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Business Feasibility of Integrated Agriculture as an Alternative for Local Economic Development in Nganjuk Regency

Moh. Kusnimad Sofi Ari [1]

Universitas Pangeran Diponegoro Nganjuk [1]
E-mail: arisujorejo2@gmail.com

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ABSTRACT:

The agricultural sector is the main contributor to the Gross Regional Domestic Product (GRDP) of Nganjuk Regency, particularly through shallot and rice production. However, dependence on monoculture farming practices often leaves farmers vulnerable to market price fluctuations and soil quality degradation caused by excessive use of chemical fertilizers. This study aims to analyze the business feasibility of an Integrated Farming System that combines the food crop, horticulture, and livestock sub-sectors as an alternative model for sustainable local economic development. The research employs a mixed-methods approach. Financial feasibility is assessed using the Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit-Cost Ratio (Net B/C), and Payback Period (PP) indicators, while the non-financial analysis examines market, technical, and environmental aspects. Data were collected through observations and in-depth interviews with farmer groups in Nganjuk's agricultural production centers. The findings indicate that the integrated farming model can reduce production costs by 20–30% through the zero-waste concept, which involves utilizing livestock waste as organic fertilizer and agricultural residues as animal feed. Financially, this business model is considered feasible, as indicated by a positive NPV, an IRR exceeding the prevailing benchmark interest rate, and a Net B/C ratio greater than 1. This study concludes that transitioning to integrated farming not only increases farmers' profitability but also strengthens the economic resilience of Nganjuk Regency against external shocks.

INTRODUCTION

Nganjuk Regency is recognized as one of the regions whose economy is predominantly based on the agricultural sector. This is reflected in the structure of its Gross Regional Domestic Product (GRDP), which indicates that the agriculture, forestry, and fisheries sectors consistently constitute the largest contributors to the regional economy, accounting for more than 30% of total economic activity. This condition demonstrates that agriculture plays a vital role, not only as a source of livelihood for rural

communities but also as one of the main drivers of economic growth in Nganjuk Regency. At the national level, the region is also widely recognized as a major producer of several leading agricultural commodities, particularly shallots (Allium ascalonicum L.), which are extensively cultivated in Sukomoro, Rejoso, and Bagor Districts, as well as rice, which is grown across various districts. Favorable geographical conditions, a suitable climate, land availability, and the community's extensive experience in agricultural activities represent significant resources that can be utilized to strengthen the development of regional agribusiness.

These agricultural resources create opportunities for communities to develop economic activities that focus not only on increasing production yields but also on optimizing resource utilization to generate added value and improve farmers' welfare. In regional economic development, the agricultural sector is closely interconnected with various other business sectors, including the provision of production inputs, commodity processing, distribution, and agricultural product trading. These intersectoral linkages provide opportunities for agriculture to evolve into an integrated chain of economic activities capable of expanding employment opportunities while stimulating community-based economic growth. Nevertheless, substantial production potential does not automatically guarantee improvements in farmers' living standards. Several challenges continue to affect the success of farming enterprises, including productivity levels, resource-use efficiency, production costs, market accessibility, and farmers' ability to anticipate various business risks.

Despite the considerable natural resource potential, farmers in Nganjuk Regency continue to face various structural challenges. Most farming activities still rely on monoculture practices, with a high degree of dependence on industrially supplied agricultural inputs. The continuous use of inorganic fertilizers and chemical pesticides not only increases farmers' financial burdens, potentially accounting for approximately 40–50% of total working capital, but also poses risks to long-term soil quality and fertility (Rachman Sutanto, 2002). Furthermore, increases in the prices of fertilizers, seeds, pesticides, and labor are often not accompanied by proportional increases in the selling prices of agricultural products. Consequently, farmers' profit margins become increasingly limited, making the sustainability of farming enterprises more vulnerable to fluctuations in production input prices.

Another issue affecting the sustainability of farming enterprises is the instability of horticultural commodity prices, particularly shallots. Price fluctuations in this commodity are strongly influenced by market supply and demand conditions. During the main harvest season, an increase in production that is not matched by sufficient market absorption capacity can lead to a substantial decline in selling prices. This situation may result in financial losses for farmers, particularly when the selling price falls below the break-even point (BEP). Ultimately, dependence on a single commodity makes farmers' income vulnerable to changes in both production and market conditions. Therefore, economic diversification is necessary to provide alternative income sources while maximizing the utilization of resources available within farming households.

