ProBusiness: Management Journal, 15 (4) (2024) pp. 650-659

Published by:Jonhariono Research, Publication and Consulting Institute

ProBusiness: Management Journal

Feasibility Analysis of Smart Transportation as an Embodiment of Smart City in Madiun City

Vindy Ananda Aminah[1], Aang Afandi[2], Padma Adriana Sari[3]
[1,2,3] DIV-Finance, Accounting, Malang State Polytechnic

ARTICLEINFO

Article history:

Received Aug 12, 2024
Revised Aug 20, 2024
Accepte Aug 28, 2024

Keywords:

The Feasibility Study,
Smart City,
Smart Transportation,
Investment,
E-Bike Sharing

ABSTRACT

Implementing the Smart City program in the field of Smart Transportation continues to be improved and is an environmentally friendly solution. The implementation of this research aims to determine location governance, Madiun City Government, the amount of initial investment costs required, and the investment feasibility of this e-bike-sharing plan. The method implemented is descriptive quantitative based on DPP (Discounted Payback Period), IRR (Internal Rate of Return), and NPV (Net Present Value) to calculate investment feasibility analysis. The results showed that the location of the E-Bike Sharing shelter at the Station, Terminal, Alun-alun Madiun City. It is furthermore, related to the Government governance plan that the E-Bike Sharing plan is managed by the Madiun City Tourism, Youth and Sports Culture Office. The total initial investment cost of the E-Bike Sharing plan issued by the Madiun City Government amounted to Rp 1,416,426,706 which includes the cost of procuring E-Bike Sharing, building shelters, electricity supply costs, and supporting equipment costs. From the total investment value, it is known that the Net Present Value (NPV) value is Rp 1,806,108,550 or more than zero, the Internal Rate of Return (IRR) value represents that the result is 58.41% or not lower than the expected minimum rate of return of 6.4% and the Discounted Payback Period (DPP) value is 1 year 12 days or shorter than the project life of 4 years, so it can be concluded that the E-Bike Sharing project investment plan is feasible to run.

Corresponding Author:

Vindy Ananda Aminah
DIV-Finance, Accounting, Malang State Polytechnic
Email: vindyananda345@gmail.com

1. INTRODUCTION

In today's modern era, green living is increasingly becoming a major concern. One example of this is the concept of smart cities, which are leading the way in implementing advanced *smart* transportation systems. These smart cities use innovative technologies to create efficient, environmentally friendly and sustainable mobility solutions, thus not only improving the quality of life of its citizens, but also reducing negative impacts on the environment. For example, Paris continues to develop infrastructure for non-motorized transportation, recognizing that motorized vehicles remain a necessity.

Indonesia aims to have 100 smart cities by 2045, Electric vehicles are considered as a solution for urban transportation to create a clean environment from air pollution. (Wahyudi *et al*., 2022). The East Java Provincial Government has launched a *Smart City* program from 2017 to 2024. The *Smart City* concept is an urban planning strategy that prioritizes the use of technology to improve public welfare and health with a high level of efficiency and effectiveness. (Hasibuan & Sulaiman, 2019)..

Based on Madiun Mayor Regulation No. 32/2020, one of the important indicators in realizing *Smart City* is *Smart Transportation*. The *Smart Transportation* concept is the development of a transportation system that aims to provide ease of travel for the community and has a low impact on the environment. (Hiban & Purnomo, 2020). The implementation of *Smart Transportation* in Madiun City is carried out through the provision of environmentally friendly city tourism-based transportation facilities, such as *E-Bike Sharing*. *E-Bike Sharing* is not just conventional transportation, but also an environmentally friendly solution that provides comfort for the community.

This study aims to determine the location and area governance plan for the placement of environmentally friendly two-wheeled vehicles (*E-Bike Sharing*) in terms of operational aspects. To determine the Madiun City Government's governance plan in managing investment in environmentally friendly two-wheeled vehicles (*E-Bike Sharing*) in terms of management aspects. To determine the investment costs required by the Madiun City Government in the implementation of environmentally friendly two-wheeled vehicles (*E-Bike Sharing*) in terms of financial aspects. To find out whether the investment in environmentally friendly two-wheeled vehicles (*E-Bike Sharing*) to be implemented has met the feasibility.

