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Implementation of the Traffic Management Code: Basis for the Traffic Congestion Mitigation Plan for Davao City

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ABSTRACT

This study evaluated the implementation of the Traffic Management Code in Davao City to identify gaps between policy awareness and infrastructure utilization. A descriptive-correlational research design was employed, gathering data from 400 purposively selected road users, including commuters, drivers, and transport planners. Data were analyzed using frequency distribution, weighted mean, and standard deviation. Findings revealed a very high level of policy awareness (M = 4.55), particularly regarding traffic signals and signs. However, awareness of technology adoption and the economic impacts of congestion were rated lower, at high levels. While stakeholders perceived enforcement as fair and consistent, the utilization of public infrastructure, specifically road connectivity and width, received the lowest relative scores (M = 4.00). The study concluded that high theoretical knowledge among road users does not automatically translate to optimized traffic flow due to infrastructure limitations and behavioral non-compliance. These results imply a critical need for shifting from purely educational campaigns to technology-driven infrastructure management. A proposed mitigation plan was developed, emphasizing intelligent transport systems and multi-sectoral safety councils to reclaim lost productivity and reduce the economic burden of urban congestion.

Keywords: *Traffic Management Code; Policy Awareness; Infrastructure Utilization; Urban Congestion; Intelligent Transport Systems*

INTRODUCTION

Managing traffic is a crucial aspect of modern urban planning and transportation systems. It encompasses a wide range of strategies and technologies focused on ensuring the safe and efficient movement of vehicles and pedestrians. A core objective of traffic management is to reduce traffic congestion through the enforcement of traffic laws, thereby improving road user safety, enhancing the efficiency of existing road infrastructure, and minimizing, if not eliminating, travel delays. The increasing number of vehicles on roads, particularly in urban areas, has created significant challenges. As cities expand and populations concentrate, traffic congestion becomes a major issue, driving the need for effective traffic management strategies and well-informed policy decisions. The effects of policies such as congestion pricing, investments in public transportation, and parking regulations on reducing traffic congestion and improving urban mobility must be rigorously examined (Albalate & Fageda, 2019).

Living in a metropolitan area in the contemporary era entails facing severe and enduring traffic congestion. Roadway congestion has continued to increase over the last 30 years in intensity and in geographic and temporal extent as demand has outgrown capacity, especially during peak periods. The continuing increase in population and vehicle use has substantially outstripped and will continue to outstrip the ability of new capacity to keep pace. This problem affects many aspects of modern society, including economic development, traffic accidents, an increase in greenhouse emissions, time spent, and systemic health impacts (Djahel, Doolan, & Muntean, 2015). Traffic congestion leads to economic losses due to wasted time, fuel consumption, and delays in goods transport; thus, efficient traffic management remains crucial for economic productivity. According to the

U.S. Department of Transportation, traffic congestion stems from three primary sources: traffic-influencing events such as incidents, work zones, and adverse weather, traffic demand fluctuations encompassing normal traffic shifts and special events, and transportation infrastructure limitations (including traffic control devices and physical bottlenecks) (U.S. DoT, 2015).

Furthermore, high congestion creates problems beyond mere commuting delays, as it can negatively influence the public's perception of a community. It may discourage new businesses and potential residents from relocating to an area due to concerns about persistent traffic constraints (Ohio University, 2022). In this context, modern societies must rely on advanced traffic management systems to minimize traffic congestion and its negative externalities. The proximate causes of congestion are numerous, and specific mechanisms relating to the triggering of congestion vary according to different classes of roadways. Thus, it is critical to observe and seek to understand the nature of travel demand in congested conditions through effective congestion management (Managing Urban Traffic Congestion, n.d.). According to fundamental traffic engineering theory, conventional mitigation methods heavily focus on boosting the traffic capacity of road linkages, junctions, and entire metropolitan networks through new road construction, as well as imposing regulatory limits on parking, pedestrians, access, and public transportation (Thomson, 1998). To address these structural gaps, the European Conference of Ministers of Transport (2007) recommends certain supply-side congestion management methods, which include enhancing traffic operations, increasing public transportation, adopting mobility management, and physically changing existing infrastructure.

In the national context, the Philippines grapples with severe urban transportation challenges, with Metro Manila serving as one of the primary Asian mega-cities suffering from the cascading impacts of excessive traffic congestion. Data from the Japan International Cooperation Agency (JICA) highlights that this crisis imposes a massive economic burden, with traffic congestion costing the country an estimated $3.5 billion daily. Furthermore, a JICA study projecting future traffic conditions warned that if no significant structural interventions are implemented, these daily economic losses could escalate to $5.4 billion by the year 2035. This projected surge accounts for anticipated growth in vehicle volume and the progressive degradation of existing infrastructure. These figures, drawn from JICA's Follow-up Survey on the Roadmap for Greater Capital Region Transport Infrastructure Development, have prompted targeted institutional responses. Consequently, under the Project for Comprehensive Traffic Management Plan for Metro Manila, the Metropolitan Manila Development Authority (MMDA) and JICA are actively collaborating to identify and analyze critical traffic bottlenecks, develop a comprehensive five-year action plan featuring sustainable traffic management solutions, and systematically enhance localized operational capacity.

