Jilin Daxue Xuebao (Gongxueban)/Journal of Jilin University (Engineering and Technology Edition)
ISSN: 1671-5497
E-Publication: Online Open Access
Vol: 42 Issue: 04-2023
DOI 10.17605/OSF.IO/S8CNU

TRANSPORTATION AND TRAFFIC SYSTEM ANALYSIS: ITS IMPLICATIONS TO TRAFFIC MANAGEMENT SYSTEMS

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Abstract

One of the most problems that the government is facing today is traffic and due to traffic congestion that eats up the time that could have been used for productive pursuits. The bigger volume of vehicles in the city there are sometimes causing of accident that cause traffic. This study focused on impact factor traffic environment systems, transport systems, traffic systems and evaluation of the level of implementation of the traffic system and management. The Traffic situation of the city was heavy during peak hours in the morning, noontime, and late afternoon. The traffic accident severity ratio is high and severe in general along studied area, and traffic injuries, fatal accidents and property damage experienced moderately severed. The entering vehicles and passing within the studies area experienced heavy traffic most of the time. The rate of traffic flow is higher than the experienced Average daily traffic; the road capacity did not sustain the smooth flow of traffic due to greater congestion and heavy traffic environment. Traffic management implementation program of the city did not affect the traffic systems analysis in terms of traffic situations, traffic accidents, transport spot speeds and transport environment and the success of traffic management programs depends on the proper implementation of concerns agencies.

Keywords: Traffic management System, Traffic Analysis, Traffic System Analysis, Traffic Evaluation

INTRODUCTION

One of the most problems that the government is facing today is traffic. Philippines is losing Php2.4 billion per day due to traffic congestion [Akhtar, M., & Moridpour, S. (2021). that eats the time that could have been used for productive pursuits. Traffic congestion (Wiseman, Y. (2017) is a perpetual problem for the sustainability of transportation development. Traffic congestion causes delays, inconvenience, and economic losses to drivers, as well as air pollution (Afrin, T., &Yodo, N., 2020). Identification and quantification of traffic congestion are crucial for decision-makers to initiate mitigation strategies to improve the overall transportation system's sustainability (Sussman, J. (2000).

Engineers (Spielberg, F. (1989). have a big role in traffic management schemes (Nellore, K., & Hancke, G. P. (2016). They are responsible for creating and managing designs and operations that enable the safe, efficient, and convenient flow of vehicle traffic (Bicchi, A., &Pallottino, L., 2000). Engineers are highly trained professionals who use their expertise to design and maintain free flowing traffic on the roads and highways. Analyzing information such as accident statistics, traffic flow and speed data, the traffic engineer develops plans for safe and efficient roads, streets, highways, and traffic related systems (Van Woensel, T., &Vandaele, N. (2007).

The thrust of the government on the smooth traffic flows, reduce accidents and implementation of the rules and regulations concerning traffic systems and management should be evaluated as to what extent of level if implementations

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(Sakhapov, R., &Nikolaeva, R. (2018). Traffic control measures and strategies aim at maintaining the available infrastructure capacity close to nominal levels, protecting the traffic networks from the detrimental effects of oversaturation and even gridlock (Papageorgiou, M., et al.,2003) In this sense, traffic control is deemed to mainly act on the supply side of the basic traffic equation [Papageorgiou, M. et al (2007).. The growing number of vehicles in the city is evidently experienced that cause traffic, malfunctions traffic control devices, narrow roads, lack of discipline among drivers, lack of awareness of the pedestrians on traffic codes and regulations, and accidents on roads, no centralized terminals for public vehicles is now experienced and evidently happen in our city as observed traffic problems. This problem needs to be addressed and given immediate attention." (Baac et al., 2011). This approach tries to control the traffic actuators to create the maximum capacity for network users. Therefore, it can be said that the advanced traffic management systems (ATMS) are based on four main sections. These four sections include traffic information, traffic assignment, traffic optimization, and traffic prediction [Shahgholian, M., & Gharavian, D. (2018). The growing size of cities and increasing population mobility have determined a rapid increase in the number of vehicles on the roads, which has resulted in many challenges for road traffic management authorities in relation to traffic congestion, accidents, and air pollution [Djahel, S et al.,. (2014)]

The researcher analyzed the traffic systems to determine if what are the possible solution that needed to make to prevent the traffic and the researcher can give advice on the traffic management based on the data that gathered and to the survey that get to the drivers of different vehicles and passengers. The general objective of the study is to analyze the traffic and the relation to its traffic management system. Specifically, it aimed to evaluate the traffic management scheme perceived by drivers and passengers; to describe traffic system analysis traffic management scheme of Traffic Management Office to traffic system analysis; and to identify the perceived best solutions to traffic problems in the City of Puerto Princesa.

