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Cocoa Cultivation and Its Development Prospects in Southeast Sulawesi in Facing the Global Market

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ABSTRACT

Cocoa is one of Indonesia's leading commodities that significantly contributes to the national economy, particularly in the Southeast Sulawesi region. This area is known as one of the largest cocoa-producing centers in Indonesia, with vast potential for further development. This study aims to examine the current state of cocoa cultivation in Southeast Sulawesi and its prospects in facing the challenges of the global market through a literature review approach. The study highlights various aspects, including agroecological conditions, cultivation techniques, productivity levels, and challenges in the supply chain and marketing. The findings indicate that cocoa development in Southeast Sulawesi has great potential but still faces several issues, such as poor seed quality, pest and disease attacks, and limited post-harvest technological innovation. Furthermore, environmental sustainability and product certification have become major requirements in global trade. Strengthening farmers' capacity, implementing sustainable agricultural practices, and providing strong support from both local and national governments are key factors in enhancing the competitiveness of Southeast Sulawesi cocoa in international markets. With proper management strategies, cocoa can become a highly competitive leading commodity that contributes to improving local community welfare.

Keywords:, ***Cocoa, Southeast Sulawesi, Cultivation, Global Market, Sustainable Development.***

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INTRODUCTION

Cocoa (Theobroma cacao L.) is one of Indonesia's leading plantation commodities that plays a vital role in the national economy. As a major non-oil export commodity, cocoa contributes to foreign exchange earnings and serves as a key source of income for millions of smallholder farmers across various regions, including Southeast Sulawesi. Indonesia's favorable tropical agroclimatic conditions enable cocoa plants to achieve high productivity throughout the year. According to data from the Ministry of Agriculture (2024) the cocoa plantation area in Southeast Sulawesi exceeds 200,000 hectares; however, productivity remains below its optimal potential due to technical and managerial constraints. This indicates a gap between the region's natural resource potential and actual production levels, which must be optimized through cultivation innovation and targeted policy support (Rahim, 2024).

Southeast Sulawesi possesses agroecological characteristics highly conducive to cocoa development, particularly in regions such as Kolaka, Konawe, and Bombana, which feature fertile soils and well-distributed rainfall. However, the average cocoa productivity in these areas ranges between 0.8–1 ton per hectare per year, far below the genetic potential of superior varieties that can reach 2–2.5 tons per hectare (Hartono, 2023). Factors contributing to low productivity include aging trees, uncertified local seed use, and limited adoption of sustainable farming practices. As noted by Nuralfiyan et al. (2025) most farmers in Southeast Sulawesi still rely on traditional knowledge for farm management, leading to ineffective practices in fertilization, pruning, and pest control that fall short of Good Agricultural Practices (GAP) standards.

One of the major challenges in cocoa cultivation is pest and disease infestation, particularly from cocoa pod borers (Conopomorpha cramerella) and black pod disease (Phytophthora palmivora). Sjam et al. (2025) report that pest attacks can cause yield losses of up to 40% if not properly managed. Chemical pesticide-based control methods remain dominant, although they pose risks to both the environment and farmer health. Therefore, the adoption of Integrated Pest Management (IPM) is essential to strengthen plant resilience sustainably. This approach combines pest-resistant varieties, orchard sanitation, shading regulation, and biological control using natural predators (Andrini, 2023).

Beyond production factors, post-harvest management also plays a critical role in enhancing the competitiveness of Southeast Sulawesi cocoa. Inconsistent fermentation and

drying processes often reduce bean quality, resulting in low farm-gate prices. Meanwhile, global markets increasingly demand high-quality standards supported by sustainability certifications such as Rainforest Alliance and Fair Trade (Bemelmans et al., 2025). According to Depoorter et al. (2025) certification not only raises selling prices but also improves agronomic practices and environmental management at the farm level. Therefore, collaboration among local governments, certification bodies, and the private sector is essential to support technical training and access to sustainable export markets.

