Proceedings of ICEMGD 2024 Workshop: Innovative Strategies in Microeconomic Business Management
DOI: 10.54254/2754-1169/115/2024BJ0225

The Correlation Between Supply Chain Management and Sustainable Development: A Case Study of Coffee from Baoshan, Yunnan

Jiaqi Zheng[1,a,*]

[1] *Business School, Oxford Brookes University, OX1 2JD, England*
a. 202014013203@stu.sdp.edu.cn
**corresponding author*

Abstract: This paper conducts an in-depth analysis of the coffee supply chain and its relationship with sustainable development in Yunnan Province, using Baoshan coffee as a case study. The research reveals that local coffee enterprises in Baoshan primarily focus on selling coffee raw materials, operating at the lower end of the value chain with relatively low added value. The main obstacles to their development are issues related to the organizational, technological, informational, and financial aspects of the supply chain, particularly concentrated in the critical upstream and midstream segments—planting and production. To address these challenges, the paper proposes an innovative development approach for the Baoshan coffee supply chain based on the integration of the "Four Chains." This approach explores sustainable development strategies for the Baoshan coffee supply chain from the perspectives of organizational, technological, informational, and financial chains, incorporating modern technologies such as the Internet, IoT, and big data, as well as concepts of supply chain integration and supply chain finance. The goal is to establish a robust coffee supply chain environment and achieve sustainable development for Baoshan coffee.

Keywords: Four Chains Integration, Supply Chain, Sustainable Development, Baoshan Coffee.

1. Introduction

The coffee industry in Yunnan has long been characterized by a phenomenon where coffee farmers and local coffee enterprises export raw coffee beans at low prices. These beans are then reprocessed and repackaged by foreign coffee companies before being imported back into China at higher prices. This situation indicates that while the quality of raw coffee beans produced in Yunnan is not inferior, the industry suffers from low levels of industrialization, a lack of leading enterprises, and an absence of representative coffee beans [1]. Additionally, the supply chain is fragmented and lacks advanced processing technology, resulting in overall low economic benefits. To improve economic outcomes, it is essential to integrate the supply chain and enhance the value added by local coffee enterprises within it [1]. China ranks sixth globally in coffee bean production, with major cultivation areas including Yunnan, Hainan, Sichuan, Guangdong, and Tibet. Among these, Yunnan Province stands out as the central hub of the coffee industry [2]. It leads the nation in terms of planting area, production

DOI: 10.54254/2754-1169/115/2024BJ0225

volume, and value, with over 99% of China's coffee beans produced in Yunnan [2]. This positions Yunnan as a pivotal player in the domestic coffee market.

As China's largest coffee-producing region, Yunnan's scale and impact are significant. In 2022, Yunnan's coffee production reached approximately 113,600 tons, accounting for 98.7% of the national total [3]. This geographical advantage places Yunnan in proximity to major coffee-producing countries like Vietnam and Indonesia, and it hosts leading global coffee trading platforms [3]. Consequently, international coffee giants such as Starbucks and Nestlé have strategically invested in Yunnan, establishing both cultivation bases and processing facilities, thereby integrating Yunnan into their global supply chains.

In response to this situation, Yunnan Province, China's largest coffee-producing area, issued a three-year action plan for the coffee industry (2018-2020) in 2018. This plan focuses on quality and market development, aiming to promote the growth of specialty coffee as its overarching goal. Thus, it is necessary to integrate various resources within the coffee supply chain, improve organizational and informational efficiency, and enhance the value added by local coffee enterprises in Yunnan, creating a favorable coffee supply chain environment.

The aim of this study is to analyze the current state of the local coffee supply chain in Yunnan and propose innovative operational management strategies. By leveraging modern technologies such as the Internet, IoT, and big data, and integrating concepts of supply chain integration and supply chain finance, this paper explores the supply chain from the perspectives of organizational, technological, informational, and financial chains. The objective is to achieve "Four Chains Integration" and advance the development of Yunnan's coffee supply chain. This study focuses on optimizing the upstream and midstream segments of the coffee supply chain, addressing issues in planting and production, ensuring coffee quality from the source, and developing specialty coffee to increase added value, thereby providing insights for innovative coffee supply chain operations. Overall Analysis of the Coffee Industry and Supply Chain in Yunnan.

