AgriMu
Journal of Socio-Economics and Agribusiness
Vol. 06 No. 02 June 2026, Pages: 12-18

FINANCIAL FEASIBILITY ANALYSIS OF SWAMP BUFFALO FARMING IN NORTH KONAWE REGENCY

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ABSTRACT
This study aims to analyze the financial feasibility of swamp buffalo farming in North Konawe Regency, particularly in Wiwirano and Landawe Districts. The study was conducted from September to November 2025 using a descriptive quantitative approach through a survey method involving 30 farmers selected purposively. Primary data were collected through structured interviews using questionnaires, while secondary data were obtained from Statistics Indonesia (BPS) and relevant literature. The analysis covered revenue, production costs, income, Net Present Value (NPV), Net Benefit-Cost Ratio (NBCR), Payback Period (PBP), and sensitivity analysis. The results showed that most farmers were of productive age, with an average livestock ownership scale of 1–5 animals. Business income increased from a loss of IDR 146,762,637 in 2020 to a profit of IDR 348,237,363 in 2024, along with the increase in revenue from livestock sales. The financial feasibility analysis indicated that the business was feasible to operate, with an NPV of IDR 258,228,973, an NBCR of 2.22, and a PBP of 3.35 years. Under a 15% change scenario, the business remained feasible despite a decline in feasibility indicators. Therefore, swamp buffalo farming in North Konawe has good economic prospects and has the potential to be developed sustainably through improved business management.

Keywords: Financial feasibility, NPV;\, NBCR, payback period, swamp buffalo.

INTRODUCTION

Buffalo farming in Indonesia remains relevant as a source of support for rural household economies due to its multifunctional role as a producer of meat and draught power, as well as an asset or form of savings for farmers. At the Asian level, buffaloes make a substantial contribution to agrarian economies because they are able to produce with relatively low inputs and play an important role in wetland farming systems. Based on type, domestic buffaloes are classified into river buffaloes and swamp buffaloes (Minervino et al., 2020). Swamp buffaloes (*Bubalus bubalis*) have high adaptability to swamp and wetland environments, making them potential livestock for development in suitable areas, including as dual-purpose animals (El Debaky et al., 2019). Several studies have also shown that swamp buffalo production and populations in Southeast Asia have tended to decline in recent decades, partly due to increasing agricultural mechanization and a shift in function from draught power to meat, milk, and hide production. Meanwhile, the strengthening of swamp buffalo production systems has received relatively less research attention than cattle or river buffaloes (Pineda et al., 2021) .

In Indonesia, particularly in Southeast Sulawesi, buffalo population dynamics and distribution patterns vary across regions. The buffalo population in Southeast Sulawesi Province was 2,525 heads in 2015 and increased to 2,812 heads in 2022, with an average growth rate of 1.62% per year (BPS Provinsi Sulawesi Tenggara, 2022). The total buffalo population of Southeast Sulawesi in 2022, amounting to 2,812 heads, was also recorded in the BPS statistical table. However, in the mainland Konawe area, particularly North Konawe Regency, an opposite trend was observed: the swamp buffalo population declined from 664 heads in 2015 to 231 heads in 2022, with an average decrease of 5.01% per year (BPS Konawe Utara 2023). In 2023, the distribution of swamp buffaloes in North Konawe Regency was concentrated in Wiwirano District, with 279 heads (61.05%), and Landawe District, with 135 heads (29.54%). This population decline, accompanied by concentrated distribution, indicates pressure on the farming system, both technically and economically, which may hinder the sustainability of swamp buffalo development in the region (Prihandini et al., 2023).

