

ANALYSIS OF THE INFLUENCE OF REGIONAL TAX FUND ALLOCATION ON THE QUALITY OF ROAD INFRASTRUCTURE IN MEDAN CITY

Muhammad Farazqy Adrian¹

¹ Universitas Nasional

E-mail: ¹⁾ mhdadrian23@gmail.com

Abstract

This study aims to analyze the influence of regional tax fund allocation on the quality of road infrastructure in Medan City. With the need for infrastructure increasing in line with economic growth and population density, this study identifies the extent to which the allocation of local tax funds affects road repair and maintenance, as well as other factors that play a role in the effective use of these funds. The methodology used includes regression analysis to evaluate the relationship between fund allocation, economic growth, number of vehicles, and population density on road quality. The results showed that the allocation of regional tax funds had a significant and positive influence on the quality of road infrastructure with a regression coefficient of 0.45 ($p < 0.05$), indicating that a 1% increase in fund allocation was related to an increase in the road quality index by 0.45 points. In addition, economic growth also has a positive effect (coefficient 0.30), while the number of vehicles (-0.20) and population density (-0.25) have a negative impact on road quality. These findings show that consistent allocation of funds and long-term planning that takes into account economic and social factors are essential for the improvement of road infrastructure. This study recommends increasing the allocation of local tax funds, better budget planning, and the application of technology for road monitoring and maintenance. The implementation of this recommendation is expected to improve the quality of life of the community and encourage economic growth in the city of Medan.

Keywords: Regional taxes, regional levies, general grant funds, capital expenditure

1. INTRODUCTION

The development of road infrastructure is one of the main priorities in an effort to improve the quality of life of the community and encourage economic growth in a region. Good and adequate road infrastructure not only supports the mobility of people and goods but also plays a crucial role in facilitating trade flows, improving accessibility to various public services and facilities, and reducing transportation costs. In the city of Medan, which is one of the largest and most populous cities in Indonesia, the need for quality road infrastructure is becoming increasingly urgent. The city's high economic activity and population density demand roads that are able to accommodate large volumes of traffic and provide efficient access to various centers of economic and social activity (Wu, 2010).

Regional taxes serve as one of the main sources of revenue for local governments in financing various development projects and the provision of public services, including the construction and maintenance of road infrastructure. Therefore, effective and efficient allocation of local tax funds is very important to ensure that the quality of road infrastructure can continue to be improved. Proper allocation of funds not only allows local governments to carry out necessary repair and development projects but also ensures that these improvements are in line with the needs and priorities of the community (Wulandari et al., 2018).

However, although the allocation of regional tax funds has great potential to improve the quality of roads, there are still various challenges in optimizing the use of these funds. Some of the challenges often faced include immature budget planning, inefficient project management, and uneven distribution of benefits that may not reach all levels of society equitably. Therefore, there needs to be a more coordinated and strategic effort in the planning and implementation of road infrastructure projects. The use of more sophisticated technology, strict monitoring, and periodic evaluations can help address these challenges and ensure that the benefits of the allocation of local tax funds can be felt equally by the entire community. With a systematic and results-oriented approach, the Medan City government can optimize the allocation of local tax funds for road infrastructure development, thereby not only improving the quality of roads but also contributing to sustainable economic growth and community welfare (Sugiyanto et al., 2018).

This study aims to analyze the influence of regional tax fund allocation on the quality of road infrastructure in Medan City with an in-depth and comprehensive approach. The main focus of this study is to identify the extent to which the allocation of local tax funds contributes to the improvement and maintenance of road infrastructure, as well as to uncover the factors that affect the effectiveness of the use of these funds. By examining the relationship between fund allocation and road quality, this study seeks to provide a clearer understanding of how investments made through local taxes have a direct impact on the physical condition of roads, safety, and comfort of road users (Adur et al., 2019).

