

PLANNING FOR THE CONSTRUCTION OF PRAYER ROOMS AND PUBLIC TOILETS BY UTILIZING PLASTIC WASTE INTO ECO BLOCKS TO ADD FACILITIES AND SUPPORT THE SUSTAINABLE DEVELOPMENT MOVEMENT AT PREPAT BAY BEACH, PANGKALPINANG CITY

Jotian Abisa¹, Nabila Karima², Muhammad Iqbal³, Putri Nathasya Dhimastika⁴, M.Afdal Samsuddin⁵

^{1,2,3,4,5} Fakultas Ekonomi dan Bisnis, Universitas Bangka Belitung, Indonesia

E-mail: jotianabis57@gmail.com, nabila121514@gmail.com, muhammadiqbal21@gmail.com, putrinathasya486@gmail.com, m.afdal@ubb.ac.id

Abstract: This study analyzes the financial feasibility of the construction of prayer rooms and public toilets by utilizing used plastic waste converted into Eco Block in Taman Bunga, Pangkalpinang City. The analysis uses several financial valuation methods, including Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), and Payback Period (PP). The results of the study showed that the project was financially feasible based on all the parameters evaluated. The development project, which is funded through the 2025 Pangkalpinang City Regional Expenditure Budget (APBD), is an innovative approach in sustainable infrastructure development by utilizing recycled plastic waste materials. This initiative not only meets the needs of public facilities but also contributes to environmental sustainability through waste management solutions

Article Information:

Received 16 June 2024

Revised 23 August 2024

Accepted 14 September 2024

Keywords: Eco block, Prayer Room, Toilet, Recycled Plastic Waste.

Introduction

Tourism is one of the sectors that plays an important role in the economic development of a region. According to data from the Ministry of Tourism and Creative Economy, the tourism sector contributed around 4.1% to national GDP in 2019 and absorbed around 13 million workers. In the Bangka Belitung Islands Province itself, the tourism sector is one of the drivers of economic growth with a contribution of 5.2% to the province's GDP in 2019.

Pangkalpinang City as the capital of the Bangka Belitung Islands Province has various

interesting tourism potentials, ranging from historical tourism, culinary, to beach tourism. Based on data from the Pangkalpinang City Tourism Office, the number of tourist visits to this city reached 425,000 people in 2019, with an average growth of 8% per year in the last five years. This shows that the tourism sector in Pangkalpinang City has promising prospects.

One of the leading tourist destinations in Pangkalpinang City is Prepat Bay Beach which is located in the Tanjung Bunga area. This beach is about 7 kilometers from the city center and can be reached within 15-20

minutes using a motorized vehicle. Prepat Bay Beach has a unique characteristic with a 2 m stretch of white sand.

Prepat Bay Beach began to be developed as a tourist attraction by the local government in the early 1990s. To attract visitors, infrastructure and supporting facilities such as roads, parking lots, and shops began to be built. Prepat Bay Beach is increasingly in demand by locals and tourists who want to enjoy the tranquil beach atmosphere. In addition, along the coast, coconut trees and sea fir give it a distinctive tropical feel. Beautiful sunset views can be seen from this beach. Future development plans include improving recreational facilities, providing accommodation, and more intensive promotions to attract more visitors. These efforts are expected to improve the economy of the surrounding community and provide an unforgettable vacation experience for tourists. As part of the Bangka Belitung Islands, Prepat Bay Beach is also a witness to the long history of this area which is famous for its tin mining.

Geographically, Prepat Bay Beach is located in a strategic area that is easily accessible from the center of Pangkal Pinang, making it one of the popular destinations for locals for a short vacation. The beauty of this beach lies not only in its natural panorama, but also in the calm atmosphere that provides comfort for anyone who visits. The existence of shady trees around the beach also adds to the coolness and beauty of this area.

Nonetheless, in recent years, the local area has made efforts to develop the tourism sector as a more sustainable economic alternative. The development of Prepat Bay Beach as a tourist destination is in line with the will of the local community to improve the regional economy through the tourism sector. However, this development also brings its own challenges, especially in terms of preserving the environment and managing the impact of tourism on coastal ecosystems.