METHODOLOGY

The researcher prepares a questionnaire and interview guide. The pre-final copies are pre-tested to the selected drivers and passengers. The copy of a CCTV Footage video, copy of a police traffic accidents records that was compile at the Office of PNP, record of a traffic count of vehicles to analyze the flow of traffic were asked from certain agencies. The researcher interviewed respondents as to clarity of the questions concerned and the researcher was administered the questionnaire to the respondents with the help of his labourers. This study uses a descriptive design of research. The design is valuable to find out the Traffic Management System and analyze the traffic. This method collects information from a group of people to describe some aspects of characteristics such as abilities, opinions, perceptions, observations, attitudes and or knowledge of the population of which that group is a part." (Fraenkel and Wallen)In this study, the implementation of Traffic Management System using questionnaire. Also, this research was used a video recorder to record all the vehicles that pass through between major intersections of Puerto Princesa City. It also utilized the descriptive

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correlation method of query that study compares the respondents on the level of implementation of the traffic system management of Puerto Princesa City and the traffic system analysis. The extent of the perception on the implementation and observance of the traffic system and management of the city was correlated to the traffic system analyzed. In order to obtain a representative sample, the researcher used convenience – purposive sampling on which the respondents are selected subjectively by the researcher" (Zulueta and Costales, Jr.). This also used convenience quota sampling technique. Equal representations of the sample/respondents distributions involved 100pedestrians, 100 students, 100 Businessman, 100 Motorcycle Drivers, 100 Cab Drivers, 100 Private Vehicle Drivers and 100 Tricycle Drivers.

RESULTS AND DISCUSSION

The Level of Implementation of Traffic System and Management objective is implemented because of mean 3.21, amongst are Prevent activities such as preventive patrols, directing and supervising traffic, investigating accidents, and eliminating road hazards and Assist peace officer in the maintenance of peace, order, and safety of pedestrians along busy fronting school gate in the urban areas (mean = 3.81) is highly implemented as perceived by drivers and pedestrians.

Causes of Traffic Problems

The Traffic Problems as perceived by the community is (1) Parking along sidewalks (mean = 3.85) which is the causes very much, (2) Vehicular and traffic accidents (mean = 3.75, (3) Increasing number of vehicles (mean = 3.7375), (4)Malfunction of traffic lights (mean = 3.7125) and (5)Lack of discipline among pedestrians (mean = 3.4875) causes so much.

Level of Implementation to the Traffic Codes, Rules, and Regulations

The Traffic Codes, Rules and Regulations is observed because of general mean = 3.39886364, this includes Giving Way during intersections, during turns, emergency vehicles approaching (mean = 3.9875), Arresting careless and dangerous driving under influence of liquor or drugs (mean = 3.925), Traffic Control/Signals and signs (mean = 3.7375), is highly observed and One way streets (mean = 3.325) which also highly implemented and Turning, reversing and stopping using right turn, left turn, stop signal (mean = 3.5625) is also highly observed.

Transportation and Traffic System Analysis

The traffic / transport system situation and the traffic system analysis were analysed according to four categories as to traffic situation, traffic Accident, transport spot speeds and Transport Environment. The traffic situation analysis shows that Average Daily Traffic (ADT) is 40, 317 vehicles entering /day passing , the Hourly volume Traffic (HVT) is 1,680 vehicles passing intersection / hour, the Average Spacing of Vehicles (S) are 19.86 m / Veh , the traffic density is 1, 472 Vehicles / km and the Traffic index of 8.3 . The traffic index determines the traffic situation of the road or intersection. The traffic accident analysis shows that the total number of Accidents are 56 in a year,

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Fatal Accidents 12 per year, Injuries Taken are 2, 052 per year, Property Damage Only (PDO) are 916 per year. The traffic accident rate shows that 4 million entering vehicles involves in an accident per year and the severity ratio of the accident analysis per year is 0.693 or 69.30 percent. The transport spot speeds analysis reveals that the Space mean speed is 31.44 km / hr, the Time mean speed is 33.36 km / hr, Time passing is 2.183 minutes every entering vehicles, Time Headway of 473.68 sec2 / vehicle, The Average speed 18.58 km/ hr and Peak hour factor of 0.933 reflects that 93.30 percent of the entering vehicles trap on the heavily traffic at most traffic hours. The transport environment analysis shows that the Rate of Traffic flow of 49, 106Veh / day is greater than the average daily traffic of 40, 317 veh/day , the Road Capacity is 27, 345 Veh / hr is less than the rate of traffic flow 49. 106 Veh / day, and the Design Repetition are 29. 43 Vehicles / Million, this shows that the traffic environment is congested.

