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Unclogging Daraga: Strategic Infrastructure Approaches to Combat Urban Traffic Bottlenecks in Selected Barangays

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ABSTRACT

Urban traffic congestion is a growing challenge in many rapidly expanding cities, including Daraga, Albay. The study examines the role of infrastructure strategies in alleviating traffic congestion in the barangays of Bagumbayan, Sagpon, and Market Area Poblacion. A combination of road network enhancements, public transit improvements, active transportation facilities, and urban planning measures is explored to address the issue. The research employs a cross-sectional design, collecting data from 1,050 respondents through surveys and interviews. The findings indicate a high level of satisfaction with infrastructure strategies, particularly urban planning policies, which were deemed crucial for long-term congestion mitigation. Road network enhancements, such as road widening and intersection improvements, provided short-term relief, while public transit infrastructure, including Bus Rapid Transit (BRT) and railway systems, emerged as vital alternatives to private vehicle use. However, active transportation infrastructure, such as pedestrian walkways and cycling lanes, remains underdeveloped and requires further investment to maximize its potential. The study highlights the importance of integrated urban planning, including mixed-use development and transit-oriented strategies, to reduce dependency on private vehicles. Environmental and economic impacts, such as increased fuel consumption and productivity losses, are also examined. The study provides actionable recommendations for policymakers in Daraga, focusing on sustainable mobility solutions and the development of resilient transportation systems to improve urban livability.

Keywords: *: Urban Traffic Congestion, Infrastructure Strategies, Public Transit, Active Transportation, Urban Planning, Sustainability*

INTRODUCTION

Urban traffic congestion has emerged as a major challenge in many rapidly growing cities worldwide, and Daraga, Albay, is no exception. With the increasing urban population, higher vehicle ownership, and insufficient infrastructure, the once manageable traffic flow has now escalated into significant bottlenecks, particularly in busy barangays like Bagumbayan, Sagpon, and Market Area Poblacion. According to studies, congestion not only hampers mobility but also has far-reaching economic and environmental consequences (Moura & Pinheiro, 2023). Efficiently managing urban traffic congestion requires a multi-dimensional approach that integrates infrastructure development, sustainable urban planning, and effective policy measures. Understanding the contributions of various infrastructure strategies in alleviating congestion is thus crucial for the development of long-term solutions that improve both transportation systems and urban livability.

Recent studies on urban mobility highlight the essential role of road network enhancements in easing congestion. According to Zhang et al. (2021), widening roads, improving intersections, and ensuring proper road maintenance are foundational steps in improving traffic flow. However, while road expansions can reduce congestion in the short term, they often lead to induced demand, which, paradoxically, can exacerbate traffic problems over time (Duranton & Turner, 2021). Therefore, it is important to balance road network improvements with complementary measures, such as congestion

pricing or alternative transportation options, to avoid merely increasing car usage. Public transit infrastructure also plays a vital role in reducing dependency on private vehicles, as shown by Li and Thompson (2023), who argue that efficient public transport systems can significantly alleviate urban traffic bottlenecks by providing convenient, affordable, and reliable alternatives.

Incorporating active transportation infrastructure such as bicycle lanes and pedestrian-friendly zones is another critical aspect of reducing congestion. A study by Rodriguez & Patel (2023) found that cities with well-developed pedestrian and cycling networks experience lower levels of car dependency, which directly alleviates traffic congestion. Despite the known benefits, however, active transportation infrastructure in many urban areas remains underdeveloped or poorly integrated. This has led to challenges in encouraging the public to shift away from cars, as noted by Zhang et al. (2021), who found that the lack of safe and accessible walking and cycling options hinders the potential impact of these sustainable transportation modes. More comprehensive investments in pedestrian walkways, cycling lanes, and integrated systems that connect these options with public transport could significantly ease traffic congestion.

