

S.M.A.R.T for Jeepneys (Systematic, Manageable, Advanced, Real-Time Terminals)

INTRODUCTION

The rate of global population growth accelerated once it reached 7 billion; At the same time, the global economy is expanding. People are accustomed to having more mobility; thus, when it comes to mobility, transportation, particularly road transportation, is the most readily available option. Undoubtedly, the more people who use the transportation system, the more conflicts (accidents) will occur. As a result, there is a proper systematic demand for transportation systems that can handle big masses of people on wheels. It is ensured that it is done so environmentally friendly and safe (Mallik, n.d.).

Because of the increase in economic activities in Urban areas, numerous people who live in Rural areas were attracted to migrate since there are lots of opportunities in Urban cities. In conclusion, there is also an increase in the demand for transportation which results in long queues, lack of vehicle emissions. (Mayo, Maglasang, Moridpour, Tabaoda)

The public transportation system in the Philippines is the textbook definition of “underdeveloped.” An Asian Development Bank (ADB) study in 2012[2] identified the main challenges in transportation in the Philippines, then and now (Pagkatotohan, 2022):

- Poor quality of road network
- Poor intermodal integration (the connection between two modes of transportation)
- Lack of quality urban transport systems

- Weak sector governance and institutional capacity
- Limited private investment in transport infrastructure

According to Randeer, AL-Motawa, Vijay (2011), public transport services are considered to be “transportation by a conveyance that provides continuing general or special transportation to the public”.

The operating efficiency of terminals, which are key nodes in the transportation network, directly influences the efficiency of transportation networks. Transportation terminals are indispensable facilities in ensuring the effectiveness and convenience of the public transport network configuration. The terminal is an important component of a transport system serving as a point of a passenger's concentration, point of passenger dispersion, point of loading and unloading passengers, point of modal interchange, accommodates waiting for passengers and vehicles, and accommodates facilities and amenities for passengers (Santos, 2020).

Terminals are mostly utilized for both inter-city and intra-city travel due to their high level of accessibility. They are areas with a large number of pedestrians who may be seeking alternative modes of transportation to continue their journey and reach their final destination (Santos, 2020).

According to Tamyapar (2019), numerous intelligent transportation technologies that benefit drivers and passengers are in operation at all times, many of which have become commonplace and overlooked. The shipping and airline industries, primarily involved in international transportation, have already implemented several advanced transportation systems. Furthermore, these

technologies, constantly improving in the railway and highway sectors, especially in urban services, continue to open up new applications [1]. Although each new technology necessitates the creation of a new standard, the effort to standardize may sometimes need to catch up to the rapid pace of technological advancement. Nevertheless, adherence to standards is necessary for effective operation, and criteria are essential for achieving compliance.

PURPOSE OR RATIONALE

According to Tamyapar (2019), the population growth in various countries has led to a desire for independent and individual living, resulting in a significant increase in vehicle ownership. This has led to negative consequences such as air pollution, noise, and urban sprawl caused by highways. Traffic congestion has worsened, particularly in urban areas, and the existing routes are inadequate during peak hours. Toll plazas on toll highways cause people to waste a lot of time, increasing stress levels. Road traffic accidents have also increased significantly.

Mallik (2014) said that by utilizing technology to enhance safety, mobility, and environmental performance, SMART aims to facilitate a national multi-modal surface transportation system that includes a connected transportation environment around vehicles of all types, infrastructure, and carry-in passenger devices.

MAIN CONCEPTS:

- **LIVE TRACKING OF JEEPNEYS**

According to Liping, Danyang (2014), With the use of installed GPS, the system would be able to provide real-time location information of the Jeeps. By this means, passengers or commuters can keep track of the jeeps as long as they are connected through the internet.

- **NO LONG LINE QUEUES FOR PASSENGERS**

According to Fillione A. (2017), In order to cope with the ever-increasing traffic congestion, the Department of Transportation (DOTr) would like to come up with a network-based approach in determining the number of vehicles required to serve the estimated passenger demand. The study suggests the following: (1) to extend the road network into the city's undeveloped barangays and improve other access for re-routing of the current traffic scheme; (2) to increase the seating capacity of jeepneys using high capacity jeepneys to increase the number of trips per day especially or underserved areas meeting the passenger demand.