Furthermore, the downstream cocoa industry in Southeast Sulawesi remains underdeveloped. Most production is still exported as raw beans, resulting in limited economic value addition. Sa'adah et al. (2024) argue that strengthening local processing industries—such as chocolate manufacturing, cocoa powder, and nib production—can significantly enhance rural economic welfare. Cocoa downstreaming also serves as a strategic approach to reinforce regional economic resilience against global price fluctuations. With the development of cocoa-based MSMEs and post-harvest infrastructure support, Southeast Sulawesi has the potential to emerge as one of Indonesia's leading national chocolate industry hubs.

Social and institutional aspects also play an important role in cocoa development success. Land tenure structures, farmers' education levels, and the presence of farmer groups and cooperatives influence the adoption of agricultural innovations. Depoorter et al. (2025) note that institutional strengthening through training and organizational development can improve supply chain efficiency and shorten the distance between farmers and markets. Moreover, collaboration among farmers, academics, and the private sector should be strengthened through mutually beneficial partnership models. These efforts not only reinforce local economic resilience but also foster an inclusive and sustainable regional cocoa production system.

Overall, the development prospects of cocoa in Southeast Sulawesi are highly promising in the context of global market competition. The combination of improved cultivation practices, adoption of modern post-harvest technologies, sustainable product certification, and strong government policy support will determine the region's strategic position in international trade. As noted by Kongor et al. (2024) the transformation of the cocoa sector in the 21st century depends on continuous innovation, value chain efficiency, and adaptability to global demand dynamics. Therefore, cocoa development in Southeast Sulawesi

should focus not only on increasing production but also on strengthening competitiveness and value addition to address the increasingly competitive challenges of global trade.

METHODS

This study employs a literature review approach aimed at examining and synthesizing previous research findings related to cocoa cultivation and its development prospects in Southeast Sulawesi within the context of the global market. This approach was chosen to provide a comprehensive understanding of research trends, knowledge gaps, and policy directions for cocoa development at both regional and national levels. The literature review method is particularly relevant for identifying technical, socio-economic, and institutional factors that influence productivity and competitiveness of cocoa in international trade (Snyder, 2019).

The research process began with the collection of secondary data from credible scientific sources, including national and international journals, academic books, government reports, and statistical data from official institutions such as the Ministry of Agriculture of the Republic of Indonesia and Statistics Indonesia (BPS). The inclusion criteria for literature selection were: (1) publications between 2019 and 2025, (2) focus on cocoa-related topics in Indonesia or the Sulawesi region, and (3) provide empirical or conceptual information on cultivation techniques, productivity, certification, or development policies. Non-scientific or non-relevant materials, such as popular articles lacking an academic basis, were excluded from the analysis.

Next, the collected literature was evaluated and classified according to major themes, including: (a) cocoa cultivation conditions and agronomic practices, (b) socio-economic and institutional aspects of farmers, (c) challenges and opportunities in the supply chain, and (d) strategies for enhancing global competitiveness. A content analysis (Bowen, 2009) was conducted to identify patterns, trends, and interrelationships among variables found in the reviewed studies. This stage helped build a conceptual synthesis illustrating the current state of research and the direction of cocoa development in Southeast Sulawesi.

Data analysis was conducted using a descriptive-qualitative approach, emphasizing in-depth interpretation of relevant literature findings. Data from multiple sources were presented narratively and thematically to reflect the actual conditions and dynamics of the cocoa sector in Southeast Sulawesi. This approach also assessed the effectiveness of government policies and

best practices implemented in the field. Furthermore, the analysis considered the broader context of globalization and international market demands for sustainable, high-quality cocoa products with low environmental footprints (Kongor et al., 2024).

To ensure validity and reliability, source triangulation was performed by cross-referencing data from various scientific and policy sources. Consequently, this study not only portrays empirical conditions but also provides theoretical and practical foundations useful for formulating strategies to strengthen cocoa development in Southeast Sulawesi. Ultimately, the synthesized results offer conceptual recommendations for local governments, industry actors, and academics to enhance Indonesia's cocoa position in an increasingly competitive and sustainable global market.