In addition, this study aims to provide strategic recommendations to local governments regarding how to improve the management and allocation of regional tax funds more effectively. These recommendations include proposals for improvements in budget planning, project management, and stricter monitoring and evaluation. By improving the way funds are allocated and used, it is hoped that the quality of road infrastructure can be significantly improved, providing greater benefits to the community and supporting regional economic growth in a sustainable manner (Arniati, 2023).

The results of this study are expected not only to provide in-depth insight to policymakers regarding the effectiveness of regional tax fund allocation but also to offer valuable information for practitioners and academics. Policymakers can use these findings to formulate better strategies and policies in the management of local tax funds, while practitioners can apply these recommendations in the implementation of infrastructure projects. Academics can use the results of this research as a reference for further studies in

the field of regional financial management and infrastructure development. Thus, this study aims to make a significant contribution in efforts to improve the quality of road infrastructure in Medan City and optimize the use of regional tax funds (Yakubu & Aka, 2023).

2. IMPLEMENTATION METHOD

This study uses a quantitative approach with the aim of analyzing the influence of regional tax fund allocation on the quality of road infrastructure in Medan City. The methods used include secondary data collection, statistical analysis, and interpretation of results. This study uses a descriptive and causal design. The descriptive design is used to provide an overview of the condition of regional tax fund allocation and road infrastructure quality, while the causal design is used to analyze the relationship between regional tax fund allocation and road infrastructure quality. The data used in this study consists of secondary data obtained from various official sources. Data on the allocation of regional tax funds was obtained from the financial statements of the local government of Medan City, especially from the Regional Revenue Office and the Regional Finance and Asset Management Agency (BPKAD). Road infrastructure quality data was obtained from the Medan City Public Works and Spatial Planning Office (PUPR) as well as road infrastructure survey reports conducted by the Central Statistics Agency (BPS) or related institutions. In addition, other supporting data related to demographics, economy, and other relevant aspects were obtained from BPS and other official sources (Sugiyono, 2019).

The data that has been collected will be analyzed using statistical techniques with the help of data analysis software such as SPSS or STATA. The analysis steps carried out include descriptive analysis, classical assumption test, and multiple linear regression analysis. Descriptive analysis is used to provide an overview of the distribution of regional tax fund allocation and the condition of road infrastructure quality in Medan City. Before conducting regression analysis, a classical assumption test is carried out to ensure that the data meets the requirements of classical linear regression, including normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. Multiple linear regression analysis is used to test the effect of regional tax fund allocation on the quality of road infrastructure. The results of the regression analysis will be interpreted to determine the influence of regional tax fund allocation on the quality of road infrastructure. The regression coefficient will indicate the direction and magnitude of the influence, while the significance test (t-test and F-test) will be used to determine the statistical significance of the influence. Based on the results of data analysis and interpretation, recommendations will be prepared that can be used by the local government of Medan City in optimizing the allocation of regional tax funds to improve the quality of road infrastructure. This research will conclude with the preparation of conclusions and policy implications that can be drawn from the results of the research, summarize the main findings, and provide practical suggestions for local governments in improving the management of tax funds and road infrastructure development. With a systematic and structured methodology, this research is expected to provide valid and reliable results, as well as make a significant contribution to the development of public policy in the city of Medan.

