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Improving the supply chain of Kintamani Bali coffee: Enhancing quality, efficiency, and global competitiveness

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Abstract

This study aims to analyze and discuss improvements in the supply chain of Kintamani Bali coffee, focusing on the challenges faced by farmers and exploring opportunities to enhance distribution efficiency, product quality, and global competitiveness. Using a qualitative explanatory approach and case study methodology, the research gathers primary and secondary data through interviews, observations, and literature reviews. The data is analyzed thematically and triangulated for validity. The findings reveal that Indonesia, as the third-largest coffee producer, has significant potential to strengthen its position in the global coffee value chain through strategies such as quality differentiation, better post-harvest processing, and improved farming practices. However, challenges such as limited farmer expertise, dependence on middlemen, and a lack of investment have led to inconsistent harvests and fluctuations in production and exports. Opportunities for growth include expanding agro-tourism, improving post-harvest techniques, and fostering strong public-private partnerships. The study concludes that enhancing coffee quality, processing methods, and sustainable farming practices can improve Indonesia's competitiveness in the global market. Recommendations include strengthening public-private partnerships, increasing farmer education, developing digital tracking systems, and improving post-harvest processing. These actions will create a more efficient and globally recognized Kintamani coffee supply chain, benefiting farmers and the broader coffee industry. This research contributes novel insights by applying a supply chain management perspective to Kintamani Bali coffee, addressing both local challenges and global opportunities.

Keywords: Agrotourism, Coffee quality, Kintamani Bali coffee, Public-private partnerships, Supply chain management.

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1. Introduction

According to data from the United States Department of Agriculture (USDA), global coffee production in the 2022/2023 period reached 170 million bags (equivalent to 60 kg of coffee per bag), reflecting a 2.8% increase compared to the previous period (year-on-year), which recorded 165.37 million bags in 2021/2022. Indonesia ranked as the third-largest coffee producer globally, with a production of 11.85 million bags in the 2022/2023 period. Of this amount, approximately 1.3 million bags were Arabica coffee, and 10.5 million bags were Robusta coffee. Around 75% of Indonesia's coffee production comes from the lowland areas of South Sumatra and Java. Meanwhile, Brazil is the largest coffee producer, with a total production of 62.6 million bags in 2022/2023, which increased by 4.5 million bags compared to the previous year. Vietnam, the second-largest producer, produced 29.75 million bags of coffee in 2022/2023, with the majority being Robusta coffee (28.74 million bags) and the remainder Arabica coffee (1.01 million bags). Colombia and Ethiopia ranked fourth and fifth, respectively, with production of 11.3 million bags and 8.27 million bags.

However, despite Indonesia being the third-largest coffee producer globally, the volume of coffee exports from Indonesia does not always reflect the high production numbers. According to historical trade balance data for Indonesian coffee from 1990 to 2016, the country's coffee exports have experienced significant fluctuations. From 421,833 tons in 1990, the export volume dropped to 267,058 tons in 2016, a substantial decline (from 502,021 tons in 2015) [1]. In 2018, Indonesia's coffee exports further declined, causing the country to rank seventh among the world's largest coffee exporters [2].

