International Journal of Management and Business
https://irdhjournals.com/ijmb
Vol 2, No 4 (2025): October. E-ISSN: 3032-5059

Analysis Of Feasibility Study For Waste Processing Business (Case Study on the Unit Pengolahan Sampah Sejahtera of BUMDes Tirto)

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INDEXING
Keywords:
Keyword 1; Feasibility study
Keyword 2; Waste processing
Keyword 3; NPV
Keyword 4; IRR
Keyword 5; Payback Period

ABSTRACT
This study aims to analyze the business feasibility of waste processing units run by Tirto Village-Owned Enterprises (BUMDes) in Landungsari Village, Malang Regency. The background of this study is the increase in waste generation due to community activities and the weak village-based waste management system. The analysis methods used in the financial aspect include Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP). The results of the study show that the waste processing business run by BUMDes Tirto is feasible from various aspects. Legally, this unit is in accordance with the provisions of Law No. 6 of 2014 concerning Villages. From the market side, there is a potential consumer from households and boarding houses that continues to increase every year. Technically and operationally, this business already has a simple but functional waste collection and sorting facility. In the financial aspect, the NPV value obtained was IDR 34,291,122, IRR was 28%, and PP for 2 years and 7.4 months, all of which showed that this business was financially viable. Therefore, this business unit is considered to have good development prospects, both in terms of economic, social, and environmental sustainability. It is advisable for BUMDes to start designing strategic steps to improve the effectiveness of waste management, including adding supporting facilities and equipment, as well as encouraging broader community involvement, so that the benefits of the activities can be felt more significantly

Article History
Received 26 April 2025; Revised 12 August 2025; Accepted 12 September 2025 : Publish 29 September 2025

INTRODUCTION

As the population in Indonesia increases, and the level of consumption rises, along with the advancement of technology, there will be more waste accumulation. If waste is not managed properly, it will certainly lead to many problems, such as the spread of diseases, environmental pollution, and water flow blockages that can cause flooding. (Sholihah, 2020). On the other hand, waste has the potential to be an economically valuable product if processed well. For example, organic waste can be converted into compost fertilizer, and plastic waste can be processed into sellable finished products. This not only reduces waste but can also create business opportunities and add economic value for the local community. The issue of waste must be addressed correctly, not just through waste processing, but also including waste management efforts (Artiyani, 2019).

One of the efforts that can be made is through Village Owned Enterprises (BUMDes). BUMDes has significant potential for community-based waste management. BUMDes stands as a village-owned business to improve the living

standards and welfare of the community through the sectors developed (Suhendri, Ventiyaningsih, et al., 2023), including waste management. With the establishment of waste processing units, there is great hope for the creation of a clean and healthy environment, as well as adding economic value for the community. For example, BUMDes in Sendangtirto Village, Sleman, has successfully reduced household waste generation through efficient waste management planning (Amin, et al, 2021). However, the waste management conducted by BUMDes still faces many challenges such as financial, operational, and community participation aspects. Another aspect that becomes a barrier is the lack of innovation in waste processing as a benchmark for sustainability and benefits for the village. Research in Waru Barat Village, Pamekasan Regency, shows the importance of planned development strategies by BUMDes and community participation to support success. (Marista, et al, 2023).

A business feasibility study is a comprehensive evaluation as a basis for determining whether a business is feasible to run or not. The feasibility study process involves several aspects, including social and economic aspects, technical and technological aspects, legal aspects, market and marketing aspects, as well as financial and management aspects. This aims to be the basis for decision-making, whether a project or business should be carried out, postponed, or even canceled. (Munir, et al, 2019). BUMDes Tirto is one of the village-owned enterprises that has been engaged in waste processing. The reason for choosing BUMDes Tirto as the research object is to assess how feasible this waste processing business is to run and to see the sustainability prospects of waste processing efforts at BUMDes Tirto.

From the explanation provided, a feasibility study is very important in decision-making. A feasibility study also helps maximize profits in a business, which is related to whether or not to continue a business operation. Therefore, the researcher is interested in further examining ''Analysis Of The Feasibility Study Of Waste Processing Business.''