3. RESULTS AND DISCUSSION

Results

Based on the data analysis that has been carried out, this study produced several significant key findings. First, there was a striking variation in the allocation of regional tax funds for road infrastructure during the period studied. Data shows that the allocation of regional tax funds is unstable and fluctuates every year, although there has been a more consistent upward trend in recent years. The year 2022 recorded the largest allocation of funds for road infrastructure, reaching 30% of the total regional tax fund, which shows the government's commitment to improving and improving the quality of roads in Medan City. In contrast, 2018 recorded the lowest allocation of only 15%, highlighting the challenges in planning and managing the budget that year. In addition, the analysis of the quality of road infrastructure shows that the road quality index in Medan City has gradually improved from year to year. In 2022, the road quality index reached the highest value, which is 80 on a scale of 0-100, which indicates that the road condition is quite good. In contrast, 2018 recorded the lowest road quality index with a score of 65, reflecting inadequate road conditions in that year. The results of multiple linear regression analysis show that the allocation of regional tax funds has a positive and significant influence on the quality of road infrastructure. The regression coefficient for the regional tax fund allocation variable is 0.45, with a $p < 0.05$, indicating that every 1% increase in the regional tax fund allocation will increase the road quality index by 0.45 points. In addition to the allocation of regional tax funds, other factors such as economic growth, the number of vehicles, and population density also have a significant influence on the quality of road infrastructure. Economic growth has a regression coefficient of 0.30, while the number of vehicles and population density have regression coefficients of -0.20 and -0.25, respectively, which indicates that the increase in the number of vehicles and population density exerts negative pressure on road quality. Overall, the results of this study provide a clear picture of the importance of regional tax fund allocation in improving the quality of road infrastructure in Medan City, as well as show the need for better and sustainable budget planning to ensure that the improvement of road quality can be maintained. The findings also emphasize the importance of considering other factors such as economic growth, the number of vehicles, and population density in the planning and management of road infrastructure.

Distribution of Regional Tax Fund Allocation

In the years studied, there was a significant variation in the allocation of regional tax funds for road infrastructure. Data shows that the allocation of regional tax funds fluctuates every year, with a more consistent upward trend in recent years. The year 2022 recorded the largest allocation of funds for road infrastructure, reaching 30% of the total regional tax fund, reflecting the government's commitment to improving and improving the quality of roads in Medan City. In contrast, 2018 recorded the lowest allocation, at only 15%, indicating challenges in planning and managing the budget that year. These fluctuations indicate the dynamics of fiscal policy and development priorities that can be influenced by various factors, including economic conditions, other urgent needs, and changes in government policies. The increase in allocation in recent years shows the government's efforts to focus

more on infrastructure development, although there is still a need for more stable and sustainable planning so that the improvement of road quality can continue to be maintained and improved.

Quality of Road Infrastructure

The quality of road infrastructure in Medan City is measured using a road quality index that includes three main aspects: feasibility, safety, and comfort. Roadworthiness includes the physical condition of the road such as a smooth, pothole-free surface, as well as clear and adequate traffic signs. Road safety includes aspects such as adequate street lighting, the presence of safety signs, and a good drainage system to prevent waterlogging. Road comfort includes aspects such as adequate road width, the presence of sidewalks for pedestrians, and efficient traffic arrangements to reduce congestion. The results of the study show that the road quality index in Medan City has gradually increased from year to year. In 2018, the road quality index was at a value of 65 (scale 0-100), reflecting road conditions that still need a lot of improvements. This condition may be caused by the lack of allocation of funds for road maintenance and repair in that year, which only reached 15% of the total regional tax fund. As time goes by, efforts to improve and improve road infrastructure begin to show positive results. In 2020, the road quality index increased to 72, indicating a significant improvement in the aspects of road feasibility and safety.

At its peak, in 2022, the road quality index reached the highest value of 80, which indicates that the road condition is good enough and adequate to support the mobility of the people of Medan City. This increase can be attributed to an increase in the allocation of regional tax funds which reached 30% that year, as well as the implementation of various road repair and construction projects by local governments. The increase in the road quality index also reflects the results of more focused and effective infrastructure improvement policies and programs, as well as increased community participation in maintaining and maintaining road conditions. Overall, the trend of increasing the road quality index in Medan City shows that consistent and directed investment in road infrastructure has a positive impact. It also underscores the importance of sustainable planning and adequate allocation of funds to ensure that the quality of roads continues to improve, so that it can support economic growth and improve the quality of life of the community.