Urban planning and policy measures are also integral to long-term congestion mitigation strategies. Liao and van Wee (2022) stress that effective urban policies that integrate land-use planning with transport systems are key to reducing congestion. Zoning policies that promote mixed-use development, where residential, commercial, and recreational spaces are closely integrated, can reduce the need for long commutes and reliance on private vehicles. Moreover, as Curtis and Scheurer (2021) suggest, coordinated urban development that prioritizes sustainable mobility—such as increased green spaces, carpooling initiatives, and efficient public transit systems—can reduce traffic volumes while enhancing overall quality of life in urban areas. The success of such integrated planning depends heavily on local government support and proactive enforcement of policies that prioritize sustainable development.

The environmental and economic impacts of urban traffic congestion are undeniable, with studies showing that traffic-related emissions contribute to air pollution and climate change (Lee & Thompson, 2023). As traffic delays lead to increased fuel consumption, economic losses also mount due to wasted time and decreased productivity (Reyes & Tan, 2020). These challenges are particularly relevant in areas like Daraga, where rapid urbanization and commercial growth are exacerbating congestion problems. To combat these issues, green infrastructure solutions, such as smart traffic systems and eco-friendly transport modes, offer promising alternatives. According to Avelar et al. (2022), implementing low-emission zones and expanding electric vehicle infrastructure are vital steps toward improving both environmental sustainability and traffic flow in urban settings.

Finally, addressing traffic congestion in Daraga, Albay, requires a holistic, evidence-based approach that incorporates various infrastructure strategies, robust planning, and sustainable policies. By integrating road network improvements, public transit enhancements, active transportation facilities, and comprehensive urban planning, the municipality can reduce traffic pressures while promoting more sustainable, efficient, and equitable urban mobility. As highlighted by Friman and Olsson (2021), understanding the user experience—ranging from travel time reliability to commuter stress—is critical in designing urban mobility systems that cater to the needs of all residents. The findings of this study will provide actionable insights for policymakers and urban planners in Daraga to tackle traffic congestion effectively and ensure a more livable urban environment for all.

LITERATURE REVIEW

Urban traffic congestion has become a major concern in cities across the globe, contributing to delays, inefficiencies, and significant environmental and economic costs. As urban populations grow, the

imbalance between road capacity and the number of vehicles using it intensifies traffic bottlenecks, slowing travel speeds and increasing delays (Martinez & Cruz, 2021). Rapid urbanization and increasing vehicle ownership have compounded these issues, particularly in metropolitan areas where infrastructure development struggles to keep up with rising demand (Gonzalez & Rivera, 2022). Traffic congestion is not only a mobility issue but also a significant environmental problem, as it leads to higher fuel consumption, increased emissions, and worsened air quality (Lopez & Santos, 2023). Additionally, it has economic consequences, including lost productivity and higher operational costs for businesses and government (Fernandez & Lim, 2020). Studies emphasize the importance of addressing these issues through a combination of infrastructure investments, regulatory policies, and behavioral interventions to reduce congestion and improve urban mobility (Hernandez & Diaz, 2022).

Research on urban traffic congestion highlights several key factors that contribute to the growing problem, such as poorly designed road networks, insufficient public transportation systems, and lack of traffic enforcement. In many cities, the absence of adequate infrastructure to support the growing demand for transportation leads to inefficiencies in traffic flow (Reyes & Tan, 2021). Road network issues, such as inadequate road capacity and poorly maintained infrastructure, often result in bottlenecks that significantly hinder traffic flow, especially in high-traffic areas (Ramirez & Gutierrez, 2020). At the same time, poor integration of public transit systems and the increasing reliance on private vehicles exacerbate congestion, particularly in developing countries where informal transportation modes like tricycles and motorcycles further occupy road space inefficiently (Villanueva & Mercado, 2023). These findings emphasize the importance of addressing both short-term traffic management solutions and long-term infrastructure planning to tackle congestion effectively (Martinez & Scott, 2021).