The development of Prepat Bay beach tourism is a member of the Porwis Babel (Babel Tourism Working Group) this area has great potential for tourism development, especially in the concept of ecotourism and Edu tourism. Mr. Masdar, who is the secretary general of SeBabel, is involved in the development of this beach. The development of this tourism involves more cooperation with the private sector than the government. This project is still in the early stages, only

running for about two months. The initial stage begins with the process of cleaning the area and the development of basic facilities.

Along with the increasing number of visitors, the need for public facilities such as prayer rooms and toilets has become increasingly urgent. Currently, these facilities are not available or inadequate, thus reducing the convenience of visitors and the potential for tourism development in the area. The construction of prayer rooms and public toilets on Prepat Bay Beach will not only improve the quality of the tourist experience.

As one of the leading tourist destinations in Pangkalpinang City, Prepat Bay Beach has the potential to be better known by domestic and international tourists. With good management and continuous infrastructure improvement, this beach can become one of the tourism icons that not only presents natural beauty, but also interesting cultural and historical potential to explore. Therefore, it is important to continue to preserve the surrounding nature and culture in order to provide sustainable benefits for the local community and tourists who visit.

However, even though Prepat Bay Beach has great tourism potential, its existence is still not so famous outside the Bangka Belitung area. This makes this beach a "hidden gem" that is worth exploring by tourists who are looking for a destination that is different from most popular beaches in Indonesia. The lack of crowds in this area gives an exclusive and personal impression to visitors.

With stunning natural beauty and tourism potential that has not been fully explored, Prepat Bay Beach has a great opportunity to develop into a leading tourist destination in Bangka Belitung. The support of the local government and the awareness of the local community on the importance of environmental conservation are the key to maintaining the natural beauty of this beach while supporting the growth of the regional tourism sector. Prepat Bay Beach is not only a place to relax, but also a symbol of harmony between humans and nature.

Literature Review

1. Previous research conducted by (Hasaya, 2021) in a study entitled "The Potential of Reusing Plastic Waste into *Eco-Paving Blocks*" shows the success in developing effective plastic waste recycling methods and producing quality

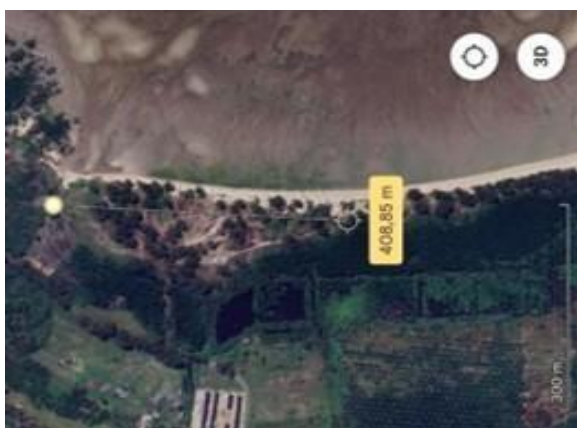
- products that are beneficial to the environment and society.
2. Previous research conducted by (Zulf, 2021) in a study entitled "Quality of Paving Blocks Using Polypropylene Plastic Waste Against Compressive Strength" the results of this study show that polypropylene plastic waste can be used effectively in the manufacture of paving blocks which has adequate compressive strength, while providing solutions to reduce plastic waste.
 3. Previous research conducted by (Fajriah & Mussadun, 2014) in a study entitled "Development of Facilities and Infrastructure to Support Sustainable Coastal Tourism" (Case Study: Wonokerto Coastal Area, Pekalongan Regency) The results of this study show the importance of planning that involves various parties and sustainability aspects to ensure that coastal tourism can develop properly without damaging environment and provide long-term benefits for local communities.
 4. Previous research conducted by (Kuncoro, 2022) in a study entitled "Assistance for the Renovation of Al Azhar Mosque in Magersari Village, Wirosari District, Grobogan Regency, Central Java" The results of this study show that this research shows that the renovation of worship facilities such as prayer rooms into mosques not only changes the physical condition of the building, but also has a positive impact on the social and religious life of the surrounding community.
 5. Previous research conducted by (Maimun A'la & Nugroho, 2023) in a study entitled "Making Paving Blocks Using Polyethylene Terephthalate (PET) Plastic Waste as a Substitute for Cement" show that PET plastic waste can be used effectively in the manufacture of paving blocks, with a significant influence on the strength and water absorption of the material.
 6. Previous research conducted by (Yazid & Ramadhan Husaini, 2023) in a study entitled "The Use of Polypropylene Plastic Waste as a Cement Substitute for Paving Blocks" show that this research contributes to reducing the use of plastic and utilizing polypropylene plastic waste as an alternative material in construction paving block.
 7. Previous research conducted by (Rahmi, 2022) in a study entitled "Comparative Analysis of the Quality of Eco Paving Blocks Made from Plastic Waste Raw Materials" The results of this study show the potential use of plastic waste, especially LDPE and PP types, in the manufacture of environmentally friendly paving blocks, even though they have quality suitable for use in parks or heavy non-traffic areas.
 8. Previous research conducted by (Sumarjo, 2022) in a study entitled "Finishing the Construction of the Prayer Room in the Taman Sari Tourism Area, Kalibening Village, Dukun District, Magelang Regency, Central Java" The results of this study show that the completion of the construction of the prayer room and other infrastructure improvements is very important to improve the quality of tourism in Kalibening Village, which in turn will improve the quality of life of the community and support the growth of the tourism sector in the area.
 9. Previous research conducted by (Utari & Kampana, 2014) in a study entitled "Planning of Tourism Facilities (*Tourism Amenities*) of Pandawa Beach, Kutuh Village, South Kuta, Badung" the results of this study show the importance of good planning and management of tourism facilities to increase the attractiveness of Pandawa Beach as a tourist destination that is more developed and better able to meet the needs of tourists.
 10. Previous research conducted by (Adhim Arasy, 2019) in a study entitled "Sustainable Planning of Coastal Tourism Areas (Case Study: Gusunga Beach, Takalar Regency)" The results of this study show that this study provides an overview of how to plan and develop the Gusunga Beach tourist area with a sustainable approach, in order to provide long-term benefits for the environment, economy, and local community.