In 2022, the road quality index was recorded with the highest score of 80 (scale 0-100), indicating that the road conditions were quite good and met the expected standards of feasibility, safety, and comfort. This index reflects the results of various efforts that have been made by the Medan City government in improving road infrastructure, including repairing damaged roads, adding supporting facilities such as street lighting, and installing more complete traffic signs. The increase in this index can also be attributed to a significant increase in the allocation of regional tax funds for road infrastructure, which reached 30% of the total regional tax funds in that year. The larger allocation of funds allows for more road repair and construction projects, as well as more intensive routine maintenance, so that the quality of roads in Medan City can be significantly improved. On the contrary, 2018 recorded the lowest road quality index with a score of 65. This value shows that the road condition in that year was still far from adequate, with many roads that suffered damage such as potholes, uneven surfaces, and the lack of supporting facilities such as lighting and traffic signs. One of the main factors contributing to the low road quality index in 2018 is the

relatively small allocation of regional tax funds for road infrastructure, only reaching 15% of the total regional tax funds. This limited funding makes it difficult for local governments to carry out road repair and maintenance projects effectively, so that many roads are left in poor condition.

The comparison between 2018 and 2022 shows how important it is to allocate adequate funds for road infrastructure. The increase in the road quality index from 65 in 2018 to 80 in 2022 shows a direct relationship between the increase in allocated funds and the improvement of road conditions. This emphasizes that investment in road infrastructure not only improves the physical condition of roads, but also increases safety and comfort for road users, as well as supports regional economic growth through increased mobility and accessibility. Overall, the increase in the road quality index in Medan City from 2018 to 2022 illustrates the success of local government policies in allocating regional tax funds more effectively for the infrastructure sector. Going forward, it is important for the government to maintain or even increase the allocation of these funds, as well as ensure that the funds are used efficiently and on target, in order to continue to improve the quality of roads and meet the growing mobility needs of the community.

Multiple Linear Regression Analysis

The results of regression analysis show that the allocation of regional tax funds has a positive and significant influence on the quality of road infrastructure in Medan City. The regression coefficient for the variable of regional tax fund allocation is 0.45, with a p value < 0.05 , which indicates that the relationship between regional tax fund allocation and road quality is statistically significant. This means that every 1% increase in the allocation of regional tax funds is consistently related to an increase in the road quality index by 0.45 points. These findings illustrate how much of a positive impact the increase in fund allocation has on improving road conditions. The regression coefficient of 0.45 indicates that an increase in investment in road infrastructure financed by local taxes has the potential to result in substantial improvements in road quality. This may include road surface improvements, drainage system upgrades, the addition of safety facilities, and better routine maintenance. The $p < 0.05$ confirms that this influence does not occur by chance and gives confidence that there is a strong relationship between the allocation of regional tax funds and the improvement of road quality. This significant influence also shows that the policy of allocating larger funds for road infrastructure can produce positive results in improving road conditions and providing greater benefits to the community.

In addition, the results of this analysis reinforce the importance of adequate fund allocation for the infrastructure sector. With higher fund allocations, local governments can carry out more repair and development projects, as well as carry out the necessary maintenance to maintain and improve the quality of roads in a sustainable manner. Overall, the results of regression analysis provide strong evidence that investment in road infrastructure through the allocation of regional tax funds has a significant positive impact on improving road quality. This shows that to achieve and maintain good quality road infrastructure, it is necessary to have adequate and consistent allocation of funds. The implementation of policies that support the increase in fund allocation can help the Medan City government in achieving better infrastructure development goals and improving the quality of life of the community as a whole.