2. Current State of the Coffee Supply Chain in Yunnan

Coffee products generally fall into four categories: green coffee beans, roasted coffee beans, instant coffee, and ready-to-drink coffee. In Yunnan Province, the local coffee industry is predominantly composed of small and medium-sized enterprises, which primarily sell semi-processed green beans. To facilitate storage, these green beans are often processed into parchment coffee and then exported or sold to international coffee companies such as Nestlé and Starbucks [4]. There are very few local coffee processing enterprises in Yunnan that possess full-chain and advanced processing technologies [4]. This can be attributed to two main reasons: firstly, international coffee companies have long dominated the consumer market, leading to insufficient development of brand integration and supply chain management among local Yunnan enterprises; secondly, Yunnan's advanced processing technologies still lag behind international standards [4].

Based on the development status of the local coffee industry in Yunnan, the current supply chain model can be outlined. In contrast, mature coffee industries abroad are typically led by brand processing companies, which directly source coffee from plantations and farms, achieving a seamless connection between production and consumption [5]. However, due to their limited capabilities, small and medium-sized coffee processing enterprises in Yunnan face high operational costs and difficulties in ensuring quality when engaging in direct procurement. Consequently, coffee acquisition in Yunnan mainly relies on third-party coffee trading centers, which become a crucial link in the supply chain. This trading model is similar to traditional outsourcing but excessive reliance on third-party coffee trading centers can lead to their monopolization of the entire market.

In Yunnan's supply chain model, coffee growers sell their beans to coffee trading centers, which then distribute the beans to various processing enterprises. While this model helps ensure a certain

DOI: 10.54254/2754-1169/115/2024BJ0225

level of coffee bean supply, it also suffers from inefficiencies and information asymmetry [6]. To enhance the overall effectiveness of the supply chain, it is necessary to further optimize and integrate resources across all stages, and improve both organizational and informational aspects.

2.1. Favorable Policy Environment and Promising Development Prospects

The Yunnan Provincial Party Committee and Provincial Government have placed high importance on the development of the coffee industry, issuing a series of policy documents to support its high-quality growth comprehensively. Since the release of the "Opinions on Accelerating the Development of the Coffee Industry" in 1998, Yunnan has introduced various documents including the "Development Plan for Yunnan Coffee Industry (2010-2020)," the "Guiding Opinions on Coffee Industry Development by the Yunnan Provincial Government Office," the "Three-Year Action Plan for Yunnan Coffee Industry (2018-2020)," and the "Three-Year Action Support Policy Measures to Enhance the Rate of Specialty Coffee and Deep Processing (2022-2024)." These policies and financial measures have significantly promoted the development of Yunnan's coffee industry.

In 2019, Longyang District was designated as a "One County, One Industry" specialty county for coffee, receiving dedicated development support. In March 2022, Yunnan's coffee industry was selected as a project under the Ministry of Agriculture and Rural Affairs and the Ministry of Finance's 2022 Advantageous Specialty Industrial Cluster, receiving 150 million yuan in central government funding over three years. Under the leadership of the provincial agricultural authorities, Yunnan has set up benchmark demonstrations for coffee industry development, recognized the first batch of "Yunnan Boutique Coffee Estates," and had three coffee enterprises listed among Yunnan's top ten green food brands. This has effectively promoted the integration of primary, secondary, and tertiary industries in the coffee sector and spurred overall industry growth.

The unprecedented attention and support from various levels of government and industry regulatory bodies have significantly broadened the development path for Yunnan's coffee industry.

2.2. Favorable Geographical Location and Broad Consumption Prospects

Yunnan is strategically located at the crossroads between China and South Asia and Southeast Asia. The Pan-Asia Railway, which passes through major coffee-producing countries such as Vietnam, Laos, Myanmar, Malaysia, and Thailand, also connects to the key global coffee trading hub, Singapore. Coffee-producing countries along this railway have a combined annual production of over 2 million tons, accounting for 20% of global production, providing abundant raw materials and efficient logistical support for Yunnan's coffee industry [7]. This geographic advantage positions Yunnan with significant potential to become a coffee trading center for South Asia and Southeast Asia, further enhancing its critical role in the global coffee supply chain.