From this title, the aim of this research is:

1. To know the management of the prosperous waste processing business run by BUMDes Tirto.
2. Knowing the feasibility analysis based on six aspects namely legal aspects, market and marketing aspects, technical and technological aspects, management and human resources aspects, environmental aspects, financial aspects using NPV (Net Present Value), IRR (Internal Rate of Return), and Payback Period?

LITERATURE REVIEW

Theoretical Foundation

Waste is the residue of human daily activities or the result of natural processes that take the form of solid, semi-solid, or liquid, which technically and economically has no utility value and is therefore disposed of in the environment. Waste is generally generated from various activities, both domestic activities such as household tasks, and non-domestic activities such as industry, trade, offices, agriculture, and so on. Although waste is fundamentally considered as discarded material, some types of waste still have the potential to be reused, either directly or through further processing. Waste is defined as leftover or discarded items that are no longer used and utilized by their owner (Taufiq, A. 2015).

Waste management is a form of business activity aimed at reducing the amount of waste generated that has the potential to cause negative impacts on the environment and human health. In the context of environmental management, waste processing is not

only seen as a technical effort to handle waste but also as a strategy oriented towards sustainability and resource efficiency (Pudjiastuti et al., 2024). Poorly managed waste can become a source of soil, water, and air pollution, as well as a breeding ground for various disease vectors, thereby disrupting the quality of life for communities at large (Suhendri et al., 2023). Furthermore, waste management also has a significant economic dimension, which is to maximize the potential utility and sale value still contained within the waste. Through approaches such as recycling, reuse, composting, and thermal treatment technology, waste can be converted into economically valuable goods or alternative energy sources. Therefore, waste management is not merely an activity for reducing waste volume, but is also part of a circular economy model that supports the efficient use of natural resources (Hidalgo, 2019).

Thus, waste processing activities become very relevant to develop as a business unit that has strategic value, both from environmental, social, and economic aspects. The implementation of this activity requires careful planning, appropriate technological support, and active participation from the community and government, in order to realize an integrated, effective, and sustainable waste management system. Waste management encompasses all activities and efforts carried out in order to handle and manage waste from the moment it is generated until its final disposal (Kahfi, A. (2017).

A feasibility study is a comprehensive and systematic analysis that needs to be conducted before a business or project is undertaken, to provide an objective basis for evaluating the feasibility of the proposed idea or business plan (Pudjiastuti et al., 2024). This analysis aims to thoroughly evaluate the various important aspects that can affect the success of the venture, including economic, environmental, legal, technical, and financial aspects. By conducting a feasibility study, entrepreneurs or investors can gain a clearer picture of the potential profits, risks, and challenges that may be faced in the future. In addition, this study also serves as an aid in strategic decision-making so that the investments made are truly targeted, efficient, and sustainable. Based on the definitions presented, it can be concluded that a business feasibility study is a process of inquiry that examines a business as a reference for whether it is feasible or not to run.

The main purpose of conducting a business feasibility study is to minimize the risk of losses that may arise from planned or ongoing business activities, as well as to avoid wasting the allocation of resources, particularly investment capital. This study functions as an initial evaluation tool for business prospects by considering various possibilities that may affect the level of success, from market, operational, financial, as well as legal and environmental aspects. In other words, a business feasibility study is conducted to ensure that the funds or capital to be invested in a project are not allocated excessively and ineffectively, considering that not all businesses undertaken are guaranteed to generate profits.

The legal aspect is an important perspective or element used as a reference as a basis for rules so that a business activity can run orderly, safely, and smoothly according to the applicable laws in the national legal system. This aspect includes various provisions and regulations that govern the legal relationships between business actors, consumers, the government, and other third parties in economic activities. The legal aspect of business itself is a branch of law that has a very broad scope, including contract law, corporate law, consumer protection law, labor law, intellectual property law, and competition law. Understanding business law is very important for every business player, as it not only serves as a guideline for making the right decisions, but the law also acts as a tool to prevent violations, conflicts, or legal losses that could harm both the company and society in general.