As a premier economic hub and major urban center in the southern Philippines, Davao City increasingly grapples with severe and significant traffic congestion, presenting an operational challenge that directly degrades local economic productivity, compromises public health, and diminishes the overall quality of life of its residents. Recent international and national metrics underscore the alarming severity of this urban crisis. The 2024 TomTom Traffic Index ranked Davao City as the eighth slowest city globally, demonstrating that local commuters experience an average travel time of nearly 33 minutes for every 10 kilometers traveled, operating under a persistent city-wide congestion level of 49%. Furthermore, national transport assessments published by Rappler indicated that Davao City has surpassed Metro Manila as the most congested urban center in the Philippines, with commuters spending an acute 107 to 136 hours per year stuck in gridlock during peak hours. Driven by rapid urbanization, this exponential surge in population concentration and private vehicle ownership has heavily choked major thoroughfares. Beyond staggering travel delays, this structural capacity imbalance directly manifests in rising road safety hazards. Operational metrics from the City Transportation and Traffic Management Office (CTTMO) recorded 13,709 vehicular accidents involving an array of private sedans, sport utility vehicles, cargo trucks, public utility jeepneys (PUJs), and taxis, alongside numerous severe pedestrian impacts (Casamayor, 2018).

To legally combat this network degradation, the City Government of Davao enacted City Ordinance No. 0334-12, Series of 2012, alternatively institutionalized through Executive Order Number 18 (Series of 2015), known as the Comprehensive Transport and Traffic Code of Davao City. Section 9 of this foundational code explicitly outlines statutory mitigation strategies, including the optimization of traffic signages, tactical route detours, localized parking allowances and prohibitions, stricter zoning reviews for building constructions affecting right-of-way, and long-term road expansions or the opening of new transport networks (City Government of Davao, 2015). Within this legal framework, physical traffic signs serve as the primary tools to convey crucial regulations, functioning as reminders, guides, or warnings. For these indicators to remain effective, a well-designed traffic sign must satisfy an immediate road need, command driver attention, and clearly communicate its message to ensure drivers have ample reaction time to prevent conflicts within Davao's dynamic traffic environment (Kraft et al., n.d.). Under the mandates of the Traffic Code, the CTTMO stands as the sole transport authority vested with the legal power to formulate, coordinate, and monitor localized policies and standards (City Transport and Traffic Management Office, 2020). Consequently, the operational capacity of the Local Government Unit (LGU) to execute these traffic management and enforcement strategies remains a critical element in promoting sustainable urban development and ensuring public safety.

This study is primarily anchored on the Theory of Traffic Congestion (Hon, 2005), which posits that urban bottlenecks are fundamentally caused by a structural mismatch between travel demand and infrastructure supply. This theory categorizes congestion into recurring causes, such as excess demand generated by rapid population and vehicle growth, and non-recurring causes, such as vehicular accidents or inefficient road utilization. Within the context of this study, the implementation of City Ordinance No. 0334-12 (the Traffic Management Code of Davao City) serves as the primary regulatory and engineering intervention intended to mitigate the recurring and non-recurring bottlenecks identified in Hon's model. The researcher argues that a mathematical and behavioral breakdown of traffic management is necessary to transition from theoretical awareness to data-driven strategic planning.

To evaluate the compounding externalities of this structural mismatch, the study integrates the Economic Impact Model (Salam, 2012). This model asserts that unmitigated urban traffic congestion induces severe macroeconomic degradation, leading to a massive loss of valuable man-hours, inflated operational costs, and diminished structural productivity for both government units and private organizations. This model directly underpins the study's examination of how localized gridlock affects the socioeconomic well-being, quality of life, and institutional access of Davao City's road users.

Furthermore, the study utilizes the Power Model of Road Safety (Elvik, 2012) to ground the behavioral and policy compliance dimensions of the traffic code. Elvik's proposition dictates that driver behavior, speed management, and policy compliance are direct functions of highly visible, effective legal enforcement and strict capacity building. This framework provides the theoretical basis for analyzing how regulatory enforcement translates into street-level order or, conversely, how enforcement gaps lead to secondary driving infractions and vehicle-to-vehicle collisions.

Finally, the study incorporates the Supply-Side Management Framework formulated by the European Conference of Ministers of Transport (ECMT, 2007). This framework outlines the direct influence of infrastructure utilization on modern urban mobility, emphasizing that modifying, timing, and expanding existing road networks and traffic control systems are essential to accommodate escalating transport demands.