Method

In this study, a quantitative descriptive method is used. Quantitative descriptive research is a research method that aims to describe or describe a phenomenon, situation, or population characteristic in a systematic, factual, and accurate manner using numerical or

statistical data. This method focuses on the collection and analysis of quantitative data to provide a clear picture of the variables being studied without any manipulation or special treatment of the research subject.

Descriptive research is a method used to systematically, factually, and accurately describe or describe current phenomena, situations, or events. The main purpose of this method is to provide a clear picture of the characteristics of a particular individual, group, or situation without altering or altering the variables being studied. Depending on the purpose of the research and the type of data collected, descriptive research is not only limited to data collection and compilation; This method can use a quantitative, qualitative, or a combination of both.



Research Location

Prepat Bay Beach is one of the new tourist destinations located in Tanjung Bunga, Pangkalpinang City, Bangka Belitung Islands Province. Prepat Bay Beach as the name "Prepat" comes from the Malay language which means "four" referring to the four small rivers that drain into this beach.

Stages of Research

a. Data Collection Methods

The data collection in this study uses secondary data. Information that has been collected, compiled, and analyzed by other parties is called secondary data. This is the type of information that researchers do not obtain directly from pre-existing sources.

Observation

In observation, the object of the study was observed to find out the initial condition of the location of the prepat bay beach in Pangkalpinang city and the installation condition of the prayer room and public toilet construction project on the prepat bay beach at this time.

Documentation

Documentation is used to collect data, especially the area and length of Prepat Bay beach for planning the construction of prayer rooms and public toilets by utilizing plastic waste into Eco Blocks to be used as development materials.

b. Financial Analysis Methods

Data processing in a project refers to a series of activities carried out to transform raw data into useful information that can be used for decision-making in the context of the project. It involves collecting, cleaning, transforming, and analyzing data to support project objectives.

1. Net Present Value (NPV)

Net Present Value (NPV) is defined as the difference between the present value of expected cash inflows and the present value of cash outflows. Net Present Value (NPV) is a capital budgeting technique that calculates the net value of an investment by discounting all cash inflows and outflows over the life of the project to its present value, using the required rate of return or capital costs.

$$NPV = \sum_t^n = 0 \frac{CF_t}{(1+r)^t} - C_0 \dots 3.1$$

CF_t = Cash flow in period t

r = Discount Rate

n = Number of Years (Economic Age)