2. METHOD

The object used in the research of the *E-Bike Sharing* plan is at the *Pahlawan Street Center* (PSC) destination located on Jalan Pahlawan Number 31, Kartoharjo District, Madiun City, East Java. This research uses descriptive quantitative research methods. Descriptive quantitative research, which is research that answers existing problems based on data and analysis. This research requires data consisting of primary data and secondary data. Primary data used in the study was obtained from interviews with employees of the Madiun City Culture, Tourism, Youth and Sports Office. Secondary data is obtained from reference books, research journals and the internet. The data collection methods used by researchers are interviews, documentation and literature studies.

The steps used to analyze the data in this study are to answer the formulation of the first problem of how the location and area governance plan for *E-Bike Sharing* in terms of operational aspects, to answer the formulation of the second problem of the Madiun City Government's governance plan in the management of *E-Bike Sharing* in terms of management / management, to answer the formulation of the third problem, namely the initial investment costs required by the Madiun City Government in the implementation of environmentally friendly two-wheeled vehicles (*E-bike Sharing*) and to answer the formulation of the fourth problem, namely the *E-Bike Sharing* investment plan whether it has met the feasibility of a business or project. This step is the final step of the investment feasibility analysis.

3. RESULT

Site Governance Plan for Placement of *E-Bike Sharing* from Operational Aspects

The assessment analysis in the operational aspect concerns the facilities and infrastructure along with the location and building land used in the project. Operational analysis is to assess the readiness of a company in running its business by assessing the accuracy of the location. [5]. Determination of feasibility in terms of operational aspects in this study is a location determination plan for the placement of *E-Bike Sharing shelters*.

The researcher's consideration chose the PSC area, namely this area is a strategic tour and has easy access. In general, the considerations in determining this location are in accordance with the target consumers, namely tourists and the people of Madiun City, close to the government center, namely Madiun city hall, close to the shopping center, namely *lawu plaza mall* Madiun, close to lodging, namely hotel merdeka and many small businesses or MSMEs so as to increase regional income in terms of trade. Researchers collected data through the interview method to the PSC manager, namely the Madiun City Culture, Tourism, Youth and Sports Office. To find out the exact and appropriate location for the placement of the *E-Bike Sharing shelter*.

1. Location of *E-Bike Sharing Shelters* in Madiun City

Figure 1
Location 1 of *the E-Bike Sharing* Plan *Shelter*

Figure 2
Location Figure 2 E-Bike Sharing Plan Shelter

Figure 3
Location of 3 E-Bike Sharing Plan Shelters

Figure 4
Main Location of E-Bike Sharing Plan Shelters

2. Map of Location Points and Routes of *E-Bike Sharing* Plan in Madiun City

Based on the research results that the *E-Bike Sharing* plan route is determined by researchers by considering the existence of tourist bicycle routes that have been provided by the Madiun City Government. The *E-Bike Sharing* route from *shelter* 1 starts from Jalan Kompol Sunaryo-Jalan Pahlawan, then from *shelter* 2 starts from Jalan Basuki Rahmat-Jalan Yos Sudarso-Jalan Pahlawan, then from *shelter* 3 starts from Jalan Colonel Marhadi-Jalan Merbabu-Jalan Ahmad Yani-Jalan

Pahlawan. The following below is a clearer picture of the location point and route of the *E-Bike Sharing* plan in Madiun City.

3. Specification of *E-Bike Sharing* Plan Line in Madiun City

The specification of the *E-Bike Sharing* plan path in Madiun City plays an important role in the *E-Bike Sharing* implementation plan and is closely related to the operation of the plan. Based on the research results obtained through interviews conducted by researchers with Mr. Wija Purwa Adhiguna, S.E as Sub-coordinator of Marketing, Tourism Resource Development and Creative Economy, as follows:

"The existing tourist bicycle route is 15 kilometers long, starting from Jalan Pahlawan which coincides with the PSC in Madiun City and through a series of roads including Cokroaminoto, Musi, Agus Salim, Colonel Marhadi, Basuki Rahmat, Ahmad Yani, Kartini, Diponegoro, Rimba Darma, Setiaki, Parikesit, Sumbo, Mastrip, Pineapple, Duku, Kapten Saputro, Manggis, Abdurahman Saleh, Mastrip, Panglima Sudirman, to Dr. Soetomo, before returning to Jalan Pahlawan as the end point."