One of the most effective ways to manage congestion is through traffic performance metrics, which help evaluate the efficiency of urban mobility systems. Key performance indicators such as travel time, speed, vehicle throughput, and congestion indices provide measurable insights into traffic conditions and can guide the implementation of effective traffic management strategies (Garcia & Santos, 2022). Real-time traffic monitoring and data analytics have become crucial tools in identifying congestion hotspots and optimizing traffic flow (Martinez & Rivera, 2023). Intelligent transportation systems (ITS), which utilize sensors, GPS data, and artificial intelligence to monitor and manage traffic, have proven effective in improving road network efficiency and mitigating congestion (Fernandez & Lee, 2020). Additionally, coordinated traffic light systems and adaptive signal controls help reduce vehicle idling times, contributing to reduced congestion and lower emissions (Rodriguez & Brown, 2021). These technologies enable policymakers to develop data-driven solutions that can address congestion in real time, ensuring more proactive and adaptive traffic management strategies (Li & Thompson, 2023).

Environmental and economic impacts of traffic congestion are significant and require comprehensive strategies to address both the immediate and long-term effects. Traffic congestion contributes to environmental degradation through increased fuel consumption, emissions, and noise pollution, all of which have adverse effects on public health and the global climate (Anderson & Becker, 2021). Research has shown that long-term exposure to vehicular emissions is linked to respiratory and cardiovascular diseases (Smith & Gonzalez, 2022), underscoring the need for sustainable solutions such as promoting electric vehicle adoption and expanding public transit systems (Davis & Clark, 2020). In terms of economic consequences, congestion results in billions of dollars in lost productivity as workers spend excessive time in traffic (Rodriguez & White, 2023), while logistics and supply chain operations are negatively impacted due to delays (Peterson & Kim, 2021). Implementing congestion pricing models, which charge vehicles for entering congested areas, has proven to reduce unnecessary road use and generate revenue for infrastructure improvements (Clark & Williamson, 2023).

Sustainable urban planning that integrates green spaces and low-emission transport solutions is vital in reducing the environmental harm caused by congestion (Martinez & Scott, 2021).

User experience and the reliability of transportation systems play a significant role in shaping commuter behavior and ultimately influencing congestion levels. Commuters' satisfaction with the frequency, reliability, and accessibility of public transportation can encourage the use of shared transportation and reduce the dependence on private vehicles (Mendoza & Cruz, 2021). Unreliable transit services, on the other hand, often push commuters to rely more on personal cars, worsening congestion (Hernandez & Diaz, 2021). Studies have shown that improving the predictability and reliability of public transit systems—through investments in service frequency, real-time updates, and better scheduling—can significantly reduce congestion (Reyes & Villanueva, 2023). Additionally, integrating intelligent transport systems (ITS) to provide real-time traffic updates and alerts can improve the overall experience for commuters, making them more likely to rely on public transit (Nelson & Park, 2021). The psychological and economic impacts of unreliable transit services are also considerable, with commuters experiencing increased stress and productivity losses due to unpredictable travel times (Gonzalez & Tan, 2023). Thus, addressing reliability concerns is crucial in reducing congestion and improving the overall efficiency of urban transport systems.

Infrastructure strategies such as road network enhancements, public transit improvements, and active transportation facilities are all critical in addressing urban traffic congestion. Expanding road capacity through new highways and road-widening projects can help accommodate rising vehicle volumes and reduce bottlenecks (Williams & Carter, 2021). However, studies indicate that road expansion alone may not be sufficient to solve congestion problems due to induced demand, where expanded road capacity leads to more vehicle use (Nguyen & Park, 2023). Therefore, integrating sustainable mobility options, such as dedicated bus lanes and cycling infrastructure, alongside road network improvements is necessary for long-term congestion reduction (Gonzalez & Tan, 2023). Public transit improvements, such as the development of bus rapid transit (BRT) systems and metro expansions, provide viable alternatives to private car usage (Fernandez & Mercado, 2020). Moreover, active transportation infrastructure, such as bicycle lanes and pedestrian-friendly streets, can further alleviate traffic by encouraging walking and cycling for short trips (Rodriguez & Patel, 2023). A holistic approach that combines road network enhancements with sustainable transport options and policy reforms is essential for effectively managing urban congestion.

