Evaluation of Environmental & Physical Impacts of Mega Transportation Projects: A Case of Lahore

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Abstract- The environmental effects allied with mega constructions often have remarkable negative bearings on cities. Cities around the globe function better when they have a refined public transportation system. Unfortunately, while developing Asian megacities, governments have failed to develop sustainable transportation system and the cities suffer from serious environmental hazards in the midst of urban growth. The absence of efficient policies regarding public transport is notable cause for such prompt escalation of diverse problems like increase in number of personal automobile, which further causes congestion on the road resulting in air and noise pollution, which ultimately affect the human's health. Therefore, Pakistan, as a developing country, has a foremost crisis on its hands. Traffic congestion in Pakistan is mostly coped by constructing overheads and subways, but constructing these is not the answer. Transportation issues need to be integrated with an inclusive plan that includes better transit and public transport systems. To solve the traffic problems of metropolitan city of Lahore, the projects like Azadi Square, Kalma Intersection, Orange line train and Metro Bus have been undertaken. Such projects aim at reducing automobile dependency, to limit land waste, to address sustainability of transport system and to make the places healthy where people live and work more conveniently. But in reality, the city environment is a lot disturbed because of these projects. This paper will highlight the hazardous impacts of construction of mega transportation projects on the environment of Lahore, with the help of systematic literature review approach which is used to summaries, appraise, drive and communicate results and implications from a detailed literature survey. Review of EIA reports, research studies and news-papers articles/interviews was considered as sample of study, which reveals that these mega projects usually do not follow the Environmental impact requirements and standards.

Keywords- Environmental Hazards, Public Transport, Governmental Role, Physical Hazards, Noise

Pollution, Air Pollution.

I. INTRODUCTION

The massive growth of cities spills usage of motorized traffic immensely. The use of these vehicles poses a serious warning to growing cities [i]. Large scale projects have long-term ecological impacts on regions and these impacts are multi-dimensional. Therefore, we should take full account of its impacts on regional ecology from the multi angle of the life cycle of the project including decision-making, design, construction, maintenance, updates and scrap phases [ii].

Greenery and natural beauty are the attributes of Lahore's environment. The enormous number of gardens is testament to its abundant offerings for those looking to sit back and relax among the flora. Lahore once known as cities of gardens with broader streets, ample greenery of trees and fewer high-rise has now transformed into a concrete jungle. The development projects of flyovers, housing schemes are emergent everywhere and do not envision the environmental concerns.

Lahore City, on its journey of becoming a Metropolis, through urbanization has created serious problem of over population. The environmental and infrastructural facilities are running short to fulfill the needs of growing population. Traffic issues in Lahore are mostly managed by building larger and better roads. Moreover, poor management and political decisions in managing public transport and automobile has aggravated the situation.

Urban environments can only be protected by calming fastest source of air, water and noise pollution and it can only be done with sustainable transportation systems with supporting policies that can help to improve urban environments meaningfully. In this paper, aims to highlight the hazardous physical and environmental impacts of mega transportation projects of Lahore City. Consequently, to make suggestions to improve the situation.

II. METHODOLOGY

This paper aims to highlight the hazardous impacts of construction as well as operation phase of megatransportation projects on the environment of Lahore. An approach of systematic literature review was used to summaries, appraise, drive and communicate results and implications from EIA (Environment Impact Assessment) reports, various research studies, and newspaper articles and interviews. In this approach, literature becomes the sample of study, therefore, the literature was explored to the extent that a saturation, in terms of repetition of knowledge, was reached. A research design was prepared, encompassing the categories and subcategories of potentials environmental hazards. Majorly two main perspectives were streamlined i.e. Environmental Hazards and Physical Hazards. A graphical illustration of research design can be seen in the figure. Consequently, data was collected from the secondary sources against these perspectives and their subcategories, for various cases of mega-transportation projects of Lahore City. Scope of the study was limited to Lahore, the second largest city of Pakistan, in terms.

of population and area. But it was mainly preferred because Lahore is leading city in terms of infrastructure development, as Syed Zeeshan Haider described, "*No other city in Pakistan compares to Lahore in... ...infrastructure development projects.*" [iii]

Major findings were drawn out from the existing literature to establish a prevailing trend and to identify the areas for improvements in form of recommendations.



Figure 1: Research Design

III. ENVIRONMENTAL HAZARDS

Pakistan is experiencing a rapid growth in its economy, increase in its population, and urban growth. Over time, industrialization, rural urban migration, and change in environmental conditions are collectively causing adverse impacts. Lahore, being one of the biggest city of Pakistan and capital of Punjab, since after independence in 1947, it has transmuted itself into educational, cultural and transportation center [iv]. All this has caused Lahore city to expand day by day. The increasing population demands for more infrastructures, housing facilities and better transportation. In order to meet this growing demand, large infrastructure for housing and transportation has been constructed. This unplanned development is not productive and is counter-productive as corresponding development is not integrated with other fields.