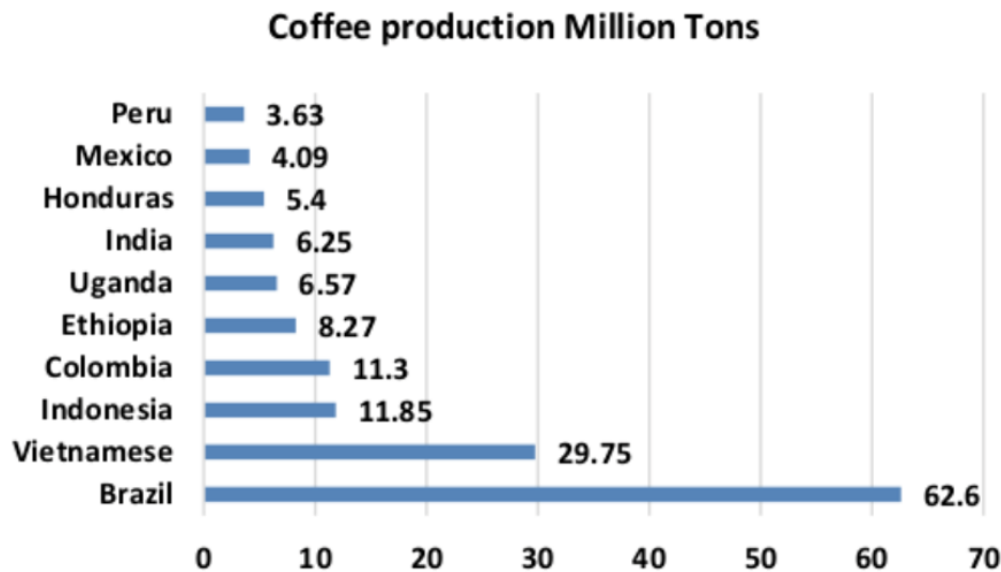


Figure 1.
Coffee Production Volume Based on 10 Peak Producers (2022/2023).
Source: Maletić [3].

This change may be attributed to several factors, one of which is the performance of Indonesia's coffee sector, which has not yet reached its full potential. Inconsistent harvests and the lack of significant increases in productivity since 1990 have contributed to this issue. Although global coffee prices have been relatively high since 2007, this has not translated into sufficient investment in the coffee sector, both from the government and the private sector, causing stagnation in Indonesia's coffee productivity. However, many rural households in Indonesia are involved in smallholder coffee farming, which has proven to contribute positively to poverty alleviation and livelihood sustainability in the country [4].

There is still significant potential for the development of the coffee processing industry within the country. The growing global demand for coffee, driven by the rise of the middle class and changing lifestyles, presents a substantial opportunity for the export of processed Indonesian coffee. In 2015, exports of processed coffee products from Indonesia were valued at USD 356.79 million, marking an 8% increase compared to 2014. Processed coffee products, including instant coffee, extracts, essences, and concentrates, are exported to various countries such as the Philippines, Malaysia, Thailand, Singapore, China, and the United Arab Emirates [5]. Coffee-producing regions in Indonesia are diverse in terms of production systems, coffee quality, post-harvest processing, institutional support structures, and the role of the private sector. One prominent coffee-producing region is Bangli Regency in Bali, which produces Kintamani coffee. Kintamani Arabica coffee is of high quality and has gained international recognition. The coffee is known for its distinctive flavor, resistance to pests, and high productivity [6].

Kintamani offers unique advantages as a coffee-producing region. With an agro-ecosystem that is well-suited for Arabica coffee, an elevation of over 1,000 meters above sea level, and a homogeneous farming system, the region is highly favorable for coffee production. However, many farmers in Kintamani still employ simple and inefficient post-harvest processing methods, which impact the quality of the coffee produced [7]. As a result, while prices received by coffee farmers are relatively low, they still produce high-quality coffee beans.

This situation highlights the importance of improving the distribution system and post-harvest processing of coffee in regions like Kintamani so that coffee farmers can receive fairer prices and better results. Additionally, enhancing knowledge of improved processing technologies is crucial for increasing the competitiveness of Indonesian coffee in the global market.

The strength of Indonesia's coffee sector lies in its significant production potential, with the country being one of the largest coffee producers globally and known for producing high-quality coffee such as the internationally recognized Kintamani Arabica coffee. The growing global demand for coffee presents a substantial opportunity for Indonesia, particularly as the rise of the middle class and changes in lifestyle boost coffee consumption. Moreover, Indonesia's coffee processing industry also holds considerable potential for export, as processed coffee products like instant coffee, extracts, and essences have gained significant markets in countries such as the Philippines, Malaysia, Thailand, Singapore, China, and the United Arab Emirates.

