

Analysis of the Value of Ability to Pay & Willingness to Pay Toll Tariffs in the People of Gresik Regency Based on the Facilities and Infrastructure of the Krian – Legundi – Bunder Toll Road

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ARTICLE INFO	ABSTRACT
Keywords: Ability to Pay (ATP); Willingness to Pay (WTP); Jalan Tol Krian – Legundi – Bunder; Optimalisasi Pendapatan Tol.	<i>This study aims to determine the toll rates desired by the people of Gresik Regency based on the value of Ability to Pay (ATP) and Willingness to Pay (WTP) on the Krian – Legundi – Bunder (KLB) Toll Road. Through traffic count surveys and Road Side Interviews (RSI) at toll gates and arterial roads, data on vehicle population, payment ability, and user preferences for existing toll rates were obtained. The analysis employed a Logit model to evaluate the relationship between the ATP and WTP values and their correlation with the current toll rates. The results revealed that both the WTP and ATP of the community were lower than the existing toll tariff. Specifically, the study found that the optimal toll rate for users would be Rp. 1,100/km, which is 26.96% lower than the current rate of Rp. 1,506/km. This adjustment not only aligns better with the financial capacities of the users but also presents an opportunity for revenue optimization. By lowering the toll rate, it is predicted that increased traffic volume could compensate for the reduced fee, ultimately benefiting both the toll operator and the community. In conclusion, establishing a toll rate that reflects user preferences is crucial for enhancing accessibility and ensuring sustainable revenue generation for infrastructure development.</i>

INTRODUCTION

East Java Province is one of the regions with high economic growth compared to other provinces in Indonesia. To support this, various efforts need to be made to improve accessibility and connectivity between regions, one of which is the construction of toll roads. The plan to build the Krian-Legundi-Bunder-Manyar toll road is one of the toll roads that will be developed, as stated in the East Java Provincial Regulation Number 5 of 2012. Presidential Regulation Number 56 of 2018 states that the 38.3 km Krian-Legundi-Bunder-Manyar ("KLBM") toll road is included in the national strategic program. Of course, there is an economic impact of infrastructure in general that is accepted. For example, after the operation of the TransJava Toll Road, there were economic changes on the Pantura Line (Prasetyo & Djunaedi, 2019). In the Presidential Regulation of the Republic of Indonesia number 80 of 2019 concerning the Acceleration of Economic Development in the Gresik - Bangkalan - Mojokerto - Surabaya - Sidoarjo - Lamongan Area, the Bromo - Tengger - Semeru Area, as well as the Selingkar Wilis and Lintas Selatan Areas, the position of the KLBM toll road as a national strategic program is increasingly emphasized and it is necessary to accelerate its implementation. Supporting the Presidential Regulation plan, in the future the city of Surabaya and its surroundings will be designated as a National Strategic Area (KSN) (Alfani, 2023).

The Krian-Legundi-Bunder-Manyar Toll Road (KLBM) is one of the parts of the Non-Trans Java Toll Road that is included in the national strategic project. The KLBM toll road was built to facilitate the activities and economic activities of the people of Sidoarjo Regency (Krian), Gresik Regency and its surroundings (Agustina & Widyastuti, 2020). Gresik Regency and its surroundings (Agustina & Widyastuti, 2020).

Chronologically, the initiation process of the Krian – Legundi – Bunder Toll Road ("KLB") began in 2013. PT. Waskita Karya (Persero), Tbk and PT. Energi Bumi Mining expressed its interest in investing in the construction of the KLB Toll Road. On 17 December 2013, the Governor of East Java Province made a letter with the number 050/2709A/022.2/2013 which substantively contained a request to the Minister of Public Works and Public Housing that PT. Waskita Karya (Persero), Tbk and PT. Energi Bumi Mining (Operational Cooperation) to be considered as the Initiating Business Entity for the KLB Toll Road Section under the name of the PT. Waskita Bumi Wira ("WBW"). On March 20, 2015, WBW sent a letter to the Minister of PUPR with the contents of the letter related to the request for the determination of WBW in initiating the KLB Toll Road. Then the Minister of PUPR

approved WBW as the initiator of the KLB Toll Road business on April 23, 2015 according to his letter number JL.03.04-Mn/362. (Kacaribu et al., 2019)

This toll road connects Krian (Mojokerto Regency) and Bunder (Gresik Regency), later it will be connected to the Surabaya – Mojokerto and Surabaya – Gresik toll roads. In addition to providing an alternative route that is shorter than for the Krian – Bunder corridor, the construction of this toll road is expected to support industrial estates (JIPEE) in this area. In addition, this toll road serves to overcome the problem of congestion on arterial roads. Traffic congestion is considered one of the main problems that need to be considered by the Government of Indonesia.