Path Analysis of E-Bike Sharing Plan in Madiun City

One significant aspect of the *E-Bike Sharing* plan is the analysis of the *E-Bike Sharing* path, especially along Jalan Pahlawan Madiun City which coincides with the PSC destination. The road is with good road conditions and can be traversed easily, the large road or highway on Jalan Pahlawan has a width of 12.5 meters. The good road conditions are equipped with well-maintained pedestrian paths, especially in access to PSC destinations, with a road width of 9 meters, the left side is 4.5 meters and the right side is 4.5 meters.

Initial Investment Costs Required by Madiun City Government Regarding the Implementation of *E-Bike Sharing* Plan

Costs that are classified as investment costs required by the Madiun City Government in the implementation plan for environmentally friendly two-wheeled vehicles (*E-Bike Sharing*) are the initial capital costs that must be prepared by the Madiun City Government.

The initial investment costs that must be prepared for this *E-Bike Sharing* plan include several components including, first, the cost of procuring environmentally friendly two-wheeled vehicles (*E-Bike Sharing*), the cost of building an environmentally friendly two-wheeled vehicle *shelter* (*E-Bike Sharing*), the cost of *supplying* electrical energy for environmentally friendly two-wheeled vehicles (*E-Bike Sharing*), the cost of supporting equipment for environmentally friendly two-wheeled vehicle plans (*E-Bike Sharing*). All of these needs are needed as an initial step in the investment costs incurred by the Madiun City government, so that this investment can have a sustainable value so that in the future it can maintain all the operational needs of this *E-Bike Sharing* plan to the maximum.

Cost of Procurement of Environmentally Friendly Two-Wheeled Vehicles or *E-Bike* Sharing

Based on the research results, it is known that the maximum capacity for location 1 and location 2 is 40 bicycles. However, researchers only used 75% of this capacity. As for location 3, due to the large area, the maximum capacity reaches 60 bicycles. Researchers took 65% of the 60 bicycles.

It is known that in location 1, located on Jalan Kompol Sunaryo (Madiun City Station), there are 30 bicycle units for rent. Meanwhile, in the main location located on Jalan Pahlawan or PSC there is no *E-Bike Sharing* for rent, because the main location is indeed placed to park the vehicle and rest. So, the total allocation of the number of *E-Bike Sharing* is 100 units.

The *E-Bike Sharing* procurement system used, namely the purchase system. *E-Bike Sharing* procurement is planned at 3 designated locations. Locations 1 and 2 will be equipped with 30 units. While in location 3 there are 40 units. The unit price for each *E-Bike Sharing* unit is IDR 6,500,000. Thus, the cost of procuring *E-Bike Sharing* in locations 1 and 2 is IDR 195,000,000, while in location 3 is IDR 260,000,000. Thus, summing up the total cost of the three locations, the cost of procuring *E-Bike Sharing* is IDR 650,000,000. So the total cost of procuring *E-Bike Sharing* in Madiun City is IDR 650,000,000. This cost is an important cost as a first step in starting an *E-Bike Sharing* plan in Madiun City.

Cost of Building an Eco-Friendly Two-Wheeled Vehicle *Shelter* or *E-Bike Sharing*

Based on the results of the analysis, the details of the cost of building an *E-Bike Sharing shelter* at location 1, location 2, and location 3 each amounted to IDR 150,000,000. This *shelter* construction cost data was obtained by researchers from data from DISBUDPARPORA Madiun City. This cost data was obtained directly from the 2023 construction services data in the Madiun City Government. Thus, the total cost of building an *E-Bike Sharing shelter* in Madiun City is IDR 450,000,000.

