

Optimising Sustainable Urban Mobility: Analysis of Non-Motorised Transport along M1 Road in Lilongwe Town, Malawi

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1 ABSTRACT

Rapid urbanization in cities has increased the demand for sustainable mobility options. At the Centre of sustainable urban mobility is Non-Motorized Transport (NMT). Nevertheless, NMT is confronted with lack of sufficient infrastructure despite being at the forefront of sustainable urban mobility initiatives in Lilongwe city. Therefore, this paper explores the barriers faced by implementation of infrastructure supporting NMT and the experiences of pedestrians and cyclists. The study employs a case study research design using mixed methods approach along M1 road in Lilongwe city. An open-ended questionnaire was administered to cyclists and pedestrians along the M1 road. Additionally, interviews with the officials from Malawi police road traffic and physical planning departments were conducted. The findings reveal that inadequate NMT infrastructure is due to lack of institutional capacity failing to enforce bylaws, using outdated urban structure plans and the city's prioritization of Motorized Transport. As a result, both pedestrians and cyclists are excluded from having access to economic activities which sustain their livelihoods. Pursuant to that, the study recommends institutional capacity development by prioritizing investment and development NMT for promotion of sustainable and resilient Lilongwe city.

Keywords: Infrastructure, Non-Motorised Transport, Sustainable urban mobility, Institutional Capacity, Mobility planning

2 INTRODUCTION

Globally rapid population growth has a significant impact on the urban landscape in cities leading to increased motorized transportation while neglecting non-motorized alternatives (Diao et al. 2021). As a result, African cities have made efforts to integrate Sustainable Development Goals (SDGs) in local initiatives which seeks to promote sustainable transportation that is inclusive, safe, and resilient (Bamwesigye and Hlavackova, 2019). Non-motorized transport (NMT) is at the Centre of development goals creating sustainable urban cities with improved social equity, resilience, safety and respect for the environment thereby achieving the SDGs (Risimati and Gumbo 2022). NMT leads to reduction in air pollution, alleviate traffic congestion, create safe conditions for NMT users and improve environmental conditions (Mansoor et al. 2022). However, NMT is faced with numerous challenges that emanate from the lack of integration with Motorized transport (MT) mainly because of ineffective policies deteriorating urban environment and lack of infrastructure for NMT (Lukomona and Nchito, 2022). In Lilongwe city of Malawi, NMT is at the forefront of sustainable urban mobility projects because of the city's initiative to promote sustainable transport modes, particularly NMT. Nonetheless, the existing initiatives have not been successful in addressing existing NMT challenges that are manifested through the lack of adequate infrastructure such as a number of lanes, street width, Zebra crossing, overpass, road markings and separation of pedestrian sidewalks and cycling lanes along M1 road.

The lack of NMT infrastructure has negatively affected economic growth, congestion, longer trips and increased road fatalities in Lilongwe. A sustainable urban transport system is characterized by efficiency, equitability and environmentally sensitive to social, political, environmental, and economic constraints. To ensure that there is an achievement in sustainable transport, Abu-Eisheh (2019) emphasized the need for investigating the complexes of transport infrastructure designs. The holistically approach will bring solutions to transport challenges, thus this paper aims to explores the barriers faced by implementation of infrastructure supporting NMT.

The paper is structured as follows; Section 1 is the abstract while section 2 is the introduction. Section 3 presents the literature review on NMT and its benefits. Section 4 and 5 present the study area and the

methodology respectively. Section 6 presents results and discussions. Lastly, Section 7 discusses policies and legislation guiding NMT while section 8 discusses the policy implications, recommendations, and conclusion.

3 LITERATURE REVIEW

3.1 Sustainable Transport

There are debates around what constitutes sustainable transport. Sustainable transport system is a system that is affordable, accessible, efficient and that meets the needs of society and is environmentally friendly, Ogryzek et al (2020). Conversely, Ndwandwe and Gumbo (2018) defines the sustainable transportation system as the system that allows the basic access of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, with equity within and between generations. It must also be affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy and reduces production of noise. Many urban poor cannot afford motorized transport such as public buses and private cars, so they must cycle or walk to their work and business places (Bruzzone et al, 2021). The transport sector needs to create separate NMT facilities and ensure that motorized and non-motorized transport users do not use the same facilities as well as to ensure safety.