It is the case of Lahore; all the development made for

better transportation routes had adverse effect on environment in one way or another. As Hammad Naqi Khan, said "Lahore is going through a severe environmental crisis," he further explained that because of massive development Lahore has to face the problems of health, air pollution, noise pollution, water pollution and climate change [v].

A. Noise Pollution

As per the government report presented by Advocate Ahmed Rauf before the court; the construction of the flyover at Ring Road, Raiwind and Kalma intersection, more than 50% of noise will reduce after completion of the project as it was launched to lower traffic pressure in the city [vi]. However the situation on ground is entirely different. The city faced heavy noise pollution not only during the construction of these flyovers and underpasses but also in their running phase. Peak hours turn the junctions into a constant vote of horns and motors. Another listed addition to noise pollution in the city is tongas, hawkers and rickshaws who creates a mess in general traffic flow and at various junctions in the city.

Metro bus service was also initiated to facilitate general public to commute along a major corridor but despite of the fact that the EIA report satisfies the standard of optimum noise level, it continues to add to city noise pollution.

Orange Line Metro Train (OLMT) is a 27 Km long route starting from Dera Gojra and ending at Niaz Baig passing through major sites old Lahore. Nespak conducted EIA report of the project and stated that it is a completely feasible project in terms of noise standards. But this route entails major transportation modes, moreover a train running on metal racks will create an additional 100dB sound. EIA reports remain silent towards this aspect of noise pollution. As per official of Environment Protection Agency, "The construction area is in stark noise pollution, that will become more worse when Orange train will start its operation" [vii].

B. Air Pollution

Air pollution is a major environmental issue in Pakistan, especially in case of Lahore where smog is getting denser by each passing day. Emission from automobiles is one of the major causes of contaminating the air. The ratio of these particulate matters is increasing day by day in the urban environment with increasing traffic volume. "The major air polluters due to heavy traffic are gases and chemicals like nitrogen dioxide, sulphur dioxide, carbon monoxide and lead. Nitrogen dioxide and sulphur dioxide caused frequent acid rains, eyes and lung diseases. Carbon monoxide trigger dizziness, severe headaches, and in many cases its excess may lead to death. Lead is also hazardous and may cause cancer [viii]. The suspended particulate matter (dust and smoke) already exceeded the WHO standards. The noise level measured is more than 85 dba [ix].

Traffic like, cars, vans busses, rickshaws are contributing a lot in the air pollution of the city. As per Environmental Department of City District Government, rickshaws contribute 65 % of total vehicular pollution. And in the present scenarios twostroke rickshaws and motorcycle rickshaws act as a parasitic mode of transportation all over the city of Lahore resulting in increased level of air pollution in the whole city.

Lahore Metro bus service also comes up with the aim that it will reduce the air pollution and traffic accidents because of rashly driven rickshaws and wagons and will provide the general public a safe and fast means of communication. EIA report cannot justify the air quality standards and thus unable to ensure the necessary measures to control air pollution in construction phase of the metro bus.

A representative of Lahore Bachao Tehreek, Ali Amjad

said that EIA report of OLMT fails to encounter the increased particulate matter during construction phase. He further stated that construction work and traffic congestion along the route will aggravate the situation and will result in increased level of air pollution. Moreover, the material used in the construction of OLMT is also contributing in increased amount of particulate matter in the air [x].

Deputy Director of the Environment Protection Department, Nasim-ur-Rehman Shah, stated that the project will be carried out in an environment-friendly manner and said to schedule a public hearing. Whereas in contrast, the residents of the colony near Shalimar Garden were completely against the project and it reflects poor planning [xi].

C. Traffic Congestion

Easy Bank loans have made it easy to own personal vehicles resulting in increased traffic volume on the roads of Lahore. This increased traffic volume creates mess on the roads. During previous years, Government had spent billions of rupees to answer the sewer traffic condition in Lahore City, including construction of flyovers and under passes. "Latest signal-free junctions and U-turns cannot calm down this congestion and the citizens still seems to face traffic jams during peak hours" [xi].

In view of the traffic jams and irregular traffic at Azadi Chowk, the Punjab Government initiated various solutions; one of it is construction of Metro. But atgrade Metro Bus encounters conflict at eight junctions one of the critical one is Azadi Chowk. The Azadi Chowk conflict needs immediate solution in order to relax both the multi modal traffic as well as the Metro Bus flow" [xii].