Project

C_0 = Initial Investment

2. Internal Rate Of Return (IRR)

Internal Rate of Return (IRR) is a rate of return that equalizes the present value of a project's cash inflows with the present value of the project's costs. In other words, the Internal Rate of Return (IRR) is the rate of return that makes the Net Present Value (NPV) of all project cash flows equal to zero. In capital budgeting, the Internal Rate of Return (IRR) is often used to compare the feasibility of an investment or project, the higher the Internal Rate of Return (IRR) of a project, the more desirable the project is. The Internal Rate of Return (IRR) provides a useful measure of the profitability of an investment, but they also remind that the Internal Rate of Return (IRR) has some drawbacks and should be used in conjunction with other project evaluation methods for well-rounded decision-making.

$$IRR = i_t + \frac{NPV_1}{NPV_1 + NPV_2} \times (i_2 - i_1) \dots 3.2$$

Where :

NPV_1 = NPV at Interest Rate i_1

NPV_2 = NPV at Interest Rate i_2

- i_1 = Discount Rate that Produces NPV₁
- i_2 = Discount Rate That Produces NPV₂

3. Benefit Cost Ratio

Benefit Cost Ratio (BCR) is a measure used in cost-benefit analysis to summarize the overall value of a project, program, or policy. BCR is calculated by dividing the present value of the total benefit by the present value of the total cost. so it must be used in conjunction with other evaluation methods for comprehensive decision-making.

$$BCR = \frac{\text{Total Benefit}}{\text{Total Cost}} \dots 3.3$$

Total Benefits : the value of benefits resulting from the project

Total Cost : total costs incurred to carry out the project

Conversely, if the BCR is less than 1, the cost exceeds the benefit and the project may not be recommended. He emphasized that BCR is a useful tool for comparing the relative efficiency of different alternative projects, especially when resources are limited. However, Greenberg also cautioned that while the BCR provides a clear picture of a project's efficiency, it does not consider the absolute scale of benefits or costs.

4. Payback Period (PP)

The Payback Period (PP) is defined as the amount of time it takes for an investment to generate a cumulative cash flow equal to the initial cost of the investment. They explain that PP is a simple method of evaluating the feasibility of an investment project by measuring how quickly the initial investment can be returned.

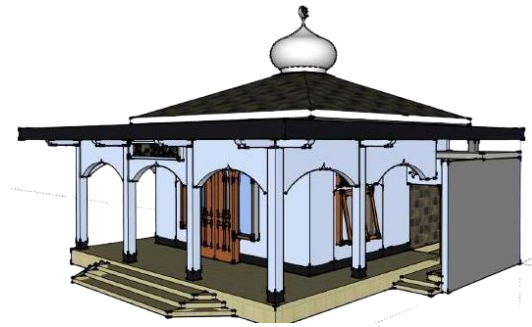
$$PP = \frac{\text{investment value}}{\text{revenue}} \times 1 \text{ year} \dots 3.4$$

To calculate the analysis of this financial aspect, use the current interest rate of 5% per year.

Results and Discussion

Project Design

a) Mosque



The plan to build a prayer room on the beach of Prepat Bay, Tanjung Bunga, Pangkalpinang City by utilizing 6,830 red brick blocks with a prayer room size of 8 meters long and 10 m wide and the height of the ablution place is 2.5 m, the wall is 3 m, the overall height is 4.5 m.

b) Toilet



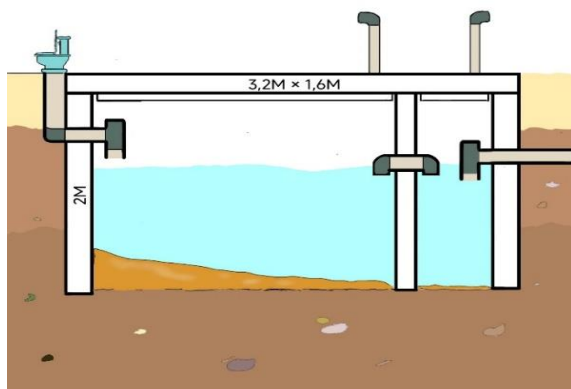
The plan to build a Public Toilet by utilizing plastic waste into Eco Block as a substitute for conventional bricks or concrete blocks to create alternative building materials on the beach of Prepat Bay, Tanjung Bunga, Pangkalpinang City with a prayer room size of 4 meters long and 6 m wide.

