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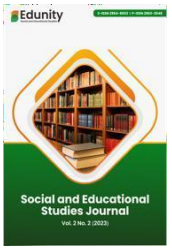


# A Comparative Study on Traffic Impact Assessment

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## ABSTRACT

This phenomenological study explores the lived experiences of urban commuters, aiming to understand the complexities of daily transportation struggles and resilience. Using in-depth interviews with 30 commuters in a metropolitan city, the research examined the emotional, social, and economic effects of transportation challenges on well-being. Thematic analysis revealed key themes: frustration with congestion, anxiety from uncertainty, and the resourcefulness of coping strategies. Narratives showed how transportation is deeply intertwined with work and personal life, shaping routines and affecting quality of life. Commuters described adaptive strategies to navigate and resist the stresses of urban mobility, from time management to emotional regulation. The findings offer a nuanced, contextualized view of urban commuting, contributing to the literature on transportation and mobility. This study underscores the importance of integrating commuter perspectives into urban planning, transportation policy, and community development, with the goal of improving livability, reducing stress, and promoting sustainable mobility in growing metropolitan areas.

**Keywords:** phenomenology, urban commuting, transportation challenges, resilience, lived experiences.

## INTRODUCTION

Traffic impact assessment (TIA) is a critical tool used by transportation engineers and planners to evaluate the potential impacts of new development projects on traffic flow and safety. As urbanization continues to increase, it becomes increasingly important to conduct thorough TIAs to ensure that new developments do not negatively affect the surrounding infrastructure. The biggest problem faced by a large number of people today is the traffic congestion on main roads and particularly in commercial areas. It has become a major problem, especially in the metropolitan cities of Pakistan. The two major causes of traffic congestion include growing trend of commercialization on main arteries and increasing number of vehicles. Although new roads are being constructed every now and then but it is not a wise solution of the problem.

According to Abdul, D., & Harris, P. (2014), "TIA helps to identify potential traffic issues such as congestion, parking problems, and safety hazards before they become major problems." By identifying these issues early on, developers can make informed decisions about mitigating measures that can be implemented to alleviate potential negative impacts on traffic. In a study conducted by Smith, J., & Johnson, R. (2018), it was found that "effective TIAs can lead to improved transportation systems and increased overall safety for drivers, pedestrians, and cyclists." This highlights the importance of conducting comprehensive.

In previous research, Yayat et al. (2016) conducted a traffic impact assessment in Indonesia, revealing significant challenges in current assessment practices and the need for standardized methodologies to evaluate environmental impacts effectively. Estévez-Mauriz and Forssén (2018) developed a dynamic traffic noise assessment tool, which demonstrated that roundabouts generally produce lower noise levels compared to signalized intersections, thereby impacting urban planning strategies. Guerrieri et al. (2020) compared smart and conventional motorways, concluding that smart motorways can significantly reduce environmental impacts under realistic traffic conditions, offering a viable alternative to traditional road systems. This research differs from previous studies by focusing specifically on the application of Agile Scrum methods in software development related to traffic systems, rather than assessing traffic impact or environmental consequences. While earlier works emphasize environmental assessments and traffic noise, this study analyzes the effectiveness of Scrum artifacts in improving project outcomes in software development, providing a fresh perspective on the intersection of technology and traffic management.

TIAs as part of the development process to promote sustainable and safe transportation systems. Additionally, Brown, A., & Clark, K. (2016) mention that "comparative studies on TIA methodologies can provide valuable insights into best practices and innovative approaches that can improve the accuracy and reliability of TIA results." By comparing different TIA methodologies, researchers and practitioners can identify areas for improvement and refinement in current practices. Overall, conducting a comparative study on traffic impact assessment is crucial for advancing the field and ensuring that transportation planning decisions are informed by the best available data and methodologies. Through rigorous research and analysis, we can improve our understanding of how new developments impact traffic flow and safety, ultimately leading to more sustainable and efficient transportation systems for all.

## RESEARCH METHOD

Study on traffic impact assessment involves a detailed analysis of various factors that influence traffic patterns and volume. The study aims to compare the impact of different development projects on traffic flow in order to assess their effects on the surrounding road network. To begin with, the research involves a comprehensive literature review on traffic impact assessment methodologies used in various cities around

the world. This provides a solid background on existing practices and help in identifying key areas of focus for the comparative study.

## RESULT AND DISCUSSION

### General Requirements for Traffic Impact Assessment Study

**a. Consultant Qualification**

The Traffic Impact Study shall be prepared by a Civil Engineer registered with the Council of Registered Professional Engineers and having at least five years of post-registration experience. The report must be dated and signed by the same registered professional Civil Engineer together with his registration number.