Currently, China's coffee market is experiencing rapid growth, with an annual consumption growth rate of 15%, significantly higher than the global average of 2.2%. Although China's total coffee consumption and per capita consumption are still lower than those in mature international markets, the growth potential is considerable. Particularly in recent years, the COVID-19 pandemic has significantly impacted global coffee imports and exports, further boosting interest and demand for Yunnan coffee. The growing interest from both domestic and international markets provides expansive market space and strong impetus for the development of Yunnan's coffee industry.

With increasing market demand and the gradual implementation of industry support policies, Yunnan's coffee industry is on the brink of unprecedented development opportunities. In the future, Yunnan is expected to secure a more prominent position in the global coffee market, driving further growth and prosperity in the coffee industry

DOI: 10.54254/2754-1169/115/2024BJ0225

2.3. Analysis of the Current Development Status of Coffee in Baoshan, Yunnan

Based on a review of the historical development of Baoshan's coffee industry, its evolution can be divided into four main stages. The initiation phase began in 1952, when coffee seeds were first planted in Lujiangba, Baoshan. By 1960, the coffee planting area had exceeded 600 hectares, laying the foundation for the industry. The subsequent downturn phase lasted from the 1960s to the late 1970s, during which market fluctuations and pest issues drastically reduced the planting area to about 200 hectares. The reactivation phase began in the late 1980s, when the intervention of the United Nations and large multinational companies led to a rapid increase in coffee prices and revitalized the Baoshan coffee industry. By the end of 1997, the planting area had expanded to 2,000 hectares. Since the launch of the "18 Biological Resource Development Project" in Yunnan in 1999, Baoshan's coffee industry has entered a period of rapid development, with significant increases in planting area and yield. This historical trajectory has laid a solid foundation for the maturation and supply chain optimization of Baoshan's coffee industry.

3. Bullwhip Effect

In the context of the overall development of Yunnan's coffee supply chain, Baoshan's coffee supply chain system remains relatively primitive and inefficient, making it difficult to ensure product quality stability. Baoshan's coffee industry faces several issues regarding supply chain management and product quality, such as unregulated supply chain management, flaws in raw materials and processing techniques, and inconsistent product quality and flavor [8]. Specifically, Baoshan's coffee supply chain includes multiple links, such as coffee farmers, processing plants, wholesalers, and retailers. However, these links are not well-coordinated, leading to challenges in controlling the quality and yield of coffee beans.

Furthermore, the bullwhip effect is evident in Baoshan's coffee supply chain. The bullwhip effect refers to the phenomenon where demand fluctuations are amplified at each stage of the supply chain [9]. In Yunnan's Baoshan coffee supply chain, coffee farmers often respond slowly to changes in market demand, making it difficult to adjust production plans and inventory management accurately. This delayed response to demand changes is passed on to processing plants, resulting in inaccurate production scheduling. Many factories in Yunnan lack the capability to form a long-term competitive advantage within the supply chain, affecting product quality and supply stability. Additionally, coordination issues between wholesalers and retailers exacerbate the bullwhip effect, leading to inefficient sales channels, slow product circulation, and severe inventory buildup.

This bullwhip effect intensifies the inefficiencies within the supply chain, limiting the market competitiveness of Baoshan coffee. The lack of effective information sharing and coordination between supply chain stages disrupts overall supply chain operations, affecting market response speed and service levels. This not only impacts Baoshan coffee's market position but also restricts its potential for expansion into broader markets. Therefore, to enhance the overall efficiency and product quality of Baoshan's coffee supply chain, it is crucial to optimize and integrate supply chain management to mitigate the negative impacts of the bullwhip effect and achieve efficient supply chain operations.

3.1. Price Transparency and High Transaction Costs

As an agricultural product, coffee beans have three notable characteristics: a long supply chain, high transaction costs, and difficulty in quality control. From rough processing to wholesale, the entire process typically involves 8 to 9 stages, reflecting the complexity of its supply chain. This complexity is primarily due to the fragmentation and low standardization within the coffee industry [10]. While there are some large-scale plantations, the industry as a whole remains highly fragmented.

