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Financial Feasibility Analysis and Supply Chain of XYZ Rice Polishing Business

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ABSTRACT

The increasing demand for premium rice in Indonesia has opened up opportunities for rice polishing businesses to increase added value and competitiveness. Challenges such as rising raw material prices, increased operational costs, and process efficiency have become obstacles in maintaining the sustainability and competitiveness of these businesses. This study aims to analyze the financial feasibility and supply chain structure of the rice polishing business at UD XYZ, ABC Regency, South Sulawesi. A case study method was used with a quantitative and qualitative descriptive approach. The financial analysis included NPV, IRR, B/C ratio, PI, ROI, payback period, and sensitivity analysis. The supply chain structure is analyzed through product, financial, and information flow mapping. The results show that UD XYZ is a small-scale business and is financially feasible to operate with a positive NPV, IRR higher than the benchmark interest rate, B/C and PI greater than 1, profitable ROI, and good financial indicators, although it is vulnerable to variable cost increases of more than 2%. The supply chain is relatively short, from rice milling to end consumers. These findings have important implications for business actors and policymakers in the development of the rice polishing industry in production centers.

1. INTRODUCTION

Rice is the main staple food for over 90% of Indonesia's population and plays a strategic role in supporting national food security. According to data from the Central Statistics Agency (BPS, 2022), rice consumption in Indonesia reaches over 114 kg per capita per year. Rice has a direct impact on social and political stability in addition to its economic significance (Saliem, 2019). Premium rice, which has superior physical qualities such a shiny white color, a low breaking rate, and a fluffier texture, has become more popular among consumers in recent years. Growing earnings, awareness of food quality, and shifting desires for healthier lifestyles are the main causes of this change (Sahudin *et al*., 2023). In order to satisfy consumer demands and provide sustainable food security, the development of premium rice is a top objective (Fitra & Prasada, 2024).

Although the government has set the Highest Retail Price (HET) for premium rice at IDR 13,900/kg, but market prices reaching IDR 15,500/kg (BPS, 2022). This reflects high demand in this segment in conjunction with changing consumption patterns prioritizing quality (Suryani & Rachman, 2008). Demand for premium rice proceeds to rise as consumers progressively consider quality standards and brand, which influence purchasing decisions (Aminuddin, 2024). This empowers businesses to improve and progress the quality of their products (Djazuli & Syarif, 2024). This phenomenon opens up opportunities for the downstream rice industry, especially rice polishing, which plays a role in increasing the added value of white rice (Putri *et al*., 2024). Post-harvest technologies offer innovations to reduce yield losses, increase milled rice yield, and improve white rice quality (Sarastuti *et al*., 2018).

Pinrang Regency is a significant rice producer in South Sulawesi. With the opportunity for agricultural growth covering 56,365 ha, Pinrang has the capacity to yield up to 660,253 tons of rice. By 2024, rice production is projected to reach 563,546.72 tons from an area harvested that is roughly 92,280 ha (BPS, 2025). Alongside being a key producer, Pinrang Regency has the capability to establish itself as a premium rice processing hub through the adoption of advanced polishing technology. Employing modern technology in post-harvest processing can enhance the competitive edge of rice-producing areas (Wijaksono *et al*., 2021). A significant contributor in this region is UD XYZ, which specializes in creating premium rice to satisfy demand in local and regional markets while also aiding in the enhancement of national food security.

UD XYZ has implemented modern technology in its production process, including the use of efficient and sophisticated rice polishing machines. This technology has been proven to improve rice quality and strengthen market competitiveness. The use of modern polishing machines has also been shown to increase production efficiency, extend the shelf life of rice, and reduce grain damage (Aminuddin., 2024). Increasing customer demand has prompted UD XYZ to undertake significant business expansion, including increased investment to increase production capacity and maintain premium rice quality standards.

Despite its market potential, UD XYZ faces significant challenges, including rising raw material prices (rice), increased operational costs (electricity, labor, maintenance), and the need to maintain premium quality standards. With premium rice prices remaining stable at around IDR 14,500 to IDR 15,500/kg, rising raw material prices and operational costs are putting pressure on profit margins (Putri *et al*., 2013). In addition to margin pressure, these conditions also increase the risk of operational inefficiencies common in small- and medium-scale food processing businesses (Alyas & Rakib, 2017). If not addressed through adaptive managerial and operational strategies, these conditions could hamper expansion and reduce the competitiveness of UD XYZ products in the market. Therefore, a financial and non-financial feasibility analysis is necessary to inform investment decisions, manage costs, and increase productivity (Rivaldo *et al*., 2024). The financial viability of a rice polishing business is heavily influenced by the efficiency of its supply chain. The supply chain structure determines the availability and price of raw materials, distribution costs, and the speed of product flow to market (Saptana *et al*., 2019). Supply chain inefficiencies can increase costs, reduce revenue, and ultimately impact financial indicators such as Net Present Value (NPV), Payback Period (PP), Profitability Index (PI), Internal Rate of Return (IRR), Benefit-Cost Ratio (B/C), Return on Investment (ROI), and sensitivity analysis results (Hasugian *et al*., 2020).

On the other hand, the lack of scientific studies specifically: (1) measuring the financial feasibility of rice polishing businesses in Pinrang using comprehensive indicators; and (2) analyzing the supply chain structure in depth, leaves business actors and policymakers without a strong scientific basis for strategic decision-making. Therefore, research on feasibility analysis and supply chain analysis is necessary. The research results are expected to not only provide an overview of business prospects but also provide input for local governments in developing downstream rice industries in production centers.

2. MATERIALS AND METHODS

This research was conducted from May to June 2025 at the UD XYZ, a rice polishing business located in Pinrang Regency, South Sulawesi. The location was selected purposively because UD XYZ is a small-scale business operating in its capacity and adopting modern technology for premium rice polishing.

The research used a case study approach with qualitative and quantitative descriptive methods to analyze financial feasibility and supply chain structure. Data collection techniques included direct observation, interviews with business owners, employees, suppliers, and distribution partners, questionnaires, and documentation.

