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Vertical Integration of the Bird's Eye Chili Market (E&G Approach) in East Nusa Tenggara Province, Indonesia

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Abstract

*Key issues in the agricultural sector of East Nusa Tenggara include a lack of coordination within the value chain, resulting in production often being misaligned with market demand and offering minimal incentives for stakeholders to enhance value-added activities. This diminishes the motivation of agricultural sector players to engage in continuous production. Among the agricultural subsectors playing a strategic role in the economy of East Nusa Tenggara, the food crop and horticulture subsector—specifically the chili commodity (*Capsicum annuum* L.)—stands out, as it frequently experiences price fluctuations, particularly in the province's traditional markets. As of September 2025 (year-on-year), East Nusa Tenggara recorded the highest inflation rate among all Indonesian provinces, reaching 8.55 percent. The primary driver of this inflation was the rising price of chili peppers in the province's markets. This study seeks to answer the following questions: 1) what are the supply and value chains for horticultural commodities in East Nusa Tenggara Province; and 2) what is the position of East Nusa Tenggara Province's horticultural commodities in the context of inter-island trade.*

INTRODUCTION

Indonesia is an agrarian nation where the agricultural sector makes a significant contribution to the Gross Domestic Product (GDP). Over the past five years (2020–2024), the agricultural sector (in the broad sense) has consistently ranked highest among the five major sectors, accounting for an average of 32% of the total. This is followed by the construction sector (23.4%), mining and quarrying (20%), manufacturing (4.5%), electricity and gas supply (2.38%), and waste management and recycling (1.48%). However, excluding the year 2020, the agricultural business sector has shown a declining trend over the last five years. In addition to its substantial contribution to the Gross Regional Domestic Product (GRDP), the sector employs a large share of the working-age population—45.89%—suggesting that agriculture represents a key economic potential for the province of East Nusa Tenggara.

Among the agricultural subsectors playing a strategic role in East Nusa Tenggara's economy is the food crop and horticulture

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subsector, particularly regarding the bird's eye chili (*Capsicum annuum* L.) commodity, which frequently experiences price fluctuations, especially in the province's traditional markets. As of September 2025 (year-on-year), East Nusa Tenggara recorded the highest inflation rate among all Indonesian provinces, reaching 8.55%. The primary driver of this inflation was the rising price of bird's eye chili in local markets.

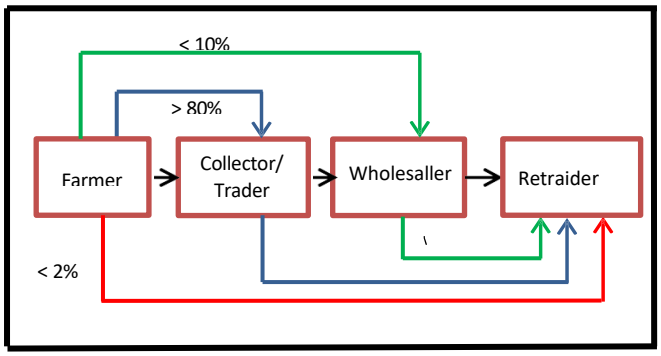


Figure 1. Chili Supply Chain in East Nusa Tenggara Province

Analysis of Key and Supporting Actors

Key Actors

Almost all economic activities involve interactions between various actors. The actors in this bird's-eye chili supply chain—referred to here as "key actors"—include the local communities living within and around the farming areas, as well as the farmers, growers, cultivators, processors, and their immediate families.

There are three key actors in the bird's-eye chili value chain in East Nusa Tenggara Province: Farmers: Responsible for land preparation, planting, fertilizing, crop maintenance, harvesting, processing, and post-harvest handling. The majority of these farmers are men; typically, bird's-eye chili farmers own the land they cultivate. Collectors: Collect and purchase bird's-eye chili from farmers, then distribute the produce to larger traders at the regency level or to traders representing processing factories. Traders: Collect and purchase bird's-eye chili from collectors or directly from farmers; they then sort, package, and ship the produce to larger traders or directly to factories located within East Nusa Tenggara Province.

Supporting Actors

Agricultural extension workers serve as supporting actors in the development of bird's eye chili cultivation in East Nusa Tenggara Province. They provide guidance to farmers on proper cultivation practices, thereby enabling them to increase both production and productivity. Furthermore, agricultural extension workers possess access to information and technology, positioning them at the forefront of disseminating programs and activities and facilitating the transfer of knowledge.

Value Chain

Farmer groups and associations of farmer groups play a supporting role in the development of bird's eye chili cultivation in East Nusa Tenggara Province, as they serve as a key resource for members to access necessary inputs, such as information, capital, and technology.