c) Tower Gate



Installation of Toren Tower, with a height of 300 cm and a width of 100 cm

d) Septic Tank



A. Financial Analysis

1. Net Present Value (NPV)

Table 4.2 Net Present Value (NPV) 10 %

Year	Cast Flow	Present Value
Year 0	IDR 210,842,000	IDR 210,842,000
Year 1	IDR 122,288,360	IDR 111,171,236
Year 2	IDR 115,963,100	IDR 95.837.273
Year 3	IDR 120,179,940	IDR 90.292.968
Year 4	IDR 111,746,260	IDR 76.324.199
Year 5	IDR 109,637,840	IDR 68.076.473

Total PV	IDR 441,702,149
NPV 10%	IDR 230,860,149

Source : Data Processed (2024)

Table 4.3 Net Present Value (NPV) 15 %

Year	Cash Flow	Present Value
Year 0	IDR 210,842,000	IDR 210.842.000
Year 1	IDR 122,288,360	IDR 106.337.704
Year 2	IDR 115,963,100	IDR 87.684.764
Year 3	IDR 120,179,940	IDR 79.020.261
Year 4	IDR 111,746,260	IDR 63.891.287
Year 5	IDR 109,637,840	IDR 54.509.383
Total PV		IDR 391,443,399,610
NPV 15%		IDR 180.601.400

Source : Data Processed (2024)

2. Internal Rate of Return (IRR)

Know

$$I_1 = 10\% \quad NPV_1 = \text{IDR } 230.860.149$$

$$I_2 = 15\% \quad NPV_2 = \text{IDR } 180.601,400$$

$$IRR = it + \frac{NPV_1}{NPV_1 + NPV_2} \times (i_2 - i_1)$$

$$IRR = 10\% + \frac{\text{IDR } 230.860.149}{\text{IDR } 230.860.149 + \text{IDR } 180.601.400} \times (15\% - 10\%)$$

$$IRR = 10\% + \frac{\text{IDR } 230.860.149}{\text{IDR } 411.461.548} \times 5\%$$

$$IRR = 10\% + 0,56 \times 5\%$$

$$IRR = 12,8\%$$

3. Benefit Cost Ratio (BCR)

Know

$$\text{Benefit} = \sum PV \text{ Benefits (1-5)} \\ = \text{IDR } 441.702.149$$

$$\text{Cost} = \text{IDR } 210.842.000$$

$$B / C = \frac{\text{Benefit}}{\text{Cost}} \\ B / C = \frac{\text{IDR } 441.702.149}{\text{IDR } 210.842.000}$$

$$= 2.1$$

4. Payback Period (PP)

Know

$$\text{Investment Value} = \text{IDR } 210,842,000$$

$$\text{Income} = \frac{\text{Rp } 579.815.500}{5}$$

$$= \text{IDR } 115,963,100$$

$$PP = \frac{\text{investment value}}{\text{income}} \times 1 \text{ year}$$

$$PP = \frac{IDR 210.842.000}{IDR 115.963.100} \times 1 \text{ year}$$

$$PP = 1.82 \text{ years}$$

Operational expenses, also known as operational expenses (OPEX), are work plans that cover all of the company's main activities in generating revenue in a given period. Therefore, the operational budget includes:

- a. Preparation Costs are costs incurred before the construction process. The required preparation fee is IDR 1,000,000
- b. Operational Costs are costs incurred to pay for labor, electricity, telecommunications and water, hygiene and consumables. Operational costs in this construction amounted to Rp 181,819,000
- c. Investment Costs are the costs incurred to make investments such as the purchase of assets. The required investment cost is IDR 3,391,000

From the results of the calculation of the financial feasibility analysis of the Prayer Room and Public Toilet Construction project using plastic waste into Eco Block, at Prepat Bay Beach, Pangkalpinang City. That in the process of building this project was declared financially feasible by using Net Present Value (NPV) analysis with an interest rate of 10% to get a result of IDR 230,860,149 and an interest rate of 15% to get a result of IDR 180,601,400, and the Internal Rate of Return was obtained a value of 12.8%, and the result of the Benefit Cost Ratio (BCR) with a benefit of IDR 441,702,149 and a cost of IDR 210,842,000 resulted in a value of 2.1. In the calculation of the Payback Period, the result was obtained 1.82 Years. So within a period of 1.82 years, the investment capital from the project to build a prayer room and public toilet in Taman Bunga, Pangkalpinang City can be returned.

