



# Financial Feasibility Analysis of a Manual Forklift Business as a Goods Moving Transport Equipment with a Hand Winch Drive System

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## ABSTRACT

Forklifts are a type of heavy equipment in the transport truck category. This tool functions to lift and move objects with large capacity and weight from one location to another. This study aims to determine the financial feasibility of a manual forklift business as a goods moving transport tool with a hand winch drive system in terms of market and marketing aspects, technical aspects and financial aspects. NPV (Net Present Value) is a method to calculate the difference between the present value of future cash inflows and outflows, considering a certain discount rate. IRR (Internal Rate of Return) is the rate of return generated by an investment that makes the NPV equal to zero. AE (Annual Equivalent) is an annual equivalent value that describes the annual profit generated by an investment. DPP (Discounted Payback Period) is the time required to return the initial investment by considering the time value of money. Based on the market and marketing, the selling price of the product using the full costing method is set at around IDR 4,512,000 units, with forecasting the demand for manual forklifts in the future which is expected to increase. Technically, the marketing location of the product was chosen at Jl. Sri Indah, Kec. Rumbai, using the factor rating method. From the financial aspect, with Bank BRI interest rate of 11% as MARR, the development of manual forklifts is considered feasible because it generates a positive NPV of IDR 997.062.647,36, IRR of 16.73%, AE worth IDR 326.437.316,93, and DPP in about 1 year and 6 months.

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## 1. INTRODUCTION

In the industrial world, the use of tools is very important to expedite a production process, especially for labor-intensive and high-risk jobs. Industrial revolution era 4.0 is the fourth revolution that is being faced by life in the

world. Besides being called the industrial revolution 4.0, this revolution can also be called the era of disruption and digital revolution. It is said to be the era of disruption because its impact can make the world's life change drastically through new innovations, especially

in the fields of science and technology. In addition, it is said to be a digital revolution because activities that are commonly carried out by humans on a daily basis are starting to be applied to digital technology (Febrianti et al., 2021). In general, a forklift (other languages lift truck, fork truck, forklift or fork truck) is a tool/vehicle that uses a fork or clamp mounted on a mast to lift, lower and move a heavy object from one place to another (Fathoni dan Anwar, 2020). Manual forklift sales data is obtained from the total sales of manual forklifts in Riau for the last 11 months at stores in Pekanbaru with the Sojihex brand. The sales data for manual forklifts in Riau are as follows:

**Table 1.** Total sales of manual forklift in Riau

No	Month	Year	Quantity (Unit)
1	December	2023	11
2	January	2024	14
3	February	2024	15
4	March	2024	17
5	April	2024	21
6	May	2024	23
7	June	2024	25
8	July	2024	25
9	August	2024	29
10	September	2024	33

Lifting and moving goods manually requires more time and effort, making it less efficient than using a forklift. Manual carrying capacity is limited by the physical condition of workers, and lifting excessive loads risks injury. Forklifts help move heavy loads quickly, improving operational efficiency. In building shops or warehouses, forklifts are very useful for transporting heavy goods, reducing the physical burden on workers and reducing the risk of injury. With a large carrying capacity, forklifts also speed up the work process and reduce worker fatigue. A business feasibility study is a scientific study that assesses to decide whether a business is feasible or not. A business idea is declared feasible if it can provide greater benefits for all parties (Pasaribu dan Saragih, 2020). The business feasibility study will take into account things that will hinder or opportunities from the investment to be carried out (Syachputri et al., 2022). The financial feasibility study of the manual forklift business as a freight transport tool with a hand winch drive system is carried out to determine

whether the product is feasible to run as a business in the future. Feasibility analysis can also help in understanding how to solve problems in a manual forklift as a goods moving transport tool. In this study, the Net Present Value (NPV) method was chosen to solve the problem as it is one of the most effective and reliable investment evaluation tools. This method takes into account the future value of money and compares it with the present value, thus helping to determine whether the project is financially viable. In the case of a manual forklift business, NPV is used to ensure the project can make a profit after all costs are calculated.