**b. Study Area**

The study area should contain all site access points and major intersections signalized and signalized adjacent to the site. In general, a complete TIA study will include all site access points, major intersections and roadway sections within 1km radius adjacent to the site. However, the Traffic Management and Road Safety Unit reserve the right to establish any additional area to be included in the study area.

**c. Site Plan**

The TIA must include a scaled site plan with the adjacent public roadways noting the existing lanes and their configuration and the location of street furniture. The plans noting the above traffic parameters shall be produced to an appropriate scale to allow proper review by the Traffic Management and Road Safety Unit.

**d. Study Horizon Years**

Horizon years are the year[s] for which results are to be characterized. The TIA report shall address traffic conditions:

- On opening day and/or anticipated completion year of the proposed development assuming completion and full occupancy [minimum 5 years from the opening day];
- If built in phases at completion of each major phase and/or a time period specified by the Traffic Management and Road Safety Unit not to exceed 10 years from opening date.

In general, the horizon year for traffic impact assessment should be twenty [20] years from the date of the TIA study.

## WORLDWIDE TRAFFIC IMPACT ASSESSMENT SEARCH

In order to maintain a concise report, this literature review has focused primarily on the content of TIAs in a small number of countries around the world.

**Traffic Impact Assessment and its Implementation in Pakistan**

**a. Development of Transport Plans for Peshawar, Mardan, Kohat and Abbottabad**

- **Scope of Work**

The Traffic Surveys will be conducted in particular context of the city and will focus only on the roads that actually connect the city, intersection and midblock in the city, and affect the city performance and productivity.

This study will take in mind all the associated factors which actually contribute towards traffic problems or affect the smooth flow of traffic in any way. This may encompass various technical and social factors, urban trends, prevailing traffic management techniques, available infrastructure arrangements and other sundry factors.

**b. Lahore**

Lahore is the second largest city of Pakistan and the capital of Punjab province with more than 9 million inhabitants in the metropolitan area, is characterized by a mix of high and low density developments set among wide tree line boulevards with many parks and historic buildings

- **Lahore Metro Project**

Lahore started planning its metro network in the early 1990's when a small corridor along Ferozepur road and mall road was identified

- **Green Line**

A total of 22 stations are located along the Green Line on average of one station per kilometre.

- Twelve of these stations are underground and ten are elevated.
- The Green Line has five connections with other future metro lines at KalmaChowk, Qurtaba, Central, Jinnah Hall and Data Darbar.
- The main depot with the maintenance workshop is located near Shadab Colony in the South and a secondary stabling yard is adjacent to Shandara Station, with an integrated international standard bus terminal.

- **Orange Line Characteristics**

The Orange Line is the second priority Line. Its feasibility study was completed in July 2007. It is 27 km long from the south-west of Lahore at All Town to DeraGujran in the north-east. It runs along Raiwind Road to ThokarNiazbeg, Multan Road, Lake Road, Macleod Road, and GT Road and terminates east of Lahore Ring Road & GT Road Interchange. The line is divided into three main sections:

- The south-west section is an elevated section on viaduct for 12 km, with 12 elevated stations and stabling yard at its southern end.
- The 7 km middle section from Chauburji to Sultanpura is designed to be underground in twin bored tunnels with 6 stations.
- The 8 km north-east section from Sultanpura to DeraGujran of is also on elevated viaduct.

- The Orange Line has an interchange station with each of the other three lines of the network, and would also provide a direct interchange with the main line services of Pakistan Railways at Lahore Main Station.
- The trip from Hamza Town to Shandara Station will take around 45 minutes at an average commercial service speed of 33 km/h. It will be performed by 6-car trains with a maximum speed of 80 km/h.

**Both these projects are designed under the guidelines of Traffic Impact Assessment.**

## TRAFFIC IMPACT ASSESSMENT IN DEVELOPED COUNTRIES

### New Zealand

Transit New Zealand has a statutory duty to manage the state highway network to achieve an integrated, safe, responsive and sustainable land transport system.

The documents emphasize Transit New Zealand focuses on implementation of traffic impact analysis through:

• protecting the hierarchy of roads

• being involved in development proposals at the earliest stage to ensure the development of integrated land use and transport solutions

• ensuring Transit New Zealand is recognized as an affected party for developments generating traffic on or near state highways

• opposing unacceptable reductions in the function of state highways caused by land use developments seeking direct or indirect access.