Primary data included information related to investment costs, operational costs, revenue, production volume, and marketing strategies. Secondary data were obtained from literature, government statistics, and internal company reports.

The financial feasibility analysis used indicators such as Net Present Value (NPV), Payback Period (PP), Profitability Index (PI), Internal Rate of Return (IRR), Benefit-Cost Ratio (B/C), Return on Investment (ROI), and sensitivity analysis results, using the following formula:

2.1. Cost Analysis

Total costs (*TC*, IDR/year) was calculated from fixed cost (*FC*, IDR/year) and variable cost (*VC*, IDR/year) using the following formula:

$$TC = FC + VC \tag{1}$$

2.2. Revenue Analysis

Revenue (π) was calculated from total cost and total benefit (*TB*, IDR/year) according to the following equation:

$$\pi = TB - TC \tag{2}$$

2.3. Payback Period (PP)

The payback period (PP) was calculated from initial investment and net cash flow per period as in Equation (3). Decision criteria is as follows: if the PP value is less than the economic life, the project is feasible, and vice versa.

$$PP = \frac{\text{Initial Investment}}{\text{Net Cash Flow per Period}} \tag{3}$$

2.4. Net Present Value (NPV)

Net present value (*NPV*) is one of the criteria to evaluate feasibility of a project. A project is considered feasible if the net present value (NPV) is positive (> 0), and not feasible if NPV < 0. If NPV = 0, then the business is at the break-even point (BEP). The NPV was calculated as follows:

$$NPV = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t} \tag{4}$$

where B_t is net benefit (revenue) in year *t*, C_t is cost in year *t, i* is interest rate (%), *n* is economic life of the rice polishing machine.

2.5. Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is another criterion to evaluate feasibility of a project. The decision criteria is as follows: if IRR > interest rate, then the business is feasible, and vice versa. If IRR is equal to interest rate, then the business is at break-even point. The IRR was calculated according to the following formula:

$$IRR = i_1 + \frac{NPV_1}{(NPV_1 - NPV_2)}(i_2 - i_1) \tag{5}$$

where *IRR* is in %/year, NPV_1 is positive NPV, NPV_2 is negative NPV; i_1 is interest rate at positive NPV (%/year), and i_2 is interest rate at negative NPV (%/year).

2.6. Profitability Index (PI)

Profitability Index (PI) can be used to evaluate the economic feasibility of an investment. If the PI is greater than one, an investment is considered feasible, and vice versa. The PI was calculated according to the following:

$$Profitability\ index\ (\text{PI}) = \frac{\text{PV}\ proceeds}{Outlays} \tag{6}$$

where PV proceeds is cash flow and outlays is total investment.

2.7. Benefit-Cost Ratio (B/C)

The are two types of Benefit-Cost Ratio (B/C), namely Gross B/C formula and Net B/C. A project is considered profitable or economically feasible if the BC is greater than 1. The Gross B/C and Net B/C were calculated according to Equation (7) and (8).

$$Gross\ B/C = \frac{\sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t}}{\sum_{t=1}^{n} \frac{C_t - B_t}{(1+i)^t}} \quad (7)$$

$$Net\ B/C = \frac{\sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t} \geq 0}{\sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t} \leq 0} \quad (8)$$

where t is year (t = 0, 1, 2….. n) years, other notations are defined previously.

2.8. Return on Investment (ROI)

A project is considered feasible if the Return on Investment (ROI) is higher than the minimum expected rate of return. Mathematically, ROI was calculated using the following formula (Syamsuddin, 2009):

$$ROI = \frac{Net\ profit\ after\ taxes}{Total\ assets} \quad (9)$$

where net profit is total revenue minus total costs and total assets/total investment is amount/total assets invested.

2.9. Sensitivity Analysis

Sensitivity analysis is a re-analysis to examine the effects that will occur as a result of changing circumstances. Factors related to these changes are influenced by several variables, including prices, cost increases, and production output. Sensitivity analysis attempts to assess the reality of a business based on the fact that business projections are heavily influenced by elements of uncertainty regarding future events (Gittinger, 1972; Aisyah & Fachrizal, 2020). Changes in NPV, B/C ratio, IRR, and PP can occur due to certain changes, such as increases in raw material prices and decreases in product selling prices. In this study, the variables analyzed for sensitivity included 2% decrease or increase in production costs due to a possible decrease or increase in raw material and operational costs during the production period in the research area. The sensitivity rate was calculated using the following formula (Gittinger, 1972; Kadariah & Gray, 1986):

$$\frac{\{(X_1 - X_0)/X\} \times 100\%}{\{(y_1 - y_0/Y)\} \times 100\%} \quad (10)$$

where X_1 and X_0 is NPV or IRR or Net B/C ratio after and before the change, respectively, X is average change in NPV or IRR or Net B/C ratio, y_1 and y_0 NPV or IRR or Net B/C ratio is production cost or selling price or production yield after and before the change, and Y is average change in production cost or selling price or production yield.

If the sensitivity rate is > 1, then the business results are sensitive to changes, but if the sensitivity rate is < 1, then business results are insensitive to changes.

2.10. Supply Chain Analysis

Meanwhile, the supply chain structure was analyzed qualitatively by mapping actors, transaction patterns, and the efficiency of product flow from upstream to downstream.

3. RESULTS AND DISCUSSION

3.1. Location and Business Overview

Pinrang is a rice production center in South Sulawesi with an agricultural area of approximately 54,000–56,365 ha and a significant rice surplus (BPS Sulsel, 2023). The majority of the population works in the agricultural sector, supporting the development of rice milling and polishing businesses such as UD XYZ (Ekasari *et al*., 2023). Strategically located, UD XYZ is supported by good transportation infrastructure, with a production capacity of up to 30 tons per day and strong relationships with local farmers (Juniarsih & Kurniawan, 2021). UD XYZ has a simple yet functional organizational structure with 13 employees. Its business legality includes a Business Identification Number (NIB) and

a registered trademark for premium rice products (BKPM, 2022). Business facilities include an office, warehouse, and a polishing machine with a capacity of 3 tons/hour, as well as storage capacity of up to 1,500 tons. With this production capacity and workforce, UD XYZ can be categorized as a small-scale agribusiness, as it has a relatively large processing and storage capacity compared to small mills, but has not yet reached the scale of a large industry (Rusmono dan Aminuddin, 2022).