## 2. LITERATURE REVIEW

Forklifts are essential to a wide range of industrial operations, playing a key role in material handling across sectors such as warehousing, logistics and manufacturing. Traditionally, these vehicles rely on human operators for maneuvering, load handling, and transport, making them prone to human error, inefficiency, and safety risks. With the rapid evolution of industrial automation, there is a growing need for autonomous solutions that can perform these tasks autonomously, improving productivity and safety (Jagadeesh et al., 2024). Business feasibility is an activity to assess the extent of the benefits that can be obtained in carrying out a business activity or project (Arnold et al., 2020). Business feasibility studies are conducted to identify future problems so as to minimize the possibility of overestimating the results to be achieved in an investment. So with a business feasibility study, at least it can provide guidance or direction to the business that will be run later (Alfajri et al., 2023).

Business feasibility assessment is very important to identify problems arising from the business process or business in the present or in the future due to the possibility of missing the achievement of an investment that has been made (Melani et al., 2024). Business feasibility contains various analyses of several aspects, namely

### a. Market and marketing aspects

The market aspect of business and investment feasibility studies discusses the amount of supply demand and prices (Rofa

et al., 2021). Marketing activities consist of analyzing marketing opportunities, developing marketing strategies, planning marketing programs, and managing marketing efforts (Puspita et al., 2022).

The cost of goods produced is the most important part that must be calculated by the company to be able to set the selling price. The method used in calculating the cost of goods produced is the full costing method (Anggreani dan Adnyana, 2020).

Forecasting is a method of reducing uncertainty regarding something that will happen in the future, for example, demand or sales, which in this case are uncertain (Wardana et al., 2024). The characteristics of good forecasting are to have low cost, high accuracy, good response, fast response, and simple (Tuffahati dan Pulansari, 2023).

#### b. Technical Aspects

Technical aspects include various activities related to business development, both from a technical point of view and its management after the business is completed. Activities related to technical aspects include choosing the location of the business, the type of machinery or equipment that is suitable for the production capacity, the layout arrangement, and the selection of the right technology to support the production process (Agustina et al., 2022).

#### c. Financial Aspects

Financial analysis is an analysis that looks at whether a project is profitable over the life of the business. The financial analysis deals with the investment to be obtained and estimates the return with a certain level of cost of capital (costs to be incurred) and the source of funds concerned (Manalu dan Br Bangun, 2020). The financial analysis includes:

NPV is Net Present Value, it is a calculation method for future cash flows. NPV calculates the time value of the cash flows and converts them into present value at a certain discount rate (Zhang, 2024). The formula used in the calculation of NPV is :

$$NPV = \frac{\text{Net Cash 1}}{(1+x)} + \dots + \frac{\text{Net Cash N}}{(1+x)^n} - \text{investment} \quad \dots(2.1)$$

Internal Rate of Return (IRR) is a method of assessing the feasibility of a business by

extending the present total method (Puspita et al., 2022). IRR is the rate of return that makes the net value of future cash flows (NPV) of an investment project zero. In other words, IRR is the discount rate at which an investment generates no profit or loss (Fanani, 2021). The formula used in IRR is :

$$IRR = iNPV_{(+)} + \left[ \frac{NPV_{(+)}}{NPV_{(+)} - NPV_{(-)}} \right] (iNPV_{(-)} - iNPV_{(+)}) \quad \dots(2.2)$$

Annual Equivalent is not much different from Net Present Value, which is one of the easiest investment evaluation analysis methods to use (Zainal et al., 2021). Annual Equivalent all incoming and outgoing money values will be distributed evenly in each period, so that all cash flow components will be equivalent to the annual value (Rumengan et al., 2017). The formula used in AE is as follows :

$$AE = \frac{NPV \times r}{1 - (1+r)^n} \quad \dots(2.3)$$

Discounted Payback Period is an investment analysis to determine the payback period of an initial investment by calculating the time value of money through discounting future cash flows. Unlike the payback period method, this method takes into account the value of future cash flows that have been discounted using a discount rate (Abuk dan Rumbino, 2020). The formula used in DPP is as follows:

$$PV = \frac{\text{Cash inflow}}{(1+r)^t} \quad \dots(2.4)$$

Based on the literature review in the journal, there are several things that have not been widely discussed in previous research. Most studies focus on automatic forklifts, while manual forklifts with hand winch systems are rarely analyzed in depth. In addition, most studies pay more attention to large companies, so the needs of small and medium industries that have limited budgets receive less attention. Previous research has also not incorporated a thorough market, technical and financial analysis for products such as these. Finally, the environmental impact of manual forklifts is also rarely discussed, even though they can be a cheaper and environmentally friendly alternative. This research attempts to fill this gap by providing a more complete and relevant analysis.