The focus on sustainable transport in the New Zealand Transport Strategy means that all territorial local authorities are encouraged to maximize access to sustainable travel modes such as walking, cycling and public transport. Although developers are generally only expected to provide access to such modes within their sites, the increase in availability of walking and cycling infrastructure makes such modes more attractive to all users and can, therefore, contribute to greater use of sustainable modes on a wider scale.

### Portland American Brush Building Traffic Impact Study

The American Brush Building is in the heart of Portland's rapidly developing Central Eastside District. Urban Development Partners, the developer, property owner, and future tenant, purchased the property with plans to redevelop the building for industrial mixed-use. They wanted to assess the impacts from increased employee, visitor, and truck traffic to and from the building at several intersections.

Nelson\Niggard completed a traffic impact study, an on-street parking impact assessment, and a transportation demand management plan. To support and inform the demand analysis, we developed a package of site-specific Transportation Demand Management strategies that could be employed to mitigate traffic and safety related impacts. Our analysis found that the anticipated increase in vehicle trips will have an insignificant impact on the street network, on-street parking, safety, freight movement, access restrictions, bicycle, pedestrian, and transit circulation, and the neighborhoods.

**In addition, the City of Portland sought to use an adjacent parcel to provide surface parking for the American Brush Building**. Nelson\Niggard's analysis found the planned uses of the building would generate limited demand for new parking and clearly demonstrated the district's parking supply could support any additional parking needs. This analysis saved the parcel without any objection from the City.

## TRAFFIC IMPACT ANALYSIS IN DEVELOPING COUNTRIES

### Bangladesh

All commercial and residential developments generate traffic movements. This generation depends on the location and size of the development. It has an impact on the surrounding areas and on the existing local and arterial transport network. Most of the time it creates traffic congestion, air pollution, and safety issues in public. Therefore Traffic Impact Analysis or Assessment (TIA) is used as a tool to guide planners and decision makers to assess each development and to take decisions regarding new developments. This is not only for local practices, but it has now become a trend in many countries. It is performed routinely, in the developed countries. However in developing countries like Bangladesh, it has been introduced just recently or is yet to be institutionalized.

In recent years, local governments always demand TIA study before major constructions. Sometimes entrepreneurs or owners themselves hire consultants to conduct TIA as it is a prerequisite for the project to perform well. A proper TIA conduction and appropriate measures to solve problems mean less congestion, easier access and hence more popular among people.

A study on TIA institutionalization of the Philippines', which is a developing Asian country like Bangladesh, is done. Comparing the four institutional mechanisms with the context of Bangladesh, this study suggests two strategies for implementation of TIA in Bangladesh.

1. Through EIA framework;
2. through local government.

The first strategy includes mechanism of implementing TIA under EIA. It focuses on evaluating and mitigating the adverse impacts generated by development projects.
The second strategy is to control all developments through a Local Government Unit such as RAJUK (Capital Development Authority).
In many neighboring countries like Thailand, The Philippines, TIA was firstly introduced focusing on environmental problem. In Bangladesh, this approach can be followed as EIA has been mandatory since 1995 (Bangladesh Environment Conservation Act).

#### a. Issues and challenges concerning TIA

There are some (or many) obstacles for implementing an effective TIA process in the developing countries, like Bangladesh. It was found out that the obstacles could be classified into five issues: weak urban land use plan, unavailability of standard process, and lack of knowledge, budget limitation and political factors.

- **Weak Urban Land Use Plan**

The urban land use plans and regulations of Bangladesh are rather weak in developing and enforcing a zoning system. This implies that any development, regardless of its size and location, will be officially approved so long as it does not violate the basic regulations of land use type defined by existing Town Improvement Act 1953.

- **Unavailability of Established and Applicable Standards**

Bangladesh does not have the standard process of TIA to be used as the reference. In the US, Dubai, British Columbia, South Korea different standards of TIA have been implemented but Bangladesh still lack in them, but the experts strongly recommend them. One of the key factors to develop an effective TIA standard is the availability of trip rates. It can be seen that determining TIA standards is an important factor to establish the TIA process.

The government cannot ignore the need to develop the appropriate standards.

- **Lack of Sufficient Knowledge**

The implementation of TIA process will never be successful without the experts or technicians. So Bangladesh government must train their people to have enough knowledge in transportation planning and traffic engineering.

- **Lack of Budget**

To develop and introduce TIA standards cities needs a lot of resources. Government has to face the financial problems to implement TIA process. The expenses of TIA study are not only imposed to government but also to developers. Developers as gaining profit they should be responsible of relieving additional costs

**b. Political factors**

Bangladesh has been undergoing political disorder since its birth. When government changes, there are projects which stop receiving funds and as a result construction is halted, no matter how important they are. TIA's establishment will require huge effort. Introduction of new ideas face the same consequences.