Electric Energy *Supply* Cost of Eco-Friendly Two-Wheeled Vehicle or *E-Bike* Sharing

The cost of *supplying* electrical energy is one of the important costs in the initial investment of *E-Bike Sharing* planning because *E-Bike Sharing* is an electric vehicle that depends on power supply to recharge its battery. Therefore, preparing this cost well is the right step in *E-Bike Sharing* planning.

1. Amount of Energy Consumed by 1 *E-Bike Sharing* Unit in 1 Day

Table 1. Amount of Energy Consumed by E-Bike Sharing

Types of *E-Bike Sharing*	Anyer Type
***Charger* Power**	90 Watts
Full Battery Duration	6 Hours
Energy Magnitude	540 Wh
	1. W

Source: Data Processed

1. Electricity Tariff Adjustment at *E-Bike Sharing Shelter* Location

It can be seen that the scope of Madiun City based on the location of the *shelter* which is in the scope of *public* services (*public place*) is included in the group of government building areas, so it is subject to P-1 / TR group electricity tariffs. So, for electric power of 6,600 VA to 200 kVA is charged at Rp 1,699.53 per kilowatt. So, the *E-Bike Sharing* plan electricity tariff adjustment in the three locations amounted to Rp 1,699.53 which is used as the cost per Kwh of electricity usage at the three *E-Bike Sharing shelter* locations.

2. *Charging* Cost for 1 *E-Bike* Sharing Unit

The cost of *charging* (battery charging) 1 unit of *E-Bike Sharing* in 1 day is charged at Rp 917.74. This figure is obtained by multiplying the number of *E-Bike Sharing* by the amount of energy in Kwh and multiplying it again by the amount of PLN tariff per Kwh. So it can be known that the cost incurred for *charging* 1 unit of *E-Bike Sharing* in 1 day is IDR 917.74. So every 1 unit of *E-Bike Sharing* that is *charged* (charging the battery) 1 time a day costs Rp 917.74.

d. *Charging* Cost for 100 *E-Bike Sharing* Units

It is known that the cost of *charging* (battery charging) for 100 *E-Bike Sharing* units, there are 30 *E-Bike Sharing* which each requires an energy amount of 540 Wh which is equivalent to 0.54 KWh. With the PLN electricity tariff of Rp 1,699.53 per KWh, the calculation of charging costs for each *E-Bike Sharing* is to multiply the number of *E-Bike Sharing* by the amount of energy in Kwh and multiply it again by the PLN tariff per Kwh. Thus, for 30 *E-Bike Sharing* Units with the same amount and PLN tariff the cost is IDR 27,532 while for 40 *E-Bike Sharing* is IDR 36,709. So the total *charging* cost for 100 *E-Bike Sharing* units is Rp 91,774 in 1 day.

***1.* *E-Bike Sharing* Charging Cost Based on *Charging* Frequency**

The cost of charging the *E-Bike Sharing* battery is based on the frequency of charging in one day. Each consists of 30 *E-Bike Sharing* with a charging cost of Rp 27,532 per charge. With a cost of Rp 55,064 per day. Furthermore, for 40 *E-Bike Sharing* with a charging cost of Rp 36,509 per charge, which results in a daily cost of Rp 73,419. The total cost of charging for 100 units in one day is IDR 183,549. If calculated for one month (30 days), the total cost of *charging* the battery for 2 times *charging E-Bike Sharing* is IDR 5,506,477 every month.

***2.* Electricity Installation Cost at *E-Bike Sharing Shelter* Location**

This cost is only incurred at the beginning or one-time payment. It is known that the cost of installing electricity in Madiun City for the three *shelter* locations has the same cost of Rp 7,738,600 for one

installation. So, the total cost of installing electricity in the three *shelter* locations is IDR 23,215,800 and this cost is only made once, namely at the beginning of the installation. This cost was obtained by researchers from the official application of the State Electricity Company (PLN) which provides a simulation menu of electricity installation costs throughout Indonesia.