3.2 Non-Motorized Transport (NMT)

Non-motorized transport refers to any mode of transportation that does not include motorized devices or is unduly reliant on engines for motion (Astrid, 2019). Walking and cycling are the dominant NMT modes. There are various benefits of NMT that promote socio-economic development in cities.

3.3 Benefits of NMT

3.3.1 Increased livability

Non-motorized transportation promotes liveable urban environments and neighbourhood communities (Patil, 2021). For example, NMT allows the implementation of public spaces, the presence of pedestrians in the streets, and the creation of structures that incorporate a feeling of place and significance. People can interact with one another as they stroll together across urban surroundings to various destinations such as school, employment, and other opportunities when NMT mobility is effective.

3.3.2 Economic benefits

Non-motorized transportation is a common mode of transportation that is affordable, dependable, and convenient (Mbatha and Gumbo, 2022). NMT is less expensive than motorized transportation in a way that when one is walking or cycling, there are no transport fare, no parking fees, no fuel is needed, as well as lower operation and maintenance costs. It may also lead to shorter travel times in heavily populated cities and towns. Additionally, NMT offers advantages such as serving as a stand-alone mode of public transportation and incorporating affordable, efficient travel for marginalized people, particularly in emerging and transitional nations (Venter et al, 2019).

3.3.3 Environmental benefits

Increased usage of NMT in cities leads to reduced traffic congestion which ultimately results in increased mobility (Amaniyo, 2022). The environmental effects of NMT are favourable. It does not produce local air pollution or greenhouse gases, which are bad for the environment and people's health. As a result, whenever a motorized trip is replaced by a non-powered one, emissions are directly reduced.

4 STUDY AREA

Lilongwe is Malawi's capital city, located in the country's central region as shown in figure 1. The Lilongwe Central Business District is under the administration of Lilongwe City Council. The most recent census in 2018 reported that 989, 318 people live in Lilongwe (Madinga, 2021). The study covers a popular M1 road in the high-density Lilongwe town. M1 road is the backbone, as it interconnects all three cities in Malawi. This indicates that it is the most used and crowded road. M1 forms a significant part of the daily activities of people as they commute to and from public transport stations and places of work, education, and worship. It is about 347 km, but the research focused only 1.59 km which is a distance from Lilongwe town hall to

Simama hotel. 1.59km was selected because of its compactness, constant congestion from both MT and NMT. In addition, there are shops along the selected route and it is the inlet of the popular Tsoka flea Market in town. The disconnect between urban motorized and non-motorized has been exacerbated leading to multiple challenges in the city thus making M1 road (1.59km from Lilongwe town hall to Simama hotel) a suitable research area.