Another intervention is the "formation of U-Turns and signal free strip in order to accommodate the traffic jams at crossings. The authorities claimed that after completion of these, there would be no congestions especially along educational institutions like LCWU, Kinnaird and APWA. The patients and especially the ambulances will have easy access to the Punjab Institute of Cardiology and Services Hospital. In lieu of it, LDA has created seven signal free junctions and two underpasses in Lahore. One underpass built at China Chowk and other near Sherpoa bridge, and seven signal free U-turns will be constructed at different junctions" [xiii].

Lahore Metro Bus Service would be justified project, "if it caters the majority of population. There are still over 350,000 cars and 850,000 motorcycles on the Lahore city roads, the claim that the project will share the load has not been achieved, and the congestion has not been reduced after Metro bus.

The Metro bus in Lahore has 180,000 trips per day, which seems to be an impressive number, but in broader sense, it falls into virtual insignificance. Lahore city has approximately 5.3 million trips per day, and metro trips of 180,000 are only 3.3 percent of it. For a mass transit system to be efficient, it should accommodate at least 20% of the city's daily ridership, and the 3.3 percent figure is far below it – which builds the Lahore Metro bus an unreasonable expenditure" [xiv]

Lahore city is also facing long traffic jams on the construction sites of Orange Line. This reflects poor planning at the end of Government. For the construction phase; no alternative routes have been provided to general public that make the condition even worse during peak hours [xv].

IV. PHYSICAL HAZARDS

There has been a number of physical hazards that arise as a result of construction of mega transportation projects which includes conservational issues and urban sprawl issues, due to population displacement, trees cutting and agricultural land destruction:

A. Conservational Issues

Culture and heritage of settlements, towns and cities evolves in centuries and these ought to be preserved and conserved and damaging them or hindering their view is no way justified in the name development. As deplored by Prof. Ajaz Anwar (Information Secretary, Lahore Conservation Society), "In the name of development, it must not be allowed to culminate Lahore's identity through projects like Orange Line". The project of Metro Bus has smashed the cultural fabric of Lahore-the city which is one of its kind-by hindering view of Lahore's cultural assets like the Badshahi Mosque Minar-i-Pakistan and Lahore Fort. Now the Lahore Orange Line Metro Train Project is also affecting two major markers of the city i.e Shalamar Gardens and Chauburji.

In case of Orange line project it has been observed that there has been no feasibility study, neither interaction with public, and certainly no suggestions are invited. It appeared that the prime objective was merely to finish it as quickly as possible and gift it to the public as a "Done Job".

"It is prohibited by law to construct within 200ft of protected declared and heritage sites. Antiquities Act of 1975 and Punjab Special Premises Preservation Ordinance of 1985 clearly states the prohibition of mega construction in their close locale" [xvi]. Moreover, under Lahore Bachao Tehreek (LBT) various civic and civil rights organizations stood against the compromise upon city's heritage sites the Government is commencing as well as against the act of depriving a large population of their homes, business and property through land acquisition [xv].

The Environmental Impact Assessment (EIA) of Orange Line has been steered by National Engineering Services Pakistan (NESPAK), there were given clear provisions to incorporate the conservational issues such as; "integration of technical design elements in order to reduce the impact of construction activities on heritage sites and public property as well; and in the matter of unavoidable interference prior consultation is needed to develop consensus on options (e.g. re-location/rebuilding) or any other form of agreed compensation" [xvii].

But the execution has not been seen accordingly. Also serious concerns has been expressed by UNESCO regarding the Punjab Government's negligence for not taking bringing up the issue prior to the launch of the project in front of Shalamar Gardens [xviii].

B. Urban Issues

Due to the construction of the Lahore Rail Mass Transit System (LRMTS), land acquisition has occurred, "The compensation for the structures, plots, private and public properties etc. had to be made as per law. The affectees should be provided with judicious compensation by allocating ample budget in total cost of project" [xvii]. Unfortunately, the compensation was not transparent and has generated chaos. "The fear of people is real, as they still remember how their businesses and lives are suffered due to their displacement from business centres and/or residential areas" [xiii].

Aslam while overviewing the EIA in Pakistan wrote that "Public consultation during the preparation of EIA does not happen. Although reports generally stated that stakeholders have been consulted but in most cases this consultation does not happen" [xix]. Due to absence of public participation and lack of their consent, the projects are not accepted on psychological level, which is the basic level of projects implementation. On the first place, people are not made to realize the need of the project, and eventually the consent for land acquisition could not be attained. Secondly, no laws have been made to relocate the activities and people that were displaced, how then people can be expected to abide by the laws. This results in promoting the trend of laisez faire wherein people are free of all the land use rules and master plans. This ultimately promotes sprawl, which then abused the green and agricultural lands. According to NESPAK report, there is a continuing diffusion in the outer areas with average density of 120 people per acre, which has increased significantly by now [xx].