Technical and technological aspects are one of the crucial components in a business feasibility study that encompasses all procedures, work methods, and the use of technology employed in the operations of a business. This aspect aims to ensure that production activities or service provision can be carried out efficiently, effectively, and sustainably. In practice, the technical aspect includes the selection of a strategic business location, facility layout planning, the selection of appropriate production equipment and machinery, availability of supporting infrastructure such as electricity, water, and transportation, and determining production capacity that aligns with market demand projections. Meanwhile, the technological aspect includes the use of modern and innovative technology that can increase work productivity, accelerate the production process, enhance the quality of products or services, and reduce overall operational costs.

RESEARCH METHOD

This research is a descriptive quantitative study using a case study approach aimed at understanding data by collecting, classifying, analyzing, and interpreting the data obtained from BUMDes Tirto. Quantitative research focuses on measurement and testing using numerical data. Quantitative methodology is usually used when the objectives and targets of the research are confirmatory (Kamayanti, et.al, 2022).

The research location is at BUMDes Tirto, Jl. Tirto Rahayu, Landungsari, Kec. Dau, Kabupaten Malang, East Java 64144. This research utilizes secondary and primary data, with data collection techniques using Documentation and Interviews. The method of data analysis is a process of organizing, interpreting, and understanding the data collected in a study. The data analysis methods used in this research include several aspects: legal aspects, market and marketing aspects, technical and technological aspects, management and human resources aspects, environmental aspects, and financial aspects. The financial aspects consist of five analyses: total cost analysis, revenue analysis, net present value (NPV), internal rate of return (IRR), and payback period (PP).

Legal analysis in a business feasibility study is an assessment of the legal aspects related to the establishment and operation of a business. The purpose of this analysis is to ensure that the business to be operated does not conflict with the applicable laws and regulations and has legitimate legality, both from the perspective of legal entities, business permits, land rights, environmental regulations, employment, and business contracts.

Market and marketing aspects in a business feasibility study are an important part that assesses the potential demand for products or services, as well as the company's ability to reach, market, and effectively distribute those products to consumers. The management and human resources (HR) aspects in a business feasibility study evaluate the organization's ability to manage resources, management structures, and the workforce needed to operate the business effectively and efficiently.

The technical and technological aspects in a business feasibility study involve assessing the technical requirements and technological capabilities needed to establish and operate a business effectively and efficiently. This aspect includes evaluating the business location, production processes, machinery/equipment requirements, facility layout, and the selection of appropriate technologies. The environmental aspect in a business feasibility study is an assessment of the impact of business activities on the environment, both physically, socially, and economically, as well as the extent to which the business complies with applicable environmental regulations and standards. The main goal is to ensure that the business to be undertaken does not harm the environment

and can operate sustainably. The financial aspect is the most important in a business feasibility study because it determines whether a business is feasible or not (Kusmaryatun, et al., 2020). This research includes five analyses of financial aspects, namely, Total Cost Analysis.

RESULT AND DISCUSSION

Business management in the Prosperous Waste Processing is carried out through four main functions, which are planning, organizing, executing, and supervising. In the planning stage, the Village-Owned Enterprises (BUMDes) set the goal of waste processing business as an effort to reduce waste generation. Organizing is done by forming a work structure, namely the head of the waste processing unit and administration, so that the tasks and responsibilities of each part can run effectively. Activities are carried out by collecting waste, which is then taken to the available Temporary Waste Disposal Site (TPS) for sorting. Sorting is done to select waste that has economic value, while waste that has no economic value will be incinerated at the local TPS.

Results of the Feasibility Analysis of Waste Processing Business

Legal Aspect

The waste processing business unit of BUMDes Tirto in Landungsari Village only operates within its own area or on a small scale that does not involve the community outside the village. Therefore, this waste processing business unit does not need to be a legal entity. This is stated in Law No. 6 of 2014 concerning Villages, specifically in Chapter X regarding Village-Owned Enterprises, Article 87 paragraph (1). This proves that this business is legally feasible to operate.