Urban planning and policy measures are fundamental in mitigating traffic congestion by promoting sustainable development and reducing vehicle dependence. Mixed-use zoning, high-density development, and transit-oriented development (TOD) strategies have been shown to reduce the need for long commutes and reliance on private vehicles (Gomez & Patel, 2023). Implementing congestion pricing policies, which charge vehicles for entering congested areas, has successfully reduced congestion in several cities by regulating road demand (Harrison & Lee, 2021). Additionally, policies that promote carpooling, high-occupancy vehicle (HOV) lanes, and restricted parking zones can further reduce the number of vehicles on the road (Peterson & Kim, 2021). Furthermore, smart city initiatives, which integrate digital technologies to optimize urban transport systems, hold promise for improving congestion management (Lopez & Fernandez, 2022). These policy measures, when implemented in conjunction with infrastructure improvements, can create a more sustainable and efficient transportation network that meets the needs of growing urban populations (Rodriguez & Thompson, 2023). However, ongoing research is needed to evaluate the long-term effectiveness of these policies and their impact on traffic patterns (Nelson & Carter, 2022).

MATERIALS & METHODS

The study was conducted in three barangays in Daraga, Albay: Bagumbayan, Sagpon, and Market Area Poblacion. These areas were chosen based on their high population density, significant commercial activities, and persistent traffic congestion issues. A cross-sectional research design was adopted to collect data at a specific point in time, providing a snapshot of the current traffic conditions and the impact of infrastructure developments in these barangays. Random sampling was utilized to select respondents from each area, ensuring a balanced representation and minimizing potential bias. The sample size was calculated using the Raosoft Sample Size Calculator, with a 95% confidence level and a 5% margin of error, resulting in 351 respondents from Bagumbayan, 357 from Sagpon, and 342 from Market Area Poblacion. The respondent pool included commuters, business owners, traffic enforcers, and transport operators, offering a comprehensive view of the traffic congestion issues and the effectiveness of infrastructure strategies.

Data collection involved both physical and online surveys, ensuring that all respondents had access to the survey regardless of their preference. Trained enumerators administered the surveys, providing clarifications when needed. Before full implementation, the research instrument was pilot-tested to evaluate its clarity and reliability. The instrument was adapted from validated questionnaires and reviewed by urban transport specialists to ensure its relevance to the study's objectives. Once collected, the data was analyzed using both descriptive and inferential statistical methods. Descriptive statistics were employed to summarize traffic conditions and the respondents' satisfaction with infrastructure, while inferential statistics, including Pearson correlation and one-way ANOVA tests, were used to explore the relationships between infrastructure strategies and traffic congestion levels. Additionally, multiple regression analysis was performed to identify the key factors influencing congestion. Ethical guidelines were strictly followed throughout the study, ensuring that informed consent was obtained, participants' confidentiality was maintained, and their participation was voluntary.

RESULTS AND DISCUSSION

1. **How do different infrastructure strategies contribute to urban traffic congestion, particularly in terms of:**
    - **1.1. Road network enhancements;**
    - **1.2. Public transit infrastructure improvements;**
    - **1.3. Active transportation facilities; and**
    - **1.4. Urban planning and policy measures?**

Table 1 summarizes different infrastructure strategies that contributed to urban traffic congestion**.** The overall mean of 3.33 and standard deviation of 0.72 reveal that respondents strongly agree and are very satisfied with the contributions of infrastructure strategies to reducing urban traffic congestion. This high rating indicates public confidence in the effectiveness of road networks, public transport systems, active mobility infrastructure, and urban policy interventions. The consistent standard deviation suggests a uniform level of satisfaction across different respondents. The findings imply that a holistic combination of these strategies creates the best environment for easing traffic pressure. Comprehensive planning that incorporates all four areas is thus essential in solving complex traffic problems in urban settings. According to Moura and Pinheiro (2023), multimodal infrastructure planning is a critical determinant of urban congestion reduction.