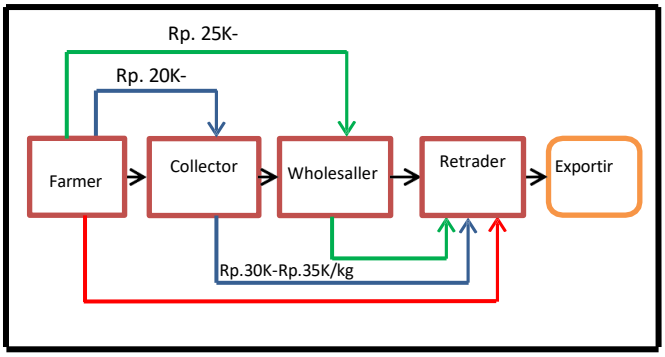


Figure 2. Chili Value Chain Diagram for East Nusa Tenggara Province

Based on the bird's-eye chili value chain in East Nusa Tenggara Province, there are four types of actors: farmers, collectors, wholesalers, and exporters or inter-island traders. Farmers sell their produce to village-level collectors for Rp 20,000 per kilogram and to district-level collectors for Rp 25,000. The selling price rises again when the product reaches wholesalers, ranging from Rp 30,000 to Rp 35,000. For inter-island trade or exports, the price reaches between Rp 90,000 and Rp 110,000 per kilogram. The selling price of bird's-eye chili is higher due to the significant costs associated with inter-island transport.

Analysis Results for the Bird's Eye Chili Commodity in ENT Province

Inbound Logistics

This activity relates to the receipt and storage of produce. It encompasses input-related processes such as material handling, warehousing, inventory control, transport vehicle scheduling, and the return of goods to suppliers. Regarding efforts to enhance the bird's eye chili value chain, a survey of agricultural experts yielded relatively high ratings for production potential, land ownership status, and the presence of experienced chili farmers (see Figure 3).

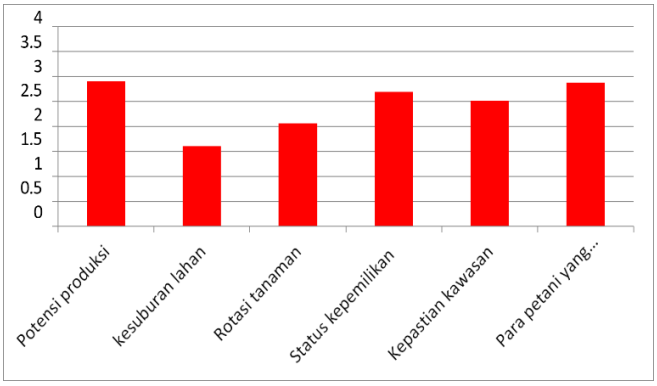


Figure 3. Respondents' Responses Regarding Inbound Logistics

Operations

Operational activities regarding horticultural production in East Nusa Tenggara Province remain quite limited, encompassing the following: inspection and monitoring of production quality; inspection of packaging and shipping methods for delivery to consumers; analysis of data to identify potential irregularities; and supervision of the workforce and other facilities utilized in the production process. In efforts to enhance the horticultural commodity value chain, survey results from agricultural experts

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assign relatively high importance to production methods and the availability of processing industries (see Figure 4).

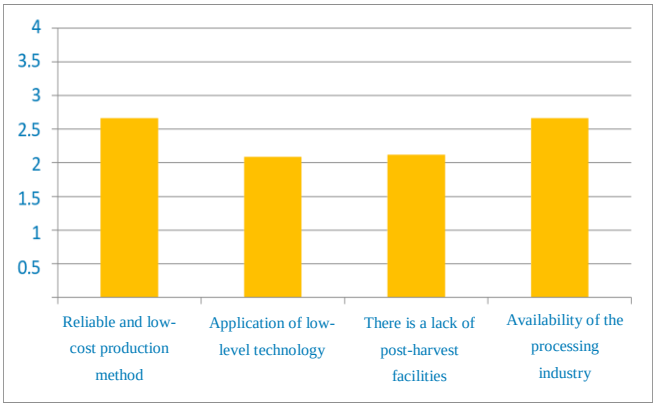


Figure 4. Respondents' Responses Regarding Operations

Outbound Logistics

Activities involving physical transportation, collection, storage, and distribution to customers—including the warehousing of finished goods, raw material handling, and order processing. In efforts to enhance the bird's eye chili value chain, a survey of agricultural experts yielded relatively high scores regarding inter-island trade competitiveness and the potential for increasing value-added (see Figure 5).