3.2. Financial Feasibility Analysis

3.2.1. Investment Analysis

Investment costs are fixed costs whose value is not affected by the quantity of product produced. For a rice polishing business like UD XYZ, the existence of adequate fixed assets is crucial for smooth operations and increased product competitiveness. UD XYZ, as a premium rice polishing business operator in ABC Regency, requires a total investment of IDR 11,250,000,000. This investment includes land acquisition, warehouse construction, the purchase of polishing machinery, which includes packaging, tamping and sorting machines, and operational trucks. UD XYZ invested in warehouse construction, including a 197 KVA electrical substation and other supporting equipment. Details of the investment costs, including the economic life and annual depreciation, can be seen in Table 1.

Investment in polishing machines plays a crucial role because it improves the quality of premium rice by producing a white, clean, and shiny appearance, while also helping maintain milling yields (Wicaksono *et al*., 2025). Rice warehouses maintain product quality while minimizing post-harvest losses, while trucks facilitate the efficient distribution of raw materials and finished products. This investment allocation results in an annual depreciation expense of IDR 802,500,000, calculated using the straight-line method based on the economic life of each asset. With this investment structure, UD XYZ demonstrates an integrated business strategy from upstream to downstream, in line with agribusiness principles that prioritize efficiency, sustainability, and added value creation (Hakim *et al*., 2025). This commitment to proper fixed asset management gives UD XYZ significant potential to develop as a competitive rice polishing business model at both the local and regional levels.

Table 1. Total investment costs of UD XYZ

No.	Investment Description / Fixed Assets	Acquisition Value (IDR)	Economic Life (years)	Depreciation (IDR/year)
1	Land	2,000,000,000		
2	Rice warehouse	3,500,000,000	20	175,000,000
3	Truck	500,000,000	8	62,500,000
4	Truck	500,000,000	8	62,500,000
5	Truck	500,000,000	8	62,500,000
6	Truck	500,000,000	8	62,500,000
7	Polishing machine and its equipment	3,200,000,000	10	320,000,000
8	Scale and its equipment	150,000,000	5	30,000,000
9	197 KVA power station	300,000,000	40	7,500,000
10	Office equipment	50,000,000	5	10,000,000
11	PC equipment and its devices	50,000,000	5	10,000,000
	Total	**11,250,000,000**		**802,500,000**

3.2.2. Production Cost Analysis of a Rice Polishing Business

Running a business requires costs, which are generally composed of two types: fixed costs and variable costs. Fixed costs are relatively constant and must be incurred even if production volume changes, while variable costs fluctuate and will change with production volume. Table 2 below presents a breakdown of fixed costs of UD XYZ, while Table 3 displays the variable cost structure for the 2020–2024 period.

During the 2020–2024 period, fixed costs of UD XYZ were relatively stable, ranging from IDR 1.925 billion to IDR 2.101 billion per year. The main components of fixed costs consisted of owner salaries, permanent employee salaries, electricity substation expenses, water and electricity costs, land rental costs, maintenance costs, asset depreciation, and bank interest rate. This stability of fixed cost components aligns with Mulyadi (2016) view that fixed costs remain

unchanged with fluctuations in production volume. Fluctuations only occurred in bank interest expenses, which increased in 2021 due to additional business loans, then decreased again in 2024. This reflects the company's ability to manage its financing structure adaptively.

In contrast to the relatively stable fixed costs, the variable costs UD XYZ fluctuated significantly during the 2020–2024 period, totaling between IDR 63.44 billion and IDR 89.76 billion per year. These variable costs are dominated by raw rice as the largest component, followed by non-permanent labor costs, transportation costs, packaging costs, and other operational components. The significant increase in variable costs in 2023 was influenced by the surge in raw rice prices and transportation costs, in line with the upward trend in unhusked rice prices at the farm level during that period. Conversely, the decline in variable costs in 2024 was primarily due to a decrease in sales volume due to rising rice prices, rising transportation costs, and adjustments to the number of non-permanent workers. This situation resulted in restrained debtor sales and the absence of an expansive sales strategy. The sharp decline in variable costs in 2024 indicates a decline in production activity as a consequence of rising raw material prices and higher operational expenses (Horngren *et al*., 2012).

Table 2. Total fixed costs of UD XYZ during 2020–2024 period

No.	Cost Description	Nominal (IDR. 000)				
		2020	2021	2022	2023	2024
1	Labor					
a.	Owner's salary	180,000	216,000	240,000	240,000	240,000
b.	Factory head	90,000	90,000	90,000	90,000	90,000
c.	Permanent factory employees	-	-	-	-	-
2	Power substation expenses	150,000	150,000	150,000	150,000	150,000
3	Water and electricity costs	3,000	3,000	3,000	3,000	3,000
4	Land rental costs	200,000	200,000	200,000	200,000	200,000
5	Maintenance costs	240,000	240,000	240,000	240,000	240,000
6	Depreciation costs	802,500	802,500	802,500	802,500	802,500
7	Bank interest costs	300,000	400,000	230,000	270,000	200,000
	Total	**1,965,500**	**2,101,500**	**1,955,500**	**1,995,500**	**1,925,500**