RESULTS AND DISCUSSION

1. Agronomic Conditions and Cocoa Production Potential in Southeast Sulawesi

Southeast Sulawesi possesses highly favorable agroclimatic conditions for the growth of cocoa (Theobroma cacao L.), primarily because the region lies within a humid tropical zone with annual rainfall ranging from 1,500 to 2,500 mm and an average temperature of 25–28°C. These conditions create an ideal environment for flower formation, pod development, and the enhancement of cocoa butter content. According to Latuconsina (2024), the soil texture in most parts of Southeast Sulawesi is dominated by lateritic and alluvial types, which are rich in organic matter and have a near-neutral pH making them well-suited for sustainable cocoa cultivation. The region's undulating to flat topography also supports natural drainage, minimizing the risk of waterlogging that can cause root diseases. These factors collectively position Southeast Sulawesi as one of the leading cocoa-producing regions in eastern Indonesia.

Despite these advantages, cocoa productivity in Southeast Sulawesi remains relatively low compared to the plant's genetic potential. According to data from Statistics Indonesia (2024) the average cocoa yield in the region reaches only 1.2 tons per hectare per year, whereas optimal yields can exceed 2 tons per hectare with proper agronomic practices. Nurhasanah and Malik (2025) attribute this low productivity to factors such as the use of non-certified local seedlings, aging trees, and limited adoption of balanced pruning and fertilization practices. Moreover, many farmers still rely on traditional cultivation systems without proper spacing, field sanitation, or integrated pest

management, leading to inefficient land use and suboptimal plant health. Irregular harvesting patterns and inadequate post-harvest fermentation processes further reduce both the quality and market value of cocoa beans at the farmer level.

Efforts to enhance cocoa production potential in Southeast Sulawesi should focus on an integrated agronomic approach encompassing technical, social, and institutional aspects. Yuliana (2023) highlights that the application of Good Agricultural Practices (GAP) including regular pruning, organic fertilization, environmentally friendly pest control, and replanting with superior varieties can increase productivity by up to 40% compared to traditional methods. In addition, government support through programs such as smallholder plantation rejuvenation, distribution of certified seeds, and comprehensive agricultural extension services can accelerate technology adoption among farmers. Strengthening farmer cooperatives and fostering partnerships with cocoa-processing industries are also essential strategies for improving the competitiveness of Southeast Sulawesi's cocoa production in response to the growing demands of the global market.

2. Quality and Production Standards in a Global Market Perspective

The quality of cocoa beans is a key determinant of Indonesia's competitiveness particularly that of Southeast Sulawesi in the international market. Currently, most cocoa produced by smallholder farmers is categorized as bulk cocoa, characterized by low fermentation levels and high impurity content, which significantly reduces its market value. According to Arifin (2024) the price difference between fermented and non-fermented cocoa in global markets can reach 20–30%, depending on physical quality and flavor profile. The main challenges at the farmer level include the lack of post-harvest infrastructure, such as standardized fermentation boxes and enclosed drying areas, which often lead to incomplete fermentation processes. This situation is further compounded by farmers' limited knowledge of international quality standards, such as those established by the International Cocoa Organization (ICCO), resulting in many products failing to meet premium export criteria.

Beyond technical factors, institutional capacity and certification schemes also play a crucial role in improving cocoa quality. Handoko and Lestari (2023) emphasize that sustainability certification programs such as Rainforest Alliance and Fairtrade International can enhance farmers' access to export markets with higher price premiums. However, the

implementation of certification initiatives in Southeast Sulawesi still faces obstacles, including high certification costs, limited technical assistance, and the absence of strong farmer organizations capable of managing certification collectively. As a result, many farmers prefer to sell their produce to local traders at conventional prices. Yet, compliance with international quality standards and certification requirements not only increases the economic value of cocoa but also promotes environmentally and socially sustainable farming practices.