Market and Marketing Aspect

BUMDes Tirto sees business opportunities that can be pursued by establishing a waste processing unit. The target market for the business operated by BUMDes Tirto is divided into two segments, namely the household segment and the boarding house segment.

Table 1 Waste Collection Rates

Number	Segment	Cost/month
1	Household	IDR 10,000
2	Cost Places	IDR 15,000

Source *: Primary Data (2025)*

This program makes it easier for the community, among other things, by eliminating the need to dispose of waste directly at the landfill. The community only needs to collect waste at designated locations where it will be picked up by waste collection workers.

Technical and Technological Aspects

The services offered are for the collection of waste, both household waste and waste from boarding houses. The community only needs to place their waste in the trash bins, then waste collectors will gather the waste and take it to the landfill. The waste collection activities are currently serving the surrounding area of Landungsari Village. Waste is transported using three-wheeled waste collection vehicles to support the work more efficiently; once at the landfill, the waste is sorted and burned using a furnace made from a drum.

Management and Human Resource Aspects

In its management, this waste processing business unit is coordinated by the head of the unit, who is responsible for collecting waste collection service fees from the community and the administrative section prepares the financial reports of the waste processing business unit. The Waste Processing Business Unit at BUMDes Tirto does not yet have permanent employees for the waste processing section; some residents come to the waste processing site with the approval of the waste unit head to sort the waste and take the waste that can be sold, while the waste that is not needed is burned at the local processing site. This is due to the waste processing unit not yet operating perfectly, and for the time being, it only sorts waste that has economic value to be resold to waste collectors.

Environmental Aspects

In waste management, it certainly has an impact on the surrounding environment, both positive and negative impacts (Jayaraman *et al*, 2019). However, if waste is not managed properly, there is a potential for conflict from the surrounding community. For example, the abundance of organic waste that is not managed properly can cause unpleasant odors that can disrupt the daily activities of the community. In the waste processing unit of BUMDes Tirto, there are two impacts that arise, namely positive and negative impacts. The positive impact is the preservation of the environment from unmanaged waste. The negative impact is the burning of waste, which produces smoke that causes air pollution around the waste collection site.

Financial Aspect

The analysis of the financial aspect is one of the most important aspects in this business feasibility study, serving as the basis for whether the business is viable or not. In this research, the financial aspects include total cost analysis, revenue analysis, net present value (NPV) analysis, payback period (PP), and internal rate of return (IRR).

1. Total Cost Analysis

- Annual fixed depreciation costs

Table 2 Annual Fixed Depreciation Costs

Component	Sum	Unit Price (Rp)	Economical Lifespan (yrs)	Depreciation per Year (Rp)
Shovel	3	50.000	5	30.000
Three-wheel motor	1	14.000.000	5	1.800.000
Combustion furnace	2	500.000	5	200.000
Total fixed costs/year				**2.030.000**

- Annual variable costs
  -Labor

Table 3 Variable Labor Costs

Year	Workforce	Monthly Wage (Rp)	Length of work	Total variable (Rp)
2020	2	1.000.000	12 months	12.000.000
2021	2	1.100.000	12 months	13.200.000
2022	2	1.150.000	12 months	13.800.000
2023	2	1.300.000	12 months	15.600.000
2024	2	1.500.000	12 months	18.000.000

Source : Processed Data (2025)

- Fuel (gasoline)

Table 4 Variable Fuel Costs

Year	Fuel (liters)	Fuel cost (Rp)	Length of operation	Total variable (Rp)
2020	480	7.650	12 months	3.672.000
2021	480	7.650	12 months	3.672.000
2022	480	7.650	12 months	3.672.000
2023	480	10.000	12 months	4.800.000
2024	480	10.000	12 months	4.800.000

Source : Processed Data (2025)