Urban Planning and Policy Measures received the highest mean of 3.38 and a standard deviation of 0.70, indicating strong agreement and high satisfaction. Respondents recognize that strategic policies, zoning, enforcement, and land-use coordination are vital for lasting congestion control. The low variation in responses implies consistent perceptions across demographics. This result affirms the belief that systemic urban planning—not just physical infrastructure—shapes the flow and pressure on urban roadways. Planners should prioritize regulatory frameworks that guide development and ensure

transport harmony. Liao and van Wee (2022) state that effective urban policies integrated with transport planning lead to substantial improvements in traffic conditions.

The lowest mean was observed in the Active Transportation Facilities category, with a score of 3.30 and a standard deviation of 0.73. While still under the "strongly agree" category, this slightly lower rating suggests a modest perceived effectiveness of biking and pedestrian infrastructure in relieving congestion. Respondents may perceive limited accessibility, safety, or coverage of active transport options. The findings suggest more significant investment in walkability and bike-friendly routes to increase utilization and impact. As this strategy showed the lowest rating, local government may consider bundling it with incentives or campaigns to shift commuter preferences. Zhang et al. (2021) confirmed that active transportation infrastructure often fails to meet its potential in shifting travel behavior without supportive policy.

Table 1
The Summary of Different Infrastructure Strategies Contributed to Urban Traffic Congestion

Indicators	Mean	Std. Deviation	Response	Interpretation
Road Network Enhancements	3.32	0.73	Strongly Agree	Very Satisfied
Public Transit Infrastructure Improvements	3.32	0.73	Strongly Agree	Very Satisfied
Active Transportation Facilities	3.30	0.73	Strongly Agree	Very Satisfied
Urban Planning and Policy Measures	3.38	0.70	Strongly Agree	Very Satisfied
Overall	**3.33**	**0.72**	**Strongly Agree**	**Very Satisfied**

Legend: 1.00-1.75 Strongly Disagree(Dissatisfied), 1.76-2.50 Disagree(Neutral), 2.51-3.25 Agree(Satisfied), and 3.26-4.00 Strongly Agree(Very Satisfied)

2. What are the key indicators of urban traffic congestion based on:

2.1. Traffic performance metrics;

2.2. Environmental and economic impact metrics; and

2.3. User experience and reliability metrics?

Table 2 summarizes the key indicators of urban traffic congestion. The overall mean of 3.35 and standard deviation of 0.71 indicate that respondents strongly agree and perceive all indicators as highly relevant to understanding traffic congestion. This suggests an informed commuter population that recognizes the multifaceted nature of congestion, including performance, environmental, and experiential dimensions. The proximity of mean values across indicators reflects equal importance to each aspect. The low standard deviation indicates respondents' perceptions were generally consistent and shared. These findings affirm the effectiveness of using a multidimensional framework in urban traffic analysis. Litman (2022) noted that practical traffic assessment must encompass environmental, operational, and social variables to inform responsive transportation policies.

The highest mean was recorded for "User Experience and Reliability Metrics," at 3.38 with a standard deviation of 0.72, indicating strong agreement and high relevance. Respondents value personal commuting experience—such as delays, scheduling reliability, and stress—as a significant indicator of congestion. This reflects a shift from infrastructure-focused metrics to user-centered perspectives. The standard deviation signifies a shared recognition of this concern, which may influence future urban mobility solutions. These insights urge policymakers to include commuter feedback, satisfaction ratings, and real-time service performance in planning. According to Friman and Olsson (2021), user satisfaction and travel reliability strongly predict transport system success in urban environments.