Table 3. Total variable costs of UD XYZ during 2020–2024 period

No.	Cost Structure	Nominal (IDR. 000)				
		2020	2021	2022	2023	2024
1	Rice raw materials	62,990,074	62,312,414	64,237,848	76,685,418	58,002,160
2	Packaging costs	1,241,896	1,217,103	1,244,757	1,244,757	859,291
3	Transport and distribution	7,058,990	11,445,550	12,987,964	6,190,350	1,323,198
4	Labor costs	7,921,218	8,330,563	6,823,528	4,427,396	2,507,694
5	Freelance employee salaries	150,000	200,000	200,000	210,000	170,000
6	Marketing employee salaries	100,000	100,000	100,000	100,000	110,000
7	Marketing costs	200,000	250,000	250,000	350,000	100,000
8	Operational water costs	7,000	7,000	5,000	6,000	5,000
9	Operational electricity costs	63,000	63,000	45,000	54,000	45,000
10	General and operational costs	150,000	180,000	200,000	200,000	125,500
11	Other costs	50,000	50,000	40,000	60,000	40,000
12	Tax costs	209,035	214,816	233,781	231,520	148,690
	Total	**80,141,214**	**84,370,446**	**86,367,878**	**89,759,440**	**63,436,533**

Total production costs of UD XYZ in 2020 were recorded at IDR 82.11 billion, increasing to IDR 86.47 billion in 2021, IDR 88.32 billion in 2022, and IDR 91.75 billion in 2023. However, in 2024, it decreased significantly to IDR 65.36 billion, primarily due to efficiency/adjustments in variable costs. The proportion of fixed costs to total costs also changed: from 2.17% (2023) to 2.95% (2024) (Garrison *et al*., 2018). This phenomenon emphasizes the importance of cost structure flexibility and variable cost control strategies to maintain business efficiency (Simatupang & Sridharan, 2005). Although there are indications of efficiency from decreasing variable costs, a rigid cost structure has the potential to erode margins when production volumes decrease (Anthony & Govindarajan, 2014). Therefore, UD XYZ needs to

adopt lean operations, a just-in-time purchasing system, and supplier and process technology evaluation to maintain long-term competitiveness (Womack & Jones, 2003).

3.2.3. Revenue Analysis

Based on the research results (Table 4), the revenue of UD XYZ rice polishing business, as presented in Table 4, is derived from the sale of polished rice, which is influenced by production volume, selling price, and operational efficiency. During the 2020–2023 period, business revenue tended to increase, from IDR 83.8 billion in 2020 to IDR 93.6 billion in 2023, but decreased sharply in 2024 to IDR 66.6 billion due to decreased production volume and weakening market demand. Average monthly revenue also decreased significantly from IDR 7.8 billion in 2023 to IDR 5.5 billion in 2024. A seasonal pattern is clearly visible, with peak revenue occurring in April and August, while the lowest revenue consistently occurs in December. This indicates that revenue fluctuations are influenced not only by price and production factors but also by seasonal cycles in the agribusiness supply chain. According to Djailani *et al.,* (2025) fluctuations in demand due to seasonal factors are a common characteristic of agribusiness, thus requiring an adaptive operational response. Similarly, Simatupang & Sridharan (2005) emphasized the importance of responsiveness in supply chain management to address the dynamics of demand and production.

Table 4. Total revenue of UD XYZ during 2020–2024 period

No.	Month	Nominal (IDR. 000)				
		2020	2021	2022	2023	2024
1	January	5,867,960	6,176,800	6,208,730	6,443,558	4,581,654
2	February	4,191,400	4,412,000	5,216,044	5,413,327	3,849,114
3	March	5,867,960	6,176,800	6,569,695	6,818,176	4,848,024
4	April	11,735,920	12,353,600	12,995,020	13,486,520	9,589,511
5	May	7,544,520	7,941,600	8,825,784	9,159,595	6,512,876
6	June	4,191,400	4,412,000	4,439,966	4,607,896	3,276,417
7	July	7,544,520	7,941,600	8,266,269	8,578,917	6,099,989
8	August	16,765,600	17,648,000	22,921,782	23,788,735	16,914,840
9	September	10,059,360	10,588,800	4,891,178	5,076,173	3,609,383
10	October	4,191,400	4,412,000	4,512,162	4,682,821	3,329,693
11	November	3,353,120	3,529,600	3,503,169	3,635,668	2,585,120
12	December	2,514,840	2,647,200	1,895,082	1,966,759	1,398,452
	Total	**83,828,000**	**88,240,000**	**90,244,880**	**93,658,144**	**66,595,072**
	Average	**6,985,667**	**7,353,333**	**7,520,407**	**7,804,845**	**5,549,589**

Table 5. Total income of UD XYZ during 2020–2024 period

No.	Description	Total Income (IDR. 000)				
		2020	2021	2022	2023	2024
1	Fixed costs	1,965,500	2,101,500	1,955,500	1,995,500	1,925,500
2	Variable costs	80,141,214	84,370,446	86,367,878	89,759,440	63,436,533
	Total Costs	**82,110,014**	**86,475,246**	**88,326,678**	**91,754,940**	**65,362,033**
3	Revenue	83,828,000	88,240,000	90,244,880	93,658,144	66,595,072
4	Income (Profit)	1,717,986	1,764,754	1,918,202	1,899,904	1,229,739

Based on revenue and cost information from the rice polishing business at UD XYZ, the rice polishing business revenue is detailed in Table 5. The net revenue of UD XYZ rice polishing business fluctuated during the 2020–2024 period. In 2020, revenue was recorded at IDR 1.72 billion, increasing to IDR 1.76 billion in 2021, and then to IDR 1.92 billion in 2022. However, in 2023, there was a slight decline to IDR 1.90 billion and a sharper decline in 2024 to IDR 1.23 billion. This decline was primarily influenced by reduced revenue due to decreased production and market demand, despite production cost efficiencies through reduced variable costs. This indicates that cost efficiencies need to be balanced with efforts to increase sales volume to maintain revenue. Based on Law Number 20 of 2008 concerning Micro, Small, and Medium Enterprises (MSMEs), UD XYZ is included in the Small Business category. To maintain competitiveness and business sustainability, strategies that can be taken include product diversification, implementing digital marketing, improving the quality of polishing results, strengthening partnerships with farmers, and optimizing

access to financing and human resource training. These steps are crucial for UD XYZ to survive and thrive amidst the highly competitive dynamics of the rice market.