Recapitulation of Electric Energy *Supply* Cost of *E-Bike Sharing* Plan in Madiun City

Table 2. Recapitulation of Electric Energy *Supply* Costs E-Bike Sharing Plan in Madiun City

Cost Details	Cost
Electricity Installation Cost at 3 *E-Bike Sharing Shelters*	IDR 23,251,800
Charging Fee (1 Month)	IDR 5,506,477
Charging Fee (4 Years)	IDR 264,310,905
Total Cost	**IDR 287,526,705**

Source: Data Processed

Cost of Supporting Equipment for the Eco-Friendly Two-Wheeled Vehicle Plan (*E-Bike Sharing*)

The cost of ancillary equipment for an *E-Bike Sharing* plan is a critical element of the initial investment as it forms the foundation of the infrastructure required to properly execute the plan. *E-Bike Sharing* does not only involve the procurement of vehicles, but also requires a number of essential ancillary equipment and tools to support its optimal operation.

The initial investment costs required to provide supporting equipment for the *E-Bike Sharing* plan, such as 100 *E-Bike Sharing* helmets that adjust to the number of *E-Bike Sharing* that will be rented out later, *E-Bike Sharing* helmets are purchased at a unit price of IDR 89,000 and the *E-Bike Sharing* application is 1 unit at a price of IDR 20,000,000. The total cost of equipment and equipment needed reaches Rp 28,900,000.

Recapitulation of Initial Investment Costs of the Environmentally Friendly Two-Wheeled Vehicle Rental Plan (*E-Bike Sharing*).

Table 3. Total Cost of Initial Investment Recapitulation of E-Bike Sharing Plan in Madiun City

No.	Cost Type	Cost
1.	*E-Bike Sharing* Procurement Cost	IDR 650,000,000
2.	*E-Bike Sharing Shelter* Construction Cost	IDR 450,000,000
3.	*E-Bike Sharing* Electric Energy Supply Cost	IDR 287,526,705
4.	*E-Bike Sharing* Support Equipment Cost	IDR 28,900,000
	Total Recapitulation Cost	**IDR 1,416,426,706**

Source: Data Processed

Discussion

Feasibility Analysis of Investment Plan for Environmentally Friendly Two-Wheeled Vehicles (*E-Bike Sharing*) in Madiun City

Analysis of the financial aspects in this study, namely the feasibility analysis of an environmentally friendly two-wheeled vehicle rental plan (*E-Bike Sharing*) placed in Madiun City. Feasibility analysis is carried out using the *Net Present Value* (NPV), *Internal Rate of Return* (IRR) and *Discounted Payback Period* (DPP) methods to determine the feasibility of an environmentally friendly two-wheeled vehicle rental plan (*E-Bike Sharing*). Broadly speaking, the steps that must be taken are to make revenue estimates and profit and loss projections, first calculating the *initial investment*. The project of this plan that will be analyzed for business feasibility is the *E-Bike Sharing* rental plan in Madiun City, especially around the *Pahlawan Street Center* (PSC) tourist destination.

Estimated Revenue for 1 (One) Year

It is known that in 1 (one) year the total revenue from the three *shelter* locations is IDR 1,576,800,000. The revenue is obtained from the calculation of the frequency of *E-Bike Sharing* in

each month, which means how many times a month this *E-Bike Sharing* is rented out. The number of frequencies is obtained by multiplying the number of *E-Bike Sharing* in each *shelter* location by the number of days each month, then multiplying again by 6, the number 6 is obtained from the number of uses of each *E-Bike Sharing* in one day, then multiplying again by the *maximum percentage of* rentals in one day which is 80%. Thus, it is known that the total revenue in 1 year by summing the frequency of *E-Bike Sharing* from month 1 to month 12 then multiplying the *E-Bike Sharing* rental fee every 30 minutes of Rp 9000.

Profit and Loss Projection of *E-Bike* Sharing Rental Plan

1. Cost Revenue of the First Year *E-Bike Sharing* Plan

Revenue is generated by multiplying the rental fee by the frequency of use each month. Frequency of use is obtained by multiplying the number of *E-Bike Sharing* by the number of days based on the month, the frequency of use in a day and the percentage of productivity, namely the maximum percentage of use in one day. Thus, the revenue cost is Rp 1,576,800,000 in the first year.