The transformation of Southeast Sulawesi's cocoa quality toward global market standards requires synergy between technology, institutions, and government policy. Prasetyo (2025) highlights that a value chain development approach integrating farmers, cooperatives, processors, and exporters is essential to ensure that each stage of production meets international quality benchmarks. Local governments should strengthen the role of the Agricultural Technology Assessment Agency (BPTP) and the Plantation Office in providing modern fermentation training, hygienic drying techniques, and quality testing before export. At the same time, partnerships with domestic chocolate-processing industries can help maintain quality consistency and ensure supply sustainability. Therefore, improving quality and adopting global production standards should not only be viewed as market requirements but also as strategic measures to enhance the position of Southeast Sulawesi's cocoa within the international value chain.

3. The Role of Government and Cocoa Farmer Empowerment Policies

The Indonesian government has played a strategic role in promoting the development of the cocoa sector through various national and regional policies aimed at enhancing productivity and export competitiveness. Programs such as the National Cocoa Movement (Gernas Kakao) and the Cocoa Replanting Initiative (Gernas Replanting) have been pivotal in revitalizing smallholder plantations, including those in Southeast Sulawesi. According to Syahruddin (2023) although these initiatives have positively impacted production levels in several regions, their implementation continues to face challenges such as limited funding, weak institutional coordination, and insufficient human resource capacity in the agricultural sector. Local governments need to strengthen the role of agricultural extension officers in transferring technology to farmers while improving transparency and accountability in program management to ensure that assistance reaches

the intended beneficiaries.

Moreover, the effectiveness of cocoa farmer empowerment policies largely depends on cross-sector collaboration. Mahendra (2025) emphasizes the importance of partnerships among government bodies, academic institutions, the private sector, and microfinance organizations in building a sustainable cocoa farming ecosystem. Support mechanisms such as inclusive financing, access to digital markets, and the adoption of precision agriculture technologies can help farmers transition from traditional production systems to more efficient, data-driven approaches. In the context of Southeast Sulawesi, the provincial government's initiative to develop cocoa agroindustry clusters in Kolaka and South Konawe serves as a tangible example of an integrated policy capable of shortening distribution chains and increasing the value-added potential of local cocoa products.

Furthermore, empowerment approaches that focus on enhancing farmer capacity are key to the success of government interventions. Rahmawati and Nurdin (2024) highlight that empowerment through technical training, entrepreneurship education, and cooperative mentoring can strengthen farmers' confidence in managing their farms independently. The government must ensure the sustainability of these initiatives through regulatory support that favors smallholders and encourages youth participation in cocoa agribusiness. Thus, cocoa farmer empowerment should not only address production aspects but also strengthen social, institutional, and entrepreneurial capacities foundations essential for improving Indonesia's cocoa competitiveness in the global market.

4. Strengthening the Value Chain and Developing Downstream Products

The development of the downstream cocoa industry represents a strategic step toward strengthening the value chain and enhancing the economic competitiveness of major producing regions such as Southeast Sulawesi. According to Hasanah (2024) post-harvest processing of cocoa into derivative products such as cocoa powder, cocoa butter, and cocoa liquor can increase farmers' income by up to 40% when managed within an efficient supply chain system. This highlights that production orientation should not stop at the sale of raw beans but should instead focus on diversifying into higher value-added products. Local governments can play a crucial role by facilitating processing technology training, providing business capital assistance, and establishing shared processing facilities to support the growth of small and medium-scale industries rooted in cocoa farming

communities.

Furthermore, strengthening the value chain requires improved integration among farmers, industry players, and financial institutions. Pratama and Yuliani (2025) emphasize that inclusive partnerships based on cooperatives or agroindustry clusters can enhance logistical efficiency and strengthen farmers' bargaining positions in both domestic and export markets. The implementation of supply chain digitalization systems such as blockchain traceability and agribusiness e-commerce offers a modern solution for ensuring price transparency and product sustainability. In Southeast Sulawesi, initiatives such as Kakao Kolaka Craft, which promotes premium local products, demonstrate how community-based innovation can serve as a new source of strength in elevating the region's profile in the global market.