However, Indonesia's coffee sector also faces several challenges. One of the main weaknesses is the significant fluctuations in both production and exports, which reflect instability in the sector. This is caused by factors such as inconsistent harvests and the lack of substantial productivity improvements since 1990. Despite relatively high global coffee prices since 2007, this has not spurred the necessary investment in the sector, both from the government and the private sector. Additionally, limitations in post-harvest processing technology are another key challenge, with many coffee farmers still using traditional methods that reduce the quality of the coffee produced. Furthermore, the sector's reliance on export markets presents a challenge, as Indonesia needs to strengthen its domestic market to ensure that the coffee industry remains sustainable and less reliant on fluctuations in international markets.

To address these weaknesses, it is essential to make improvements in the distribution system, post-harvest processing technology, and increase knowledge among coffee farmers. By implementing these measures, Indonesia's coffee sector has the potential to grow more rapidly, providing greater benefits for coffee farmers and strengthening Indonesia's position in the global coffee market.

The aim of this study is to analyze and discuss improvements in the supply chain of Kintamani Bali coffee, focusing on identifying the challenges faced by farmers as well as opportunities to enhance distribution efficiency, product quality, and the competitiveness of Kintamani coffee in the global market.

To answer the research questions, it is necessary to link the problem with the literature review. Supply chain management (SCM) is a relatively new concept that views all activities of a company as part of an integrated system. In this context, company integration occurs both upstream, such as in the provision of raw materials, and downstream, which involves distribution and marketing processes. SCM refers to a series of approaches implemented to integrate suppliers, manufacturers, warehouses, and other storage facilities efficiently, ensuring that the products produced are distributed with the right quality, in the right location, and at the right time. The goal is to minimize costs while satisfying customer needs [8].

According to Kurniawati et al. [9], supply chain refers to a series of relationships between companies or activities that facilitate the distribution of goods or services from the source to the buyer or customer. The supply chain involves continuous relationships regarding goods, money, and information. Goods typically flow from upstream to downstream, money flows from downstream to upstream, and information flows in both directions. Horizontally, there are five main components in the supply chain: suppliers, manufacturers, distributors, retailers, and customers. Vertically, the key components of the supply chain include buyers, transporters, warehouses, and sellers.

The supply chain consists of three main parts: upstream, internal, and downstream. The upstream supply chain includes first-tier suppliers and the relationships established with them. The internal supply chain covers all processes used by the organization to transform raw materials received from suppliers into finished products ready for distribution. The downstream supply chain involves all processes related to delivering products to the customer [10].

Partnerships in a business context refer to a cooperation between two or more parties with individual needs, who agree to work together to achieve shared goals that will enhance the capacity of each party. These partnership models are often applied in small businesses, community empowerment, and Corporate Social Responsibility (CSR) frameworks [11]. A partnership can be defined as a set of relationships that helps manage the flow of information between partners, regulates the depth and breadth of interactions, and understands dynamic changes between partners. Important dimensions of partnerships include commitment, coordination, dependency, and trust [12].

In the development of agribusiness in the plantation sector, cooperation or partnerships between agribusiness actors and farmers are crucial. Such partnerships are needed to redistribute business opportunities, production assets, and benefits to farmers. Furthermore, there are global challenges faced by the plantation sector, such as capturing the downstream market that controls the largest margins and the production input industries that burden farmers.

In agribusiness communities, each subsystem in the supply chain must be aligned to improve overall supply chain performance. In this context, social capital, which includes trust, norms, and networks, plays a vital role in establishing effective cooperative relationships. Partnerships between small businesses (including farmers) and medium or large enterprises in the supply chain must adhere to principles of mutual dependence, mutual reinforcement, and mutual benefit. The social capital built through trust and networks can strengthen these cooperative relationships, providing mutual benefits to all parties involved [13].