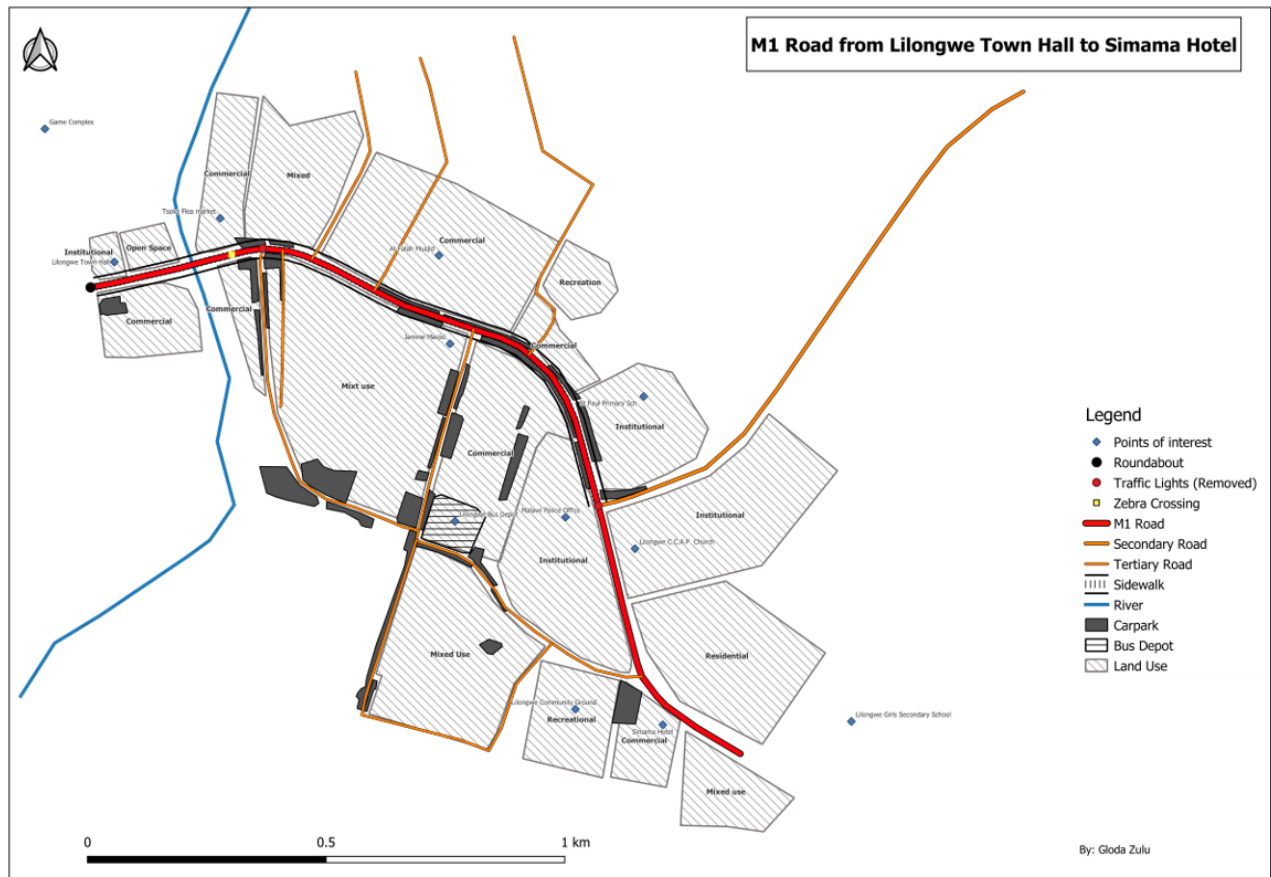


Fig. 1: Study Area M1 Road

5 METHODOLOGY

The study adopted case study research design which aided a comprehensive understanding of the state of NMT in Lilongwe. Using a mixed method approach, interviews and questionnaires were conducted to further analyze the barriers faced by NMT. During data collection process, questionnaires containing open ended questions were administered to NMT users which were cyclists and pedestrians. 64 NMT users were randomly selected along M1 road and given questionnaires to fill in.

Additionally, semi-structured interviews were conducted with 15 different stakeholders responsible for NMT planning. The stakeholders comprised of planning officials, officials from Roads Authority, Civil engineers, traffic police officers and association representatives. Purposive sampling was used to select key informants because they play an important role in the transport system. The data collected from the research was analyzed by two methods of data analysis which are thematic and descriptive. In thematic, the researcher read all the transcripts to identify, analyze, and report repeated patterns. These patterns and trends from data collected were coded in, and general themes were constructed for summarization. On the other hand, Quantitative data including demographic information was analyzed using descriptive data analysis where distribution of the study population, central tendency and dispersion of other quantitative variables was generated. This information is presented in the form of frequencies and percentages using Microsoft Excel.

6 RESULTS

The results presented in this section are conveyed through modal share, population distribution, experiences of pedestrians and cyclist, institutional capacity in investing in NMT infrastructure and the main barriers for NMT.

6.1 Modal Share

The modal split in figure 2 shows the percentage of travelers who use non-motorized and motorized transport along the M1 road in Lilongwe town. A total of 96 respondents filled in questionnaires of which the majority were pedestrians 56% while cyclist recorded 23% and vehicles consisting of minibus and private vehicles recorded 21%. The results indicate a high usage of NMT. This means that people are heavily reliant on this mode of transportation, this can be so because it is cheap and faster when there are traffic jams.

