JOURNAL OF ALGEBRAIC STATISTICS
Volume 13, No. 3, 2022, p.5583-5590
https://publishoa.com
ISSN: 1309-3452

A Study to Evaluate the Magnitude of Impacts of Road Widening Projects: with Special Focus on Tamil Nadu

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Abstract
Road widening projects are an important part of city planning and infrastructure development for three main reasons: to handle more traffic, make roads safer, and encourage economic expansion. The need for larger and more efficient road networks is becoming increasingly pressing as urban areas continue to grow. From 2018 through 2021, road widening projects were carried out in the Tamil Nadu province. This study aimed to determine the full scope of those impacts. The primary data collection tool for this study was a questionnaire administered using the descriptive correlational-survey methodology. The survey included 105 participants, including engineers from the Department of Public Works (DPWH), officials from local government units (LGUs), and randomly selected community members. The weighted mean was the statistical tool that was used. The researcher found that the road widening project had relatively effective effects on efficiency, effectiveness, equity, ethics, economics, and environment, according to the respondents, based on the data collected.

Keywords: Road widening, Economy, Environment, Effective, Ethics

I. Introduction

Modern urban planning and infrastructure development would not be complete without undertaking road widening projects to increase transportation networks' capacity, safety, and efficiency. The necessity for longer highways is growing as cities throughout the globe struggle to accommodate expanding populations and more traffic. Road widening projects are complex endeavors that encompass several aspects, including physical construction, careful planning, involvement of stakeholders, and environmental issues. Improving the quality of life for people and supporting economic development are common goals of these projects. They aim to minimize travel time, alleviate traffic congestion, and accommodate future expansion. Improving the infrastructure's ability to withstand both present and future demands is the fundamental goal of road widening projects. This usually entails constructing new highways, expanding current ones, enhancing crossings, and adding amenities like bike lanes and pedestrian walkways. To start, we conduct environmental impact evaluations and thorough traffic studies to learn about the present and foretell the future. By informing the planning and design phases, these studies guarantee that the project is in line with larger urban development objectives and reduces adverse effects on the local population and the environment.

Involvement of relevant stakeholders is essential for the completion of road widening projects. As part of this process, we will be reaching out to area companies, people, and government organizations to hear their thoughts and address their issues. Overcoming any opposition and maintaining seamless project implementation requires effective communication and openness throughout the project lifetime. To promote more inclusive and sustainable development, it is important to engage stakeholders in order to detect and reduce social, economic, and environmental repercussions. The execution of road widening projects is heavily influenced by environmental factors. The ecosystems, air quality, and decibel levels in the area may be greatly impacted by these initiatives. Environmental impact evaluations must be comprehensive, and steps must be taken to lessen the likelihood of negative consequences. Among these measures can include the use of environmentally friendly building materials and techniques, the preservation of green areas, and the management of stormwater runoff. Road widening projects may help make cities greener and better places to live if they put an emphasis on environmental sustainability.

Coordinated operations such as site acquisition, utility relocation, excavation, and building are required for the technical execution of road widening. Careful preparation and oversight are required for each of these stages because of the distinct difficulties they bring. In highly crowded regions, where space is at a premium, land

acquisition, for example, can spark heated debates. It often requires negotiations with landowners and, in extreme circumstances, may call for eminent domain actions. Another important consideration is utility relocation, which necessitates communication with utility providers to transfer water pipes, electricity lines, and other infrastructure without interrupting service. Ensuring smooth traffic flow and avoiding interruptions to everyday life are of the utmost importance throughout the building phase. To do this, it is common to communicate with the public clearly, set up temporary traffic control strategies, and organize construction operations during off-peak hours. In order to speed things up and lessen the effect on the surrounding surroundings, modern building methods and technology like modular and prefabrication can be used.

Funding initiatives to expand roadways is an additional important factor to think about. Government coffers, private sector partnerships, or both may need to be dipped into for these pricey endeavors. A variety of funding mechanisms are being considered, including public-private partnerships (PPPs), tolls, and the utilization of grants and loans from both domestic and foreign financial organizations. For road widening projects to be completed on schedule and under budget, it is crucial to secure sufficient and long-term funding. Road expansion projects can have far-reaching socioeconomic effects, beyond the obvious advantages of better traffic flow and less congestion. They have the potential to increase the availability of vital services, boost local economies through better connection, and generate employment opportunities both during and after construction. The expansion and improvement of the region as a whole may be accelerated by the implementation of well-planned road widening projects, which in turn encourage more investment and urban development. Consequently, a comprehensive and coordinated strategy is necessary for the successful execution of road widening projects. In order to accomplish the set goals, it is necessary to strike a balance between economic, social, environmental, and technological factors. Planning, stakeholder participation, technical execution, sustainability, and finance are the defining characteristics of a successful project. To improve the quality of life for city dwellers, transportation networks must be more efficient, safe, and environmentally friendly, and road widening projects will continue to play a crucial role in this endeavor.