The slow development of buffalo farming compared with other ruminants is often associated with constraints related to feed, environment, genetics, and the low adoption of livestock management practices by farmers. Buffalo production literature also emphasizes that nutrition and feed management are important determinants of productivity improvement (Kannan et al., 2023). In the context of Southeast Sulawesi, local studies highlight the need to pay attention to local feed resources, including forage and agricultural by-products, as the foundation for swamp buffalo development. This also indicates that feed is a key variable in the cost structure and business performance of farmers. Nevertheless, studies on swamp buffaloes in this region have tended to focus more on technical aspects and population dynamics, while information addressing the core question of whether this enterprise is feasible and profitable under actual farmer conditions remains limited, particularly in North Konawe Regency. The population decline from 664 to 231 heads and the concentration of distribution in Wiwirano and Landawe Districts have not been strongly explained from an economic and financial feasibility perspective, even though development decisions require evidence-based assessments of profitability, efficiency, and business risk (Rohaeni et al., 2023).

This study presents a location-specific feasibility analysis of swamp buffalo farming in North Konawe Regency by integrating population dynamics data from 2015 to 2023, traditional husbandry characteristics, and the most determining cost-performance factors, particularly feed and management. This framework is important because financial feasibility analysis in agribusiness and livestock enterprises is commonly conducted using investment indicators such as NPV, IRR, Net B/C, and Payback Period as the basis for development recommendations. This approach has also been widely used in feasibility studies in the agricultural and livestock sectors. Therefore, this study aims to analyze the feasibility of swamp buffalo farming in North Konawe Regency based on financial feasibility indicators, while also identifying the determinants of business performance at the farmer level as a basis for realistic and sustainable development recommendations.

MATERIALS AND METHODS

This study was conducted in North Konawe Regency from September to November 2025 using a quantitative approach with a descriptive design through a survey method. Data were collected through structured interviews using questionnaires administered to swamp buffalo farmers. The survey method was selected because it is effective for systematically obtaining data on costs and revenues from respondents, thereby describing the actual condition of the enterprise and supporting the calculation of financial feasibility indicators(Sugiyono, 2019).

The population in this study consisted of all swamp buffalo farmers who were actively engaged in swamp buffalo farming in North Konawe Regency, particularly in swamp buffalo production centers, namely Wiwirano and Landawe Districts. The research sample was determined using purposive sampling, namely the deliberate selection of respondents based on specific criteria. Respondents were selected on the consideration that they were farmers who were still actively raising swamp buffaloes, were directly involved in farm management activities, and had at least one year of farming experience. The number of respondents analyzed was 30 farmers..

The data used in this study consisted of: Primary data, obtained through field observations and structured interviews using questionnaires, including data on costs, revenues, selling prices, business scale, and management practices. Secondary data, obtained from Statistics Indonesia (BPS), relevant government agencies, literature, and previous research findings to strengthen the analytical context.

Data Analysis

1. Revenue

Total business revenue refers to the gross income obtained from the sale of outputs, calculated by multiplying the quantity of production by the selling price per unit of product. Mathematically, total revenue is formulated as follows

$$\boldsymbol{TR} = \boldsymbol{Q} \times \boldsymbol{P}$$

2. Total Cost

Total business cost is the sum of all fixed costs and variable costs used in the production process. It serves as the basis for calculating income and conducting financial feasibility analysis of an agribusiness enterprise.

$$\boldsymbol{TC} = \boldsymbol{FC} - \boldsymbol{VC}$$

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Income

Business income refers to the net profit obtained after all production costs are deducted from total revenue. It reflects the actual economic performance of an enterprise within a given production period. Mathematically, business income is formulated as follows:

$$\boldsymbol{Pd = TR - T}$$

Net Present Value (NPV)

Net Present Value (NPV) is used to assess whether a project is able to generate economic added value for investors based on a certain discount rate. NPV is a key indicator in financial feasibility analysis because it directly shows the difference between discounted benefits and discounted costs. Mathematically, NPV is formulated as follows:

$$NPV = \sum_{t=0}^{n} \frac{(Bt - Ct)}{(1+i)t}$$

Net Benefit-Cost Ratio (Net B/C)