### 3. RESEARCH METHOD

Research methodology is used to explain the flow of research to make it more systematic and directed.

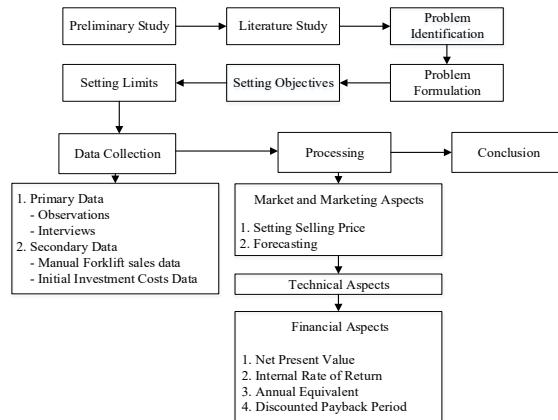


Figure 1. Research methodology

The first step taken in this research is:

#### 1. Data Collection

Data collection is needed as a process of obtaining information that will be used in data processing in research. The results of data collection were obtained from observations and interviews with sellers of manual forklift equipment. The data obtained in the form of :

##### a. Sales price of manual forklifts in Riau

A number of manual forklift sales data were summarized from stores located in Pekanbaru that sell Sojihex products, with a data collection time span of the last 11 months.

##### b. Initial investment costs

The initial investment cost is the initial stage in business planning which includes all expenses needed to start a business, such as purchasing raw materials and machinery in the manufacture of manual forklifts.

#### 2. Data Processing

Data processing is carried out to find solutions to problems in analyzing the feasibility of a manual forklift business. In this study, data processing includes 3 aspects, namely market and marketing aspects, technical aspects, and financial aspects. The data processing consists of the following steps :

##### a. Market and Marketing Aspects

Market and marketing aspects are carried out to determine the selling price of manual

forklifts and forecasting to determine the forecast demand for manual forklifts in the next few years.

#### b. Technical Aspects

Technical aspects are carried out to determine the location of the manual forklift business and how long the manual forklift production process takes. The technical aspect aims to ensure that the production process runs efficiently, effectively, and in accordance with established quality standards.

#### c. Financial Aspects

Financial aspects are carried out to assess the costs that will be incurred in an investment. In this research, the financial aspects are calculated using several methods, namely : Determining the Minimum Attractive Rate of Return (MARR) involves the following steps: Determine the discount rate, opportunity cost, investment risk factor and set the MARR as an annual percentage based on these factors.

Net Present Value (NPV) is done to calculate the net value at the present time using the discount factor of the MARR that has been calculated previously.

Internal Rate of Return (IRR) is done to find out how many % of investment returns each year. If  $IRR > MARR$  then an investment is feasible.

Annual Equivalent (AE) is the opposite of the Net Present Value (NPV) method, AE is a method that converts evenly all costs at each time period throughout the life of the investment. Based on this method, an investment is feasible if  $AE > 0$ .

Discounted Payback period is done to find out how long it takes to return the initial investment.

## 4. RESULT AND DISCUSSION

In this research, the business plan carried out is to design a manual forklift with a handwinch drive system as a solution to lift and move goods effectively, especially for small and medium-sized businesses that need tools with low operating costs. Data collection is needed to obtain information that will be used in

research data processing. The data obtained are as follows (Table 2).

**Table 2.** Recapitulation of initial investment costs

No	Item	Unit	Price (IDR)	Subtotal (IDR)
1	Bank Loan Rilon ARC	-	150.000.000	150.000.000
2	400GE welding machine	1	8.500.000	8.500.000
3	Bosch 13 RE Impact 13mm Drill Machine	1	250.000	250.000
4	Shark MZ0725 Air Compressor BOSCH Power	1	1.500.000	1.500.000
5	GWS 700 Grinder	1	450.000	450.000
6	Rent a place	12 mont hs	35.000.000	35.000.000
7	Meters	1	20.000	20.000
8	Building renovation		8.000.000	8.000.000
9	Office Computer Set	1	5.700.000	5.700.000
<b>Total</b>				<b>209.420.000</b>

Data processing is carried out to find solutions to problems in analyzing the feasibility of a manual forklift business. In this research, data processing includes 3 aspects, namely market and marketing aspects, technical aspects, and financial aspects.