The KLB Toll Road is divided into 4 sections. Section 1 is a section that connects the Krian Bypass National Road and Kedamean District with a section length of 9,770 km. Section 2 is a section that connects Kedamean District and Cerme Region with a section length of 13,205 km. Section 3 is a section that connects the Cerme Region and the Bunder Region, Kebomas District with a length of 6,025 km. And, for Section 4 is the section that connects the Bunder Area, Kebomas District with Manyar District with a length of 9,399 km. In 2020, the KLB Toll Road Sections 1 – 3 (KLB Toll Road) have been operating from Krian to Bunder, while the Bunder – Manyar / Section 4 section which is adjacent to the Surabaya – Gresik toll road (Bunder – Manyar Segment) is in the process of land acquisition which until now is still ongoing. The current toll collection on the operation of the KLB Section is enforced based on the Decree of the Minister of PUPR Number 1677/KPTS/M/2020 concerning the Determination of Motorized Vehicle Types and the Amount of Toll Tariffs on the Krian – Legundi – Bunder – Manyar Toll Road Sections 1 – 3 (Krian – Legundi – Bunder).

Currently, the Initial Phase Wringinanom Junction (4 Ramp Northbound) has been operating as of February 22, 2023. The Wringinanom Junction is a *toll-to-toll* connection that directly connects the Transjawa Toll Road through the Surabaya – Mojokerto Toll Road and the KLB Toll Road. The hope of *this Junction* is to accelerate the accessibility and mobility of toll road users both from West & East destinations and from Gresik destinations so that it can cut travel time. If there is an origin to Gresik – Solo (West – North Destination Origin), the use of this *Junction* is very optimal both in terms of fare and length of trip. However, if there is an origin of Gresik – Waru (Origin of East – North Destination), the usefulness of *the Junction* is still not felt both in terms of fares and travel length due to the many alternative routes that are shorter and cheaper rates from both toll roads and non-toll roads.

The imposition of toll tariffs is often a conflict between toll road users and the Government. Given that toll roads are paid alternative roads, the provision of this toll road will not be spared from the intervention of investment needs from business entities. Sometimes the toll rates imposed on the community are not fully in accordance with the wishes and abilities of the community, of course, as prospective users of the toll road in question. The toll tariff imposed on the community is a form of compensation obtained by the Toll Road Business Entity which of course pays attention to the value of investment costs in accordance with the scope of the work.

One of the impacts of not entering road users on toll roads is the high toll rates. This toll tariff is one of the things that is quite sensitive for road users. The toll rates applied at the beginning of the operation of the Decree of the Minister of PUPR Number 1677/KPTS/M/2020 are as follows for Group 1 of Rp. 1,506/km, Groups 2 and 3 of Rp. 2,259/km, and Groups 3 and 4. One of the indicators of the cause is the reluctance of road users to enter the toll road because the tariff is too expensive, which incidentally is always compared to the existing tariff in Surabaya – Gempol with an estimated open tariff of Rp. 459/km (BUJT Surabaya – Gempol data).

By understanding the declining economic conditions due to the Covid-19 pandemic and the dynamics of traffic conditions that exist to date, it is necessary for me to evaluate the condition of various data and information. Therefore, it is necessary to have an analysis of toll rates with a better socio-economic review. The value of the benefits of toll roads will operate very effectively for toll road users and providers. Therefore, an analysis is needed on the adjustment of toll rates desired by the people of Gresik Regency based on the perception of *Willingness to Pay* (WTP) and *Ability to Pay* (ATP). The topic of this study is to determine the toll rates imposed on the people of Gresik Regency. The main reason for the need for this study is to find out the perception of the people of Gresik Regency in interpreting *Willingness to Pay* (WTP) and *Ability to Pay* (ATP) in accordance with the facilities and infrastructure of the Krian – Legundi – Bunder Toll Road. As a case study, this research was taken on the Krian – Legundi – Bunder Toll Road with PT. Waskita Bumi Wira as a Business Entity of the Krian – Legundi – Bunder Toll Road.