2. Operating Costs of the First Year *E-Bike Sharing* Plan

The operational costs used for *E-Bike Sharing* planning in Madiun City consist of variable costs and fixed costs.

1. Electricity Cost of *E-Bike Sharing Shelter* Location for the First Year
   The cost of electricity every month is IDR 5,506,477. Thus, the calculation of electricity costs for 12 months or one year by multiplying the cost of electricity each month by 12. For the cost of installing electricity is only done once in the first month. So the total cost of supplying electrical energy in the first year is IDR 89,293,526.
2. Maintenance Cost of *E-Bike Sharing* in the First Year
   This maintenance cost is obtained from PT Gaya Abadi Sempurna Tbk that every 1 time the *E-Bike Sharing service* costs Rp 50,000. In a period of 1 month, *E-Bike Sharing* is *serviced* 2 times, so that the cost of *servicing E-Bike Sharing* in locations 1 and 2 with a total of 30 units of *E-Bike Sharing* will cost Rp 36,000,000 per year. Meanwhile, for location 3 with the number of *E-Bike Sharing* 40 units, it costs Rp 48,000,000 every one year. So, the total cost of *E-Bike Sharing* maintenance in the first year amounted to Rp 120,000,000.
3. Salary Cost of *E-Bike Sharing* Plan Employees in the First Year
   The cost of employee salaries was obtained from the Madiun City Statistics Agency (BPS) *website* which was accessed in 2024, that the researcher determined employee salaries based on the Madiun City minimum wage in 2024. It can be seen that the salary of the *shelter* guard category employee is IDR 2,243,291 per month and for the salary of the supervisor category employee is IDR 4,486,582, which is twice the salary of the *shelter* guard category employee. So the total cost of salaries for 4 employees per month is IDR 11,216,455. Meanwhile, the cost of employee salaries in the first year amounted to IDR 134,597,460.
4. Depreciation Cost of *E-Bike Sharing* Plan in the First Year
   It is known that all assets are depreciated using the straight-line method. The economic life of the assets is 4 years adjusted to the age of the project and assumed to have no residual value. The acquisition price of *E-Bike Sharing* and helmets is adjusted to the number of units required by the three *E-Bike Sharing shelters*. It is known that the depreciation cost of E-Bike Sharing is IDR 162,500,000 and the depreciation cost of helmet is IDR 2,225,000. Thus, the total depreciation cost is Rp 164,725,000.
5. Tax Rate Imposed on *E-Bike Sharing* Income
   The basis for the imposition of VAT is the rental transaction value at a rate of 11%, in accordance with Law No. 42 of 2009 and Law No.7 of 2021. The basis for the imposition of Income Tax 23 is the gross rental value at a rate of 2% in accordance with Law No.36 of 2008 concerning Income Tax and its Implementation Regulations. So based on the total income, the amount of tax can be calculated using the existing provisions and the total tax obtained in 1 year is IDR 172,014.

1. *Net Present Value* (NPV) Method

$$\text{NPV} = \left(\frac{\text{Kas Bersih Tahun 1}}{(1+\text{r})^1}\right) + \left(\frac{\text{Kas Bersih Tahun 2}}{(1+\text{r})^2}\right) + \left(\frac{\text{Kas Bersih Tahun 3}}{(1+\text{r})^3}\right) + \left(\frac{\text{Kas Bersih Tahun 4}}{(1+\text{r})^4}\right) - \text{Investasi}$$

$$\text{NPV} = \left(\frac{\text{Rp } 896.169.468}{(1+0{,}1)^1}\right) + \left(\frac{\text{Rp } 1.011.188.268}{(1+0{,}1)^2}\right) + \left(\frac{\text{Rp } 1.068.697.668}{(1+0{,}1)^3}\right) + \left(\frac{\text{Rp } 1.126.207.067}{(1+0{,}1)^4}\right) - \text{Rp } 1.416.426.709$$