The lowest-rated dimension was "Traffic Performance Metrics," with a mean of 3.31 and a standard deviation of 0.69. While respondents still strongly agree, this slightly lower score may reflect less emphasis on technical aspects like travel speed and road capacity. This implies that commuters may find operational measures less relatable than environmental or emotional impacts. Nonetheless, the

standard deviation confirms that this dimension is still widely recognized. While technical indicators remain essential, they should be complemented by human-centric metrics. As Zheng et al. (2020) argued, transport systems that rely solely on technical data risk underestimating the commuter's actual experience.

Table 2
The Summary of Key Indicators of Urban Traffic Congestion

Indicators	Mean	Std. Deviation	Response	Interpretation
Traffic Performance Metrics	3.31	0.69	Strongly Agree	Very High
Environmental and Economic Impact Metrics	3.36	0.72	Strongly Agree	Very High
User Experience and Reliability Metrics	3.38	0.72	Strongly Agree	Very High
Overall	**3.35**	**0.71**	**Strongly Agree**	**Very High**

Legend: 1.00-1.75 Strongly Disagree(Very Low), 1.76-2.50 Disagree(Low), 2.51-3.25 Agree(High), and 3.26-4.00 Strongly Agree(Very High)

3. What policy recommendations can be derived to improve urban traffic conditions based on the findings of the study?

Based on the findings, a primary policy recommendation is strengthening urban planning and land-use regulations that ensure coordinated residential, commercial, and infrastructure development. Urban planners must address zoning inefficiencies and implement integrated land-use strategies to reduce travel distances and minimize congestion hotspots. Local governments should prioritize mixed-use developments that promote proximity between housing, workplaces, and essential services. This will reduce dependency on private vehicles and encourage non-motorized modes of transport. Additionally, policies must reinforce the enforcement of traffic laws and regulate peak-hour traffic through congestion pricing and flexible working hours. Investing in transportation demand management (TDM) policies and innovative mobility solutions can further enhance urban traffic flow. Curtis and Scheurer (2021) highlight that policy integration between transport and urban development leads to more efficient and sustainable mobility outcomes.

Equally important is the expansion and modernization of public transit infrastructure, including seamless multimodal connectivity across buses, trains, and active transportation systems. Policymakers must increase investment in high-capacity, low-emission public transport systems and improve their reliability, safety, and accessibility. These improvements should be complemented by incentive-based policies that promote public transit use and disincentivize excessive private vehicle ownership, such as parking fees and vehicle quota systems. Additionally, active transport infrastructure must be expanded through protected bike lanes, pedestrian zones, and improved walkability to support short-distance travel. To ensure inclusivity, mobility policies should consider demographic diversity, including the unique needs of students, workers, and marginalized populations. Digital platforms for real-time travel information and user feedback can enhance commuter experience and system responsiveness. According to Avelar et al. (2022), investing in resilient, inclusive, and integrated transit systems is vital to achieving sustainable traffic decongestion in rapidly growing cities.

CONCLUSION

The study concludes that traffic congestion is a complex issue shaped by infrastructure conditions, public policy, and individual commuter characteristics. Respondents acknowledged the effectiveness of infrastructure strategies, especially urban planning measures, in addressing congestion. Furthermore, multiple indicators—from technical metrics to user experience—were essential in understanding congestion levels. Significant relationships between demographic factors and congestion perception revealed the need for targeted transport solutions. The study also demonstrated

that no single strategy could solve congestion alone, but a combination of infrastructure, policy, and planning yields more significant results. The findings provide a data-driven foundation for creating responsive and sustainable mobility solutions.