- Summary of total costs

Table 5 Total Cost Recap

Year	Fixed Fee (Rp)	Variable Costs Workforce (Rp)	Variable Fuel Costs (Rp)	Total Cost (Rp)
2020	2.030.000	12.000.000	3.672.000	17.702.000
2021	2.030.000	13.200.000	3.672.000	18.902.000
2022	2.030.000	13.800.000	3.672.000	19.502.000
2023	2.030.000	15.600.000	4.800.000	22.430.000
2024	2.030.000	18.000.000	4.800.000	24.830.000

Source : Processed Data (2025)

Based on the analysis table of the total waste processing effort, it is known that the fixed cost (depreciation) per year is Rp. 2,030,000 after depreciation, and there is a residual value of the vehicle of Rp. 5,000,000. There are variable labor costs consisting of two people, each receiving a wage of Rp. 1,000,000 per month in 2020, which experiences wage increases annually, with the labor wage reaching Rp. 1,500,000 in 2024. There are also variable fuel costs amounting to Rp. 3,672,000 in 2020, which experience a price increase from Rp. 7,650 to Rp. 10,000 in 2023 and 2024.

2. Analysis of Waste Processing Business Revenue

Table 6 Analysis of Waste Processing Business Revenue.

Year	Description	Price (Rp)
2020	Receipt of garbage collection fees	
	Household waste x 270	32.400.000
	Garbage costs x 20	3.600.000
	Amount (Rp)	36.000.000
2021	Receipt of garbage collection fees	
	Household waste x 275	33.000.000
	Garbage Cost x 25	4.500.000
	Amount (Rp)	37.500.000
2022	Receipt of garbage collection fees	
	Household waste x 290	34.800.000
	Garbage Cost x 33	5.940.000
	Amount (Rp)	40.740.000
2023	Receipt of garbage collection fees	
	Household waste x 300	36.000.000
	Garbage Cost x 40	7.200.000
	Amount (Rp)	43.200.000
2024	Receipt of garbage collection fees	
	Household waste x 320	38.400.000

Garbage Disposal Cost x 45	8.100.000
Amount (Rp)	46.500.000

Source : Processed Data (2025)

Based on the table above, the number of users of waste collection services has increased every year. In 2020, the revenue reached Rp. 36,000,000 and continued to rise due to the increase in the number of service users, reaching a revenue of Rp. 46,500,000 in 2024.

3. Net Present Value (NPV) Analysis

Table 7 Net Present Value (NPV) Analysis

Year	Income (Rp)	Fixed fee (Rp)	Variable cost of labor (Rp)	Variable Fuel Costs (Rp)	Total cost (Rp)	Net cash flow (Rp)	Annual NPV (Rp)
1	36.000.000	2.030.000	12.000.000	3.672.000	17.702.000	18.298.000	17.262.264
2	37.500.000	2.030.000	13.200.000	3.672.000	18.902.000	18.598.000	16.552.154
3	40.740.000	2.030.000	13.800.000	3.672.000	19.502.000	21.238.000	17.831.834
4	43.200.000	2.030.000	15.600.000	4.800.000	22.430.000	20.770.000	16.451.785
5	46.500.000	2.030.000	18.000.000	4.800.000	24.830.000	21.670.000	16.193.085

Source : Processed Data (2025)

NPV Analysis :

$$NPV = \sum_{1}^{5} \frac{CFt}{(1+6\%)^t} - Investasi\ awal_0$$

$$NPV = \frac{18.298.000}{(1+0.06)^1} + \frac{18.598.000}{(1+0.06)^2} + \frac{21.238.000}{(1+0.06)^3} + \frac{20.770.000}{(1+0.06)^4} + \frac{21.670.000}{(1+0.06)^5} - 50.000.000$$

= 17.262.264 + 16.552.154 + 17.831.834 + 16.451.785 + 16.193.085 – 50.000.000
= 34.291.122

Based on the results of the table above, it is known that the initial investment for the waste processing business is Rp.50,000,000. According to the net present value (NPV) analysis based on (Bank Indonesia, 2025) with a discount rate of 6%, the results of the investment project calculation for the waste processing business indicate that it is feasible, as the net present value is 34,291,122, which is greater than zero. This proves that this business is worthy of being pursued and developed.