II. Review Of Literature

Siddique, Tariq & Pradhan, S. (2019) The route network in the treacherous Himalayan terrain functions as vital transit arteries. The landscape is prone to landslides due to its geology, characterized by the presence of weak rocks. Human engagement in developmental activities is consistently exacerbating and degrading the geo-environmental situation of the region. such example of such intervention is the expansion of roadways being carried out on vulnerable slopes. This discussion focuses on the problems related to inadequate excavation for the expansion of National Highway -58 in Uttarakhand, India. Implementing surface and subsurface drainage treatment is the primary action that must be addressed. Avoid conducting excavations at a steep angle. Utilizing steel mesh and flexible barriers can help prevent possible falling blocks by both containing them and reducing their kinetic energy. Implementing appropriate corrective steps will enhance the safety of the route. The excavated sediment should be disposed of at well-designed and scientifically engineered disposal sites. Rock sheds will be built in areas where there is a high risk of rockfall.

Gichaga, Francis. (2016) This study provides an overview of the historical and cultural context around road improvement and road safety features in Kenya, a developing nation located in East Africa. Individuals from underdeveloped regions in developing nations may struggle to understand and adapt to contemporary transportation systems, particularly roads, due to differences in cultural norms and practices. This study examines two case studies: one on the socio-economic consequences of enhancing a 50-km road with high quality and high traffic volume, and the other on the surveillance and assessment of road safety factors along the Northern Corridor in Kenya after significant road enhancements. The enhancements made to the Nairobi-Thika Highway, which is a major route, have generated significant interest from investors located along the highway corridor. The presence of the high-speed road has resulted in the regrettable outcome of cars traveling at excessive speeds colliding with people who are crossing the road in sites that are not approved for pedestrian crossings. The Northern Corridor, a transportation route connecting the Great Lakes Countries of the Democratic Republic of Congo, Burundi, Rwanda, and Uganda to the port of Mombasa in Kenya, has seen persistently high accident rates over a significant period. Monitoring and assessment activities on the Northern Corridor have revealed that drivers are the primary culprits in creating accidents, accounting for 49.4% of

incidents, followed by pedestrians at 21.7%. The data also indicates that 24% of the incidents occurring along the Northern Corridor result in fatalities, which is a matter of significant concern. The survey also revealed that a significant proportion of road users had not received any form of instruction or training regarding road safety. This article outlines many recommendations derived from road safety research about potential enhancements in several elements of road safety along the corridor. It also explores the potential applicability of these modifications to other routes in a broader context. For instance, there are guidelines about the layout of the road, training and conduct of drivers, upkeep of vehicles, and the need of improving road safety by establishing road safety parks where individuals may get instruction and practice road safety techniques. Ultimately, we assert that the restoration of the Northern Corridor, stretching from Mombasa on the Kenyan coastline to the Ugandan border, has resulted in notable enhancements in road safety.

Tomek, Radan & Vitásek, Stanislav. (2016) Considering the significant impact of transportation on a nation's economic progress and the substantial financial commitments involved, conducting a comprehensive economic evaluation of these investments is crucial. Hence, it is suitable to scrutinize and maybe alter current approaches for assessing the economic efficacy of road development at the scientific level, bolstered by practical experience in the field. The focus of our study is to assess and enhance existing economic assessment methodologies, as well as to integrate the Life Cycle Cost Analysis (LCCA) agenda into the investment decision-making process. Therefore, it aims to enhance the efficiency of both the investment choice process and the realization phase by suggesting specific methods derived from our study findings and real-world building experience.

Pienaar, Wessel. (2014) This study presents a framework for integrating social assessment into the economic evaluation and selection process of road building projects in order to promote a fairer distribution of benefits in a developing country. The essay begins by explaining the overall economic advantages that might result from investing in road infrastructure that is economically justified. The many categories of non-road-user benefits are identified and explained. The operational attributes of road transport that promote the stimulation of economic activity are discovered and discussed. The current disparity in income distribution in South Africa is briefly addressed, followed by a thorough examination and analysis of the utilization of equity weights in project evaluation to promote a more fair and balanced allocation of benefits.