Several studies have examined the affordability of toll roads by analyzing the willingness to pay (WTP) and ability to pay (ATP) of users. A study by (W. Li et al., 2021) examined the impact of road pricing policies on user behavior and found that users are more likely to avoid toll roads when alternative routes are available, particularly when the price elasticity is high. Similarly, (Son et al., 2022) studied the determinants of WTP for highway infrastructure in South Korea and highlighted that travel time savings significantly influence user decisions.

A study by (Z. Li et al., 2021) analyzed toll road pricing strategies and suggested that differentiated pricing models could improve road usage efficiency while maintaining fairness for lower-income groups. Additionally, (Gu, 2024) examined public perceptions of toll tariffs and found that fairness and transparency in pricing play a crucial role in user satisfaction and compliance. Meanwhile, (Prasetyo & Djunaedi, 2019) conducted an economic

analysis of toll roads in Indonesia and concluded that economic growth is positively correlated with infrastructure development, but users often perceive toll rates as burdensome.

Several studies have examined factors that influence Ability to Pay (ATP) and Willingness to Pay (WTP) towards toll road tariffs. For example, research by (W. Li et al., 2021) highlighted how price elasticity affects road users' decision in choosing toll or alternative roads. They found that the higher the price elasticity, the more likely users are to avoid tolls if the rates charged are perceived to be too high. (Son et al., 2022) also examined the determinants of WTP in transportation infrastructure and revealed that the travel time saving factor is one of the main variables in determining people's WTP. This research shows that road users are more likely to accept higher tariffs if they experience significant benefits in terms of time efficiency.

In addition, research by (Zhao et al., 2023) examined the psychological factors affecting WTP of toll road users and found that perceived fairness in tariff determination strongly influences user compliance and satisfaction. The transparency factor in toll tariff policy is also a crucial element in public acceptance of tariff increases (Gu, 2024). In Indonesia, a study by (Prasetyo & Djunaedi, 2019) showed that while toll road infrastructure development can drive economic growth, users often feel burdened by existing toll rates. Therefore, evaluating ATP and WTP is important to adjust tariffs to support infrastructure sustainability without hampering public accessibility.

In addition, it is important to consider the social impact of toll rates. Several studies have shown that high toll rates can cause social injustice, especially for low-income groups who rely heavily on transportation for daily mobility (Madi et al., 2013). Unaffordable rates may encourage users to choose cheaper alternative routes, potentially increasing congestion on non-tolled highways (Enriquez, n.d.). Therefore, determining toll rates that are equitable and within people's means is crucial in transportation infrastructure planning (Wan et al., 2023).

East Java Province has consistently demonstrated robust economic growth compared to other provinces in Indonesia. This growth has been facilitated by substantial investments in infrastructure, including the construction of the Krian-Legundi-Bunder-Manyar (KLBM) Toll Road. Infrastructure projects such as these are part of Indonesia's broader national strategic initiatives aimed at improving regional connectivity and economic integration (Agustina & Widyastuti, 2020). The development of toll roads is expected to enhance trade, facilitate transportation efficiency, and contribute to industrial growth (Prasetyo & Djunaedi, 2019). The implementation of efficient road pricing policies is essential for ensuring sustainable infrastructure financing (Gu, 2024).

However, despite the apparent benefits, there remains an ongoing debate regarding toll tariff structures, particularly their affordability for the general public. The Ability to Pay (ATP) and Willingness to Pay (WTP) of road users are crucial indicators in determining the optimal toll rate that balances infrastructure development costs with affordability (Kacaribu et al., 2019). Previous studies have highlighted that users often perceive toll rates as excessive, leading to a preference for arterial roads (Alfani, 2023). This perception suggests the need for a reassessment of toll pricing models to align with public expectations and economic realities (Z. Li & Hensher, 2009).

Several studies have examined the impact of toll pricing on user behavior. For instance, a study by (Agustina & Widyastuti, 2020) assessed the characteristics and route choices of Surabaya-Mojokerto toll road users. Their findings indicate that while toll roads offer significant time savings, the cost factor remains a primary concern.