2. Methods

This study uses an explanatory qualitative approach with a case study method to gain a deeper understanding of improvements in the supply chain of Kintamani Bali coffee. This qualitative design was chosen to allow the research to explore the meaning, processes, and issues related to the Kintamani coffee supply chain, particularly in the context of distribution, product quality, and the competitiveness of coffee in the global market. According to Creswell's perspective,

the data generated prioritizes narratives over numbers, ensuring a more comprehensive explanation of the complexities and contexts surrounding the various actors and institutions involved in the coffee supply chain.

The authors collect both primary and secondary data to build a comprehensive understanding. Primary data is gathered through interviews and observations involving stakeholders from government institutions, coffee farmers, practitioners, academics, and industry players. Secondary data is collected from scholarly journals, trusted news sources, institutional reports, and relevant books. All of this data is then organized into a thematic dataset, which includes legal frameworks, institutional structures, national and international cooperation, infrastructure, human resources, and operational capabilities within the coffee supply chain.

Once all the data is collected, the next step is to code and triangulate the data from various sources to ensure its validity. This triangulation aims to confirm or refine the accuracy of the information by seeking consistent responses from multiple sources. This process ensures that the interpretation of the research findings is reliable and aligned with real-world conditions. If new indicators arise, the researcher will adjust the conceptual framework to enrich the contribution to knowledge regarding improvements in the coffee supply chain [14].

3. Results and Discussion

3.1. Results

Indonesia has the potential and opportunity to position itself more strategically and dynamically in the global coffee value chain by leveraging and consolidating opportunities. These approaches can also be applied to improving the supply chain of Kintamani Bali coffee. Strategies that can be implemented include: (a) increasing the value of Kintamani coffee products (quality differentiation); (b) increasing added value functionally (processing of raw coffee beans in the downstream sector); and (c) improving value through more efficient processes (enhanced productivity at the farming level) [4].

However, due to the limited capacity and expertise in the coffee sector possessed by the government and coffee farmers, the most feasible improvement path is through strategic efforts by identifying opportunities, resources, and points that can be improved in the coffee value chain, as well as efforts to enhance partnerships with the private sector. The government needs to develop opportunities to utilize resources (especially through farmer training) from the private sector to support the development of farming businesses through innovative public-private partnerships.

Efforts to realize the above ideas have already been implemented or are still in the planning stage by both regional and central governments. These efforts include [4]:

3.1.1. Launch of the People's Economic Synergy Action Program

The People's Economic Synergy Action Program is an initiative proposed by the central government to encourage collaboration between state-owned enterprises (SOEs), ministries, and the private sector. This program has initiated various activities aimed at strengthening the supply chain of Kintamani Bali coffee.

1. Empowering Kintamani coffee farmers through post-harvest training and the distribution of People's Business Credit (KUR). Through this program, farmers can gain better capital and knowledge of post-harvest processing techniques that meet export standards. As a result, the market value of their harvest will improve. This assistance is critical for the potential of Kintamani, which, with its volcanic mountains and cool climate, allows coffee produced by Kintamani farmers to be among the best in the world. To achieve this, proper post-harvest processing methods must also be implemented [15].
2. Efforts to meet online demand have been planned by the Department of Agriculture, Food Security, and Fisheries of Bangli Regency by developing millions of coffee seedlings in Tani Village, Kintamani. As of February 2016, more than seven million superior coffee seedlings have been successfully developed. This program is designed to meet the capacity needs of the coffee mill owned by the Bangli Regency government, in collaboration with private sector institutions [16].