### Market and Marketing Aspects

Processing of market and marketing aspects is carried out by calculating the cost of production first before determining the selling price of the product and forecasting to determine future sales. The following is the selling price of the product with the full costing method is as follows (Table 3).

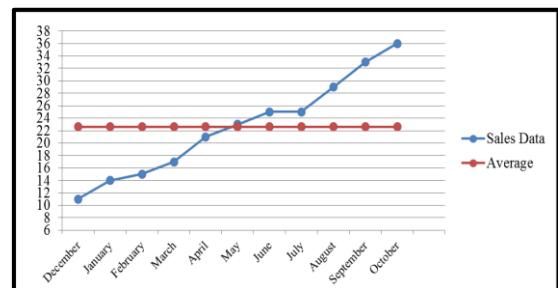
**Table 3.** Product selling price

Description	Total
Raw Material Cost	2.468.000
Labor Cost	203.125
Variable Overhead Costs	11.427,58
Fixed Overhead Costs	325.000
Cost of Goods Manufactured	3.007.552,58
Expected Profit Percentage	50%
	1.503.776,29
<b>Selling Price Unit</b>	<b>4.511.328,87</b>

Based on the calculation of the product selling price using the full costing method, the selling price per unit of manual forklift is obtained at IDR. 4.511.328,87, which is rounded up to IDR.

4,512.000 per unit.

Forecasting is done to determine future demand, so that entrepreneurs know the market opportunities of this manual forklift with a handwinch drive system. The plot of manual forklift sales data in this study can be seen in the Figure 2.



**Figure 2.** Plot of manual forklift sales data

Sales of manual forklifts show a consistent monthly increase. To predict future sales, Trend Least Square analysis can be used by minimizing the sum of squared errors.

The recapitulation of sales data for the next 5 years is as follows:

**Table 4.** Recapitulation of Sales data for the next 5 years

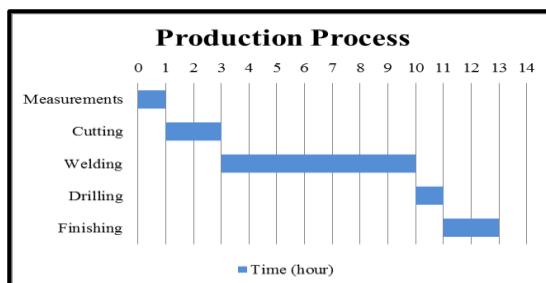
Years	Sales (Unit)
1	659
2	1003
3	1348
4	1692
5	2036

Market analysis shows that manual forklifts with hand winch drive systems have significant market potential, especially among small and medium-sized industries seeking cost-effective solutions. Consumers' demand for efficient but affordable goods moving equipment is on the rise, given their limited funds to purchase automated machines. Competition in the market is quite low for this segment of manual forklifts, as most manufacturers focus more on automated technology. With the projected steady growth in the logistics and manufacturing sectors, this product has the opportunity to increase market share. Sales projections also show a positive trend, given the growing need for transportation of goods along with economic growth in related sectors.

### Technical Aspects

Technical aspects are very important for

business feasibility as they cover many things related to the operation and production of a business. Businesses can run more efficiently, effectively, and reduce the risk of operational failure by paying attention to the technical aspects as a whole. The technical aspects discussed in this study are the determination of business location and production process. Based on the analysis using the factor rating method that has been carried out, it can be concluded that the location chosen for the sale of manual forklifts is Jl. Sri Indra, Rumbai Kec. because it has the highest score of 83.78. With the selection of the area Jl. Sri Indah, Kec. Rumbai as a business location, the rental costs incurred each year are IDR. 35,000,000. The production process is very important to know in order to know the time required in making 1 unit of manual forklift, which can be seen on the Gantt Chart.



**Figure 3.** Gantt chart of manual forklift production process

Based on this figure, it can be seen that the time needed to make 1 unit of manual forklift is 13 hours. In the production process of making manual forklifts, various types of hardware and one special software are used to design and design these manual forklifts with high precision, resulting in tools that are efficient, sturdy, and in accordance with operational needs. The hardware and software are as follows (Table 5).