4. Analysis of the payback period of the waste processing business

Based on the cash flow calculations over five years of the waste processing business, it is found that this business can generate positive net cash flow every year after the initial investment is made in year 0. The net cash flow value significantly increases from the first year and continues to generate profits until the fifth year. The analysis results show that this business is able to recover all initial investments in a relatively short period, which is about 2 years and 7.4 months. This indicates that the waste processing business has a short payback period, which is a positive indicator in the business feasibility assessment. Overall, these results reflect that the waste processing business is financially viable and has promising profit potential.

5. Analysis of Internal Rate of Return

Based on the calculation results of the Internal Rate of Return (IRR) conducted using Microsoft Excel, an investment return rate of 28% was obtained. This figure indicates that the IRR of the waste processing business significantly exceeds the current

bank interest rate, which is 6% according to the benchmark interest rate data from Bank Indonesia in 2025. By comparing the obtained IRR value with the bank interest rate, it can be concluded that this project is financially categorized as feasible and profitable, as the IRR value higher than the interest rate reflects the project's ability to generate a return rate that exceeds the cost of capital.

In investment feasibility analysis, IRR is one of the important indicators used to measure the efficiency of long-term investments (Pudjiastuti, et.al, 2024). If the IRR is greater than the discount rate or the interest rate used for comparison, then the investment is considered viable because it can provide a return that is higher than the minimum expected return. Thus, an IRR of 28% not only indicates that investment in waste processing business can yield a positive return, but also shows that this business has the potential to grow and provide sustainable economic contributions.

Apart from the financial aspect, the success of this project in achieving a high IRR also reflects the effectiveness of business planning and a promising market potential. Therefore, these results can serve as a strong consideration for investors, business managers, and the village government to continue supporting the development of waste processing units as one of the alternative solutions for productive and economically valuable environmental management.

CONCLUSION

The waste processing business unit of BUMDes Tirto emerged as a response to the issues of waste accumulation caused by community activities and consumption patterns, thus requiring attention from the village government. Based on the analysis results of various aspects of business feasibility, such as legal, human resource management, market and marketing, technical and technology, and environmental aspects, the waste processing unit of BUMDes Tirto is deemed feasible to operate. However, it still needs to be developed to support the success of the unit's implementation.

Table 5.1 Summary of the business feasibility results

Enterprises	*Payback Period*	NPV (Rp)	IRR	Feasibility
Waste processing business	2 years 7.4 months	34.963.377	28%	Proper

Source : Processed Data (2025)

A. Net Present Value (NPV)

The NPV calculation using an interest rate of 6% shows a positive figure, amounting to IDR 34,963,377. This figure indicates that this business is capable of providing profits. This aligns with what is stated by (Suliyatno, 2010), that if the NPV is less than or does not provide profits, the business is deemed unfeasible.

B. Payback Period (PP)

The PP calculation over five years from 2020 to 2024 shows a feasible result with a payback period of approximately 2 years and 7.4 months. A business can be considered feasible if PP < the maximum payback period (Suliyatno, 2010).

C. Internal Rate of Return (IRR)

A business can be considered feasible if the IRR > the desired discount rate (Suliyatno 2010). Based on the calculation results, it shows a positive figure of 28%, exceeding the desired discount rate of 6%. Therefore, the prosperous waste processing business can be considered feasible.

SUGGESTION

It is advisable for BUMDes to start designing strategic steps to improve the effectiveness of waste management, including adding supporting facilities and equipment, as well as encouraging broader community involvement, so that the benefits of the activities can be felt more significantly. For the development of knowledge, further research is recommended to explore more diverse analytical approaches, such as risk analysis or comparative evaluation of various business scenarios, in order to produce deeper and valid findings. In addition, similar research models also have the potential to be applied to other business sectors, not limited to waste management alone.

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