Yang, Yazao et al., (2012) Due to the growing disparity between the availability and demand for transportation, urban traffic issues have gotten increasingly intricate. The causes of traffic congestion have gotten increasingly varied. During the implementation of the urban road project, the surrounding road network will experience significant disruptions, resulting in the emergence of traffic issues. Simulation is a crucial tool for evaluating the effects of transportation, particularly in analyzing the impact of construction traffic. Hence, traffic simulation holds significant importance in the context of policy formulation and traffic management. This article utilized the professional simulation program Vissim to analyze the effects of Qiwan road on the Changjiang fast road upgrading project in Zhongshan city. The simulation and traffic evaluation findings can provide proactive and specific solutions regarding traffic safety, traffic organization, and modifications to road facilities. The traffic impact analysis indicates that ensuring traffic safety and a high-efficiency transport system requires the implementation of successful traffic re-organization projects. The simulation approach is an excellent means of conducting traffic impact assessments.

III. Research Methodology

The descriptive correlational survey technique of research was utilized in this study in order to evaluate the degree of the impacts that were brought about by the implementation of the road widening project in the state of Tamilnadu. It included 105 respondents who were purposefully picked from the community, as well as engineers from the Department of Public Works and Highways (DPWH), officials from local government units, and members of the community. After developing a questionnaire for the survey, it was presented to the committee that was responsible for the dissertation for review and approval.

After doing a dry-run with thirty Department of Public Works and Highways (DPWH) staff located outside of the Tamilnadu province, the researcher then sent survey questionnaires to the respondents indicated above. When taking into consideration the epidemic, the respondents were provided with an adequate amount of time to complete the surveys. There was a successful retrieval of the instruments. Following the collection of data from the respondents, a statistical analysis was performed, during which a number of descriptive statistics were taken

JOURNAL OF ALGEBRAIC STATISTICS
Volume 13, No. 3, 2022, p.5583-5590
https://publishoa.com
ISSN: 1309-3452
into consideration. For the purpose of determining the magnitude of the impacts that the implementation of the road widening project had on the respondents in areas of efficiency, effectiveness, equity, ethics, economics, and environment, a weighted mean was utilized.

IV. Data Analysis And Interpretation

Table 1: Road Widening Project Efficiency Effects

Particulars	**WM**
Road repair maintenance has little impact on the flow of traffic.	3.38
Reduce town/city and intercity traffic.	3.51
Reduce road cracks after expanding.	3.32
Built drainage prevents water from accumulating along the national route.	3.39
Provide adequate compensation for road widening-affected communities' relocation.	3.33
Both sides of the lane have traffic assistance during road repairs.	3.46
All-motorist traffic signage during road maintenance.	3.41
Systematic road accident reporting to authorities	3.38
Checking provincial national highway status for repair and upkeep.	3.47
To protect residences along the national highway, steel or concrete barriers were built.	3.42
Overall Weighted Mean	3.39

The level of efficiency in implementing the road widening project was shown in Table 1. The total WM was 3.39, which is considered to be moderately successful, as can be shown. Because of this, the process of enlarging the road was effective. Also, out of all the indicators, the one that was deemed somewhat successful was the one that exhibited the greatest weighted mean score (WM) of 3.51: less traffic congestion both within and outside the town/city. The aim of the road widening project has been accomplished.

Table 2: Road Widening Project Effectiveness Effects

Particulars	**WM**
Widening roads make tourist locations accessible.	3.52
In case of soil erosion along the national road, traffic flow is not hampered.	3.42
Road widening projects manage everyday traffic.	3.58
Road users can see safety signs.	3.38
Accidents should decrease annually.	3.36
All roads are always accessible.	3.52
Widening efforts included accident-prone national routes.	3.52
The slope along the national road is stabilized to minimize soil erosion.	3.38

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Culvert pipes prevent water flow from both sides of highways becoming blocked.	3.35
Now, all businesses are accessible.	3.44
Overall Weighted Mean	3.47

The efficacy of the impact that the implementation of the road widening project had on the respondents was shown in Table 2, which displayed the results of the project. The total WM was 3.47, which describes it as being successful to a modest degree. This indicated that the implementation of road widening was effective and moderately effective in the sense that that road widening projects are now able to handle the volume of vehicles on a daily basis, that tourist destinations are now accessible and can be traversed at any time, and that national roads that are considered to be accident prone areas were included in the widening project.

Table 3: Road Widening Project Equity Effects

Indicators	**WM**
Cut travel time between towns.	3.52
Rough roads reduce vehicle wear.	3.39
Lower road users' fuel utilization.	3.48
Motor vehicles of any sort can use the road.	3.41
The road is for everyone, regardless of race or time.	3.50
Pedestrian paths always improve road safety.	3.43
We provided safe pedestrian and vehicular access.	3.47
Bicycle lanes exist.	3.32
Road expansions accommodate the elderly and disabled.	3.32
The road expansion accommodates many sidewalk users.	3.40
Overall Weighted Mean	3.37

The consequences of the implementation of the road widening project were included in Table 3, which included the respondents' perceptions of the effects in terms of gender equality. If we look at the table, we can see that the overall WM was 3.37, which indicates that it was satisfactory. Consequently, this demonstrated that the majority of respondents held the belief that the road widening is reasonably effective and beneficial to the people in a manner that reduces the amount of time it takes to go from one town to another, thereby lowering the amount of gasoline that road users use, and that the road is accessible to all users regardless of race, time, and other factors.