A similar study by (Prasetyo & Djunaedi, 2019) evaluated economic shifts before and after the construction of the TransJava Toll Road, revealing that infrastructure development significantly influences regional economic dynamics. Additionally, (Kacaribu et al., 2019) conducted research on infrastructure investments in Indonesia, emphasizing the importance of balancing financial viability and public accessibility in toll road projects. (Zhao et al., 2023) explored the psychological factors affecting WTP, showing that perceived fairness plays a crucial role in user acceptance of toll pricing policies. Furthermore, (Muhammad & Wahyuni, 2022) examined urban toll policies and suggested that dynamic pricing models could better accommodate different income groups. These studies underscore the necessity of integrating socioeconomic considerations into toll pricing policies to ensure public acceptance and optimal utilization (Hawley et al., 2020).

While previous studies have addressed various aspects of toll road development and user behavior, a significant gap remains in understanding the precise balance between ATP and WTP in the context of the KLBM Toll Road. Most studies focus on broad economic impacts or general user preferences without delving into the specific financial thresholds that determine road user decision-making. This research aims to fill that gap by providing a detailed analysis of ATP and WTP among different vehicle categories, offering insights into potential tariff adjustments that could maximize both revenue and public satisfaction. This study introduces a comprehensive approach to evaluating toll road affordability by integrating both qualitative and quantitative analyses of ATP and WTP. Unlike previous research, which primarily examines historical data and economic trends, this study utilizes real-time surveys, traffic count data, and direct user interviews. By incorporating these methodologies, the study offers a more nuanced understanding of road user preferences and financial capabilities, which can serve as a basis for more equitable toll pricing strategies.

The primary objective of this research is to determine the optimal toll tariff structure based on the ATP and WTP of road users in Gresik Regency. Specifically, the study seeks to:

1. Analyze the financial capacity of road users in paying toll fees.
2. Examine user preferences regarding toll rates and alternative routes.
3. Propose an optimal toll pricing model that aligns with public affordability and economic viability.

The findings of this research have several implications. For policymakers, the study provides empirical data to support equitable toll pricing decisions. For infrastructure investors, it offers insights into revenue optimization strategies. Finally, for the general public, the study contributes to the broader discourse on transportation equity, ensuring that toll roads remain accessible to all socioeconomic segments (Muhammad & Wahyuni, 2022).

METHOD

Research Flow Chart

The research begins with the problem formulation, where the specific research problem is identified and defined. Following this, a survey team is formed to facilitate effective data collection. The team then engages in initial survey planning and methodology setup, creating a structured plan to guide the survey process. Once the planning stage is complete, the team proceeds with data collection and analysis. This includes conducting traffic count surveys to gather quantitative data and surveying the number of respondents to ensure a representative sample. A significant component of this research is the Stated Preference survey, which utilizes methods such as Ability to Pay (ATP) and Willingness to Pay (WTP) to assess participants' preferences and financial capabilities. After the data collection phase, the results are meticulously documented. The analysis of this data involves employing a Logit Model for the stated preferences and further analysis of both ATP and WTP. The findings from this analysis are then compiled to draw meaningful conclusions. Finally, the research culminates in the formulation of conclusions and recommendations, providing insights that can inform future decisions and strategies. This structured approach ensures a comprehensive understanding of the research topic from start to finish.

The research entitled *Analysis of the Value of Ability to Pay & Willingness to Pay Toll Tariffs in the Community of Gresik Regency Based on the Facilities and Infrastructure of the Krian – Legundi – Buner Toll Road*. This research contains the ability and willingness of the community in imposing toll tariffs imposed. Data collection through respondents using questionnaires and surveys directly to several strategic location points to obtain primary data including respondent profiles, respondent characteristics, and respondent preferences.

This study involves a traffic count survey on the Legundi National Road – Simpang Empat Bunder to identify the population of arterial road users and vehicles switching to toll roads, by calculating the daily volume of vehicles based on the 2023 Indonesian Road Capacity Guidelines. The researcher also conducted Road Side Interviews (RSI) at three toll gates (Bunder Gresik, Cerme, and Belahanrejo) and two arterial road locations (Karangandong and Cerme) to understand the ability and preferences of users towards toll rates. The substance of the RSI includes the respondent's profile, characteristics, and preferences. Sample data was taken based on the proportion of vehicles from toll transactions and *arterial traffic counting*, with the number of samples calculated using an empirical formula to limit the scope of the study.