DOI: 10.54254/2754-1169/115/2024BJ0225

Additionally, the low level of standardization in production and processing further affects efficiency and product quality.

High transaction costs are another significant feature of coffee beans. As a bulk commodity, coffee beans are traded on four major global exchanges, with prices for different varieties fluctuating according to market conditions. The domestic market typically uses a fixed-price quotation method, which increases risk for enterprises when prices fall. In contrast, using basis price quotations allows procurement costs to adjust with market price fluctuations, benefiting traders and downstream buyers. However, in China, basis price quotations are often opaque, leading to difficulties in accurately determining actual prices. Compared to this, the basis pricing for other bulk commodities like soybean meal and soybean oil is more transparent, with well-developed balance sheets that allow both buyers and sellers to trade based on these balance sheets.

The lack of detailed balance sheets in the coffee bean market creates significant uncertainty for buyers when deciding on purchasing timing and makes it difficult to obtain accurate market price information. This information asymmetry exacerbates price volatility in the coffee bean market, posing additional challenges for each link in the supply chain.

4. Integration of Four Chain

4.1. Organizational Chain

4.1.1. Problems in the Initial Processing Stage

Overall, the Yunnan coffee industry remains predominantly focused on raw material supply, with a relatively short industrial chain and low added value, resulting in insufficient market development. This positions Yunnan coffee at the lower end of the industrial chain, where, despite abundant resources, the market advantages have not been effectively realized, limiting its competitiveness in the broader market [11].

In terms of products, Yunnan coffee enterprises are generally small in scale and invest insufficiently in raw material bases and initial processing plants. The infrastructure within the production areas, such as irrigation systems, drying beds, and storage facilities, is relatively rudimentary, weakening the ability to withstand natural disasters. Additionally, the aging of coffee germplasm resources is exacerbated, with a limited number of organically certified coffee plantations and relatively outdated deep processing technology, necessitating significant improvements in overall product quality.

4.1.2. Organizational Issues in the Planting Stage

With the expansion of coffee planting areas in Yunnan, various business models have emerged, ranging from the initial “company + coffee farmers” and “cooperative + coffee farmers” to the current “company + cooperative + coffee farmers” and “company + base + coffee farmers.” However, in any model, coffee farmers remain the fundamental unit. Throughout the development of the coffee industry, whether it is fresh coffee cherries or initial processed coffee beans, the benefits obtained by coffee farmers generally do not exceed the added value of the agricultural products themselves [12]. Although the income of coffee farmers has increased, this increase is not due to an enhancement in added value but merely a rise in revenue. This situation results in significant fluctuations in coffee planting areas, reflecting the continued low profitability of coffee farmers, which adversely affects the sustainable development of the coffee industry from a broader perspective.

For example, in the four major coffee-producing regions of Yunnan, although some areas have begun adopting the “company + base or estate, cooperative” business model, many regions still rely primarily on smallholder farmers for coffee cultivation due to the small scale of most estates or bases.

DOI: 10.54254/2754-1169/115/2024BJ0225

This business model leads to fragmented coffee planting, low standardization, and a lack of effective cooperation among individuals, making it difficult to achieve economies of scale. As a result, coffee farmers are long-term disadvantaged in the supply chain, with incomes often below the industry average, which is one of the main reasons for the recent reduction in coffee planting areas in Yunnan.

Moreover, most regions lack large-scale leading brand enterprises and unified production standards, resulting in non-standardized production techniques and uneven coffee yield and quality. Difficulties in controlling the quality of coffee at the source further hinder the development of coffee in Baoshan, Yunnan. The absence of unified standards and standardized production processes impacts the overall quality improvement and market competitiveness of the coffee industry.

4.2. Information Chain

4.2.1. Disconnect Between Production and Market

From a market perspective, Baoshan coffee has low technological content and added value, insufficient brand promotion efforts, and relatively simple marketing methods. Most enterprises are small, scattered, and lack strength, with low market share and insufficient local sales enterprises with significant recognition and influence [13]. Market sales are constrained by multinational corporations, and coffee prices are affected by fluctuations in the international market. In particular, in Baoshan, despite being the highest coffee producer, most of the coffee is still sold as raw material, lacking an independent brand that integrates production, research and development, and sales. Furthermore, coffee enterprises operate independently, leading to intense competition and resulting in low recognition of Baoshan coffee among ordinary consumers, with many people not even knowing what Baoshan coffee is. The brand effect has not been effectively utilized, and brand recognition and influence need further enhancement.