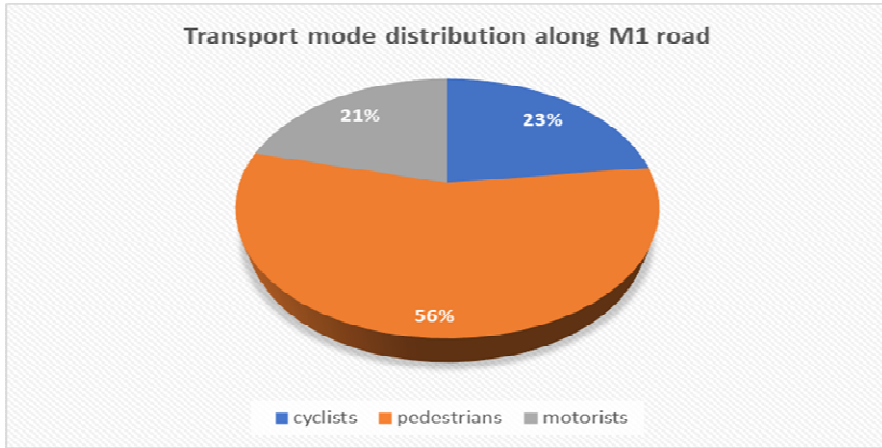


Fig. 2: Modal Share of Transport

6.2 Population distribution

Respondents were probed on their place of residence and from the responses, there was variation in terms of where they reside. The respondents were from Area 14, Area 10, Area 15, Mchesi and many other residential areas as shown in figure 3. This ensured diversity of M1 road users from all over Lilongwe. It also indicates that M1 is a connecting route in all areas in Lilongwe which confirms its frequency of use.

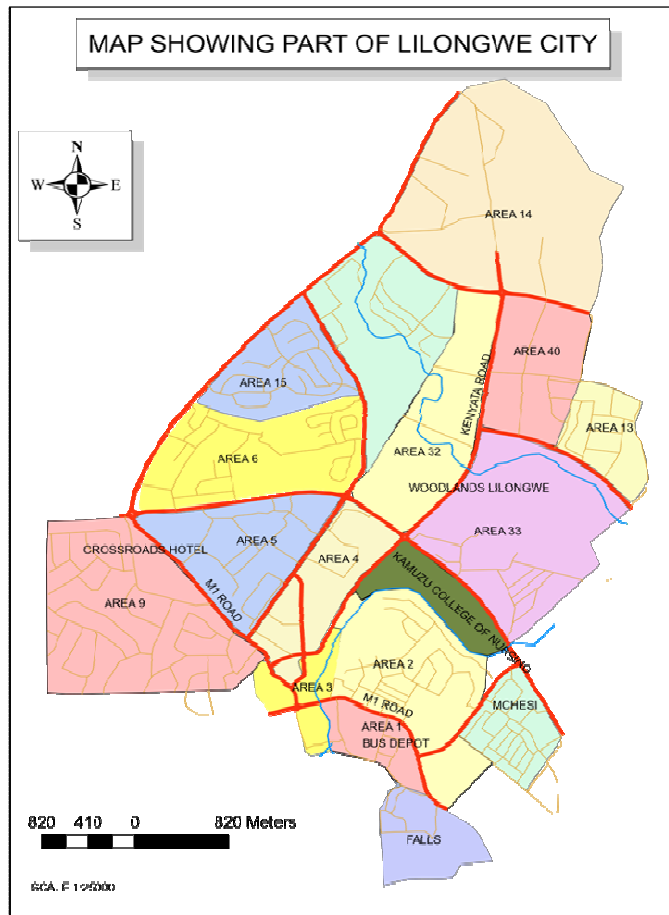


Fig. 3: Lilongwe residential Areas of M1 users

6.3 Experiences of Pedestrians and Cyclist

Findings from the study indicated that the majority of pedestrians and cyclists felt unsafe while using the M1 road and this attributed to the poor state and lack of NMT infrastructure. Figure 4 shows safety levels of pedestrians, cyclist and motorist.