RESULTS AND DISCUSSION

Calculation Results

Furthermore, from the data obtained from the researcher based on the condition of the arterial road, several data can be obtained, namely the characteristics of arterial road users, ATP value, WTP value, and Optimum Toll Tariff.

Characteristics of Road Users

The researcher also conducted details of the type of work of arterial road users. The use in the description of this type of road user work is to provide confidence in how far from the typical permanent and non-permanent employees as characteristics of road users. From the results of the survey conducted by the researcher, road users are dominated by drivers. This is of course because the characteristics of road users follow the characteristics of the Gresik Regency area which has more industry players, ports, transportation, large, medium and small companies, and offices

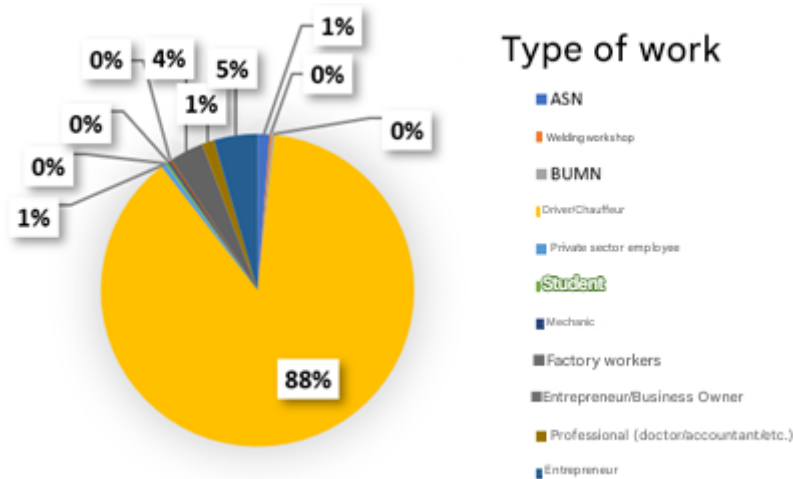


Figure 2 Types of Arterial Road User Jobs
Source: Researcher Processing, 2024

The amount of income greatly determines the allocation of expenses in traveling. From the results of the survey conducted by the researcher, road users are dominated by road users with an income of Rp. 3 million to Rp. 4 million. This certainly determines the amount of ATP and WTP values because it is directly proportional to the value of income.

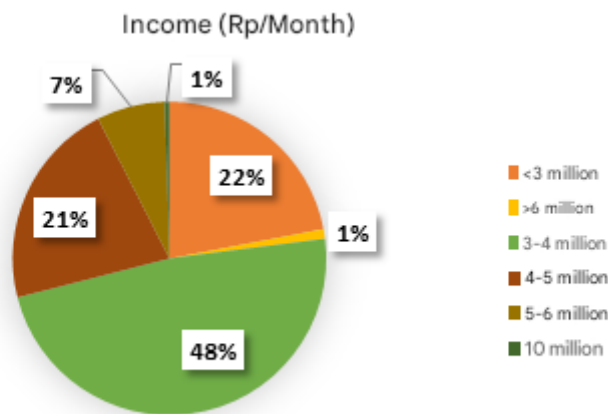


Figure 3 Income Value of Arterial Road Users
Source: Researcher Processing, 2024

Ability to Pay Results

Ability to Pay provides an overview of road users being able to pay toll fares on the way. The determination of this ATP value is based on the number of respondents who have conducted a previous survey by the Researcher. This ATP value is divided by Vehicle Class. This classification is based on PP 23/2024 which divides Vehicle Classes on Toll Roads into 5 (Five) types. For Group 1 are ordinary vehicles passenger cars, sedans, jeeps, pick-ups, buses and private vehicles and other transportation. Group 2 is a double-axle truck. Group 3 is a triple truck vehicle. Group Four is a four-axle truck. Group Five is a truck vehicle with five axles and more. The calculation of ATP is based on the calculation of the equation / formula below.