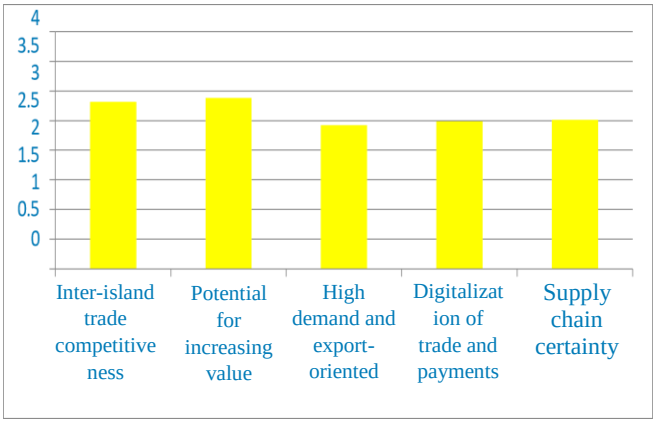


Figure 5. Respondents' Responses Regarding Outbound Logistics

Marketing and Sales

Most of the farmers' horticultural harvests from each village are sold to local traders. In an effort to improve the horticultural commodity value chain, the results of a survey of experts in the agricultural sector gave relatively high points to stakeholder support, availability of financing and availability of transportation (see Figure 6).

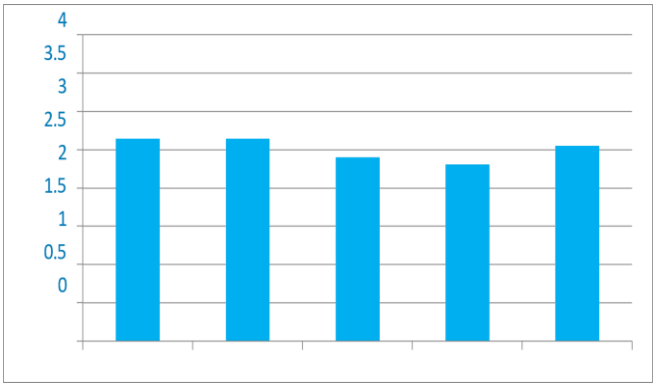


Figure 6. Respondents' Responses Regarding Marketing and Sales

Interview findings indicate that the majority of bird's eye chili production is sold to middlemen or collectors based in Kupang City. For farmers, the presence of these urban-based middlemen actually places a burden on them, as the prices offered are very low; however, farmers have no other option but to sell to the middlemen who come directly to their farms, as limited access keeps them dependent on these intermediaries. Interviews with a middleman further revealed that nearly every district has a major middleman or collector.

The selling price of bird's eye chili depends on the accessibility of the farmer's field to the middlemen; the greater the distance middlemen must travel to purchase the crop, the lower the price. This occurs because middlemen visit the fields in person to buy the harvest. Furthermore, middlemen offer lower prices because the chilies sold by farmers are often of poor quality; consequently, middlemen tend to apply a uniform price to the produce, regardless of whether the quality is high or low.

Supporting Activities in the Bird's Eye Chili Value Chain

The factors influencing the bird's eye chili value chain are examined through supporting activities such as infrastructure, human resource management, technology development, and procurement. Presented below are the research findings based on a sample of 33 respondents regarding the bird's eye chili value chain.

Infrastructure

All basic structures and facilities—whether physical or social (such as processing facilities, the logistics flow for bird's eye chili, and other supporting supplies), required for the operations of community or business activities. Based on questionnaire results regarding area status and legal standing, the average response score was 48.5%, indicating that infrastructure plays a crucial role in supporting the bird's eye chili commodity value chain.

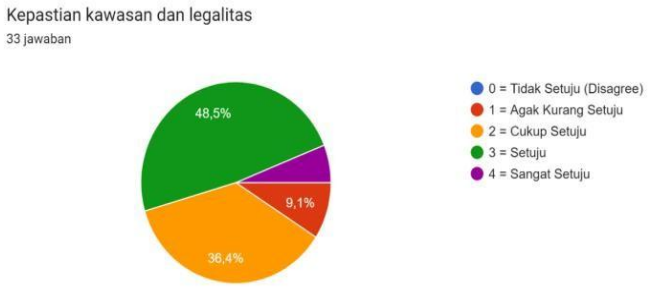


Figure 8. Respondents' Responses Regarding Infrastructure

Human Resources

The role of local governments and stakeholders in supporting the development of horticultural farming, specifically regarding bird's-eye chili cultivation by village farmers, is still considered insufficient. Interviews with bird's-eye chili farmers in Tesbatan Village, Kupang Regency, yielded a score of 38.2%; this indicates that respondents agree chili farmers in East Nusa Tenggara Province possess good experience and quality. However, while agricultural extension workers do provide guidance on bird's-eye chili cultivation to farmers in Amarasi District, this support has not yet reached all villages and chili farmers across Kupang Regency.