Net Benefit-Cost Ratio (Net B/C) is an investment feasibility indicator that compares the present value of all benefits with the present value of all costs over the project life. This ratio is used to assess the efficiency of capital utilization, where a Net B/C value greater than one indicates that the benefits received are greater than the costs incurred; therefore, the enterprise is considered financially feasible. Mathematically, Net B/C is formulated as follows:

$$Net\frac{B}{C} = \frac{\sum_{t=1}^{n} NBt\ (positif)}{\sum_{t=1}^{n} NBt\ (negatif)}$$

Payback Period (PP)

Payback Period (PP) is an analytical method used to determine the length of time required to recover the initial investment from the cash flows received during a certain period. A shorter payback period indicates faster capital recovery and lower investment risk. Mathematically, Payback Period is formulated as follows:

$$PBP = T_{p-1} + \frac{\sum_{i=0}^{n} Ii - \sum_{i=0}^{n} B_{icp-1}}{Bp}$$

Sensitivity Analysis

Sensitivity analysis is used to assess the resilience of business feasibility to changes in key input variables (Nisrina et al., 2022). The scenario may be conducted by increasing costs, such as feed or labor costs, or decreasing selling prices by a certain percentage, while other variables are maintained under the base-case condition. Subsequently, the values of NPV, IRR, and B/C are recalculated.

RESULTS AND DISCUSSION

1. Initial Investment in Swamp Buffalo Farming

The initial investment in swamp buffalo farming in North Konawe Regency includes the construction of housing facilities and the procurement of supporting facilities, such as feeding equipment and drinking water facilities. Based on the research results, all respondents used their own capital without utilizing bank credit. This condition indicates that the initial capital requirement is relatively high, while access to formal financing remains limited among farmers, even though access to credit may be associated with business performance and profitability (Lestari et al., 2024).

Table 1. Initial Investment in Swamp Buffalo Farming

No.	Type of Expenditure	Number of Units	Price per Unit (IDR)	Total (IDR)
1	Housing construction	30	611,111	18,333,333
2	Feeding equipment	30	1,000,000	30,000,000
3	Construction of water reservoir/drinking pond	30	700,000	21,000,000
4	Initial health equipment/PPE	30	300,000	9,000,000
	Total	**120**		**78,333,333**

Source: Processed primary data, 2025

Table 1 presents the components of the initial investment in swamp buffalo farming for 30 respondents, including housing construction, feeding equipment, construction of water reservoirs or drinking ponds, and initial health equipment. The total initial investment was IDR 78,333,333, with the largest cost components coming from feeding equipment and housing construction. This indicates that basic infrastructure is a primary requirement in supporting the sustainability of swamp buffalo farming. This investment structure emphasizes that although the investment value per farmer is smaller than enterprises based on purchasing large numbers of livestock, initial capital remains an important prerequisite because it affects business risk and profit expectations in subsequent periods. In line with this, investment decisions in production assets represent the allocation of funds to obtain future economic benefits by considering risk and business capacity(Dittrich et al., 2017).

2. Revenue of Swamp Buffalo Farmers

Revenue is one of the important indicators in assessing the economic performance of swamp buffalo farming. Business revenue is obtained from the sale of livestock, both adult males and culled females, calculated by multiplying the number of animals sold by the selling price per head.

Table 2. Revenue of Swamp Buffalo Farming in North Konawe Regency, 2020–2024

Year	Type of Buffalo	Number (Head)	Price (IDR/head)	Total (IDR)
2020	Adult male	11	36,000,000	396,000,000
	Culled female	2	8,000,000	16,000,000
	Revenue	**13**		**412,000,000**
2021	Adult male	15	37,000,000	555,000,000
	Culled female	2	8,250,000	16,500,000
	Revenue	**17**		**571,500,000**
2022	Adult male	18	38,000,000	684,000,000
	Culled female	2	8,500,000	17,000,000
	Revenue	**20**		**701,000,000**
2023	Adult male	19	39,000,000	741,000,000
	Culled female	2	8,750,000	17,500,000
	Revenue	**21**		**758,500,000**
2024	Adult male	22	40,000,000	880,000,000
	Culled female	3	9,000,000	27,000,000
	Revenue	**25**		**907,000,000**