3.2.4. Business Feasibility Criteria

Based on the research results, a financial feasibility analysis was obtained, as shown in Table 6. The feasibility analysis of UD XYZ rice polishing business indicates that the investment is financially feasible. Based on the Payback Period (PP) method, the investment can be recovered within 3 years and 10 months, much faster than the projected 10-year business life, thus being declared feasible. The Net Present Value (NPV) result of IDR 3.21 billion at an interest rate of 11.5%/year shows a positive value, meaning the net cash flow exceeds the present value of the investment costs. The Internal Rate of Return (IRR) of 20.36%/year also indicates feasibility, as it is higher than the discount rate of 11.5%/year (Horngren *et al*., 2012). The Profitability Index (PI) and Net B/C are both 1.29, indicating that every IDR 1 of investment generates IDR 1.29 in economic benefits. The Gross B/C is also above 1, at 1.01, confirming the efficient use of capital. Furthermore, the Return on Investment (ROI) was recorded as very high at 188.27%, indicating that the business generated significant profits compared to the total investment (Hakim *et al*., 2025). Overall, all financial indicators confirm that this business is feasible. However, to maintain long-term profitability, recommended strategies include increasing production efficiency, diversifying products such as organic and brown rice, and utilizing digital technology in marketing. Access to microfinance and strengthening partnerships with farmers are also crucial to support business sustainability (Molenaar, 2020).

Table 6. Financial analysis of UD XYZ at interest rate of 11.5%/year

Investment Criteria	Calculation Result	Explanation	Feasibility
Payback Period (PP)	3 years 10 months	Entrepreneur's projection 10 years	Feasible
Net Present Value (NPV)	Rp 3,213,033,831	NPV at interest rate (11.5% p.a) is positive > Feasible	Feasible
Internal Rate of Return (IRR)	20.36% / year	IRR is feasible > bank interest rate 11.5% p.a	Feasible
Profitability Index (PI)	1.29 times	PI > 1 time with interest rate 11.5% p.a, Feasible	Feasible
Benefit-Cost Ratio			
– Net B/C	1.29 times	B/C > 1 time, Feasible	Feasible
– Gross B/C	1.01 times	B/C > 1 time, Feasible	Feasible
Return on Investment (ROI)	188.27%	ROI > 0%, investment is considered profitable	Feasible

Table 7. Sensitivity analysis results for UD XYZ with variable cost change scheme

Investment Criteria	Conditions of Change in Variable Costs	
	Decrease 2%	Increase 2%
Payback Period (years)	2 years 6 months	9 years 4 months
Net Present Value (Rp)	9,136,317,831	(2,710,250,169)
Internal Rate of Return (%)	36.31% p.a	3.90% p.a
Return on Investment (%)	259.92%	116.62%
Net B/C (times)	1.81 times	0.76 times
Gross B/C (times)	1.03 times	0.99 times
Conclusion	Feasible	Not Feasible

3.2.5. Sensitivity Analysis

A sensitivity analysis was conducted by considering two scenarios of changes in variable costs that impact operations, specifically the cost of purchasing raw materials, namely rice, in ABC Regency. These changes in variable costs were an increase and a decrease of 2%, respectively; the results of the analysis are shown in Table 7. The results of the sensitivity analysis show that UD XYZ is quite vulnerable to changes in variable costs. In a scenario of a 2% decrease in variable costs, the business is still considered feasible to run with positive financial indicators, namely an NPV of IDR9,136,317,831, an IRR reaching 36.31%/year (far above the benchmark interest rate of 11.5%/year), an ROI of 259.92%, and a Net B/C ratio of 1.81 times. In addition, the Payback Period is relatively short at 2 years and 6 months, indicating a quick return on investment. Conversely, in a scenario of a 2% increase in variable costs, the business becomes unfeasible. This is indicated by a negative NPV (IDR-2,710,250,169), a drastic drop in IRR to 3.90%/year (below the benchmark interest rate), an ROI of only 116.62%, and a Net B/C ratio of 0.76 times. The payback period

also deteriorated to 9 years and 4 months, far exceeding the projected business lifespan. This situation demonstrates that small changes in variable costs have the potential to shift a business from viable to unviable.

The stability of the Gross B/C ratio, which only slightly changed (1.03 times for variable cost increases and 0.99 times for decreases), requires careful interpretation, as it can be misleading if not analyzed in conjunction with other financial indicators (Horngren *et al*., 2012). Therefore, variable cost efficiency strategies and the implementation of flexible operational systems such as lean operations and just-in-time (Simatupang & Sridharan, 2005) are crucial for maintaining business resilience. This high sensitivity that MSMEs are vulnerable to fluctuations in costs and demand. Therefore, UD XYZ needs to design adaptive scenarios and risk mitigation policies to maintain business viability in the face of market dynamics (Nestiti *et al*., 2025). These efforts can be achieved through operational cost efficiency, optimizing energy and labor usage, and machine maintenance (Alyas & Rakib, 2017). Strengthening the supply chain through long-term contracts with suppliers, diversifying raw material sources, and expanding markets, including e-commerce, are crucial steps to maintain business sustainability. A sensitivity score of <1 indicates insensitivity to changes occurring in a 2% decrease or increase in variable costs. The sensitivity scores can be seen in Table 8.