3.1.2. Building Stronger Institutions to Handle Coffee with Strong Involvement from Stakeholders (Collaboration Between the Government and Private Sector)

This program aims to bridge the gap between farmers and their consumers. By establishing these institutions, farmers can channel their coffee production to be processed into higher-quality products with better export value. Related to this program, both the central and regional governments have already attempted to implement it, including:

1. The Bangli Regency government, in collaboration with the private sector, has established a coffee processing factory through a partnership with PT Java Qahwa Indonesia. This effort is expected to enhance the Kintamani coffee brand at the local, national, and even international levels, enabling Kintamani coffee to compete well with other coffee varieties. This partnership between the local government and the private sector is also likely to improve the selling price for farmers, as the training provided earlier has made it easier for farmers to channel their products to partners [17].
2. Another initiative being encouraged by the central government to improve the value and supply chain of Kintamani coffee is the support from Bank Indonesia through the development of farmer groups based on integrated agro-tourism. The central bank, through its local program, will provide technical assistance to the "Harapan Maju" farmer group in Subak Pejeng, Batur Tengah Village, Kintamani, which manages the integrated agro-tourism. This includes infrastructure development, human resource enhancement, market access, and product marketing. The integrated model includes not only coffee but also other agricultural products developed on two hectares of land. Visitors can pick coffee, see the processing stages, and enjoy coffee beverages as part of the agrotourism experience [17].

3.1.3. Implementing A Strong and Reliable Data and Information System.

This effort is part of a broader initiative to improve the marketing chain of Kintamani coffee. Throughout Indonesia, the coffee marketing process at the farmer level still primarily involves smallholder farmers who sell their coffee to middle collectors (often called middlemen) who purchase the coffee directly from the farmers or through traditional village markets. Arabica coffee is often sold by farmers as parchment coffee to be further processed at milling centers. Efforts to minimize such marketing practices have been made through a state-owned enterprise by building a Digital Village, which helps create cooperatives and SMEs for Kintamani residents, making them more knowledgeable about modern marketing methods and information. Additionally, this village provides data and innovations on the coffee production and processing stages, which are part of efforts to create a more modern production and processing system [18].

3.2. Discussion

3.2.1. Analysis using Supply Chain Management Theory

The findings from the study on Kintamani Bali coffee align closely with key principles from Supply Chain Management (SCM). The primary objective of SCM, as outlined by Simchi-Levi et al. [8], is to ensure that products are delivered efficiently, with the right quality, in the right location, and at the right time, while minimizing costs and satisfying customer needs. In the case of Kintamani coffee, efforts to enhance quality differentiation, functional value addition, and improved processes at the farming level directly address these key supply chain management principles.

The strategy to improve Kintamani coffee's position in the global market through quality differentiation and post-harvest processing is an example of SCM's upstream and downstream integration. The upstream supply chain focuses on the initial stages of production, such as providing high-quality coffee seedlings and enhancing farming productivity. By improving the quality of coffee beans and post-harvest processes, these efforts ensure that the raw materials are of high quality, which is critical for downstream activities such as processing, marketing, and distribution.

The downstream supply chain is focused on activities such as coffee processing, packaging, and distribution. By establishing partnerships with companies like PT. Java Qafila Indonesia, the Bangli Regency government aims to create a stronger link between coffee producers and the market, increasing the coffee's competitiveness locally, nationally, and internationally. Through the implementation of this partnership model, the coffee produced is processed and marketed to meet global export standards. This directly aligns with the SCM goal of ensuring products are delivered with the right quality and price, to the right market on time.

Moreover, the government's efforts to develop agro-tourism that includes coffee production, alongside infrastructure and human resource development, highlight the integration between various actors within the coffee supply chain. The collaboration between the central government, local government, private businesses, and financial institutions (e.g., Bank Indonesia) exemplifies the importance of partnerships in supply chain management. These partnerships help manage the flow of information, resources, and capital, ensuring that farmers gain access to better training, capital, and technology to enhance their production and marketing capabilities.

According to Mohr and Spekman [12], successful partnerships are based on commitment, coordination, dependency, and trust. The partnership between the Bangli government and the private sector to build a coffee processing factory demonstrates these principles. By working together, both parties can strengthen the supply chain, improve product quality, and ensure mutual benefits, such as higher selling prices for farmers and expanded market access.