4.2.2. Information Asymmetry between Links

First, there are significant barriers between the information publishing entities and information receiving entities, preventing the rapid and effective transmission of information to growers and processing enterprises. Second, coffee growers, especially those who are small, weak, and dispersed, generally do not pay enough attention to obtaining the latest coffee market information domestically and internationally, leading to difficulties in keeping up with market trends and demand changes. Finally, the mechanism for collecting and transmitting coffee information is still inadequate, mainly reflected in the slow update speed of information on professional coffee websites, which exacerbates the asymmetry of market information.

The isolation and asymmetry of information between different links create a significant disconnect between production and market demand [14]. This disconnect not only leads to a lack of consumer knowledge about the coffee production process but also makes coffee farmers unfamiliar with market demand changes and trends. Especially for some small-scale coffee planting organizations, the importance of market information is not well recognized, and many coffee farmers lack awareness of the latest developments in the coffee industry, leaving them unaware of market changes and demand fluctuations. This situation causes coffee farmers to often engage in blind planting without effective market research and planning, lacking systematic organization and support. Such information asymmetry and market disconnection increase the risk of coffee unsold, impacting the income of coffee farmers and the stability of the entire industry chain.

DOI: 10.54254/2754-1169/115/2024BJ0225

4.3. Technology Chain

4.3.1. Issues with Coffee Bean Planting and Processing Technologies

In the coffee planting stage, obtaining high-quality coffee requires strict soil and climate conditions, which need to be ensured through professional testing and analysis. However, most coffee farmers lack the necessary testing tools and technical guidance to scientifically assess these critical factors. At the same time, individual coffee farmers often lack effective learning channels and scientific management techniques, leading to issues such as excessive or insufficient fertilization, improper timing of pruning and weeding, and untimely pest and disease control. These management deficiencies directly affect the quality of coffee, resulting in yields that do not meet ideal levels.

In the processing stage, coffee farmers need to complete a series of operations, including harvesting, flotation, peeling, fermentation, washing, and drying, to process coffee beans into parchment coffee for sale. However, since traders generally do not buy fresh coffee cherries directly, coffee farmers must undertake the entire initial processing process themselves. In this process, coffee farmers often fail to meet technical requirements due to non-standardized operations and lack of professional equipment, thus affecting the quality of coffee beans and the standards of the final product.

4.4. Financial Chain

4.4.1. Initial Stage Financial Problems

Coffee trees typically require 5 to 7 years to reach full production and have a maturation period lasting 8 to 10 months each year, extending the overall production cycle significantly. Due to the high cost of agricultural inputs in coffee cultivation, coffee farmers must have a certain financial foundation to sustain production and operations. However, many coffee farmers face significant financial challenges, especially during planting and harvesting periods, when financial pressure often creates difficulties. Additionally, the traders' practice of purchasing on credit exacerbates this issue, delaying farmers' income and affecting their liquidity, hindering subsequent production and further industry development.

4.4.2. Financing Difficulties

In the existing traditional coffee supply chain, the degree of organization is low, the chain is complex, and the participating entities are numerous and dispersed, leading to many management irregularities. This fragmented supply chain structure creates significant challenges for individual coffee farmers in financing, as the financing operations are complex and their risk-bearing capacity is weak, lacking effective risk control measures. Due to the frequent and urgent peaks in financial demand, coffee farmers often struggle to obtain sufficient financing support during periods of financial shortage. The goal of supply chain integration is to enhance overall efficiency and coordination by consolidating various links, reducing redundant transaction branches and links, thereby improving the financing environment.