Source: Processed primary data, 2025

The table 2. shows the development of swamp buffalo farming revenue among 30 respondents during the 2020–2024 period. Business revenue tended to increase from year to year, mainly driven by the rising selling price of adult male buffaloes and the increasing number of animals marketed, particularly in the adult male category. Meanwhile, the contribution of culled females to total revenue was relatively smaller, but it still served as an additional source of income that supported the stability of cash flow in swamp buffalo farming. In addition to price factors, relatively stable regional market demand, especially for consumption needs and traditional ceremonies, became a major driver of increased revenue (Tangkeliku & Irianto, 2023). This pattern indicates that swamp buffalo farming in North Konawe has good market prospects and can provide a significant income contribution to farmers, making it relevant for further analysis in terms of costs, income, and financial feasibility.

3. Fixed Costs

Fixed costs are costs whose amount remains relatively unchanged even when the number of livestock kept differs, because these costs are incurred as long as the business operates.

Table 3. Fixed Costs of Swamp Buffalo Farming

No.	Type of Expenditure	Total (IDR/year)	Average per Farmer (IDR/year)
1	Water and electricity for housing facilities	9,533,334	317,778
2	Housing depreciation	28,733,334	957,778
3	Depreciation of feeding equipment	10,300,001	343,333
4	Depreciation of water reservoir/drinking pond	7,766,667	258,889
5	Labor wages	412,629,300	13,754,310
	Total	**468,962,636**	**15,632,088**

Source: Processed primary data, 2025

The table 2. shows fixed costs in swamp buffalo farming among the 30 respondents were dominated by labor costs and housing depreciation. The total fixed cost incurred reached IDR 468,962,636 per year, with an average fixed cost of IDR 15,632,088 per farmer per year. This cost structure indicates that labor costs, amounting to IDR 412,629,300 per year, and physical business facilities through depreciation of housing and equipment are the main factors determining the amount of fixed costs in swamp buffalo farming. This finding is in line with studies on livestock business cost structures, which identify family labor or hired labor and housing depreciation as important components of fixed or non-cash costs in smallholder livestock enterprises (Akmal et al., 2023).

4. Variable Costs

Variable costs in swamp buffalo farming are costs that change according to production activities and the number of livestock raised.

Table 4. Variable Costs of Swamp Buffalo Farming

No.	Type of Expenditure	Total (IDR/year)	Average per Farmer (IDR/year)
1	Medicines and vitamins	10,300,001	343,333
2	Livestock transportation	21,000,000	700,000
3	Maintenance of housing and fences	9,000,000	300,000
4	Purchase of buffalo calves/stock	49,500,000	1,650,000
	Total	**89,800,001**	**2,993,333**

Source: Processed primary data, 2025

The table 4. shows that the total variable cost of swamp buffalo farming among the 30 respondents reached approximately IDR 89,800,001 per year, with an average of IDR 2,993,333 per farmer per year. The largest cost components were the purchase of buffalo calves or stock and livestock transportation, indicating that livestock procurement and marketing activities are the main determinants of variable costs. This pattern is consistent with findings in beef cattle fattening enterprises, where variable costs dominate and the purchase of feeder cattle or stock often becomes the largest cost component (Maulidiah & Sunyigono, 2023).

5. Income from Swamp Buffalo Farming

Income from swamp buffalo farming refers to the net profit obtained by farmers after total revenue from livestock sales is deducted by all production costs, both fixed and variable costs.