One alternative that can be considered to address these challenges is the development of business

diversification by integrating agricultural and livestock activities. Through this approach, farmers have opportunities to generate income not only from food crop and horticultural cultivation but also from livestock activities that can provide additional economic value. In its implementation, beef cattle and goat farming can serve as complementary business units interconnected with agricultural activities. Livestock can also become an alternative source of revenue when crop production declines or agricultural commodity prices become unfavorable. By developing more than one type of business activity, farmers can reduce their dependence on a single income source, thereby strengthening the economic resilience of farming households.

In response to these needs, agricultural business development should be directed toward a production system capable of adapting to changing conditions while maintaining its long-term sustainability. One approach that can be implemented is the Integrated Farming System (IFS), which connects the food crop and horticultural subsectors with livestock activities through an interconnected ecological cycle known as a closed-loop system. This approach emphasizes the zero-waste principle by promoting the reuse of by-products generated from production activities. Agricultural waste, such as rice straw and crop residues, can be utilized as livestock feed. Conversely, livestock waste can be processed into organic fertilizer and returned to agricultural land to improve soil nutrient content (B.P. Wibowo and R. Nurmalina, 2020). This resource utilization pattern makes it possible to reduce dependence on externally supplied production inputs, lower operational expenditures, and improve the efficiency of local resource utilization.

In addition to providing environmental benefits, the implementation of an integrated farming system also offers considerable economic potential. The relationship between crop cultivation and livestock activities creates a complementary production pattern, as each subsector can supply resources required by the other. Agricultural by-products can be utilized as livestock feed, while processed livestock manure can be used as organic fertilizer to support land productivity. At the same time, livestock activities generate marketable products that provide additional sources of income. These interconnected activities create opportunities to reduce production costs, diversify revenue streams, and increase the economic value of waste that has previously been underutilized. Therefore, an integrated farming system functions not merely as an innovation in production techniques but also as an agribusiness strategy that emphasizes a balance between economic sustainability and environmental conservation.

Although it offers several advantages, implementing an integrated farming system still requires careful business planning, particularly regarding investment requirements and operational management. The construction of livestock facilities, procurement of animals, feed provision, waste processing, labor requirements, and agricultural production facilities are all components that require financial resources. These requirements must be carefully calculated to ensure that the financial burden does not exceed farmers' financial capacity. In addition to financing factors, the success of this system is also influenced by the availability of raw materials, human resource competencies, technological capabilities, market access, and

business management capacity. Without adequate planning, integrating the two subsectors may instead increase expenditures and operational risks. Therefore, a business feasibility analysis is necessary to determine whether an integrated farming model can be implemented and expanded on a larger business scale.

Assessing the feasibility of an integrated farming business requires consideration of both non-financial and financial aspects. Non-financial aspects include market conditions and opportunities, technical readiness, management capabilities, and compliance with applicable legal regulations. Meanwhile, financial analysis aims to determine the business's ability to generate profits and recover the invested capital. Several indicators can be used to assess financial feasibility, including Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit-Cost Ratio (Net B/C), and Payback Period (PP). These indicators provide information regarding the economic benefits generated, investment returns, the relationship between benefits and costs, and the time required to recover the initial investment. Furthermore, sensitivity analysis is necessary to identify the business's capacity to withstand changes in the prices of production inputs and the selling prices of agricultural and livestock commodities.

Within Nganjuk Regency, Sukomoro and Rejoso Districts offer considerable opportunities for the development of integrated farming systems. Both areas have established shallot production activities and livestock potential that can be interconnected within an integrated business model. The availability of agricultural and livestock resources provides an initial foundation for establishing more efficient and sustainable agribusiness activities. However, this potential requires further empirical investigation, particularly to assess the economic feasibility of integrating the two subsectors, the composition of costs and revenues, and the investment capacity to generate profits for farmers. Such an assessment is necessary because each region has distinct production conditions, resource availability, and socioeconomic characteristics.

Although numerous studies have examined shallot farming, livestock enterprises, and sustainable agriculture, research specifically integrating financial feasibility analysis with non-financial aspects of crop and livestock enterprises based on the actual conditions of farmers in Nganjuk Regency remains limited and requires further investigation. This research gap highlights the importance of studies that not only estimate profits based on theoretical calculations but also evaluate business feasibility by considering actual field conditions. In this regard, a mixed-methods approach is considered relevant because it enables the integration of quantitative analysis of financial feasibility indicators with qualitative approaches to understanding business practices, farmers' readiness, and various factors influencing the implementation of an Integrated Farming System.