In synthesis, these complementary theories provide a robust foundation for the study's conceptual framework. The independent variables—comprising the level of policy compliance, technology adoption, public awareness, and perceived economic impacts—are structurally derived from the paradigms of Elvik (2012), Salam (2012), and the ECMT (2007). Collectively, they feed directly into the baseline parameters of Hon's (2005) congestion theory, serving as the definitive, empirical basis for the formulation of a comprehensive Traffic Congestion Mitigation Plan for Davao City.

The conceptual framework of the study is outlined in Figure 1.

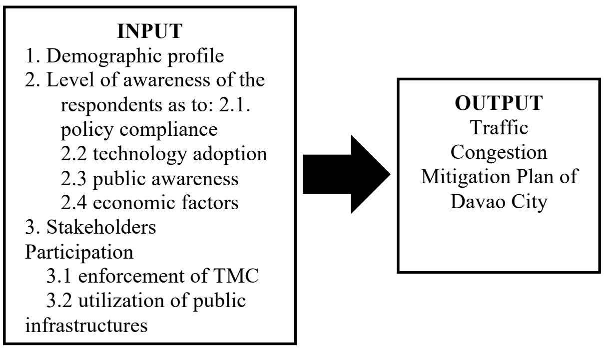

Figure 1. Input and Output

Specifically, this study sought to accomplish the following objectives using descriptive statistics:

1. Determine the demographic and professional profile of the respondents when grouped into Policy Makers, Traffic Enforcers, and Public Utility Vehicle (PUV) Drivers, in terms of:
   1.1. Gender;
   1.2. Type of Road Users;
   1.3. Educational Attainment;
   1.4. Vehicle Type;
   1.5. Role based on Professional Hierarchy;
   1.6. Frequency of Commuting.

2. Ascertain the level of implementation of the Traffic Management Code of Davao City as perceived by the respondents in terms of:
   2.1. Policy Compliance;
   2.2. Technology Adoption;
   2.3. Public Awareness;
   2.4. Economic Factors; and
   2.5. Transportation Habits and Costs.

3. Determine the level of stakeholders' participation regarding the enforcement of the Traffic Management Code and transport infrastructure utilization in terms of:
   3.1. Enforcement Cooperation; and
   3.2. Public Transportation Infrastructure Utilization.

4. Identify the primary challenges and operational gaps encountered by the stakeholders based on the items in the survey questionnaire.

5. Utilize the descriptive findings and computed mean scores of this study as the definitive baseline for the development of a comprehensive Traffic Congestion Mitigation Plan for Davao City.

MATERIALS AND METHODS

This chapter presents the research respondents, research instruments, and research design and procedure.

A total of 400 respondents from different barangays are employed in the study to provide accurate data from a large population. Simple random sampling affirms that the population is objective, representative, and with equal probability (Noor et al., 2020). In the selection, criteria include individuals who spent hours traveling and working on the road such as commuters which composed of students and private and government workers, traffic enforcers, taxi drivers, and PUJ drivers in Davao City since they experience most of the situations in a congested roadway of the city proper in Davao.

Figure 2. Map of Davao City

Distribution of Respondents Across Selected Barangays in Davao City (n = 400)

Corridor Sector	Target Barangays	**Sample Allocation (n)**
West / South Corridor	Calinan, Mintal, Toril, Bangkal, Matina	n = 269
North / East Corridor	Lasang, Bunawan, Panacan, Sasa, Cabantian, Buhangin	n = 131
TOTAL POOL	**11 High-Congestion Barangays**	**n = 400**

This study employs a Descriptive Survey Research Design to provide a comprehensive assessment of the implementation of the Traffic Management Code. Descriptive statistics, specifically frequency distribution, weighted mean, and standard deviation, were utilized to characterize the respondents and quantify their perceptions. This methodology is appropriate for evaluating the efficacy of existing policy frameworks and identifying gaps in infrastructure utilization, as it provides a clear, data-driven baseline for the development of a localized congestion mitigation plan. Following that, a review of related literature and studies was conducted to substantiate the variables in the study. Secondary data derived from various government agencies' reports and publications. After collecting the data needed, the researchers will tabulate and analyze the gathered data with the help of statistical tools.

Research procedure

The researcher underwent a series of steps to ensure that the data of the study were credible and valid. The first step was to present the chosen topic to the thesis adviser to ensure its relevance to the current setting. The research was thoroughly reviewed by the adviser to identify and address possible errors in the paper. An outline defense was then conducted. After the research study was approved, data gathering proceeded. The researcher sent a letter requesting approval to conduct the study, after which the questionnaire was distributed to the qualified respondents. The responses were then collected, encoded in MS Excel, and processed using SPSS. Finally, the results were analyzed and interpreted.