- **AVAILABILITY OF JEEPNEYS**

Advanced traveler information systems which contains three key facets to the provision of real-time traffic information: collection, processing, and dissemination, with each step entailing a distinct set of technology devices, platforms, and actors, both public and private, will brief road-users about existing and upcoming traffic conditions, dangers in the road, weather forecast, and services and accommodation stations on the road with the help of global positioning system via websites or smartphone apps. This system enables individuals to plan and organize an excellent road trip owing to the fact that they are able to search road information, estimated time of arrival, and designated route conditions while sitting on a couch at home. Thus, people who like to travel somewhere that are not familiar to them can easily plan a multi-modal trip (Tamyapar & Duru, 2019).

- **CENTRALIZED JEEPNEY TERMINALS FOR THE QUEUES**

One of any country's fundamentals is its infrastructure for transportation.

Country. A country's economy must guarantee a sufficient supply of transportation infrastructure for sustainable development. The city's public transit system is one such facility. Improved operational conditions for public transportation can be achieved by more effectively utilizing urban areas, especially that space designated for transportation (A, M. K., & N, R. H. , 2019).

- **CLEAN JEEPNEY TERMINALS**

Provincial bus terminals are relatively well developed with clean and separate comfort rooms, sufficient parking lots, communication facilities, CCTV, information counters, signages, and others. The facilities at P2P stations are usually ticket booths, vending machines, and bus shelters (Almec Corporation Oriental Consultants Global Co., LTD., 2022).

PROJECT DESCRIPTION

- **GOALS**

SMART stands for Systematic, Manageable, Advanced, Real-Time Terminals. It is a technology-based system that aims to enhance the safety and mobility of the performance of the jeepneys. The system includes live tracking of jeepneys, no long queues for passengers, and availability of jeepneys.

By utilizing GPS technology, the system provides real-time location information of jeepneys, allowing passengers to track their location.

SMART aims to improve the terminal transportation system in the Philippines by designing a centralized smart terminal. This solution will address the issue of long queue lines and increase the availability of transportation options for commuters, thereby enhancing their overall commuting experience in terms of accessibility and comfort.

Additionally, the SMART system aims to improve the efficiency of transportation terminals, which are essential facilities in ensuring the effectiveness and convenience of the public transport network systems. The concept can boost the economy and serve as a framework for solving issues related to traffic flow, congestion, and queues in terminals by integrating architectural solutions and manageable technological systems.

Overall, the SMART system for jeepneys aims to facilitate a multimodal transportation system that includes a connected transportation environment around vehicles of all types, infrastructure, and carry-in passenger devices.

- **OBJECTIVES**

This paper aims to develop a SMART system for Jeepneys in the Philippines that is systematic, manageable, advanced, and real-time to improve the operating efficiency of terminals and reduce traffic congestion.

The following objectives could be pursued by the following:

- To investigate the effectiveness of implementing a SMART system in improving the efficiency and safety of public transportation, specifically in the context of jeepneys.
- To determine the impact of a SMART system in reducing traffic

congestion and queues in public transportation terminals, particularly in high-traffic areas.

- To assess the feasibility of live tracking of jeepneys using GPS technology and its potential to improve passenger experience and safety.
- To evaluate the potential benefits of increasing the seating capacity of jeepneys using high-capacity vehicles in meeting passenger demand and reducing long queues.
- To explore the potential of advanced traveler information systems in improving the availability and accessibility of jeepneys and other public transportation options for passengers.
- To examine the challenges and opportunities in implementing a SMART system for jeepneys, particularly in governance, institutional capacity, and private investment in transport infrastructure.

The system should enable live tracking of Jeepneys. The paper will explore the feasibility of implementing the system, the required technology, infrastructure, and the implications for governance and institutional capacity in the transportation sector. The paper will focus on the perspectives of passengers, operators, and policymakers to ensure that the system is aligned with their needs and interests.

In conclusion, SMART aims to propose recommendations for successfully

implementing a SMART system for jeepneys in the Philippines. These objectives could form the basis of a comprehensive research study to improve the public transportation system in the Philippines, particularly for commuters who rely on jeepneys as their primary mode of transportation.

• METHODOLOGY

The paper's design, data collection, and limitations will outline its research process through observational data.