Based on the foregoing discussion, this study aims to examine the business feasibility of implementing an Integrated Farming System that connects the food crop and horticultural subsectors with livestock activities in Nganjuk Regency, focusing on Sukomoro and Rejoso Districts. The assessment

covers market, technical, management, legal, and financial aspects using NPV, IRR, Net B/C, PP, and sensitivity analysis indicators. The findings are expected to provide an empirically grounded overview of the prospects for integrated farming development and serve as a reference for farmers, investors, and local governments in formulating agribusiness development policies. Ultimately, the implementation of this model is expected to become an alternative strategy for strengthening the local economy through improved production efficiency, diversified income sources, optimal resource utilization, and the development of sustainable agricultural activities in Nganjuk Regency.

RESEARCH METHODS

This study employs a mixed-methods approach using a sequential explanatory design, which combines quantitative and qualitative research approaches through a series of sequential stages. The first stage involves a quantitative approach to develop and calculate the financial feasibility projections of the business. Subsequently, a qualitative approach is employed to provide a more comprehensive explanation of the financial findings by considering farmers' socioeconomic conditions. The research was conducted in Nganjuk Regency, particularly in Sukomoro and Rejoso Districts. These locations were selected purposively based on their potential for shallot cultivation and beef cattle farming. The entire research process was conducted over a period of four months.

The research participants were selected using purposive sampling, involving 30 farmers who met specific criteria: owning or cultivating at least 0.25 hectares of agricultural land, raising a minimum of two ruminant livestock animals, and having at least two years of farming experience. To obtain more comprehensive information and strengthen data validity, the study also involved three agricultural extension officers and two agricultural commodity collectors. The data consisted of primary and secondary sources, collected through participatory observation, structured interviews, document analysis, and Focus Group Discussions (FGDs). The FGDs were conducted with representatives of farmer groups to confirm and validate the fundamental assumptions used in developing the financial projections (Sugiyono, 2017).

Data analysis was conducted using two main approaches. First, descriptive analysis was employed to assess business feasibility based on market, technical, management, and legal aspects. Second, quantitative analysis was conducted to measure the financial feasibility of the integrated farming business. Financial projections were developed based on a five-year cash flow analysis using several investment feasibility indicators, namely Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit-Cost Ratio (Net B/C), and Payback Period (PP). In addition, sensitivity analysis was conducted using the switching value approach to determine the extent to which changes in production input prices and agricultural product selling prices could affect business sustainability. The overall findings were subsequently used as the basis for determining the feasibility of developing an integrated farming model in Nganjuk Regency (Kadariah, 2001).

RESULTS AND DISCUSSION

1. Non-Financial Feasibility Analysis

An assessment of non-financial aspects is a fundamental component of business feasibility evaluation. A business with seemingly high financial returns may not necessarily be viable if it lacks adequate market readiness, technical capacity, resource management, and legal and environmental compliance. Therefore, evaluating the feasibility of developing an integrated farming system in Nganjuk Regency requires a comprehensive assessment. In this study, the non-financial feasibility analysis focuses on four main components: market and marketing aspects, technical and technological aspects, human resource management, and legal and environmental aspects.

1.1 Market and Marketing Aspects

The market analysis indicates a complementary relationship between shallot commodities (Allium ascalonicum L.) and beef cattle farming. These commodities have different market characteristics, allowing them to provide a balance in farmers' revenue sources within an integrated farming system.

First, shallot market dynamics. Leading shallot varieties cultivated in Nganjuk Regency, particularly Bauji and Tajuk, have relatively extensive market distribution networks and access to major national wholesale markets, including Kramat Jati Wholesale Market in Jakarta. Nevertheless, this commodity is characterized by considerable price fluctuations. During the peak harvest season, shallot prices may decline to as low as IDR 10,000 per kilogram. Meanwhile, the break-even point (BEP) that farmers need to achieve ranges from IDR 12,000 to IDR 14,000 per kilogram. This difference indicates the potential for financial losses when harvested products are sold at prices below production costs.