Correlation with the traffic management scheme of the Traffic Management Office to traffic system analysis

There is slight correlation but not significant relationships between the traffic systems analysis and the Implementations of Traffic System and Management Program of Puerto Princesa City because of the correlation coefficient of 0.1099 and t- computed value of 0.5750 falls short with the t- critical value of 2.05 tested at 0.05 level of significance with df = 27, this accepts the null hypothesis. There is high correlation and significant relationships between the traffic system analysis and the perceived causes of traffic because of the correlation coefficient of 0.8933 and the t- computed value of 10.516 exceeds the t- critical value of 2.05 tested at 0.05 level of significance with df = 28 this rejects the null hypothesis. The correlation between the traffic system analysis and the level of implementation of the traffic codes, rules and regulations is high and significant because of the correlation coefficients is 0.8958 and t –computed value of 10.853 is greater than the t- critical value of 2.05 tested at 0.05 level of significant with df = 29 and null hypothesis is rejected.

CONCLUSION

From the findings of the study, the following conclusions were drawn. Peace, order and safety is a primary concerned of the traffic systems and management of the by assisting of police officer in the front of school gate, vehicle patrols and supervising traffic in order to maintain the smooth flow of traffic and eliminating the road hazards that can cause heavy traffic (De Souza, A. M., et al, (2017). The causes of traffics are affected by parking of the different vehicles along sidewalks, vehicular and traffic accidents because of the slow investigation in the road, increasing the number of the vehicles, malfunctioning of traffic light sometimes and the lack of disciplines among pedestrians (Daganzo, C. F. et al.. (1997). The community is not mostly aware in the traffic codes and regulations by abiding its regulations by observing to give priority on approaching every vehicles and the same with the drivers that drive their vehicles is lack of self-discipline (Guimarães, A. G., & da Silva, A. R. (2019). The Traffic situation is heavy during peak hours morning, noontime, and afternoon (Benda, H. V., &Hoyos, C.

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G. (1983). Traffic accident severity ratio is high and severe in general along studied area, and traffic injuries, fatal accidents and property damage experienced moderately severed (Parker, D.,et al ,(1995). The spot speeds time passing per vehicles of 2minutes with an average spot speeds of 20 kph and the time space mean speed relatively near to 35kph .The entering vehicles and passing within the studies area experienced heavy traffic most of the time or the road experienced 20 hours traffic congestion a day(El-Shourbagy, M. (2020). The rate of traffic flow is higher than the experienced Average daily traffic, the road capacity did not sustain the smooth flow of traffic due to greater congestion and heavy traffic environment (Zhao, Y., et al.,. (2022). Traffic management implementation program of the city did not affect the traffic systems analysis in terms of traffic situations, traffic accidents, transport spot speeds and transport environment and the success of traffic management programs depends on the proper implementation of concerns agencies (Walker, J., et al., (2021). Traffic systems analysis of traffic situation, traffic accidents, transports spot speeds and transport environment is affected by the extent possible causes of the traffic problem existed along the national road between Caltex station and Junction 1 causes traffic systems problems, thus the respondents perception that causes traffic problems is correct. Traffic codes, rules and regulations affects the traffic systems such as traffic situation, traffic accidents, transport spot speed and environments, thus improper implementation and observance of the traffic codes, rules and regulation will cause traffic system problems and observance of traffic codes, rules and regulations will affects traffic system, and self-discipline among pedestrians, drivers and traffic law enforcers is required to have smooth traffic system in the area.

In general, good, and smooth traffic system is affected by proper implementations of traffic management scheme/program, traffic codes, rules and regulations, existing traffic systems analysis was affected by the perceived existing problems and level of implementation of traffic codes, rules, and regulations, thus they this were correlated to each other. The community perceived towards Best Possible Solution to minimize cause of traffic problems were to construct over pass in order the pedestrians, install traffic lights along y – intersection, construction of road along bay walk, construction road, loading only and Provide centralized terminal for cabs and tricycles.

POLICY IMPLICATIONS

This study could be helpful for the information for the awareness of traffic management. The data that the researcher gathered could be used for the improvement of existing management system in and the information could be helpful in answering the needs or problems of drivers and passengers. The result of this study will serve as basis to evaluate the efforts of the Puerto Princesa City Traffic Management group to maintain the smooth flow of traffic and to implement rules and regulation on the road. In addition, it will serve to increase their consciousness on the important of obeying traffic rules and regulations and this is a privilege which gave him the chance to know and understand how to analyze traffic and its correlation to Traffic Management System. It will provide information that will be guided to become traffic engineer in the future. To the field of Traffic Management and accident investigation, this will serve as a good reading

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material to acquire knowledge about the possible solutions of the existing to be encountered traffic problems. To give insights and information regarding the implementation of traffic management systems. This study will be significant for the future researchers for them to have reference material for their study and at the same time encourage other future researchers to involve themselves into a deeper study on the same topic.

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