The ATP value is divided into 3 values. The distribution of ATP Value is seen from the value of the tariff on the Krian – Legundi – Bunder Toll Road where in the division there are 3 division of tariff values. The distribution of ATP values is as follows:

- ATP group 1
- ATP group 2 and 3
- ATP group 4 and 5

The researcher intends to clarify the results of the study. For example, in the calculation of ATP, there is an example of calculation from ATP taken from transportation income and expenses. For example, an upper road user with the initials A has an Entrepreneurial job with a monthly income of Rp. 4,500,000, monthly expenses of Rp. 2,000,000, and monthly transportation expenses of Rp. 2,430,000 using Group 1 in traveling. Meanwhile, A travels approximately 1,920 km every month. Then the ATP value is obtained through the calculation of the Formula 2.1:

$$ATP = \frac{I \times Pp \times Pt}{Tt} = \frac{4.500.000 \times \left(\frac{2.000.000}{2.430.000} \right) \times \left(\frac{2.430.000}{4.500.000} \right)}{1920}$$

ATP = Rp. 1042/km

The calculation of ATP values is carried out based on intervals. The interval is determined from the number of respondents with a logarithmic function. The middle value of each interval is calculated, then a graph of ATP values and the percentage of respondents is obtained. Based on the analysis of the average value of ATP in Group 1, the tariff result was Rp. 1,477/km.

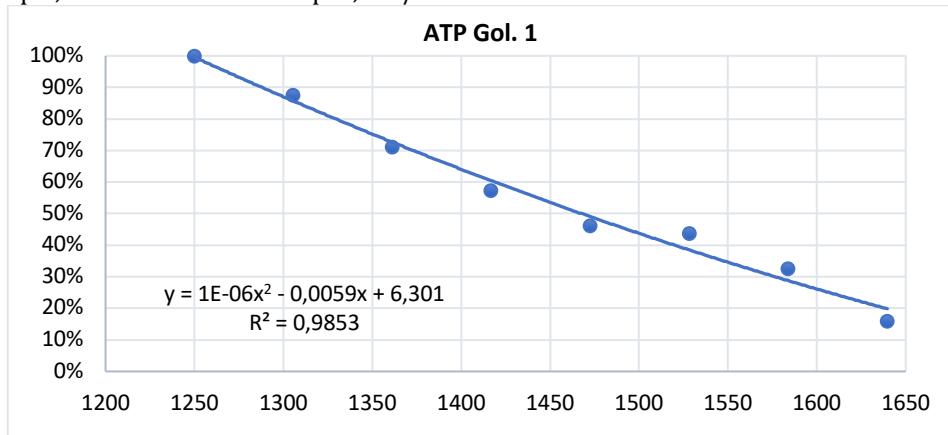


Figure 4 Group 1 ATP Value Graph

Source: Researcher Processing, 2024

The same step is carried out as the calculation of ATP Group 1, then based on the analysis of the average value of ATP in Groups 2 and 3, the tariff result of Rp. 2,144/km is obtained with the following interval graph.

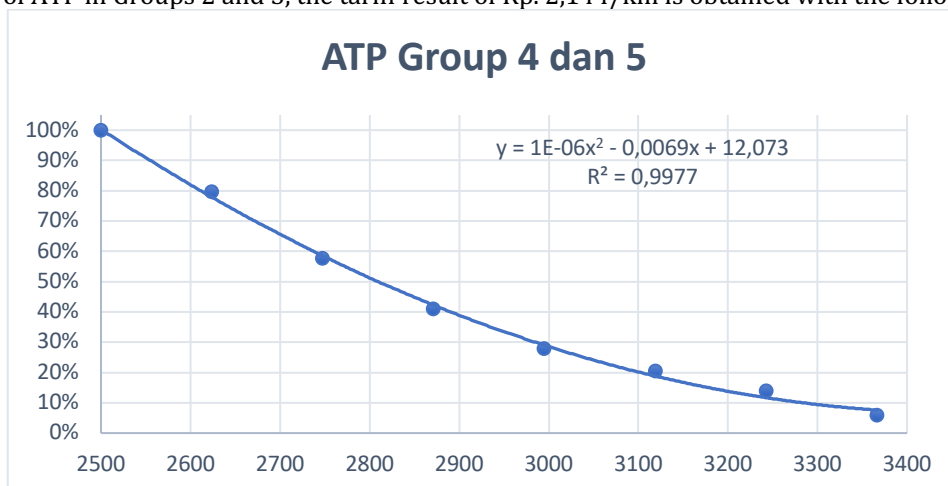


Figure 5 ATP Value Graph Groups 4 and 5

Source: Researcher Processing, 2024

In summary, *Ability to Pay* (ATP) reflects an individual's ability to pay for transportation services based on income, calculated from the ratio of transportation costs to travel intensity. Factors that affect ATP include income, allocation of transportation costs, and travel intensity. The calculation of ATP is obtained from transportation costs per income.