Second, the role of livestock as a market stabilizer. Unlike shallots, the beef cattle market in Nganjuk Regency tends to exhibit relatively stable and inelastic characteristics, with prices showing an estimated annual increase of approximately 5–8% (Dinas Peternakan dan Perikanan Kabupaten Nganjuk, 2023). Within an integrated farming system, livestock ownership can function as a buffer asset when crop commodity prices decline. Through livestock ownership, farmers have an alternative source of funds that can be liquidated to meet capital requirements for the next planting season. This condition can reduce farmers' need to sell agricultural land or rely on loans when facing economic pressure caused by declining shallot prices.

Third, marketing strategies. Based on the business conditions of farmers in the research locations, several efforts have been undertaken to increase profitability through more effective marketing methods. For shallot commodities, one strategy being implemented is the measured bulk-selling system (Tebasan Terukur). Meanwhile, beef cattle are marketed directly to slaughterers through a direct-selling method, thereby reducing dependence on intermediaries or local livestock brokers (blantik). Both strategies are intended to obtain more favorable selling prices and increase the profit margins received by farmers.

1.2 Technical and Technological Aspects

Technical feasibility is one of the determining factors in the successful implementation of an integrated farming system. Based on research findings in Sukomoro District, production efficiency can be improved through the implementation of a closed-loop system. Under this system, by-products from agricultural and livestock activities are reused as production resources, allowing the two subsectors to operate in a sustainable and mutually supportive relationship.

First, agricultural waste processing for livestock feed.

Shallot cultivation generates waste in the form of skins and leaves remaining from the sorting process. The amount of this waste is estimated to reach 2–3 tons per hectare per harvest cycle. However, shallot waste cannot be directly fed to cattle in its fresh condition because it may cause health problems, including anemia. Therefore, it requires processing through a fermentation process using probiotics for seven days before being used as animal feed. The application of this fermentation technology has been reported to reduce the need for concentrate feed by up to 40% (B.P. Wibowo, 2021).

Second, the utilization of livestock waste as organic fertilizer.

In addition to producing marketable livestock products, cattle farming also generates manure that can be utilized as raw material for organic fertilizer. An adult cow is estimated to produce approximately 10–15 kilograms of solid manure per day. With five cattle incorporated into an integrated farming system, the amount of manure produced, after appropriate processing, can be converted into approximately 15 tons of mature organic fertilizer annually.

From an agronomic perspective, the application of this organic fertilizer to shallot fields in Nganjuk Regency provides benefits in improving soil porosity. Furthermore, the use of organic fertilizer has been reported to increase shallot bulb weight by 10–15% compared with the exclusive application of chemical fertilizers. These findings indicate that livestock waste processing not only helps reduce environmental problems but also provides direct benefits to agricultural productivity.

1.3 Management and Social Aspects

From a management perspective, one of the main challenges in implementing an integrated farming system is the allocation of labor. Managing crop cultivation and livestock activities simultaneously requires more time and attention than monoculture farming. Based on the research findings, livestock management requires an additional 2–3 hours of labor per day. This additional workload must be considered to ensure that responsibilities between agricultural and livestock activities can be allocated effectively.

On the other hand, cattle ownership in Nganjuk Regency is not solely associated with economic interests but is also closely related to local social and cultural values. In the local wisdom of the community, cattle are commonly referred to as Rojokoyo, symbolizing livestock as a form of household wealth. Cattle

ownership is often regarded as an indicator of a family's economic capacity and financial stability. Furthermore, farmers who own cattle as savings assets tend to be perceived as having greater economic capacity and creditworthiness by local financial institutions. Therefore, the implementation of an integrated farming system is consistent with existing community practices while also offering the potential to strengthen farmers' economic positions.

2. Financial Feasibility Analysis

Financial analysis was conducted to determine the ability of an integrated farming system to generate profits and recover the initial investment. The calculations in this study use the assumptions of one integrated farming business unit as the basis for developing financial projections. The main parameters are as follows:

1. Land area: 1 hectare, with fixed land rental costs included in the calculation.
2. Livestock scale: 5 fattening cattle.
3. Project period: 5 years, comprising 10 shallot planting cycles and 5 livestock production cycles.
4. Discount factor: 12%, based on a moderate assumption above the prevailing interest rate for People's Business Credit (KUR).