Research Design:

This qualitative research explores the feasibility of implementing a systematic, manageable, advanced, real-time terminal (SMART) for jeepneys in the Philippines. The research will employ an observational study design, where the researcher will observe and document the behavior of jeepney terminals and the passengers' experiences with the current transportation system. The research will focus on the main concepts of the SMART system, including live tracking of jeepneys, no long line queues for passengers, and availability of jeepneys.

Data Collection:

The primary data collection method will be observation, which will be conducted at selected jeepney terminals. The researcher will observe the behaviors of jeepney operators, passengers, and other stakeholders.

Secondary data will be obtained through a comprehensive review of literature related to the main concepts of the SMART system. The literature review will provide background information on the feasibility of

implementing the SMART system in the Philippine jeepney transportation system.

Limitations:

The study's main limitation is that it will focus only on selected jeepney terminals and passengers, which may differ from the entire jeepney transportation system in the Philippines.

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REFERENCES

- Tamyapar, B., & Duru, F. (2019, December 14). Smart Transportation Systems. ResearchGate.
https://www.researchgate.net/publication/337928590_Smart_Transportation_Systems?fbclid=IwAR1cVfcjBMu71tXpRVUwo5aYz36cj0IPYnhXleF1eKLvFIRqAdA9IDRLD1Q
- Tarlac Public Transportation Terminal. (2020). Scribd.
<https://www.scribd.com/document/466486143/Tarlac-Public-Transportation-Terminal?fbclid=IwAR3-eRsHNTzC-x97EjTfloQY9uDrNrTOA5DGjR2CR5RbsSZI5jkoCt9WzY#>
- Maha, A., Bobâlcă, C., & Țugulea, O. (2014b). Strategies for the Improvements in the Quality and Efficiency of Public Transportation. *Procedia. Economics and Finance*, 15, 877–885.
[https://doi.org/10.1016/s2212-5671\(14\)00551-6](https://doi.org/10.1016/s2212-5671(14)00551-6)
- Mallik, S. (n.d.). Intelligent Transportation System.
https://www.ripublication.com/ijcer_spl/ijcerv5n4spl_10.pdf
- Pagkatotohan, J. (2022, September 28). *How to Deal with Common Commuter Problems in the Philippines*. Moneymax.
<https://www.moneymax.ph/lifestyle/articles/commuters-everyday-dilemma>
- Xu Liping, Li Dangying (2014, December 06). *A Novel Embedded Vehicle Terminal for Intelligent Transportation*
<https://ieeexplore.ieee.org/abstract/document/6977544>
- Francis L. Mayo, Renan S. Maglasang, Sara Moridpour, Evelyn B. Taboada (2022). *Impact of transport policies to commuter safety in urban cities of a developing country: A sustainability and system*

perspective, Case Studies on Transport Policy,
<https://www.sciencedirect.com/science/article/pii/S2213624X22001730>

(PDF) *Smart Transportation Systems*.
(2019, December 14). ResearchGate.
https://www.researchgate.net/publication/337928590_Smart_Transportation_Systems

Wang, Y., Guo, J., Ceder, A., Currie, G., Dong, W., & Hao, Y. (2014). Waiting for public transport services: Queueing analysis with balking and reneging behaviors of impatient passengers. *Transportation Research Part B-Methodological*, 63, 53–76.
https://www.researchgate.net/publication/261186876_Waiting_for_public_transport_services_Queueing_analysis_with_balking_and_reneging_behaviors_of_impatient_passengers

(2022, February 3). DATA COLLECTION SURVEY ON IMPROVING ROAD-BASED PUBLIC TRANSPORT SYSTEM IN METRO MANILA, REPUBLIC OF THE PHILIPPINES FINAL REPORT.
<https://openjicareport.jica.go.jp/pdf/12369815.pdf>

Fillone, A. (2017, November 30). (PDF) *Jeepney Service Operation and Demand in Baguio City, Philippines*. ResearchGate.
https://www.researchgate.net/publication/321385963_Jeepney_Service_Operation_and_Demand_in_Baguio_City_Philippines

A, M. K., & N, R. H. (2019). Effect of Improper Bus Stop Locations on Capacity and Speed-Flow Relations on Urban Roads. *International Journal of Recent Technology and Engineering*, 8(3), 1489–1494.
<https://doi.org/10.35940/ijrte.c4148.098319>