Willingness to Pay Results

Similar to *Ability to Pay*, *Willingness to Pay* has 3 types of values based on the classification of vehicle types according to existing toll rates. The determination of the WTP value is based on the number of respondents who have conducted a previous survey by the Researcher. The WTP value is taken on average from the results of the interview on the ideal toll tariff desired by the respondents. The results of the WTP certainly provide an overview of the willingness of road users to use toll roads by considering the escorting toll service and the selection of routes for the surrounding road network.

The WTP value is divided into 3 values. The distribution of WTP Value is seen from the value of the tariff on the Krian – Legundi – Bunder Toll Road where in the division there are 3 division of tariff values. The distribution of WTP values is as follows:

- WTP Group 1
- WTP Group 2 and 3
- WTP Group 4 and 5

The WTP value is known through the results of direct interviews with road users. The researcher immediately asked road users the question "How much is the desired toll tariff?". The calculation of the WTP value is calculated based on intervals. The interval is determined from the number of respondents with a logarithmic

function. The middle value of each interval is calculated, then a graph of the WTP value along with the percentage of respondents is obtained from these results, calculations can be carried out both in intervals and the average value of the WTP. Based on the analysis of the average WTP value in Group 1, the tariff result was Rp. 1,406/km.

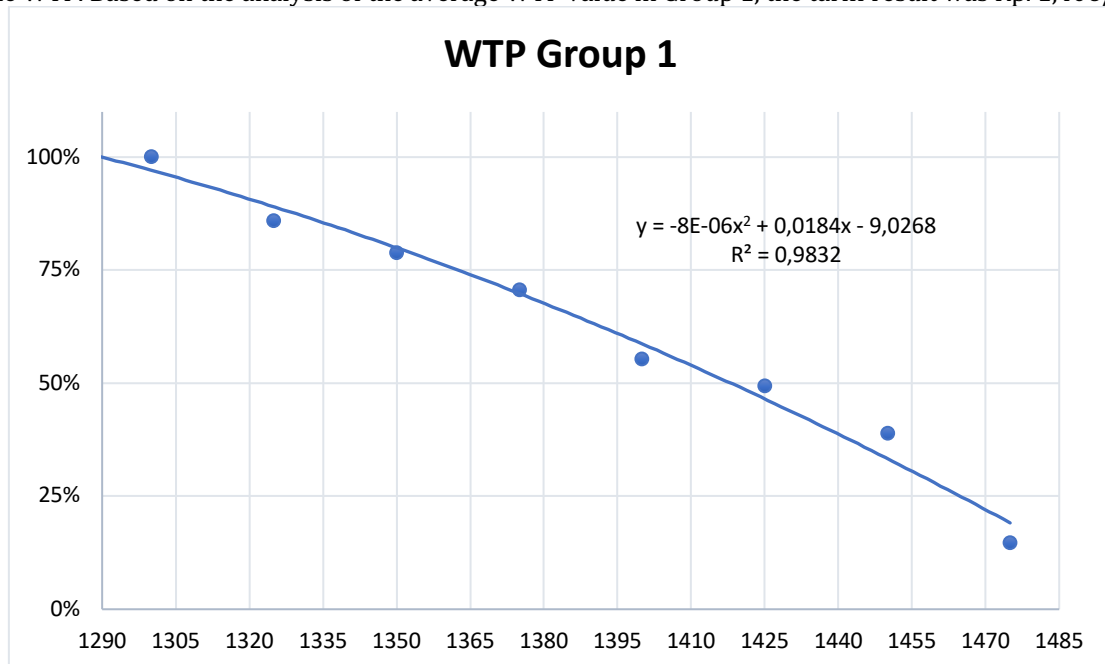


Figure 6 WTP Group 1 Value Chart
Source: Researcher Processing, 2024

The same step is carried out as the calculation of ATP Group 1, then based on the analysis of the average WTP value in Groups 2 and 3, the fare result of Rp. 2,118/km is obtained with the following interval graph.