On the other hand, financing assessments face high difficulties. The financial transparency of financing objects in the traditional coffee supply chain is generally insufficient, which results in a lack of necessary data support for financial institutions when conducting credit evaluations. Many financial institutions have not established comprehensive credit assessment systems, affecting the accuracy of evaluations and reviews. In this situation, the stability of the financial chain is severely threatened, especially when the financial chain breaks, coffee farmers and various supply chain parties may face serious financial shortages, further exacerbating financing difficulties. The liquidity

DOI: 10.54254/2754-1169/115/2024BJ0225

issues of coffee farmers not only directly impact their operational capabilities but also threaten the healthy development of the entire supply chain. Therefore, financial institutions need more systematic evaluation methods to ensure the stability of the financial chain and the sustainable development of the supply chain. This requires building a comprehensive credit assessment system, introducing more transparent data and scientific evaluation standards, thereby providing solid financial support for the long-term stable development of the coffee industry.

5. Solutions and Recommendations

5.1. Enhancing Awareness of Yunnan Baoshan Coffee Construction

Firstly, enterprise operators should enhance their focus on brand building for Yunnan coffee, leveraging the unique brand positioning of Yunnan coffee to carefully create a strong core brand, which will drive the development of other brands and comprehensively enhance the brand value of Yunnan coffee. Secondly, enterprises should actively carry out relevant training and competition activities to help employees better understand and identify with the brand concept of Yunnan coffee. Finally, the government should work on creating a unique brand identity for Yunnan coffee, reducing dependence on international futures standards, and establishing buyer standards for specialty coffee beans. Expanding sales channels through e-commerce and live streaming platforms, reducing intermediate links, achieving deep processing, and integrating the primary, secondary, and tertiary industrial chains will further enhance the brand value of Yunnan coffee.

5.2. Building and Establishing a Coffee Variety System for Yunnan Baoshan and Creating a Strong Brand

Firstly, the province should consolidate resources and efforts to focus on building a strong brand, reducing the presence of small and scattered brands, and completely changing the situation of “having varieties but no brand” for Yunnan coffee, giving Baoshan coffee a unique representation. Secondly, enterprises should focus on innovation, actively introducing high-tech talents, and promoting innovation and research and development for the Yunnan coffee brand, breaking traditional single marketing models. Finally, cooperation with coffee chains, hotels, and other channels should be deepened, expanding the product sales network and actively seeking

6. Conclusion

This paper presents a comprehensive analysis of the coffee supply chain in Baoshan, Yunnan, and its connection to sustainable development. The study highlights that local coffee enterprises in Baoshan are primarily engaged in the sale of coffee raw materials, positioning themselves at the lower end of the value chain with relatively minimal added value. The primary barriers to their development are concentrated in the organizational, technological, informational, and financial dimensions of the supply chain, especially within the critical upstream (planting) and midstream (production) stages.

The research identifies the "bullwhip effect," where demand fluctuations are amplified at each stage of the supply chain, leading to inefficiencies and difficulties in quality control. This issue is exacerbated by high transaction costs, a lack of price transparency, and fragmented information systems. To address these challenges, the paper proposes an innovative development approach based on "Four Chains Integration," utilizing modern technologies such as the Internet, IoT, and big data, and incorporating supply chain integration and finance concepts. The objective is to enhance the supply chain environment for Baoshan coffee and achieve sustainable development.

The significance of this study lies in its detailed examination of the Baoshan coffee supply chain and its implications for sustainable development. By focusing on chain integration and the application

DOI: 10.54254/2754-1169/115/2024BJ0225

of modern technologies, the research offers a comprehensive framework to address the low added value and inefficiencies of the local coffee industry. The proposed "Four Chains Integration" method provides strategic pathways to improve organizational efficiency, technological advancement, information flow, and financial stability.

The impact of this research is twofold. Firstly, for Baoshan coffee enterprises, the integration of chain elements and the application of modern technologies can enhance product quality, improve market positioning, and increase economic returns. Secondly, the study contributes to the field of sustainable development by demonstrating how optimizing supply chains can support industry growth and reduce economic disparities.

Despite its valuable insights, the study has certain limitations. Primarily, the research is focused on Baoshan, which may not fully represent the diverse conditions of other coffee-producing regions in Yunnan or China. Therefore, the findings might not be universally applicable, as different regions may face distinct challenges and opportunities. Additionally, the study relies on case-specific data and observations, potentially overlooking the impact of global market fluctuations or industry trends.