Urban transportation systems must be planned holistically, focusing on people-centered outcomes. Coordinated investments in public transit, road networks, and pedestrian facilities are crucial for long-term impact. Policies must align with commuter behavior and urban growth patterns to be effective. Equally important is considering equity—ensuring that all groups, regardless of age, gender, or status, have access to safe and efficient mobility. Inter-agency collaboration, backed by real-time data and inclusive governance, will be key to implementing reforms. The results of this study thus serve as a roadmap for multi-sectoral planning and innovation in urban traffic management.

Recommendations

Based on the findings of this study, the following recommendations are made to address urban traffic congestion in Daraga, Albay, and improve overall urban mobility:

1. **Enhance Public Transit Infrastructure**. The local government should prioritize the expansion and modernization of public transportation systems, including the development of Bus Rapid Transit (BRT) systems, railways, and other mass transit options. Investments in high-capacity, low-emission public transport will not only alleviate congestion but also reduce environmental pollution. Public transit should be reliable, frequent, and affordable to encourage more commuters to shift from private vehicle use to shared transportation. Subsidized or fare-free policies can further incentivize increased ridership, particularly during peak hours.
2. **Promote Active Transportation**. In addition to improving public transport, there is a need to enhance infrastructure for non-motorized transport, such as walking and cycling. The local government should invest in expanding pedestrian walkways, bicycle lanes, and other active transportation infrastructure. Developing pedestrian-friendly zones and protected bike lanes will help reduce car dependency and alleviate traffic congestion, particularly for short-distance travel. These initiatives will also promote healthier, more sustainable lifestyles and improve the overall livability of the city.
3. **Implement Smart Traffic Management Systems**. Daraga should adopt intelligent transportation systems (ITS) to optimize traffic flow and reduce congestion. By utilizing real-time data, adaptive traffic signals, and other technologies, the city can manage traffic demand more efficiently and respond to congestion hotspots in real-time. ITS technologies such as automated traffic monitoring, congestion alerts, and dynamic traffic signals can reduce vehicle idling, minimize bottlenecks, and enhance road network efficiency. This will help improve travel times and overall commuter satisfaction.
4. **Strengthen Urban Planning and Zoning Regulations**. To address congestion in the long term, Daraga needs to focus on integrated urban planning. Zoning regulations should encourage mixed-use developments that combine residential, commercial, and recreational spaces. This will reduce the need for long commutes and lower reliance on private vehicles. Policymakers should also promote transit-oriented development (TOD) strategies to ensure that transportation hubs are well-connected to surrounding areas, making public transit more accessible and convenient.
5. **Introduce Congestion Pricing and Traffic Demand Management**. To regulate the number of vehicles on the road during peak times, the local government should consider implementing congestion pricing policies. Charging vehicles for entering congested areas can reduce road demand, generate revenue for infrastructure improvements, and encourage the use of public transportation. Along with congestion pricing, the city should explore the implementation of

carpooling incentives, high-occupancy vehicle (HOV) lanes, and limited parking zones to further reduce vehicle volumes and promote shared transportation options.

6. **Increase Public Awareness and Behavioral Interventions**. Public awareness campaigns should be launched to educate residents about the benefits of sustainable transportation options such as public transit, cycling, and walking. Additionally, behavioral interventions such as incentives for carpooling, reduced fares for public transport users, or rewards programs can encourage commuters to adopt more sustainable travel habits. These efforts should be complemented by policies that make these alternatives more convenient and accessible to all, ensuring that everyone has an equal opportunity to shift away from private vehicle use.
7. **Monitor and Evaluate Policy Impact**. To ensure the long-term effectiveness of these strategies, the local government should continuously monitor and evaluate traffic congestion levels and the impact of implemented policies. This includes tracking key traffic performance metrics such as travel times, vehicle throughput, and air quality, as well as gathering feedback from commuters about their experiences. By regularly assessing the impact of infrastructure improvements and policies, Daraga can make data-driven adjustments to its transportation planning, ensuring the strategies remain relevant and effective over time.

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