$$\text{NPV} = \text{Rp } 3.222.535.256 - \text{Rp } 1.416.462.706$$

$$\text{NPV} = \text{Rp } 1.806.108.550$$

The total cash inflow in the first year is Rp 896,169,468, in the second year is Rp 1,011,188,268, in the third year is Rp 1,068,697,668, and in the fourth year is Rp 1,126,207,067. After discounting with a discount *factor of* 0.909 in the first year, 0.826 in the second year, 0.751 in the third year, and 0.683 in the fourth year, the *present value* results for the first year are Rp 814,699,516, Rp 835,692,783 in the second year, Rp 802,928,375 in the third year, and Rp 769,214,581 for the fourth year.

The total *present value of* cash inflows is Rp 3,222,535,256. NPV is calculated by means of total PV minus the initial investment, so that the NPV result is Rp 1,806,108,550. From the results of the *net present value* calculation of the total cash inflow during the investment period, it can be known about the feasibility of the *E-Bike Sharing* plan project. A project is considered feasible if the NPV is positive and more than zero. So with an NPV value of Rp 1,806,108,550, the *E-Bike Sharing* investment plan project in Madiun City is considered feasible to run.

2. *Internal Rate of Return* (IRR) Method

$$IRR = P1 - C1 \times \frac{P2 - P1}{C2 - C1}$$

$$IRR = 58\% - Rp\ 7.487.497 \times \frac{59\% - 58\%}{-Rp\ 10.742.476 - Rp\ 7.487.497}$$

$$IRR = 58\% - Rp\ 7.487.497 \times \frac{1\%}{-Rp\ 18.229.973}$$

$$IRR = 58\% - (Rp\ 7.487.497 \times -0{,}000000055\%)$$

$$IRR = 58\% - (-0{,}44\%)$$

$$IRR = 58{,}41\%$$

The IRR generated from the *E-Bike Sharing* plan project is 58.41%. Through *trial and error*, a positive NPV value was obtained at a discount rate of 58% and a negative NPV was obtained at a discount rate of 59%. The minimum expected rate of return is 6.4% based on the *safe* rate which can be seen in Table 34. From these results it can be seen that the *E-Bike Sharing* rental plan project in Madiun City is feasible to run because the resulting IRR is higher than the minimum expected rate of return indicating that the interest rate is > from the *safe* rate, namely 58.41%> 6.4%, so this project can be said to be financially feasible.

3. *Discounted Payback Period* (DPP) Method

$$DPP = 1\,Tahun + \frac{Rp\ 523.226.600}{Kas\ Bersih\ yang\ sudah\ di\ diskontokan/Tahun} \times 1 Tahun$$

$$DPP = 1\,Tahun + \frac{Rp\ 523.226.600}{Rp\ 893.200.106} \times 1\,Tahun$$

$DPP = 1\ Tahun + 0{,}41\ Bulan$
$DPP = 1\ Tahun\ 12\ hari$

A project is viable if the DPP period is shorter than the project life. The project life of the *E-Bike Sharing* investment plan is 4 years. With a DPP of 2 years and 9 days, the *E-Bike Sharing* plan project is feasible to run. It means that it can be concluded that the economic life of the investment is longer than the DPP value, so the investment is feasible to run.

Managerial Aspects (*Decision Making*)

Based on the results of research on the feasibility analysis of *Smart Transportation* as a manifestation of *Smart City* in Madiun City through the *E-Bike Sharing* rental plan. The initial investment costs that must be considered by the Madiun City Government vary, among others, the cost of procuring environmentally friendly two-wheeled vehicles is a considerable cost that must be incurred by the Madiun City Government, so researchers provide recommendations for the Madiun City Government to collaborate with PT Gaya Abadi Sempurna Tbk. This company serves from the procurement of environmentally friendly two-wheeled vehicles (E-Bike Sharing), maintenance of environmentally friendly two-wheeled vehicles, *E-Bike Sharing* applications and *accessories* needed by *E-Bike Sharing*.