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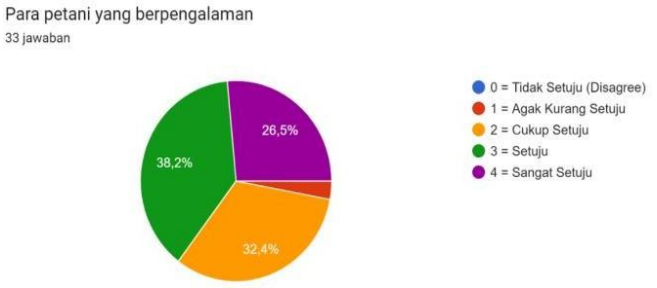


Figure 9. Respondents' Responses Regarding Human Resources

Cultivation Technology

Horticultural cultivation technology, especially cayenne pepper, is still carried out by farmers in a traditional way. Some farmers have not implemented good cultivation procedures. The score shows that 44.1% quite agree that the application of agricultural technology is still ongoing. In terms of cultivation and processing technology, farmers can still obtain available technology and use it to produce better cayenne pepper commodities.

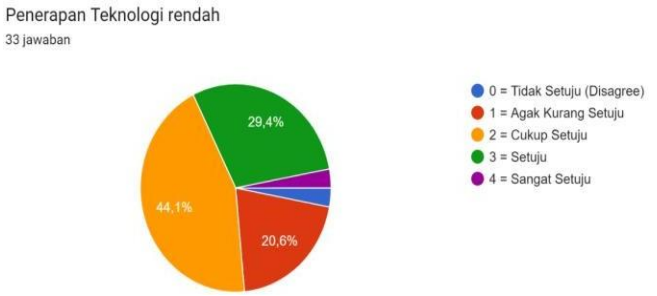


Figure 10. Application of Agricultural Technology

Interviews with agricultural extension workers reveal that farmers have indeed received information regarding proper cultivation and post-harvest processing techniques; however, not all farmers have been willing to implement these practices. In reality, production yields could be increased through correct tapping methods and proper post-harvest processing.

Purchasing

To date, the quality or standards of the bird's-eye chili peppers being sold have been determined by traders; although the Indonesian National Standard (SNI) for horticultural quality exists, it has not been fully implemented by either farmers or traders. Farmers lack bargaining power under this system and are often disadvantaged. Furthermore, there are currently no specific government regulations regarding quality standards for marketable horticultural produce. Consequently, farmers sell their harvests without applying specific quality treatments, resulting in low prices because traders treat all produce uniformly, lumping it together without sorting for quality or adhering to established standards.

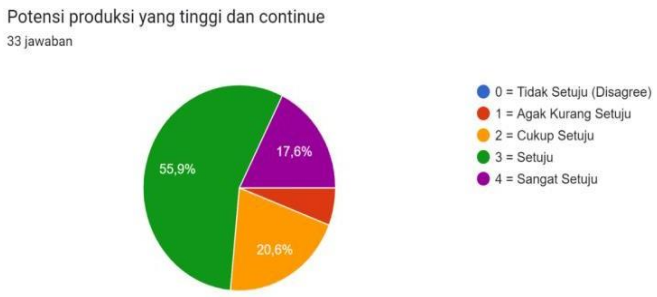


Figure 11. Production Potential

CONCLUSION

The bird's eye chili value chain in East Nusa Tenggara Province generally involves three key actors: farmers, processors, and wholesalers. Farmers carry out the majority of value chain activities, as they are the primary agents in traditional-scale bird's eye chili production.

The bird's eye chili value chain is shaped by two categories of activities: primary activities—comprising inbound logistics (horticultural raw material inputs), operations (processing horticulture into semi-finished goods), outbound logistics, and horticultural marketing—and support activities, which include horticultural production infrastructure, human resource development, technology development, and procurement.

Based on the analysis of respondent data, the findings are categorized as follows: a) Strengths, influenced by production potential, value potential, production methods, competitiveness, human resources, and land ownership status; b) Weaknesses, influenced by low technology adoption, education levels, soil fertility, inconsistent yields, and the availability of post-harvest facilities; c) Opportunities, influenced by designated production areas, high demand, supply chain certainty, funding availability, and post-harvest factors; and d) Threats, influenced by climate change, pest infestations, price fluctuations, and regulations.

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