Table 8. Sensitivity rate analysis of UD XYZ at interest rate of 11.5%/year

No.	Criteria	Before Change	After Change	Sensitivity Rate	Remark
1	**Scheme: Variable Cost Increase 2%**				
	Payback Period (years)	3.84	9.36	44.07	Sensitive
	Net present value (IDR)	3,213,033,831	(2,710,250,169)	(1,243.18)	Not Sensitive
	Internal rate of return (%/year)	20.36	3.90	(71.59)	Not Sensitive
	Profitability Index (times)	1.29	0.76	(27.17)	Not Sensitive
	Gross B/C ratio	1.01	0.99	(0.99)	Not Sensitive
	Return on investment (%)	188.27	116.62	(24.80)	Not Sensitive
2	**Scheme: Variable Cost Decrease 2%**				
	Payback Period (years)	3.84	2.48	22.41	Sensitive
	Net present value (Rp)	3,213,033,831	9,136,317,831	(49.65)	Not Sensitive
	Internal rate of return (%/year)	20.36	36.31	(29.15)	Not Sensitive
	Profitability Index (times)	1.29	1.81	(17.60)	Not Sensitive
	Gross B/C ratio	1.01	1.03	(0.99)	Not Sensitive
	Return on investment (%)	188.27	259.92	(16.55)	Not Sensitive

The sensitivity analysis shows that UD XYZ is quite vulnerable to changes in variable costs. In a 2% variable cost increase scheme, most investment indicators show the insensitive (NS) category, except for the Payback Period (PP) which is classified as sensitive (S) with a sensitivity rate of 44.07. This means that although the business is still able to return capital, the pressure of higher variable costs has the potential to slow cash inflows, thereby delaying the achievement of the break-even point. Other indicators such as NPV, IRR, PI, Gross B/C, and ROI are in the insensitive (NS) category, but the changes are quite significant with a sharp downward trend, which if allowed to continue could lead to an unviable condition. Conversely, in a 2% variable cost reduction scheme, the business actually shows potential for strengthening. The Payback Period has accelerated and is classified as sensitive (S) with a sensitivity rate of 22.41, which indicates an improvement in cash inflows and an acceleration in the return on capital. However, other indicators remain categorized as insensitive (NS) despite increasing values, such as the NPV, which rose to IDR 9.13 billion, the IRR, which jumped to 36.31%/year, and the PI and ROI, which also improved. This condition indicates that the reduction in variable costs has a more positive impact, although technically not all indicators are sensitive.

These results confirm that UD XYZ is relatively stable to limited changes in variable costs, but its financial resilience responds more quickly to cost reductions (efficiency) than to cost increases. This finding aligns with Gitman *et al*. (2015), who stated that sensitivity analysis serves to identify critical parameters that most influence investment feasibility. Furthermore, Soputan *et al*. (2025) emphasize that understanding cost sensitivity is crucial for MSMEs in the agro-industrial sector, as raw material costs are a dominant component of the cost structure. Therefore, operational efficiency strategies, supply chain optimization, and input price negotiations are key to maintaining long-term business competitiveness and profitability.

3.3. Supply Chain Analysis

Supply chain management at UD XYZ encompasses three main flows: product, financial, and information flows. The product flow begins with farmers and rice mills as suppliers of raw rice. The rice is then processed at UD XYZ polishing facility through cleaning, drying, polishing, and packaging before being distributed to wholesalers, retailers, and end consumers. This process demonstrates a structured logistics system that emphasizes efficiency and product quality (Sutoni *et al*., 2021). Figure 1 illustrates the supply chain for UD XYZ.

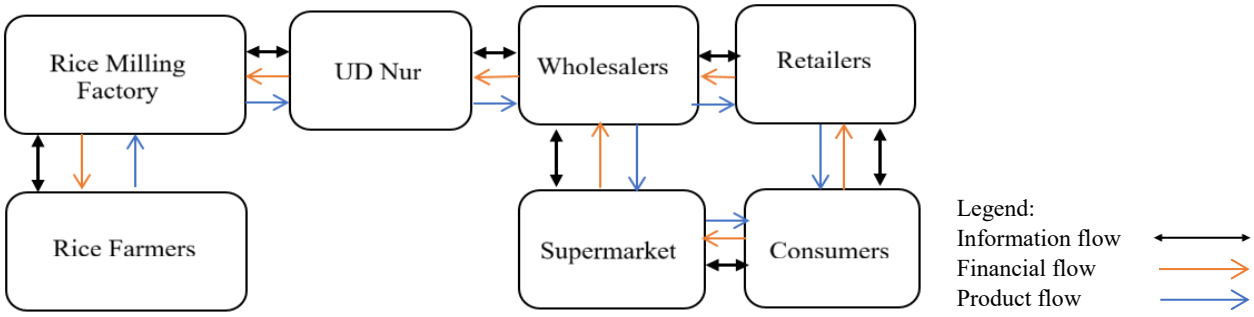

Figure 1. Supply chain pattern of rice polishing business UD XYZ

Financial flows demonstrate a downstream-to-upstream payment scheme. Farmers sell unhusked rice to rice mills, which then sell the rice to UD XYZ, before the rice is finally marketed to consumers. This financial pattern is efficient because it shortens the transaction chain, reduces logistics costs, and increases profit margins (Veronica *et al*., 2025). Information flow is two-way and involves all actors, from farmers to consumers. Rapid and accurate information, such as market prices, harvest schedules, and demand estimates, plays a crucial role in operational decision-making and maintaining supply chain balance (Anggreany *et al*., 2023).

The supply chain structure UD XYZ involves several key actors, including rice millers (RMU), rice polishers, and wholesalers. Rice millers face challenges from fluctuating grain supplies, limited infrastructure, and market competition (Kusuma *et al*., 2023). Meanwhile, wholesalers play a role in streamlining distribution but also face the challenges of price and supply fluctuations. UD XYZ supply chain model tends to be short, from mills directly to factories and then to consumers or distributors, enabling distribution efficiency, higher quality control, and reduced logistics costs (Munthe & Simanjuntak, 2024). This model aligns with modern supply chain management principles that encourage operational integration and efficiency. To improve supply chain competitiveness and efficiency, UD XYZ is advised to strengthen partnerships with rice producers, adopt modern processing and packaging technologies, and expand distribution through e-commerce and information digitization (Anugrah *et al*., 2022). Product diversification and the implementation of a market data monitoring system are also crucial for improving business sustainability.