Based on the results of research on the feasibility analysis of *Smart Transportation* as a manifestation of *Smart City* in Madiun City through the *E-Bike Sharing* rental plan. The Office of Culture, Tourism, Youth and Sports (DISBUDPARPORA) is one of the agencies licensed by the Madiun City Government for PSC management, so researchers provide recommendations for investors and entrepreneurs to cooperate and contact the agency if interested in implementing this *E-Bike Sharing* plan with the Madiun City Government.

4. CONCLUTION

In terms of operational aspects, the governance of the *E-Bike Sharing* placement location in this study is related to determining the location for the placement of *E-Bike Sharing* shelters which are expected to accommodate the transportation needs of people who will go to the PSC. The locations chosen to be *shelters* in this study include *shelter* 1 on kompol sunaryo road coinciding at Madiun City station, *shelter* 2 on basuki rahmat road coinciding at Madiun City terminal, and *shelter* 3 on colonel marhadi road coinciding at Madiun City square. In terms of management, alternatives that can be used in the management of the *E-Bike Sharing* plan, namely the Madiun City Culture, Tourism, Youth and Sports Office (DISBUDPARPORA) will be the agency that manages but UPTD as an organization that is shaded and directly involved in the implementation of this *E-Bike Sharing* plan. Based on the calculation of Labor Requirements (KTK), it is known that to properly accommodate operational activities, a workforce of 5 people is needed to maintain the *shelter*. The total initial investment cost of the *E-Bike Sharing* plan incurred by the Madiun City Government amounted to Rp 1,416,426,706, consisting of the cost of procuring *E-Bike Sharing of* Rp 650,000,000 *shelter* construction costs of Rp 450,000,000, electrical energy *supply* costs of Rp 287,526,705 and the cost of supporting equipment of Rp 28,900,000.

Based on the feasibility analysis of the investment plan for environmentally friendly two-wheeled vehicles (*E-Bike Sharing*) in Madiun City, it is known that the *Net Present Value* (NPV) value is Rp 1,806,108,550 or more than zero so that this investment is considered feasible to run. The feasibility analysis of the *E-Bike Sharing* plan project using the *Internal Rate of Return* (IRR) shows a result of 58.41% or higher than the expected minimum rate of *return* of 6.4% so that this project can be said to be financially feasible. Based on the *Discounted Payback Period* (DPP) method, it is known that the DPP for the *E-Bike Sharing* plan project is 1 year and 12 days or shorter than the peoyek life of 4 years so that the investment is feasible to run.

REFERENCE

Hasibuan, A., & Sulaiman, O.K. (2019). Smart city, konsep kota cerdas sebagai alternatif penyelesaian masalah perkotaan kabupaten/kota, di kota-kota besar Provinsi Sumatera Utara. *Buletin Utama Teknik*, *14*(2).

Hiban, M.I., Purnomo, E.P., & Nurkasiwi, A. (2020). Smart city dalam memenuhi hak-hak penyandang difabel di Yogyakarta "Studi kasus : Infrastruktur transportasi publik dalam memenuhi hak penyandang difabel. *Jurnal Pemerintahan dan Politik*, *5*(2), 69-73.

Kasmir., & Jakfar. (2016). *Studi kelayakan bisnis*. Edisi revisi. Jakarta: Kencana Prenada Media Group.

Kasmir., & Jakfar. (2020). *Edisi revisi studi kelayakan bisnis*. Jakarta: Prenadamedia Group.

Kemkominfo. (2017). *Guideline masterplan smart city gerakan menuju 100 smart city*. Jakarta.
Nisa, L.C, & Susanti, A. (2023). Strategi penerapan mobil listrik di Surabaya sebagai smart mobility. *Jurnal Media Publikasi Terapan Transportasi, 1*(2), 213-225.
Prasetyo., & Joko, S.Y. (2023). *Prinsip smart city di Indonesia*. Salatiga: Universitas Kristen Satya Wacana.
Wahyudi, A.A., Widowati, Y.R., & Nugroho, A.A. (2022). Strategi implementasi smart city Kota Bandung. *Jurnal Good Governance*, *18*(1), 88-98.