2.1 Investment and Operational Cost Structure

Before assessing financial feasibility, it is necessary to identify all expenditures associated with business operations. These expenditures consist of initial investment costs and operational costs incurred throughout the business period. Both components form the basis for preparing cash outflows, which are subsequently used to calculate investment feasibility indicators.

a. Initial Investment Costs

Initial investments in an integrated farming system are allocated to provide the infrastructure and facilities required to support both crop production and livestock activities. These investment components include the construction of communal livestock housing, procurement of a feed chopper, installation of a simple biogas system, and the purchase of five feeder cattle for fattening purposes. Based on the calculations, the total initial investment requirement amounts to IDR 145,000,000.

b. Operational Cost Efficiency

One of the expected economic advantages of implementing an integrated farming system is the reduction of operational expenditures through the utilization of available resources within the production system. Integrating agricultural and livestock activities enables some production requirements to be fulfilled without relying entirely on externally purchased inputs. The resulting cost savings include:

1. Fertilizer cost savings. Utilizing organic fertilizer to replace a portion of chemical fertilizers, particularly urea and ammonium sulfate (ZA), makes it possible to reduce inorganic fertilizer use by 30%. The resulting cost savings are estimated at IDR 4,500,000 per planting season.

2. Feed cost savings. Utilizing rice straw and shallot cultivation residues as livestock feed can reduce the need to purchase forage from external suppliers. Through this approach, feed costs are estimated to decrease by IDR 5,000,000 annually.

2.2 Results of Financial Feasibility Indicators

Based on five-year financial projections, the implementation of an integrated farming system demonstrates positive results across several investment indicators. These calculations provide an overview of potential profitability, investment returns, the relationship between benefits and costs, and the period required to recover the initial investment.

a. Net Present Value (NPV)

The calculation results indicate that the integrated farming business generates a positive NPV of IDR 218 million. This value suggests that, after accounting for the cost of capital and inflation over the analysis period, the business is capable of generating net economic benefits amounting to IDR 218 million. Compared with monoculture farming on an equivalent land area, these results indicate the potential for higher profitability. As a comparison, monoculture farming generates an average NPV of approximately IDR 120–140 million. Therefore, integrating crop cultivation and livestock activities offers the potential to generate greater additional economic value for farmers.

b. Internal Rate of Return (IRR)

The IRR obtained from this analysis reaches 34.2%. This rate indicates that the business has a relatively high capacity to generate investment returns. The value also substantially exceeds prevailing deposit interest rates and commercial lending rates. Therefore, based on the IRR indicator, an integrated farming system offers an attractive investment opportunity for prospective investors and banking institutions considering financing agribusiness activities.

c. Net Benefit-Cost Ratio (Net B/C)

The analysis results indicate a Net B/C value of 1.92. This figure illustrates that every IDR 1 of expenditure in the business generates IDR 1.92 in net benefits based on the calculation method applied. A Net B/C ratio greater than one indicates that the economic benefits generated exceed the costs incurred. Accordingly, based on this indicator, the integrated farming business can be categorized as financially feasible.

d. Payback Period (PP)

Based on the investment recovery calculation, the capital invested in constructing livestock facilities and procuring cattle is estimated to be recovered within 2 years and 3 months. The relatively short payback period is supported by recurring revenue from shallot harvesting, which takes place approximately every 70 days. These cash inflows can be utilized to support livestock maintenance and operational requirements. With two complementary sources of revenue, business capital turnover can be maintained more effectively, while the risk of delayed investment recovery can be reduced (J. Price Gittinger, 2008).

2.3 Sensitivity Analysis

Considering that agricultural activities in Nganjuk Regency remain exposed to uncertainties associated with climatic conditions and market price fluctuations, sensitivity analysis was conducted to measure the ability of an integrated farming system to maintain its business feasibility under changing economic conditions. This assessment was performed through several scenarios involving changes in commodity selling prices and production input costs (stress tests).

a. Scenario 1: A 30% Decline in Shallot Selling Prices

In the first scenario, a simulation was conducted to examine the possibility of a 30% decline in shallot selling prices. This change was used to assess the extent to which reduced revenue from the crop subsector affects the overall financial performance of the integrated farming business.

The calculation results show that the NPV decreases to IDR 89,000,000, while the IRR declines to 19%. Despite the substantial reduction in profitability, the business remains financially feasible because its NPV is still positive.

This condition demonstrates the important role of the livestock subsector in maintaining farmers' income stability when shallot prices decline. Revenue from cattle sales, which tends to be relatively more stable, can help offset some of the operational losses resulting from lower agricultural commodity prices. Thus, farmers implementing an integrated farming system have alternative income sources that can help maintain business continuity. This differs from monoculture farming, which depends more heavily on a single commodity and is therefore more vulnerable to financial pressure when selling prices decline sharply (Kadariah, 2001).

b. Scenario 2: A 50% Increase in Chemical Fertilizer and Concentrate Feed Prices

The second scenario simulates a 50% increase in the prices of chemical fertilizers and concentrate feed. This scenario aims to assess the capacity of an integrated farming system to withstand rising production costs caused by external factors.