Ethical considerations

Lastly, participation in this study was voluntary. The researcher discussed with the respondents the study purpose and confidentiality as an ethical consideration. The researcher conducted critical reviews of the research findings to ensure consistency and the research process was cleared and followed to enable readers or other researchers to understand and track the reliability of this study, where they will be able to determine whether this research can be used as a literature in their future study.

Before respondents agreed to voluntarily participate in the conduct of the research, a brief description and the purpose of the research were thoroughly explained to them. They were informed that they were not being forced to participate or pressured into doing anything they did not want to. That means giving them a choice and the ability to opt out at any time, even if they have already agreed to take part in the research. Likewise, participants in this study were fully informed of the potential risks and benefits of this research.

Table 2. Summary Table of Computed Variable Means and Categorical Interpretations

Objective Dimension	**Survey Section**	**Core Operational Challenge Encountered**	**Theoretical Root Cause**
Policy Compliance	2.1	The Behavioral Speed Paradox: High rule awareness but flexible self-compliance regarding velocity boundaries.	Power Model of Road Safety *(Elvik, 2012)*
Technology Adoption	2.2	Signal Synchronization Deficit: Underutilization and poor optimization of traffic light timing elements.	System Operational Failure *(Miyim & Muhammed, 2019)*
Public Awareness	2.3 & 2.4	Enforcement Inconsistency: Perceived structural gaps in parking enforcement failing to protect man-hours.	Network Degradation Theory *(Pendor & Tasgaonkar, 2016)*
Enforcement Cooperation	3.1	Reactive Compliance Gap: Low levels of proactive civic cooperation, relying heavily on visible punitive actions.	Capacity Building Deficit *(Dacalanio, 2017a)*
Infrastructure Utilization	3.2	Supply-Side Structural Mismatch: Physical transit infrastructure and loading bays cannot absorb actual travel volumes.	Traffic Congestion Theory *(Hon, 2005; ECMT, 2007)*

CONCLUSION

The study concludes that the implementation of the Traffic Management Code in Davao City is characterized by a significant "Awareness-Execution Gap." While the findings indicate a very high level of policy awareness (M = 4.55) among road users—suggesting that the public is well-educated on traffic signs, signals, and rules—this theoretical knowledge does not translate into optimized traffic flow.

The primary bottleneck is identified as a supply-side failure. The utilization of public infrastructure (M = 4.00) received the lowest relative score, confirming that the city's current road connectivity and width are insufficient to meet the demands of a rapidly growing vehicle population. Furthermore, the high representation of daily commuters and private drivers confirms that the city is suffering from a massive loss of "precious man-hours," directly impacting the local economy as predicted by the Economic Impact Model.

Ultimately, traffic congestion in Davao City is no longer an issue of "lack of education" but is a result of physical infrastructure limitations and behavioral non-compliance that persists despite high awareness. Therefore, a shift from traditional educational campaigns to technology-driven infrastructure management is essential to mitigate the current crisis.

Recommendations

Based on the findings, the following measures are recommended to form the basis of the Traffic Congestion Mitigation Plan for Davao City:

1. For the City Transport and Traffic Management Office (CTTMO)
   - Transition to Intelligent Transport Systems (ITS): Move beyond manual flagging by implementing AI-powered traffic signalization that adjusts in real-time based on actual vehicle volume rather than fixed timers.
   - Strict Enforcement of Obstruction Laws: Since infrastructure utilization scored lowest, the CTTMO must prioritize the removal of physical bottlenecks, such as illegal street parking and vendors, to reclaim existing road width.
2. For the Sangguniang Panlungsod (City Council)
   - Legislative Review of City Ordinance No. 0334-12: Amend the code to include stiffer penalties for repeat behavioral offenders (e.g., tailgating and illegal overtaking) to address the behavioral non-compliance identified in the study.
   - Incentivizing Mass Transit: Develop policies that support the modernization of public transport to reduce the volume of private vehicles, as 43.3% of stakeholders are already commuters.
3. For Urban Planners and Engineers
   - Focus on Connectivity: Prioritize the opening of new roads and the completion of bypass links to decentralize traffic from the city proper, addressing the mismatch between travel demand and infrastructure supply.
   - Pedestrian-Centric Design: Improve the quality of sidewalks and crossings to encourage walking for short distances, thereby reducing the reliance on motorized transport.
4. For Future Researchers
   - Longitudinal Study on Technology: Conduct a follow-up study specifically on the impact of Dashcam technology and GPS-based enforcement on driver behavior in Davao City.
   - Economic Loss Analysis: Perform a deep-dive quantitative study on the specific Philippine Peso value lost per household in Davao City due to peak-hour delays.

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