In addition to the allocation of regional tax funds, other control variables, such as economic growth, the number of vehicles, and population density, also show a significant influence on the quality of road infrastructure in Medan City. The results of the regression analysis revealed that economic growth has a regression coefficient of 0.30. This means that every 1% increase in economic growth corresponds to an increase in the road quality index by 0.30 points. This positive influence reflects how economic growth can increase local government capacity and revenue, which in turn allows for greater investment in road infrastructure repair and development. Growing economies often increase fiscal capacity and expand the resources available for infrastructure projects, thus contributing to improved road quality. On the other hand, the number of vehicles has a regression coefficient of -0.20, which indicates that every 1% increase in the number of vehicles is associated with a decrease in the road quality index by 0.20 points. This suggests that an increase in the number of vehicles can put additional pressure on road infrastructure, causing faster breakdowns and increasing the need for more frequent maintenance. High traffic density can accelerate road wear, increase congestion, and reduce road comfort and safety.

Population density also has a regression coefficient of -0.25, which indicates that every 1% increase in population density is associated with a decrease in the road quality index by 0.25 points. High population density is often associated with increased demand for road infrastructure and more intensive road use. This can result in faster road wear and tear and require additional investment to meet the needs of a growing community. Overall, the significant influence of these control variables underscores the complexity of the factors that affect the quality of road infrastructure. Positive economic growth can support improved road quality, while high vehicle numbers and population densities can present additional challenges that need to be managed. Therefore, infrastructure planning and management must consider all of these factors to optimize the quality of roads and ensure that infrastructure can effectively meet the needs of the community.

Discussion

The results of this study show that the allocation of regional tax funds has a significant influence on the quality of road infrastructure in Medan City. These findings are in line with the theory of development economics which states that government investment in public infrastructure, including roads, can improve the quality and accessibility of public services, as well as encourage regional economic growth. Investment in good road infrastructure not only improves the physical condition of roads but also facilitates the mobility of goods and people, which contributes to economic efficiency and improvement of people's quality of life. The distribution of regional tax fund allocations that vary every year reflects the dynamics of fiscal policies and development priorities implemented by local governments. In recent years, there has been an increase in fund allocation which shows the commitment of the Medan City government to improve the quality of road infrastructure. This increase reflects efforts to address infrastructure issues and meet the needs of a growing society as the economy grows and population density (Elsivera & Abdillah, 2017).

However, fluctuations in fund allocation also indicate the need for more consistent and sustainable budget planning. These fluctuations can lead to instability in the quality of road infrastructure, with some years experiencing significant improvements while others may face funding shortages. To ensure sustainable road quality improvement, a more

structured budget planning strategy and long-term projections that consider development needs and priorities holistically are needed. With more stable budget planning and more consistent fund allocation, local governments can be more effective in responding to infrastructure challenges, improving road conditions, and providing greater benefits to the community. Overall, this study emphasizes the importance of the role of local tax fund allocation in improving the quality of road infrastructure and shows that better planning and more regular allocation can support sustainable development. By overcoming fluctuations in fund allocation and implementing more consistent policies, the Medan City government can be more effective in improving road quality and supporting more inclusive economic growth (Mudasih & Subroto, 2022).

Regression analysis shows that in addition to the allocation of regional tax funds, other factors such as economic growth, the number of vehicles, and population density also have a significant influence on the quality of road infrastructure in Medan City. Positive economic growth contributes to an increase in regional revenues and the government's financial ability to finance the construction and maintenance of road infrastructure. As economies develop, local governments often have more resources to allocate to the infrastructure sector, which can improve the quality of roads and related facilities. However, the positive effects of economic growth can be less significant if not balanced with good planning and management. On the other hand, the increase in the number of vehicles and population density can put additional pressure on road infrastructure, accelerate road wear and tear, and increase the need for more intensive maintenance. Along with the increase in vehicles and the number of residents, the streets in Medan City must be able to accommodate higher traffic volumes without compromising quality. This requires additional efforts in the planning and development of road infrastructure to address these challenges and ensure that roads remain in good condition (Maharani et al., 2021).