4. CONCLUSION

Based on the results of the research on the financial feasibility and supply chain analysis of the rice polishing business in ABC Regency, it can be concluded that rice polishing business UD XYZ is categorized as a small business based on annual net revenues ranging from IDR 1.23 billion to IDR 1.92 billion. The financial evaluation indicates that UD XYZ is financially viable, with a positive NPV, an IRR higher than the benchmark interest rate, a B/C and PI greater than 1, a profitable ROI, and good financial indicators, although vulnerable to variable cost increases of more than 2%. The supply chain is relatively short, from the rice mill to the end consumer. These findings provide important implications for business actors and policymakers to develop rice polishing industry in production centers.

REFERENCES

Aisyah, S., & Fachrizal, M.H. (2020). Analisis finansial dan sensitivitas usaha penggilingan padi. *Paradigma Agribisnis*, ***3***(1), 50–63.

Alyas, A., & Rakib, M. (2017). Strategi pengembangan usaha mikro, kecil dan menengah dalam penguatan ekonomi kerakyatan

(Studi kasus pada usaha roti Maros di Kabupaten Maros). *Jurnal Sosiohumaniora*, ***19***(2), 114–120. https://doi.org/10.24198/sosiohumaniora.v19i2.12249

Aminuddin. (2024). Kajian perbandingan mutu gabah dan beras hasil pengolahan di unit penggilingan padi PPK di Jawa Barat. *Jurnal Pangan*, ***33***(3), 217–226.

Anthony, R.N., & Govindarajan, V. (2014). *Management control systems* (12th ed.). McGraw-Hill Education.

Anggreany, S., Sumardjo, D., & Syahyuti. (2023). Peran jaringan komunikasi sebagai elemen penting dalam pengembangan korporasi petani di Indonesia: Tinjauan literatur. *Forum Penelitian Agro Ekonomi*, ***41***(2), 119–133.

Anugrah, I.S., Hestina, J., Suryani, E., Wahyuni, S., & Hermanto. (2022). Kinerja e-commerce Toko Tani Indonesia dalam pengembangan distribusi pangan. *Analisis Kebijakan Pertanian*, ***20***(1), 49–71. https://doi.org/10.21082/akp.v20n1.2022.49-71

BPS (Badan Pusat Statistik) Sulawesi Selatan. (2023). *Luas Panen dan Produksi Padi Di Sulawesi Selatan 2023*. BPS Provinsi Sulawesi Selatan. https://sulsel.bps.go.id

BPS (Badan Pusat Statistik). (2022). *Statistik Harga Konsumen 2022*. Badan Pusat Statistik.

BPS (Badan Pusat Statistik) Sulawesi Selatan. (2023). *Sulawesi Selatan Dalam Angka 2023*. BPS Provinsi Sulawesi Selatan.

BPS (Badan Pusat Statistik). (2025). *Luas Panen dan Produksi Padi Di Kabupaten Pinrang 2024*. BPS Kabupaten Pinrang.

Djailani, A., Indriani, R., & Boekoesoe, Y. (2025). Analisis kinerja rantai pasok beras dengan pendekatan efisiensi pemasaran di Kecamatan Limboto Barat Kabupaten Gorontalo. *Agricultural Review*, ***4***(1), 1–10.

Djazuli, R.A., & Syarif, I.H. (2024). *Manajemen Agribisnis Modern*. UMG Press, Yogyakarta.

Ekasari, Z.K., Nuraeni, N., Apriani, W., Kasirang, A., & Waris, F.A. (2023). Prospek pengembangan agribisnis berbasis desa mandiri di Kecamatan Uluere Kabupaten Bantaeng. *Jurnal Agrisistem: Seri Sosek dan Penyuluhan*, ***19***(2), 143–154. https://doi.org/10.52625/j-agr-sosekpenyuluhan.v19i2.321

Fitra, J., & Prasada, I.Y. (2024). Peramalan harga beras premium di Kabupaten Kebumen. *Agritechpedia: Journal of Agriculture and Technology*, ***2***(2), 28–36.

Garrison, R.H., Noreen, E.W., & Brewer, P.C. (2018). *Managerial accounting* (16th ed.). McGraw-Hill Education.

Gitman, L.J., Juchau, R., & Flanagan, J. (2015). *Principles of managerial finance* (6th ed.). Pearson Higher Education AU.

Gittinger, J.P. (1972). *Economic Analysis of Agricultural Projects*. The Johns Hopkins University Press. https://doi.org/10.24201/edu.v7i03.208

Hakim, L., Nasution, S., Agus, S., & Suryani, N. (2025). Analisis profitabilitas usaha penggilingan padi di UD Dadi Mulyo Kabupaten Jepara. *Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, ***11***(2), 2166–2178.

Hasan, I., Rosida, I., & Nurliani, N. (2022). Preferensi konsumen terhadap keputusan pembelian beras berdasarkan kualitas beras medium dan premium pada pasar tradisional di Kota Makassar. *Jurnal Ilmiah Ecosystem*, ***22***(2), 231–236.

Hasugian, I.A., Fionna, I., & Khairunisa, W. (2020). Analisis kelayakan dan sensitivitas: Studi kasus UKM Mochi Kecamatan Medan Selayang. *Buletin Utama Teknik*, ***15***(2), 2598–3814.

Horngren, C.T., Datar, S.M., & Rajan, M. V. (2015). *Cost Accounting: A Managerial Emphasis* (15th ed.). Pearson Education.

Juniarsih, T., & Kurniawan, D. (2021). Analisis efisiensi teknis usaha penggilingan padi keliling di Lubuk Pakam Kabupaten Deli Serdang. *Jurnal Agrisep*, ***22***(1), 7–18. https://doi.org/10.17969/agrisep.v22i1.18398

Kadariah, & Gray, C.S. (1986). *Pengantar Evaluasi Proyek*. PT Gramedia, Jakarta.

BKPM (Badan Koordinasi Penanaman Modal). (2022). *Laporan Perizinan Usaha dan Nomor Induk Berusaha (NIB)*. Kementerian Investasi, Jakarta.

Kusuma, I.M., Widayanti, S., & Indah, P.N. (2023). Manajemen rantai pasok produk beras di penggilingan padi Sumber Baru Kecamatan Sidoarjo, Kabupaten Sidoarjo. *Jurnal Ilmiah Manajemen Agribisnis*, ***11***(1), 6–12.