**Table 5.** Hardware and software for making manual forklifts

Hardware	Software
Welding machine	AutoCAD
Grinding machine	
Drilling machine	
Hammer	
Meter	
Brush	

### Financial Aspects

Processing of financial aspect data in analyzing

the financial feasibility of a manual forklift product development business with a handwinch drive system is carried out calculations such as:

Cash flow is the difference between income and expenses in a certain period. Calculating cash flow is useful for knowing the amount of net cash earned each year. The recapitulation of cash flow for each year can be seen as follows (Table 6).

**Table 6.** Recapitulation of expenditure costs for each year

Year	Income	expenses	Net Cash
1	595.584.000	482.980.940,56	112.603.059,44
2	906.912.000	684.466.048,58	222.445.951,42
3	1.218.240.000	886.873.192,60	331.366.807,40
4	1.525.056.000	1.025.102.772,04	499.953.227,96
5	1.836.384.000	1.227.758.900,06	608.625.099,94

MARR (Minimum Acceptable Rate of Return) is the minimum rate of return expected by an investor or company to accept a project or investment. This MARR includes the following three values:

a. Discount Rate (i)

This is the interest rate or return expected from the investment. The interest rate for this investment is 6% from Bank BRI in 2024.

b. Opportunity Cost (Cc)

It is the cost associated with choosing one investment over an alternative investment. This opportunity cost can also be thought of as an additional component that reflects the costs incurred by choosing a particular investment.

c. Investment Risk Factor( $\alpha$ )

Risk factors that can be taken from this manual forklift tool business are increasing the price of raw materials, canceling products from buyers, causing damage to the machine.

So that the MARR value obtained is

$$\begin{aligned}
 &= i + C_c + \alpha \\
 &= 6 + 0 + 5\% \\
 &= 11\%
 \end{aligned}$$

Net Present Value (NPV) aims to calculate the net value at the present time. NPV calculation uses a discount factor from the previously calculated MARR of 11%. The NPV calculation can be seen as follows:

**Table 7.** Recapitulation of expenditure costs for each year

Years	Net Cash	DF 11%	Present value
1	112.603.059,44	0,90	101.342.753,50
2	222.445.951,42	0,81	180.181.220,65
3	331.366.807,40	0,73	241.897.770,40
4	499.953.227,96	0,65	324.970.597,17
5	608.625.099,94	0,59	358.089.805,64
Total			<b>1.206.482.647,36</b>

Then the calculation of PV of net cash investment from year 1 to 5 is :

$$\begin{aligned} \text{NPV} &= \text{Total PV Net Cash} - \text{Total PV Investment} \\ &= \text{IDR } 1.206.482.647,36 - \text{IDR } 209.420.00 \\ &= \text{IDR } 997.062.647,36 \end{aligned}$$

(Then the Investment is said to be feasible, because the NPV is positive).

Internal Rate of Return (IRR) aims to show how much % return on investment each year.

$$\text{IRR} = 0,11 + \left( \frac{1.206.482.647,36}{1.206.482.647,36 - 365.892.567,87} \right) (0,15 - 0,11)$$

$$\text{IRR} = 0,11 + \left( \frac{1.206.482.647,36}{840.590.079,49} \right) (0,15 - 0,11)$$

$$\text{IRR} = 0,11 + (1,433) \times 0,04$$

$$\text{IRR} = 0,11 + 0,057232$$

$$\text{IRR} = 0,16732 \sim 16,73\%$$

(Then the investment is said to be feasible, because the value of IRR > MARR).

To determine the Annual Equivalent (AE) of a manual forklift business with a handwinch drive system is as follows:

Known data

$$1. \text{ NPV} : 1.015.733.755,30$$

$$2. \text{ Discount Rate (MARR)} : 11\% \text{ or } 0,11$$

$$3. \text{ Estimated project duration} : 5 \text{ years}$$

$$AE = \frac{NPV \times r}{1 - (1+r)^{-n}}$$

$$AE = \frac{1.206.482.647,36 \times 0,11}{1 - (1+0,11)^{-5}}$$

$$AE = \frac{1.206.482.647,36 \times 0,11}{0,40655}$$

$$AE = \frac{132.713.091,20}{0,40655}$$

$$AE = 362.437.316,93$$

The AE obtained is positive, indicating that the project can provide returns. Discounted Payback Period (DPP) aims to determine the period of return on investment.