Conclusion

Based on the calculation of the financial feasibility analysis of the construction project of the Prayer Room and Public Toilet using used plastic waste materials into Eco Block in Taman Bunga, Pangkalpinang city, that the construction of this project was declared feasible from all aspects of finance by using the analysis methods of NPV (Net Present Value), IRR (Internal Rate

of Return), BCR (Benefit Cost Ratio) and PP (payback period).

The budget used in the planning of the project for the construction of prayer rooms and public toilets uses used plastic waste materials to become Eco Blocks in Taman Bunga, Pangkalpinang city, using Cooperation Budget funds between private parties or those who want to invest.

Acknowledgments

All praise for the presence of Allah SWT for his guidance that has guided our steps in completing the article entitled "Planning for the Construction of Prayer Rooms and Public Toilets by Utilizing Plastic Waste into Eco Blocks to Add Facilities and Support the Sustainable Development Movement at Prepat Bay Beach, Pangkalpinang City". The author would like to thank his friends and supervisors who have helped in the process of completing the writing of this article.

Conflict of Interest

The author conducted research as an improvement of coastal tourism infrastructure. In this case, the author as a designer provides the feasibility of a tourism infrastructure project in the form of muhsolas and toilets.

References

- Adhim Arasy, M., Trisutomo, S., & Aliah Ekawati, S. (2019). Sustainable Planning of Coastal Tourism Areas (Case Study: Gusunga Beach, Takalar Regency). In *Journal of Maritime Regions and Cities* (vol. 7).
<https://doi.org/10.20956/jwkm.v7i0.1338>
- Baracskey, D. (2018). Cost-benefit analysis: concept and practice. Jstor.
- Barokah, H. (2012). Eco-friendly and energy-efficient architecture. *Scientific Journal of Architecture*, 9(1),10–12.
- Brealey, R. A., Myers, S.C., & Allen, F. (2014). *Corporate Finance Principles*. McGraw Hill.
- Brigham, E.F., & Houston, J.F. (2013). *Fundamentals of Financial Management*. Southwest Cengage Learning.
- Fajriah, S. D., & Mussadun. (2014). *Development of Facilities and*

- Infrastructure to Support Sustainable Coastal Tourism (Case Study: Wonokerto Coastal Area, Pekalongan Regency). *Journal of Regional & Urban Development*.
- Fazis, M. (2022). *Project Planning and Project Scheduling*
- Hasaya, H., Masrida, R., & Firmansyah, D. (2021). The potential for reusing plastic waste into eco-paving blocks. *Journal of Scientific Networks (Jjst)*.
- Jordan, BD, Ross, S.A., & Westerfield, R.W. (2003). *Fundamentals of Corporate Finance*. Mcgraw Hill.
- Kuncoro, A. H. B. (2022). Assistance for the renovation of the Al Azhar Mosque in Magersari Village, Wirosari District, Grobogan Regency, Central Java. *Horizon: Journal of Global Community Service*.
- Maimun A'la, & Nugroho, C. K. (2023). Making Paving Blocks by Using Polyethylene Terephthalate (PET) Plastic Waste as a Substitute for Cement.
- Novianti, T. (2016). *Introduction to Project Evaluation*.
- Rahmi, S. A., Lydia, E. N., Purwandito, M., & Lisa, N. P. (2022). Comparative Analysis of the Quality of Eco Paving Block Made from Plastic Waste Raw Material. *Journal Terrace : Journal of Civil Engineering*, 12(2), 395.
- Sumarjo, Sutarto, & Alifin Nur, N. (2022). Finishing the Construction of the Prayer Room in the Taman Sari Tourism Area, Kalibening Village, Dukun District, Magelang Regency, Central Java (Vol. 1, Issue 2).
- Utari, P. S., & Kampana, I. M. A. (2014). Planning of Tourism Facilities (Tourism Amenities) Pandawa Beach, Kutuh Village, South Kuta, Badung. *Journal of Tourism Destinations*, 2(1).
- Yazid, M., & Ramadhan Husaini, R. (2023). The use of polypropylene plastic waste as a cement substitute in paving blocks. *Journal of Technology and Civil Engineering*, 1, 34–38.
- Zulf, E. K., Zainur, & Soehardi, F. (2021). Quality of Paving Block by using waste plastic polypropylene against compressive strength. *Journal of Engineering*.