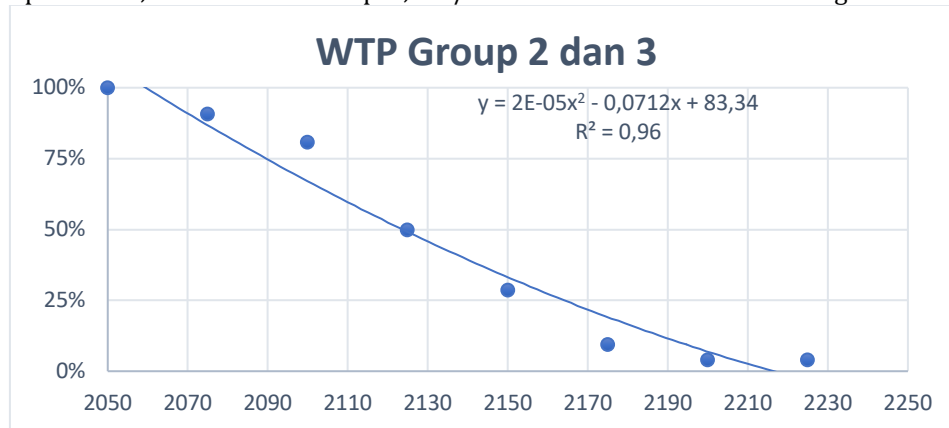


Figure 7 WTP Group 2 and 3 Value Chart
Source: Researcher Processing, 2024

The same step is carried out as the calculation of ATP Group 1 and Groups 2 and 3, then based on the analysis of the average WTP value in Groups 4 and 5, the fare result is Rp. 2,855/km with the following interval graph.

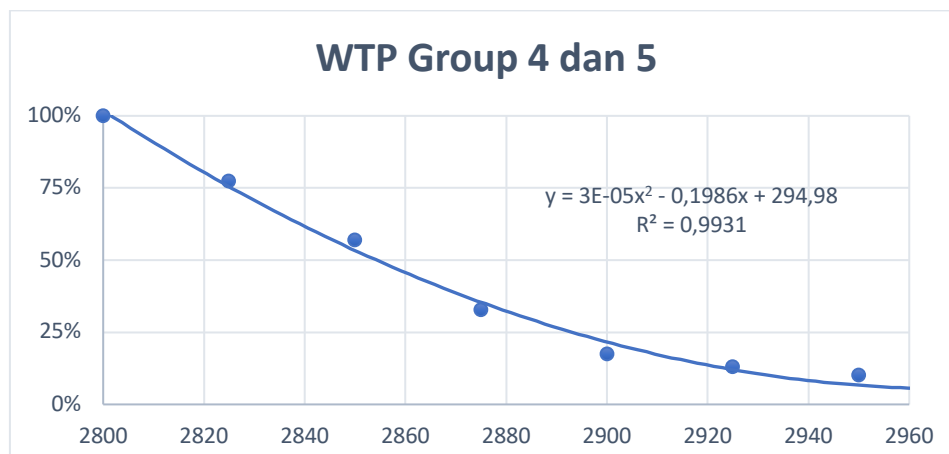


Figure 8 WTP Group 4 and 5 Value Chart

Source: Researcher Processing, 2024

Willingness to Pay (WTP) refers to the willingness of respondents to pay toll fees according to the survey results. The results of the calculation were obtained that all vehicle groups had a small range between ATP and WTP. This condition allows that the characteristics of respondents have a limited income so that the allocated transportation costs are also limited. The characteristics of national road vehicle users are classified based on vehicle groups. The characteristics identified include employment, income, economic conditions and perception of toll roads.

CONCLUSION

This study concludes that the toll tariff desired by the people of Gresik Regency based on Willingness to Pay (WTP) and Ability to Pay (ATP) is lower than the existing toll tariff. The toll tariff desired by the people of Gresik Regency based on Willingness to Pay for Group 1 vehicles is Rp. 1,406/km, Groups 2 and 3 are Rp. 2,118/km, and Groups 4 and 5 are Rp. 2,855/km. while the desired tariff based on Ability to Pay for Group 1 is Rp. 1,477/km, Group 2 and 3 is Rp. 2,144/km, and Group 4 and 5 is Rp. 2,865/km. When compared to the existing toll tariff, the ATP and WTP values are smaller than the existing toll tariff (Rp. 1506/km). Then the tariff that generates the most optimal toll revenue from the Krian – Legundi – Bunder Toll Road is Rp. 1,100/km or a decrease of 26.96% from the existing toll tariff of Rp. 1,506/km. So that many road users choose arterial roads as alternative routes for travelan.

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