Based on the results of this study, several important recommendations can be proposed to improve the management of road infrastructure in Medan City. First, local governments need to increase and optimize the allocation of regional tax funds for road infrastructure consistently. A larger and stable allocation of funds will allow the government to carry out the necessary repairs and maintenance more effectively. Additionally, long-term planning that considers factors such as economic growth, vehicle numbers, and population density is essential to ensure that policies and fund allocations can proactively respond to changing needs. The application of technology in road monitoring and maintenance is also an effective strategy to increase the efficiency and effectiveness of the use of local tax funds. Technologies such as data-driven road management systems, road condition monitoring sensors, and predictive analytics can help governments identify and address infrastructure issues more quickly and on target. By utilizing this technology, the government can carry out preventive maintenance, reduce unexpected repair costs, and ensure that the quality of roads remains optimal. Overall, this recommendation aims to create a more holistic and sustainable approach to road infrastructure management, which will support economic growth and improve the quality of life of people in Medan City. The implementation of these suggestions is expected to have a positive long-term impact, making better road infrastructure the foundation for more advanced urban development (Metekohy et al., 2024).

Thus, the results of this study make a significant contribution to the development of public policies in the city of Medan, especially in terms of the management of regional tax

funds and the development of road infrastructure. The findings of this study not only identify the relationship between the allocation of local tax funds and the quality of road infrastructure but also explore the impact of other economic and social factors. This information is invaluable for policymakers in formulating more effective strategies to optimally allocate resources and design policies that support infrastructure quality improvement. The implementation of the proposed recommendations based on the results of this study is expected to have a wide positive impact. By consistently increasing the allocation of local tax funds and planning budgets that take into account economic growth, the number of vehicles, and population density, local governments can improve road quality in a sustainable manner. This effort will not only improve the physical condition of the road but will also facilitate mobility, increase the accessibility of public services, and reduce congestion, which will ultimately have a positive impact on the quality of life of the community (Ira Safitri et al., 2021).

In addition, the application of technology in the monitoring and maintenance of road infrastructure can improve the efficiency and effectiveness of the use of funds, ensuring that repairs are carried out on time and as needed. This will not only reduce unexpected maintenance costs but also ensure that the roads in Medan City remain in good condition, supporting vital economic and social activities. With the proposed strategic steps, it is hoped that the City of Medan can create a more conducive environment for economic growth and community development. Policies based on the results of this study will help local governments in designing programs that are more responsive to the needs of the community and more adaptive to economic and social dynamics. Overall, improving the quality of road infrastructure through better management of regional tax funds will contribute to more inclusive and sustainable development, encourage economic progress, and improve the welfare and quality of life of the people in Medan City.

4. CONCLUSION

This study aims to analyze the influence of regional tax fund allocation on the quality of road infrastructure in Medan City. The results of the study show that the allocation of regional tax funds has a positive and significant influence on the quality of road infrastructure. Any increase in the allocation of regional tax funds has been proven to improve the road quality index, confirming that government investment in road infrastructure has a real positive impact. However, there is a significant variation in the allocation of regional tax funds for road infrastructure every year, although there has been an increase in allocation in recent years. These fluctuations indicate the need for more stable and sustainable budget planning. In addition to the allocation of regional tax funds, factors such as economic growth, the number of vehicles, and population density also have a significant effect on the quality of road infrastructure. Positive economic growth contributed to improved road quality, while increasing vehicle numbers and population density put pressure on existing road infrastructure. Based on the findings of the research, it is recommended that the Medan City government increase and optimize the allocation of regional tax funds for road infrastructure consistently. In addition, it is necessary to carry out long-term planning that takes into account economic and demographic factors to ensure the sustainable improvement of the quality of road infrastructure. The application of technology in road monitoring and maintenance is also recommended to improve the

efficiency and effectiveness of the use of funds. This research provides important insights for policymakers in an effort to improve the quality of road infrastructure in Medan City through better management of regional tax funds, and is expected to improve the quality of life of the community and support regional economic growth .

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