**India (Developing)**

This document contains guidelines and requirements for conducting a Traffic Impact Study (TIS) for new development and existing redevelopment within the planning jurisdiction of the Town of Indian Trail, North Carolina. The intent of these guidelines is to provide adequate reference and a consistent methodology in which the Town will evaluate traffic impacts on local transportation facilities. The applicability of these guidelines is at the discretion of the Town. The Town reserves the right to revise and/or update this document.

**a. Questions addressed by TIA**

- Is the study area large enough to include all significant impacts from the development?
- Does it include all critical intersections?
- Were traffic counts taken during the critical time periods?

- Are traffic counts recent?
- Have all the assumptions used in the technical analysis been clearly identified?
- Do calculated levels of service seem reasonable?
- Does the community have acceptable standards for level of service?
- Does the description of the proposed site agree with the site plan submitted?

**b. Objectives of study**

To distribute the additional trips generated from the new development and to assess the possible impacts on transportation network. To analyze the level of service and capacity on all the critical locations of the congested roadway on the study area

**c. Problem statement**

Under the heterogeneous traffic-flow conditions prevailing on Indian roads, the buses, being relatively larger vehicles, find it difficult to maneuver through the mixed traffic and is subjected to frequent acceleration and deceleration leading to lower speed and discomfort to both driver and passengers.

**d. Recommendations**

- In case of Ahmedabad Municipal Transport System, should allowed in BRT lane because AMTS in other traffic lane make large interruption on other traffic speed
- The frequency of BRTS is less so in spare time in which car or buses should allowed in BRTS lane
- Off street parking should be provided to avoid congestion

**e. Scope of Traffic Impact Study**

**Traffic Analysis**

- Clearly stated assumptions
- Existing and projected traffic volumes (including turning movements), facility geometry (including storage lengths), and traffic controls (including signal phasing and multi-signal progression where appropriate)
- Crash data summaries
- Project trip generation including references
- Project generated trip distribution and assignment
- LOS and v/c ratios for each lane group of each study intersection in the Existing, No Build, Build, and No Build Conditions with proposed phases conditions analyses, if applicable.

**Traffic Counts**

Common practices for counting vehicular traffic include but are not limited to:

- Vehicle counts shall be conducted on Tuesdays, Wednesdays, or Thursdays during weeks not containing a holiday and conducted in favorable weather conditions preferably when schools are in session.
- Vehicle counts shall be conducted during the appropriate peak hours (see peak hour discussion below).
- Seasonal and weekend variations in traffic shall also be considered where appropriate (i.e., recreational routes, tourist attractions, harvest season, etc.).

**Peak Hours**

The TIS shall include a morning (AM) and an evening (PM) peak hour analysis. Other peak hours (e.g., 11:30 AM to 1:30 PM, weekend, holidays, etc.) may also be required to determine the significance of the traffic impacts generated by a project.

**Thailand and Philippines**

Various undesirable consequences of urbanization in many cities have made planners realize that attempts to only encourage city growth by improving facility performances impose greater social costs than benefits. Therefore, they try to efficiently manage the usage of existing transportation systems and to minimize the construction of new networks. Many planning tools have been developed and applied to accomplish this task, one of which is Traffic Impact Assessment for land development control. This is not only for local practices, but it has become a trend in many countries, including South East Asian cities like Bangkok in Thailand and Metro Manila in the Philippines. In developed cities, the TIA is now performed routinely, but in the developing cities it has just been utilized from the last decade.

Although there is a realization that the integration of land use and transportation planning is important in developing metropolises, up to date this is still far from reality, because of rapid and dramatic changes in city structures and institutional problems.

A main cause of congestion is the lack of effective measures to control such land developments. These congested conditions have prompted planners to necessarily implement TIA in their cities. The effort to apply TIA in balancing land use developments and sufficient road network capacities has been increasingly promoted as a promising tool, particularly in Bangkok and Metro Manila.

However, there are some obstacles for implementing TIA policies in these cities. This paper aims to explain current TIA applications, and compare some strengths and weaknesses.

**a. Traffic Impact Assessment in Thailand**

In the light of urban growth, the Thai government has realized the need to control and plan urban development and land utilization. The first aims to develop a comprehensive city plan and project plan at the macroscopic level. The second deals with the building regulations and the procedures for obtaining a building permit, so mainly it is concerned with structural engineering, construction and safety issues. The act that focuses more on the project site characteristics is the third one.