Table 4: Road Widening Project Ethics Effects

Particulars	**WM**
Any vehicle or road user followed speed limits.	3.40
Assigned emergency roadside parking was seen.	3.32
Road contractors restore damaged homes during road widening projects.	3.32
Slow-moving cars used the outer lane.	3.30
Fast cars took the inner or center lane.	3.40

All road users heeded traffic signs to reduce accidents.	3.33
There are no automobiles that go the other way.	3.40
Preservation of the location's aesthetics	3.40
If road improvements occur near schools, hospitals, etc., construction follows the national noise standard.	3.43
Relocating electricity poles with authorized electric cooperatives	3.38
Overall Weighted Mean	3.38

The WM and interpretation of the extent of the impacts of the implementation of the road widening project were provided in Table 4. The respondents' perceptions of the magnitude of the consequences were expressed in terms of ethics. For the whole, the WM was 3.38, which is considered to be moderately effective. It was demonstrated that the respondents are in agreement that the implementation of the ethics in construction, such as the utilization of the inner or middle lane of the road by fast-moving vehicles, the absence of any vehicle that pursues the opposite flow of traffic, and the preservation of areas that have aesthetic value to the location, are all adhered to.

Table 5: Road Widening Project Economic Effects

Particulars	**WM**
Local and regional product delivery improved.	3.45
New traffic pauses allowed purchases.	3.42
New job had been generated.	3.46
Maintenance of road widening does not lower local GDP.	3.46
Farm items arrive on time and are nice.	3.50
Road widening did not encompass prime agricultural land.	3.36
SME and variety shop relocations were not reported before or after route extension.	3.38
Banking and other financial transactions increased.	3.36
More petrol outlets were opened for drivers.	3.39
Access to emergency auto repair services.	3.35
Overall Weighted Mean	3.37

In Table 5, the WM was included as an interpretation of the amount of the effects that the implementation of the road widening project had on the economy, as seen by the respondents. With a total WM of 3.37, the effectiveness was characterized as being modest. This meant that the completion of road widening projects helped the economy in many different ways, including as ensuring that agricultural products are delivered on time and of a high quality, enhancing the distribution of items from the vicinity as well as other products from other regions, and creating new employment opportunities.

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ISSN: 1309-3452

Table 6: Road Widening Project Environment Effects

Particulars	**WM**
Air pollution does not worsen following road expansion.	3.52
It does not pollute water with fuel or chemicals from passing automobiles.	3.40
Road widening does not increase noise pollution.	3.45
To reduce air and noise pollution, road diversions were made.	3.46
Trees and animals were unharmed before and after road widening.	3.46
Construction dust is regulated to protect surrounding homes.	3.37
Reduce national road flooding following heavy rains.	3.39
Breakwaters and coastlines were excluded from road expansion.	3.41
Houses near road widening do not experience temperature fluctuation or higher thermal index.	3.43
Road expansion did not harm aquifers.	3.33
Overall Weighted Mean	3.40

The WM and interpretation of the amount of the impacts that the implementation of road widening projects had on the environment were included in Table 6. These effects were perceived by the respondents. The total WM was 3.40, which describes it as being successful to a modest degree. It can be asserted that the respondents stated that the road widening was moderately effective and did not harm the environment in various aspects such as trees and animals were not harmed before and after the road widening; additionally, the noise pollution did not worsen even after the road widening and road diversion had been created to minimize the effects of air and noise pollution in the locality. This is something that can be asserted.

V. Conclusion

The construction of road widening projects is an important effort that handles the myriads of demands that contemporary urbanization imposes on individuals and communities. The need for road networks that are both more extensive and more efficient is becoming increasingly urgent as cities continue to develop and the volume of traffic continues to rise. Road widening projects are an essential component of modern infrastructure planning because of their ability to reduce traffic congestion, improve safety, and encourage economic growth. Impacts on the environment and society, which are frequently severe, need to be addressed via the implementation of sustainable practices and thorough mitigation mechanisms. Environmental Impact Assessments, sometimes known as EIAs, are useful tools for determining the possible adverse consequences of a project and developing strategies to mitigate such effects. On a social level, it is essential to make certain that local populations are supported through the implementation of efficient relocation and compensation schemes in order to minimize the negative effects.

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