Table 5. Income from Swamp Buffalo Farming

Year	Revenue (IDR)	Total Cost (IDR)	Income (IDR)
2020	412,000,000	558,762,637	-146,762,637
2021	571,500,000	558,762,637	12,737,363
2022	701,000,000	558,762,637	142,237,363
2023	758,500,000	558,762,637	199,737,363
2024	907,000,000	558,762,637	348,237,363

Source: Processed primary data, 2025

The table 5. shows that income from swamp buffalo farming among the 30 respondents increased from year to year during the 2020–2024 period. Income increased from -IDR 146,762,637 in 2020, indicating a loss, to IDR 348,237,363 in 2024. This increase was mainly influenced by higher revenue from livestock sales, while total production costs remained relatively stable. This trend indicates that swamp buffalo farming has increasingly favorable and sustainable economic prospects (Khafsah et al., 2018).

6. Financial Feasibility

Table 6. Results of Financial Feasibility Analysis of Swamp Buffalo Farming in North Konawe Regency, 2020–2024

No.	Investment Criteria	Value
1	Net Present Value (NPV)	IDR 258,228,973
2	Net Benefit-Cost Ratio (NBCR)	2.22
3	Payback Period (PBP)	3.35 years, (± 3 years 4 months)

Source: Processed primary data, 2025

The table 6. shows Based on the results of the financial feasibility analysis, swamp buffalo farming among the 30 respondents was considered feasible to operate. The Net Present Value (NPV) of IDR 258,228,973

indicates that the enterprise generates added value because the NPV is positive. The Net Benefit-Cost Ratio (NBCR) of 2.22 indicates that the net benefits obtained are greater than the costs incurred, as NBCR is greater than 1. Meanwhile, the Payback Period (PBP) of 3.35 years, or approximately 3 years and 4 months, shows that the initial investment can be recovered in about three years, indicating a relatively good rate of capital recovery (Khafsah et al., 2018).

Sensitivity Analysis

Table 7. Results of Sensitivity Analysis of Swamp Buffalo Farming in North Konawe Regency, 2020–2024

Investment Criteria	Change (%)	Normal Condition	Cost Increase of 15%
NPV (IDR)	15%	IDR 258,228,973	IDR 184,542,765
Net B/C (NBCR)	15%	2.22	1.90
Payback Period (PBP)	15%	3.35 years, approximately 3 years and 4 months	3.35 years(± 3 years 4 months)

Source: Processed primary data, 2025

The table 7. shows Based on the sensitivity analysis table with a 15% change scenario, the financial feasibility of swamp buffalo farming remained feasible, although the indicators declined. Under normal conditions, the NPV of IDR 258,228,973 decreased to IDR 184,542,765, but it remained positive. The Net B/C or NBCR also declined from 2.22 to 1.90, but it remained greater than one, indicating that net benefits were still greater than costs. Meanwhile, the Payback Period remained at 3.35 years, or approximately 3 years and 4 months, indicating that the investment recovery period did not change under this scenario. In both theory and practice of feasibility analysis, a business is considered feasible if the NPV remains positive and the Net B/C remains above 1 after being tested under a sensitivity scenario (Safitri et al., 2024).

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CONCLUSIONS

Based on the study of 30 swamp buffalo farmers in North Konawe Regency, specifically in Wiwirano and Landawe Districts, during the 2020–2024 period, the respondents were dominated by farmers of productive age (15–64 years). The average livestock ownership ranged from 1 to 5 animals, indicating that the enterprise was still small to medium in scale and managed traditionally. During the study period, business performance improved, as reflected in the increase in income from a loss of IDR 146,762,637 in 2020 to a profit of IDR 348,237,363 in 2024. The results of the financial feasibility analysis showed that swamp buffalo farming was feasible to develop, with an NPV of IDR 258,228,973 (NPV > 0), an NBCR of 2.22 (NBCR > 1), and a PBP of 3.35 years. In the sensitivity analysis with a 15% change scenario, the feasibility indicators declined but the enterprise remained feasible, with an NPV of IDR 184,542,765, an NBCR of 1.90, and a PBP of 3.35 years. Therefore, swamp buffalo farming in North Konawe Regency is financially feasible to develop and relatively resilient to a 15% change, although profitability decreases under the sensitivity scenario.

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