Additionally, the importance of social capital, which includes trust, norms, and networks cannot be overlooked in this case. The development of the Digital Village, which enables Kintamani coffee farmers and cooperatives to access modern marketing methods, represents a step toward building social capital. The knowledge and networks gained through this initiative help empower farmers, improve their business capacity, and facilitate better cooperation across the supply chain.

The integration of upstream, internal, and downstream processes, as well as the strengthening of partnerships and the creation of social capital, are key factors that can improve the overall performance of the Kintamani coffee supply chain. The strategic steps taken by both the government and the private sector in enhancing quality, increasing value through processing, and fostering collaboration exemplify how SCM principles can be effectively applied to the coffee industry. By aligning all actors and processes within the supply chain, these efforts can create a more efficient, competitive, and globally recognized Kintamani coffee supply chain.

3.2.2. Enhancing the Global Competitiveness of Kintamani Bali Coffee: Strategic Improvements in the Supply Chain and Partnerships

The research shows that Indonesia, particularly Bali, holds great potential to position itself more strategically within the global coffee value chain. By enhancing the quality and value-added processes, such as improving post-harvest processing and utilizing more efficient farming methods, Indonesia can increase the competitiveness of Kintamani coffee in the global market. The steps undertaken by the government and private sector show a commitment to strengthening the Kintamani coffee supply chain, particularly through initiatives like the People's Economic Synergy Action Program, which focuses on training farmers and increasing access to capital. However, the research also highlights the challenges of limited expertise and capacity within the coffee sector, particularly at the level of farmers and local governments. Strategic partnerships with the private sector are key to overcoming these limitations. The government's efforts to collaborate with private businesses and develop agro-tourism models that include coffee production represent a promising approach to enhancing the coffee value chain and increasing both the production quality and market value of Kintamani coffee. Moreover, the development of stronger institutions and a reliable data and information system will play a critical role in improving marketing practices, reducing the influence of middlemen, and providing better market access for Kintamani coffee. The establishment of a Digital

Village to foster modern marketing and production techniques demonstrates the potential for innovation to support the growth of the coffee sector in Bali. Overall, these initiatives, if fully implemented and sustained, can create a more efficient, competitive, and globally recognized supply chain for Kintamani coffee.