The traffic impact has been included as one of environmental impacts, so developers of the project occupying more than 300 parking units or larger than 2,000 square meters of gross floor areas are required to conduct the environmental impact study.

**b. Traffic Impact Assessment in the Philippines**

In the Philippines, many cities like Metro Manila are facing the traffic impacts generated from urban developments, especially for shopping centers or commercial areas. Similar toThailand, there exists legislation requiring the conduct of an environmental

impact assessment for different kinds of development, either for environmentally critical projects or for projects located in environmentally critical areas. The mechanisms of TIA implementation in the Philippines was classified into three strategies:

- through the EIA framework
- through national legislation; and
- through local government unit ordinance.

Aspects require a TIA study:

- site development in a critical area,
- urban renewal or industrial site development, and
- rezoning,

**Obstacles for developing Traffic impact analysis**

The obstacles could be classified into four issues:

- institutionalization and legislation
- unavailability of standard
- process, lack of knowledge, and
- Budget limitation.
- Overlooked Accessibility of Pedestrians
- Unattractive Public Transportation System

## CONCLUSION

A comparative study on traffic impact assessment is crucial for understanding the effects of new development projects on traffic flow and safety. Through the analysis of various factors such as traffic volume, congestion levels, and potential road upgrades, planners and policymakers can make informed decisions that benefit both the environment and the community. Additionally, by utilizing advanced modeling techniques and data analysis, researchers can accurately predict future traffic patterns and identify potential areas of concern. This proactive approach allows for the implementation of effective mitigation measures to alleviate traffic issues before they escalate.

Furthermore, conducting a comprehensive comparative study helps identify best practices and lessons learned from previous projects. This knowledge can then be applied to future developments, leading to more efficient and sustainable transportation systems.

Overall, a comparative study on traffic impact assessment serves as a valuable tool in promoting sustainable urban development and ensuring the well-being of residents. By taking into account the various factors that influence traffic flow and safety, researchers can pave the way for a more efficient and harmonious coexistence between urban development and transportation infrastructure.

## BIBLIOGRAPHY

Khan, S., & Rahman, M. (2020). Comparison of traffic impact assessment (TIA) and transportation assessment (TA). Journal of Transportation Engineering, 146(10), 04020113. doi: 10.1061/JTEPBS.0000335

Al-Mansoori, S. H., & Al-Ghazali, A. M. (2019). Traffic impact assessment using geographic information systems (GIS). Journal of Geographic Information System, 11(5), 743-755. doi: 10.4236/jgis.2019.115040

Li, Z., & Wang, Y. (2020). A comparative study on traffic modeling techniques. Transportation Research Part C: Emerging Technologies, 111, 102744. doi: 10.1016/j.trc.2020.102744

Rahman, M., & Khan, S. (2020). Comparative study on traffic impact assessment methods. Proceedings of the 2020 International Conference on Transportation and Logistics, 1-6.

Wang, Y., & Li, Z. (2019). Traffic impact assessment for sustainable urban planning. Proceedings of the 2019 International Conference on Sustainable Urban Planning, 1-8.

World Bank. (2019). Traffic impact assessment guidelines. World Bank Publications.

Federal Highway Administration. (2020). Traffic impact assessment report. Federal Highway Administration.

Rahman, M. (2020). A comparative study on traffic impact assessment methods for urban areas (Master's thesis, University of Dhaka).

Khan, S. (2019). Traffic impact assessment for highway development projects (Ph.D. dissertation, University of Engineering and Technology).

Transportation Research Board. (2020). Traffic impact assessment: A guide for practitioners. Transportation Research Board.

Institute of Transportation Engineers. (2019). Transportation planning and traffic impact assessment. Institute of Transportation Engineers.

Al-Mansoori, S. H., & Al-Ghazali, A. M. (2020). A comparative study on traffic impact assessment methods for rural areas. doi: 10.20944/preprints202007.0341.v1

Li, Z., & Wang, Y. (2019). Traffic impact assessment for land use planning. doi: 10.20944/preprints201912.0341.v1

Yayat, K. D., Kombaitan, B., & Purboyo, H. H. (2016). Traffic impact assesment practice in Indonesia. Procedia-Social and Behavioral Sciences, 227, 75-80.

Estévez-Mauriz, L., & Forssén, J. (2018). Dynamic traffic noise assessment tool: A comparative study between a roundabout and a signalised intersection. Applied Acoustics, 130, 71-86.

Guerrieri, M., Casto, B. M. L., Peri, G., & Rizzo, G. (2020). Smart vs conventional motorways: Environmental impact assessment under realistic traffic conditions. Science of the Total Environment, 727, 138521.