**Table 8.** Discounted payback period (DPP)

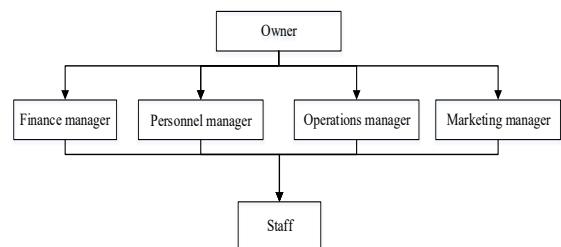
Year	Net Cash	Present Value	Cumulative Net Cash
0	209.420.000	209.420.000,00	-209.420.000
1	112.603.059,44	101.444.227,43	-107.975.772,57
2	222.445.951,42	180.542.145,95	72.566.373,38
3	331.366.807,40	242.292.612,54	314.858.985,92
4	499.953.227,96	329.334.715,78	644.193.701,70
5	608.625.099,94	361.189.408,12	1.005.383.109,82

$$\text{DPP} = 1 + \frac{-107.975.772,57}{180.542.145,95}$$

$$\text{DPP} = 1 + (0,588) = 1,60 \text{ years}$$

Then it can be seen that the discounted payback period is 1 year and 6 months. The financial feasibility analysis of manual forklifts with handwinch systems shows significant industry implications, such as improving operational efficiency, reducing investment costs, and offering an environmentally friendly solution suitable for businesses with storage warehouses. As well as improving productivity and work safety.

## Organizational Structure

**Figure 4.** Organizational structure

Owner: The person who owns the company and is responsible for the strategic decisions and direction of the company.

Financial Manager: The person who manages the company's finances, including planning, budget oversight, and financial reports.

Personnel Manager (HR): The person who manages human resources, including recruitment, training, and employee welfare.

Operations Manager: The person responsible for the smooth running of the company's daily operations and the efficiency of work processes.

Marketing Manager: The person who plans and manages marketing strategies to promote products and increase sales.

Staff: Employees who carry out operational tasks and responsibilities in accordance with instructions from superiors or managers.

Industry can benefit from the results of this study by using the feasibility analysis that has been compiled to make more informed decisions in designing or adopting hand winch-driven manual forklift systems. The results of this study provide technical, financial and market guidance that can help companies save costs, improve operational efficiency and

ensure that investments in this technology provide favorable returns. In addition, the industry can also use the market data and projections presented to understand consumer needs and identify growth opportunities in the logistics and freight transportation market. The results of this study show a more specific approach to the use of manual forklifts with a hand winch drive system, which has not been widely discussed in previous studies. Unlike previous studies that may have focused more on automated forklift technology, this study provides an alternative solution that is more cost-effective and suitable for small industries. In addition, the financial and market feasibility aspects of this manual forklift are more in-depth than previous studies. The limitations of this research include several points that need to be noted. Firstly, the scope of the study is limited as the focus is only on manual forklifts with a hand winch system, thus excluding other types of forklifts with other systems that may be relevant. Secondly, data collection was conducted in a specific region or industry, so the results of this study may not be fully generalizable to a broader context. Thirdly, this research has not addressed environmental aspects, such as the environmental impacts that may be caused by the use of manual forklifts. Finally, this research has not fully considered the latest technological developments that may affect the effectiveness and efficiency of manual forklifts, so there is still room for further exploration in the future.

## 5. CONCLUSION

Based on the objectives of this study, it can be concluded that the manual forklift business with a handwinch drive system is feasible based on market, technical, and financial aspects. The market aspect shows great opportunities through high demand, especially in building stores, with a competitive selling price of IDR 4,512,000 per unit. Technically, the shop location is strategic on Jl. Sri Indah near supporting facilities, with an initial production capacity of 12 units per month and the need for additional machines to meet projected demand. From a financial aspect, with an initial capital of IDR 150.000.000 from a bank loan, the analysis showed a positive NPV of IDR 997.000.000, IRR of 16.73% exceeding MARR of 11%, AE of IDR

326.000.000, and DPP of 1.5 years, making the business financially viable. Suggestions for future research include technological developments on manual forklifts, such as the integration of semi-automatic systems to improve efficiency. Research can also be extended to other regions or industrial sectors to obtain more representative results. Furthermore, comparisons between manual forklifts and other technologies, such as automated forklifts, can be made to understand their advantages and disadvantages.

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