The calculations indicate that increases in the prices of these two components reduce the NPV to IDR 165,000,000, while the IRR reaches 28%. Although the feasibility indicators experience some changes, the results still demonstrate that the integrated farming business remains highly feasible for development.

The business's ability to maintain its feasibility is associated with its degree of self-sufficiency in meeting production input requirements. Approximately 60–70% of input requirements, particularly fertilizer and fibrous feed, can be fulfilled through the utilization of resources available within the integrated farming system (in situ). Lower dependence on externally purchased inputs enables the business to remain relatively resilient when agricultural input prices increase. In other words, integrating agricultural and livestock activities contributes to strengthening economic resilience while reducing the impact of external price fluctuations on business operations.

3. Implications for the Local Economy of Nganjuk Regency

The implementation of an integrated farming system has the potential to generate benefits not only for individual farming households but also for broader regional economic development. The interconnectedness of agricultural and livestock activities can create new economic opportunities that support increased production, employment generation, and food availability. Several potential implications can be identified as follows.

a. Increasing Gross Regional Domestic Product (GRDP)

The development of an integrated farming system offers opportunities to generate additional economic value for Nganjuk Regency through increased activity in the livestock subsector. If approximately 20% of shallot farmers in Nganjuk Regency begin adopting this business model, regional economic activity is projected to increase through additional livestock production integrated with agricultural activities. Such growth can be achieved without expanding agricultural land because optimization focuses on existing resources and available farmland.

b. Employment Generation

An integrated farming system is relatively labor-intensive because it combines several production activities within a single management framework. Crop cultivation, livestock maintenance, feed processing, and waste management require continuous labor involvement. This creates opportunities for members of farming households to participate productively in business activities. Consequently, family labor that was previously underutilized or categorized as disguised unemployment can be mobilized through the management of integrated farming enterprises (Lincolin Arsyad, 2017).

c. Strengthening Food Security

The implementation of an integrated farming system is also important in supporting regional food security. Integrating food crop cultivation and livestock activities can increase the local availability of agricultural products and livestock commodities. The development of integrated beef cattle farming is expected to help reduce Nganjuk Regency's dependence on beef supplies from other regions. Furthermore, utilizing organic fertilizer derived from livestock waste can reduce farmers' dependence on subsidized fertilizers, whose distribution is influenced by central government policies. Therefore, this model has the

potential to strengthen local food production independence while improving the region's capacity to meet agricultural resource requirements sustainably.

CONCLUSION

Based on the research findings, the development of an integrated farming system in Nganjuk Regency is considered feasible from a non-financial perspective, encompassing market, technical, and social aspects. Shallot and beef cattle commodities have complementary market potential, enabling income diversification and reducing business risks. From a technical perspective, implementing the Zero-Waste principle by utilizing agricultural waste as livestock feed and animal manure as organic fertilizer can improve resource-use efficiency while reducing dependence on external inputs. Furthermore, its alignment with the local wisdom of the Nganjuk community, particularly the tradition of livestock ownership known as Rojokoyo, serves as a supporting factor for community acceptance and the sustainability of this business model.

From a financial perspective, the integrated farming system demonstrates promising investment prospects and has the potential to generate higher returns than conventional monoculture farming practices. This is indicated by a positive Net Present Value (NPV), an Internal Rate of Return (IRR) exceeding the benchmark interest rate, and a relatively short Payback Period (PP) of less than three years. These financial benefits are supported by two primary revenue streams, namely shallot cultivation and beef cattle sales, which accelerate investment recovery while strengthening business cash flow.

In addition to its financial profitability, the integrated farming system demonstrates relatively strong business resilience based on the sensitivity analysis. The business remains financially feasible despite a 20–30% decline in shallot selling prices or an increase in the prices of chemical fertilizers and concentrate feed. This resilience is supported by the optimal utilization of agricultural and livestock waste as alternative production inputs, which helps reduce operational costs. Therefore, the integrated farming system has the potential to serve as a sustainable agribusiness development model in Nganjuk Regency through increased profitability, income diversification, production efficiency, and strengthened economic resilience among farming households.

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