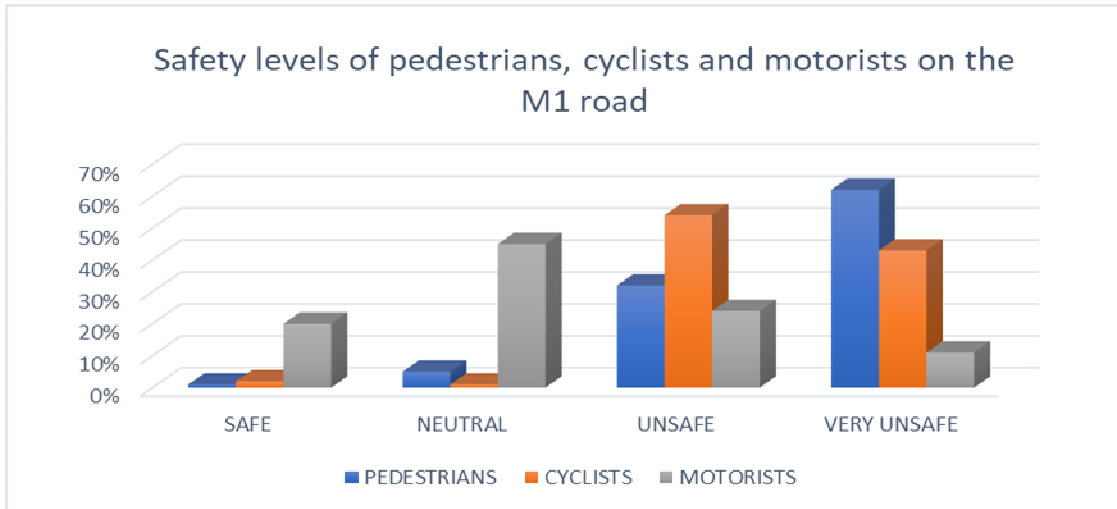


Fig. 4: Safety levels of M1 road users

6.3.1 Pedestrians

The responses from pedestrians mostly focused on the lack of NMT infrastructure, unsafe conditions caused by over speeding of motorists and overtaking unnecessarily in a road that has limited to no pedestrian sidewalks. The absence of pedestrian crossing was also pointed out as one of the challenging experiences that pedestrians face along the M1 road. Lack of zebra crossing, and sidewalks creates unsafe travelling conditions for them. There are no designated crossing zones for pedestrians, and this leads to a lot of jaywalking along the road, which subsequently causes road accidents and inconveniences to motorists.

6.3.2 Cyclists

Cyclists expressed their discomfort when using the M1 road due to lack cycling lanes. The M1 road has no cycling lanes and any visible road marking as shown in Figure 6. This has negatively affected cyclists as they always struggle and compete with other motorists on the M1 road. One cyclist said:

“We are at always at a disadvantage because other road users do not respect us, sometimes we end up cycling in between vehicles which is dangerous for us”- cyclist



Fig. 6: Part of M1 road without road marks and cycling lanes.

6.4 Institutional Capacity in investing in NMT infrastructure.

Malawi Roads Authority initiated the Malawi M1 Road Rehabilitation 1 project under the supervision of Ministry of Transport in October 2019 to integrate NMT to the existing transportation system. The government was given K131 billion financial assistance from European Investment Bank for the M1 road project (Times news, 2022). The primary goal of the rehabilitation project was to increase the reliability and durability of the M1 road's roadway. Despite the existence of strategic plans and approaches responsible for efficiently investing in NMT in the Lilongwe city, the rehabilitation project is a failure. The NMT infrastructure looks to have outlived its economic life and has deteriorated overtime. The lack of infrastructure of NMT poses a plethora of challenges jeopardizing the NMT users and overall sustainable urban mobility of Lilongwe city.

6.5 Main barriers for NMT in Lilongwe

There are many hindrances affecting the NMT from effectively saving its purpose. There are physical and organization barriers that reduce and remove the opportunity of the performance of NMT in Lilongwe city.

6.5.1 Physical barriers

The M1 road is a congested route in terms of traffic and pedestrian flows, yet it lacks readily apparent infrastructure that might enhance walkability and cycling, such as pedestrian walkways and cycle lanes for NMT. There are no facilities on the street to handle Lilongwe's large number of pedestrians. Unmaintained pedestrian pathways are congested by parked cars, forcing some walkers onto the road and raising the possibility of MT-NMT conflict. Road signs and zebra crossings are absent on M1, which heightens the possibility of conflict with MT. To aid NMT users' mobility, there are no pedestrian crossings or lights. There are no facilities for cycling. The biker must take a chance when using the road with MT who disobeys NMT. Overall, M1 Road was created without giving proper thought to NMT as a mode, much like many other streets such as Malangalanga and Glyn Jones in the Lilongwe Municipal area, which explains the absence of pedestrian pathways and cycle tracks among other NMT facilities. Lilongwe generally lacks a sufficient NMT infrastructure.