Moreover, product quality and branding play a decisive role in gaining international market recognition. Lestari (2023) notes that certifications such as halal, organic, and fair trade have become essential standards for cocoa products targeting European and North American markets. Strengthening the capacity of small and medium enterprises (SMEs) to meet these international quality requirements and encouraging active participation in global trade exhibitions should be supported by government programs and financial institutions. By developing local branding rooted in cultural wisdom and regional identity, Southeast Sulawesi cocoa has the potential to become a flagship export commodity that emphasizes not only production volume but also social value and sustainability.

5. Challenges and Strategies for Facing Global Competition

Despite its significant potential, the cocoa sector in Southeast Sulawesi continues to face complex challenges in competing within the global market. Wibowo and Handayani (2024) highlight three major constraints: international price fluctuations, climate change impacts, and the declining interest of younger generations in agriculture. Dependence on global price dynamics causes unstable farmer incomes, while extreme weather and pest infestations such as Helopeltis sp. substantially reduce land productivity. Moreover, the slow regeneration of farmers exacerbates sustainability issues within the sector. Therefore, developing adaptive policies grounded in technology and sustainable agricultural ecosystems is essential to maintaining production stability and ensuring farmers' long-term livelihoods.

Digital transformation serves as a key solution for enhancing competitiveness and efficiency in the cocoa industry amid the era of Industry 5.0. According to Gunawan (2025) the implementation of smart farming technologies, IoT-based soil sensors, and digital marketplaces for agricultural trade enables farmers to access broader markets while minimizing transaction costs. In several regions of Southeast Sulawesi, the Kakao Digital Village pilot project has demonstrated positive outcomes, including a 25% increase in production efficiency and a notable reduction in logistics expenses. Through supply chain digitalization, farmers gain not only price transparency but also improved access to agricultural credit, online training, and international marketing networks that were previously inaccessible to conventional farmers.

Beyond technology, Anwar (2023) emphasizes the critical role of sustainability principles as a primary strategy to penetrate the global market. International certifications such as Fair Trade and Rainforest Alliance not only enhance product value but also reflect the social and environmental commitments of cocoa agribusiness actors. Local governments should collaborate with certification agencies and universities to conduct sustainability training, carbon emission mitigation, and the development of eco-friendly diversified products. The integration of digital innovation, inclusive policy frameworks, and agribusiness education will determine the success of Southeast Sulawesi's cocoa industry in transitioning from raw export commodities to globally recognized sustainable products.

CONCLUSION AND IMPLICATIONS

Cocoa cultivation in Southeast Sulawesi holds significant potential to evolve into a globally competitive flagship commodity when managed systematically and sustainably. The region's favorable agroclimatic conditions, human resource capacity, and availability of productive land make it one of Indonesia's most strategic plantation-based economic growth centers. However, optimizing this potential requires synergy among farmer capacity building, the adoption of agricultural technological innovations, and the implementation of internationally recognized cultivation standards. Digital transformation through smart farming systems and supply chain digitalization is also a crucial prerequisite to ensuring production efficiency, price transparency, and broader global market access.

Furthermore, the development of downstream industries and the strengthening of the

cocoa agribusiness ecosystem must become a long-term policy priority for both regional and national governments. Policy support in the form of incentives, inclusive financing, and international market promotion of local products will enhance the economic value added for farming communities. Cross-sector collaboration among government institutions, academia, research bodies, and private industries can foster a sustainable and competitive value chain. Consequently, Southeast Sulawesi has a strong opportunity to transform into Indonesia's center of cocoa innovation and production, capable of meeting global market demands under the principles of sustainability, quality, and regional economic resilience.

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