Molenaar, R. (2020). Panen dan pascapanen padi, jagung, dan kedelai. *Eugenia*, ***26***(1), 17–24.

Mulyadi. (2016). *Akuntansi Biaya* (5th ed.). UPP STIM YKPN, Yogyakarta.

Munthe, E.F., & Simanjuntak, M. (2024). Penerapan sistem manajemen rantai pasokan untuk meningkatkan efisiensi distribusi hasil pertanian padi di Kecamatan Silaen. *Jurnal Multidisiplin Saintek*, ***3***(11), 41–50. https://doi.org/10.3785/kohesi.v3i11.4229

Nestiti, I.L., Lestari, A., & Manda, G.S. (2025). Peranan strategi mitigasi dalam menghadapi risiko operasional pada perusahaan dan UMKM. *INNOVATIVE: Journal of Social Science Research*, ***5***(3), 5334–5345. https://j-innovative.org/index.php/Innovative

Putri, A.S., Rosanti, N., & Saleh, Y. (2024). Analisis kinerja penggilingan padi pada berbagai skala usaha: Studi kasus di Kecamatan Buay Madang Timur Kabupaten OKU Timur Provinsi Sumatera Selatan. *Jurnal Ilmu-Ilmu Agribisnis: Journal of Agribusiness Science*, ***12***(2), 117–124. https://jurnal.fp.unila.ac.id/index.php/JIA

Putri, T.A., Kusnadi, N., & Rachmina, D. (2013). Kinerja usaha penggilingan padi: Studi kasus pada tiga usaha penggilingan padi di Cianjur, Jawa Barat. *Jurnal Agribisnis Indonesia*, ***1***(2), 143–154.

Rivaldo, F., Maswadi, M., & Pamela, P. (2024). Analisis kelayakan usaha penggiling padi di Desa Paoh Concong Kecamatan Simpang Hulu Kabupaten Ketapang. *Jurnal Media Informatika*, ***6***(2), 669–687.

Rusmono, M., & Aminudin. (2022). Pola konfigurasi mesin dan rendemen penggilingan di usaha penggilingan padi kecil (PPK): Studi kasus di Provinsi Jawa Barat. *Jurnal Pangan*, ***31***(3), 217–232.

Sahudin, E.Y., Lastinawati, E., & Septianita, S. (2023). Analisis preferensi konsumen dalam pembelian beras premium di pasar modern Kota Baturaja. *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, **9**(2), 2294–2306. https://doi.org/10.25157/ma.v9i2.10334

Saliem, H.P., Hermanto, H., Erma, S., Rita, N.S., & Mewa, A. (2019). Dinamika pola konsumsi beras dan pangan berbahan baku beras yang dimakan di luar rumah di Indonesia. *Analisis Kebijakan Pertanian*, **17**(2), 95–110. https://doi.org/10.21082/akp.v17n2.2019.95-110

Saptana, Suryani, E., & Darmawati, E. (2019). Kinerja rantai pasok, dinamika, dan pembentukan harga beras di Jawa Tengah. *Analisis Kebijakan Pertanian*, ***17***(1), 39–58. https://doi.org/10.21082/akp.v17n1.2019.39-58

Sarastuti, S., Ahmad, U., & Sutrisno, S. (2018). Penerapan GHP dan GMP pada penanganan pascapanen padi di tingkat penggilingan. *Jurnal Pangan*, **27**(2), 79–96.

Simatupang, T.M., & Sridharan, R. (2005). An integrative framework for supply chain collaboration. *The International Journal of Logistics Management*, ***16***(2), 257–274. https://doi.org/10.1108/09574090510634548

Soputan, A., Tarore, M.L.G., & Laoh, O.E.H. (2025). Analisis kelayakan finansial pengembangan usaha penggilingan padi di Desa Wineru Kecamatan Poigar Kabupaten Bolaang Mongondow. *Agri-SosioEkonomi Unsrat*, **21**(3), 1188–1199.

Suryani, E., & Rachman, H.P.S. (2008). Perubahan pola konsumsi pangan sumber karbohidrat di perdesaan. *Jurnal Pangan*, ***17***(52), 13–22.

Sutoni, A., Ibrahim, N.T., Indrawati, D., Cahyati, A.Y., & Addilah, F.M. (2021). Analisis rantai pasokan dalam pengelolaan komoditas beras (studi kasus di P.B. Jembar Ati, Kabupaten Cianjur). *Jurnal IKRA-ITH Teknologi*, ***5***(2), 72–79.

Syamsuddin, L. (2009). *Manajemen keuangan perusahaan: Konsep aplikasi dalam perencanaan, pengawasan, dan pengambilan keputusan*. Rajawali Pers.

Undang-Undang Republik Indonesia Nomor 20 Tahun 2008 tentang Usaha Mikro, Kecil, dan Menengah. *Lembaran Negara Republik Indonesia Tahun 2008 Nomor 93*.

Veronica, S.K.K., Ade, I.E., & Mega, S. (2025). Analisis rantai pasok dan mekanisme impor beras dalam menjaga stabilitas harga di Indonesia. *Jurnal Pertanian Agroteknologi*, ***12***(6), 432–441.

Wicaksono, M.A., Tantri, Y.R.S., Edi, H., & Ketut, S. (2025). Perencanaan operasional pada produsen beras premium berbasis teknologi smart farming di PT Agro Panca Unggul. *Jurnal Pengabdian kepada Masyarakat Nusantara*, **6**(3), 4117–4128. https://doi.org/10.55338/jpkmn.v6i3.6206

Wijaksono, R., Rozaki, Z., Wulandari, R., & Suryani, C. A. (2021). Pemanfaatan teknologi pertanian oleh petani milenial. In *Prosiding Seminar Nasional Agribisnis dan Teknologi Pertanian*. Fakultas Pertanian, Universitas Muhammadiyah Yogyakarta: 109–116.

Womack, J.P., & Jones, D.T. (2003). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* (2nd ed.). Free Press.