Another limitation is that the proposed solutions have not been empirically validated. Although the "Four Chains Integration" approach is theoretically robust, its practical effectiveness remains to be tested. The study has not extensively explored the socio-economic impacts of these recommendations on local coffee farmers and communities.

Future research should focus on several key areas to extend the findings of this study. First, comparative studies across different coffee-producing regions could provide a more comprehensive understanding of supply chain challenges and solutions. This would help in developing strategies tailored to specific regional conditions and needs.

Second, empirical research is needed to evaluate the actual application of the "Four Chains Integration" approach. Field studies and pilot projects could assess the effectiveness of the proposed strategies, identify potential barriers, and suggest areas for improvement. Additionally, examining the social and economic impacts of these strategies on local communities, including the well-being of coffee farmers and the broader economic environment, would offer valuable insights.

Finally, future research should consider the impact of global market trends and technological advancements on the coffee supply chain. Understanding how international trade policies, market demand fluctuations, and technological innovations affect local supply chains will be crucial for developing adaptive and resilient strategies in the evolving coffee industry.

In conclusion, this paper provides a foundational analysis of the Baoshan coffee supply chain and proposes a comprehensive approach to leverage modern technologies and optimize supply chain management for sustainable development. While the study offers valuable insights, further research is necessary to validate and expand these findings, supporting the overarching goal of enhancing the sustainability and economic viability of the coffee industry.

References

[1] *Lu, X., Li, Y.F., and Yan, Z.R. (2021) Exploration of 'Four Chains Integration' Operational Management of Yunnan Coffee Supply Chain. Supply Chain Management, 2(2), 80-99.*

[2] *Zhou, Y.F., Chen, Z.H. (2010) Operating the Industrial Chain to Accelerate the Development of Yunnan Coffee Industry. China Tropical Agriculture, 05, 27-30.*

[3] *Wang, Y.W. (2024) Polishing the 'Golden Brand' of Baoshan Small-Particle Coffee. Yunnan Daily, 005.*

[4] *Yang, L.J., Liu, Y., Zhong, Y.L. (2023) Exploration of Integrated Development Paths for Baoshan Coffee's Three Industries. Journal of Southwest Forestry University (Social Science), 06, 33-45.*

[5] *Cao, S., Guan, P.L. (2023) Yunnan Baoshan's Specialty Industry Boosts Border Area Prosperity. Economic Daily, 008.*

[6] *Wang, H.L., Liu, E. (2024) Building a Yunnan Specialty Coffee Brand. Yunnan Agriculture, 07, 27-30.*

DOI: 10.54254/2754-1169/115/2024BJ0225

[7] *Rui, D.P., Quan, W., Luo, Y., Li, L., Huang, J.X. (2023) Research on the Current State and Countermeasures of Scientific and Technological Development in Yunnan's Coffee Industry. China Rural Science & Technology, 08, 49-51.*

[8] *Ouyang, Y. (2023) Recommendations for High-Quality Development of China's Coffee Industry. China Foreign Investment, 11, 66-67.*

[9] *Kong, C.L. (2023). Yunnan's 'Real Gold and Silver' Support for the Development of the Coffee Industry. Yunnan Economic Daily, A01.*

[10] *Zhou, X.F., Zhao, J.J., Yang, X.Y., Wang, L.D., Lü, S., Zhao, J. (2023) Current Status and Countermeasures of Yunnan Province Coffee Geographical Indication Brand Cultivation. Agriculture and Technology, 10, 177-180.*

[11] *Duan, Y., Wang, S.J. (2022) Yunnan Vigorously Improves the Rate of Specialty Coffee. Yunnan Daily, 005.*

[12] *Li, W.R. (2023) Yunnan Province High-Quality Coffee Industry Development Seminar Successfully Held in Baoshan. Tropical Agricultural Science and Technology, 02, 90-91.*

[13] *Luo, Y.F., Zhang, X.F. (2023) Investigation and Research on Yunnan Coffee Brand Promotion Path — Taking Baoshan City as an Example. Food Industry, 04, 98-100.*

[14] *Zhou, C. (2022) Competitive Intelligence Analysis of Yunnan Province Coffee Industry. Yunnan University.*