foster sustainability in the coffee industry in Kerinci.

4.2 Quantitative Results

4.2.1 Adoption of Sustainable Practices among Coffee Producers

Table 1. Adoption of Sustainable Practices

Sustainable Practices	Percentage of Coffe Producers
Shade-grown coffe	72%
Organic farming	58%
Water Conservation	64%
Reforestation efforts	41%

The table above shows the percentage of coffee producers in Kerinci that have adopted various sustainable practices. It can be observed that most coffee producers in the Kerinci region have adopted sustainable practices. The highest adoption rate is for shade-grown coffee, with 72% of producers implementing this practice. Organic farming and water conservation practices are also prevalent among coffee producers, with adoption rates of 58% and 64%, respectively. Reforestation efforts, although slightly lower, are still considerable, with 41% of coffee producers engaging in such activities.

Table 2. Consumer Preferences for Sustainable Coffee and Certification

Consumer Preferences	Percentage of Respondents
Willingness to pay for sustainable coffee	82%
Influence of sustianability certifs=ation On purchasing decisions	
- Fair Trade	67%
- Organic	58%
- Rainforest Alliance	41%

Source: Data Processing Results (2023)

Table 2 displays consumers' preferences regarding sustainable coffee and the influence of various sustainability certifications on their purchasing decisions. The majority of respondents, 82%, expressed a willingness to pay more for sustainable coffee, indicating strong consumer demand for environmentally friendly products. When considering specific certifications, Fair Trade certification was found to have the highest influence on purchasing decisions, with 67% of respondents considering it important. Organic certification followed close behind, with 58% of respondents considering this certification important. Rainforest Alliance certification was also considered important by 41% of respondents.

Table 3. Multiple Regression Analysis Results Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
(Constant)	5.893	1.244			2.032.050
Sustainable Practices	.109	.045	.365		8.044.000
Value Chain	.132	.037	.275		7.189.000

a. Dependent Variable: Local Economic

Source: Data Processing Results (2023)

The table above presents the results of the regression analysis that examines the relationship between sustainable practices, value chain integration and local economic outcomes in the coffee industry in Kerinci. The coefficients show the estimated effect of each variable on the dependent variable (local economic outcomes). The results show that sustainable practices have a significant positive influence on local economic outcomes (coefficient = 0.362, sig < 0.000). This suggests that coffee producers who adopt sustainable practices experience improved economic outcomes in the local context of Kerinci. Similarly, value chain integration also showed a significant positive influence on local economic outcomes (coefficient = 0.275, sig < 0.000). This suggests that actively participating in value chain activities

contributes to improved economic performance in the coffee industry.

These quantitative results provide valuable insights into the adoption of sustainable practices among coffee producers in Kerinci and consumer preferences for sustainable coffee and certification. The high level of adoption of sustainable practices among coffee producers indicates a positive trend towards environmental sustainability in the region. In addition, strong consumer willingness to pay premium prices for sustainable coffee and the influence of certification underscore potential market opportunities for value-added coffee commodities from Kerinci. These findings further support the need to improve environmental sustainability practices and value chain dynamics to foster local economic development and enhance the competitiveness of the coffee industry in Kerinci.

Discussion

Qualitative analysis of the interviews revealed that coffee producers in Kerinci have begun to adopt various environmental sustainability practices. These include the adoption of shade coffee cultivation, organic farming techniques, water conservation measures, and reforestation efforts. The producers emphasized the importance of preserving the region's rich biodiversity, protecting water sources, and mitigating the effects of climate change. However, challenges such as limited access to sustainable agricultural inputs, knowledge gaps, and financial constraints were identified as barriers to wider adoption of sustainable practices.

Quantitative analysis of survey data provides insights into value chain dynamics and value addition in coffee commodities in Kerinci. Findings indicate that coffee producers who are actively engaged in value chain activities, such as processing and direct marketing, are able to capture a higher proportion of the value generated in the coffee value chain. Value addition is facilitated through improved quality, product differentiation, and closer relationships with

buyers. In addition, the study found that certification schemes, such as Fair Trade and organic certification, play an important role in adding value to coffee commodities and improving market access for Kerinci producers.

Correlation analysis between sustainable practices, value chain dynamics and local economic indicators showed a positive relationship. Coffee producers who adopt sustainable practices and actively participate in value chain activities report higher incomes and improved livelihoods. The integration of sustainable practices in the value chain also contributed to increased productivity, improved product quality, and access to premium markets. In addition, the study identified positive spill-over effects to the local economy, such as job creation, improved infrastructure, and increased investment in the coffee sector.

In conclusion, this study demonstrates the importance of environmental sustainability and the value chain concept in the context of the local economy of value-added coffee commodities in Kerinci, Indonesia and supports previous research that has made the connection [17], [28]–[30], [32]–[34]. The findings highlight the positive impact of sustainable practices and value chain integration on local economic development, emphasizing the need for ongoing efforts to improve environmental sustainability, economic competitiveness, and overall sustainability in the coffee industry in Kerinci. By implementing the recommended interventions, Kerinci can position itself as a leader in sustainable coffee production, contributing to local economic development and global sustainability goals.

CONCLUSION

This study explored the role of environmental sustainability and the value chain concept in the context of the local economy of value-added coffee commodities in Kerinci, Indonesia. The findings show that coffee producers in Kerinci have started to adopt sustainable practices, which have positive environmental and economic

impacts. The integration of sustainable practices in the value chain contributes to added value, market access, and local economic development. However, challenges such as limited resources and knowledge gaps need to be addressed to further promote sustainability in the coffee sector. This study provides recommendations for stakeholders to improve environmental sustainability, economic competitiveness, and overall sustainability in the coffee industry in Kerinci. By implementing these recommendations, Kerinci can position itself as a sustainable coffee producer and contribute to the global demand for environmentally friendly, high-quality coffee.

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