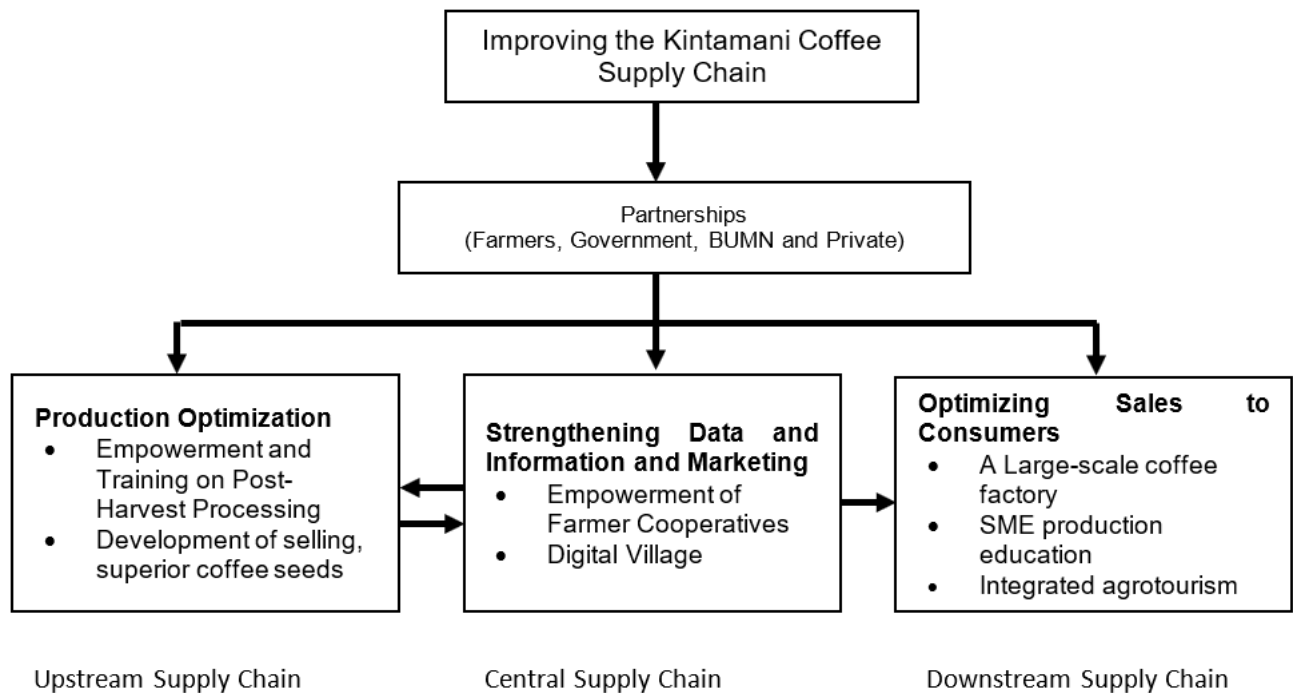


Figure 2.
Kintamani Coffee Supply Chain Improvement Model Design.

4. Conclusion

The aim of this study was to analyze and discuss improvements in the supply chain of Kintamani Bali coffee, focusing on identifying the challenges faced by farmers as well as opportunities to enhance distribution efficiency, product quality, and the competitiveness of Kintamani coffee in the global market. Based on the findings, the aim of the study has been achieved. The research successfully identified various challenges faced by farmers, such as limited expertise, dependence on middlemen, and limited capacity at the local government level. Additionally, the study highlighted several opportunities to improve the supply chain, such as enhancing product quality, better post-harvest processing, and partnerships with the private sector that can strengthen the position of Kintamani coffee in the global market. The efforts made by the government and private sector, such as the People's Economic Synergy Action Program, the development of agro-tourism models based on coffee, and the establishment of Digital Villages, demonstrate a strong commitment to improving the supply chain of Kintamani coffee. Moreover, the study emphasized the importance of integrating actors across the supply chain upstream, internal, and downstream to create a more efficient and sustainable system. This research not only succeeded in achieving the aim of analyzing and discussing improvements in the supply chain but also provided strategic recommendations to enhance the competitiveness and sustainability of the Kintamani coffee sector in both domestic and international markets.

5. Recommendations

Strengthen Public-Private Partnerships: The government should further enhance collaborations with private businesses to address expertise gaps and improve farmer training, access to capital, and processing facilities.

Invest in agro-tourism and value addition: Expanding the agro-tourism model that includes coffee production can increase the visibility and market value of Kintamani coffee, creating additional income for farmers and local communities.

Improve Marketing and Data Systems: The establishment of digital platforms for farmers to access real-time data on market trends and product pricing will empower them to make informed decisions, reducing dependency on middlemen.

Promote Sustainable Farming Practices: Encouraging the adoption of sustainable farming methods will boost productivity and coffee quality. Providing better tools and resources will help farmers produce more competitive products.

Monitor and Evaluate Progress: The government should implement regular monitoring and evaluation of initiatives to ensure effectiveness and make necessary adjustments for long-term success.

Develop Stronger Institutions: Strengthening institutions supporting coffee production and marketing, such as cooperatives and processing centers, will improve the overall supply chain and farmers' market access.

Enhance International Collaboration: Collaborating with international partners will help meet global standards, improve product quality, and increase the global reputation of Kintamani coffee.

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