6.5.2 Organizational barriers

The NMT project is failing to be properly implemented because of lack of institutional capacity, the projects stand halfway through construction due to a lack of oversight, planning and budgeting by the Malawi Roads Authority. On the other hand, The Lilongwe city council lack a framework to make plans and prepare projects, the city is still using outdated urban structure plans. Even when money and financing are available, each of these situations shows how a lack of institutional competence can prevent the implementation of NMT infrastructure growth.

7 POLICIES AND LEGISLATIONS GUIDING NMT

7.1 Road Traffic Act 2014

The Road Traffic Act aims at safe regulation of traffic for both NMT and MT users in Malawi. Subsection (1) of the Road Traffic Act provides instructions for carrying out national-level road traffic law enforcement. To ensure the safety of all road users the Act stipulates that pedestrians are not permitted to walk on a public road except when moving from one side to the other or for other legitimate reasons and are only allowed to use the sidewalk or footpath. Contrary to the regulations of the Act, pedestrians are forced to walk on the road because of lack of infrastructure and street vending. The Act, however, is failing to regulate NMT to ensure safety on the M1 road.

7.2 Malawi National Transport Policy 2017

The policy aims to promote equity among all road users, increase understanding of the social and cultural aspects associated with non-motorized modes of transportation, increase the visibility of NMT modes of transportation in transportation planning and programming, and encourage the integration of amenities for non-motorized road users like women, children, seniors, and people with disabilities (Malawi National Transport Policy, 2015). It also encourages the maintenance of the infrastructure as needed. The government pays a blind eye when it comes to maintenance. One key informant lamented the corruption in the building

sector, which he thinks is one of the causes of the nation's subpar infrastructure. There are many factors at play when it comes to the state of Malawi's roads; many contractors take corners, which lowers the standard of the projects' work.

7.3 Malawi Road Transporters Authority Act, 2014

The Authority's goals and functions are to advance, promote, and protect the welfare of approved transporters and the land transportation industry in Malawi, as well as to establish locations where approved carriers can meet for business like bus terminus, designate pedestrian and cyclists' zones and facilities. The Authority also works with the government and municipal authorities to advocate for the improvement and preservation of roads, overpasses, footpaths, and walkways in a satisfactory condition. The Malawi Road authorities is accountable for protecting limited public financing in the road infrastructure itself to ensure fair allocation of both mechanized and non-mechanized infrastructure facilities finance. To build or maintain roads, the government has hired a variety of contractors through the Roads Authority. However, excessive prices, corruption, and subpar roads are costing the nation billions of Kwachas. Many of these roads have questionable pricing. Instead of just accepting the lowest bid price, the Roads Authority and councils may do Malawians a great favour by awarding contracts to contractors that charge fairly for high-quality services.

8 POLICY IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

The Malawi Road Authority Act of 2014 advocates on improving overpasses and footpaths conditions, the municipality has never maintained them along M1 road. The flyover was removed in 2020 and the footpaths are damaged, broken and with lots of potholes. It has been over 20 years since its construction, but no maintenance work has been done. It has been learnt that poor to no maintenance of NMT creates accessibility problems for its users.

According to the Malawi National Transport Policy (2017), a road reserve includes a utility strip, footways, on-street parking and lines of trees and space for future widening of the road. However, the reality is that the above-mentioned NMT facilities such as walkways for pedestrians and cyclists, zebra crossings and road signs are still absent and insufficient. People see no use for the NMT infrastructure, and they have turned it to be used as a site for business opportunities whereby street vending is booming along the sidewalks. This has created unsafe conditions for NMT users as they use the same facilities as motorized transport mode.

This study has presented evidence that Lilongwe city of Malawi, lacks infrastructures that support walking and cycling. NMT infrastructure is partially provided specifically along the M1 road used frequently for pedestrians and cyclists, however, those few places do not even have road signs for the other road users to acknowledge and give access to the NMT users. These problems result in congestion, longer commuting hours and accidents are inevitable. The study recommends that, Policy makers, transport planners and engineers will require to make changes in infrastructure maintenance in a way that avoid liability costs and to keep road users safe, they must assure quick reaction to newly discovered road problems, prioritize preventative maintenance, and integrate modern technology into road infrastructure management systems. Another recommendation can be on providing efficient intermodal transportation connectivity points within and between modes, in order for each to function properly and users to connect easily, and where the capacity to switch between modes should be in a timely, cost-effective manner where performance is measured on the capacity to interconnect in order to optimize the end-to-end movement with the most effective system.

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