Then comes the "Canal Widening Project" wherein the plan is to widen the canal bank road as a solution to congestion due to the increasing vehicular traffic. Neither the legal obligation of conducting the EIA of the project has been fulfilled nor has the assurance of transparency of the project been maintained by involving public. Historically, widened roads only end up drawing more traffic, as well a social disparity wherein the government focuses on providing for the car-owning citizen in a country like Pakistan where the population that requires drinking water, public transport, public toilets and sidewalks, and is far larger than the elite fraction. "There is a great concern among organizations and groups of concerned citizens that the project violates basic codes of transportation engineering and design and is feeble in offsetting traffic congestion" [xxi].

The "Canal widening project" also includes the cutting down of several thousand old trees and have lost over 50 acres of the green belt, which is sure to lead to a number of environmental problems including rising carbon and toxic content and subsequently temperatures, plus the loss of old species of shrubs and trees that provide shelter to a variety of birds and small animals.

In addition to all these physical hazards, the urban design and beauty of the city is also a lot damaged due to such interim projects, which are not the part of any development plan. "A complaint has been filed with the Environmental Protection Department regarding the long run sustainability of the project. It said that the elevated BRTS track threatened the scenic beauty of various heritages sites and would also result in a fall of property values" [xxii].

V. RESULTS & DISCUSSION

"Few forces have been more influential in modifying the earth than transportation"[xxiii].

Large-scale construction projects are the ones which have great impacts on people's lives. Especially the major transportation projects are likely to lead to socioeconomic, political, cultural and environmental conflicts. These projects demand long construction period, large capital investment, huge scale of construction throughout the life cycle even after their construction. Therefore, these projects are fundamental to alleviate the problems related to environment.

A road cuts through the heart of the city links its original

historical part to the modern part of the city. An overhead bridge or an underpass enables you to reach your destination faster. A widened road gives you open choice of bringing out your own vehicle according to your own ease. Infrastructure is necessary for development, but it can also have devastating impacts on the environment. The road that cuts through the older parts of the city is a threat to the originality that lies in the history of the city. The overhead or underpass bridge that enables you to be faster are built at the cost of the sentiments of a large population including those whose lands have been acquired and those who are relocated. The widened road generates a very clear social disparity among those who can afford their own vehicle and those who cannot.

The design, planning and construction of infrastructure projects does not always consider environmental concerns. Though long-term development plans are no more a practice in the developed countries yet in Pakistan the norm is still followed and so called master plans are prepared for the developments to come during the span of coming 25-30 years. These are the only planning we observe for our cities and even these are not followed after spending millions on preparing these plans. Irrespective of that, such large-scale projects must be according to the needs of the people at least since planning is supposed to be for the people, but public, their aspires and needs are considered the least. Moreover, when these projects are not planned properly on the first place, their sustainability has to remain a question mark then. The governments, industry and other leaders must consider the sustainability, including examining innovative ways that will reduce environmental impact.

Following table shows the deductions made from the systematic literature review as results and findings of the research:

Categories	Deductions	Supporting References
Noise Pollution	1. Lahore city faced heavy noise pollution not only during the construction of the projects of flyovers and underpasses but also in their running phase. Peak hours turn the junctions into a constant vote of horns and motors	
	2. Metro bus service was also initiated to facilitate general public to commute along a major corridor but despite of the fact that the EIA report satisfies the standard of optimum noise level, it continues to add to city noise pollution.	[v], [vi], [vii]
	3. Orange Line Metro Train (OLMT) route entails major transportation modes, moreover a train running on metal racks will create an additional 100dB sound. EIA reports remain silent towards this aspect of noise pollution.	

Table 1. Results and Findings

Technical Journal, University of Engineering and Technology (UET) Taxila, Pakistan Vol. 24 No. 4-2019 ISSN:1813-1786 (Print) 2313-7770 (Online)

Categories	Deductions	Supporting References
Air Pollution	 EIA report of metro bus Lahore cannot justify the air quality standards and thus unable to ensure the necessary measures to control air pollution in construction phase of the metro bus EIA report of OLMT fails to encounter the increased particulate matter during construction phase. Furthermore, construction work and traffic congestion along the route has aggravated the situation and has resulted in increased level of air pollution. Lack of public participation was observed as the residents of the colony near Shalimar Garden were completely against the project and it reflects poor planning 	[v], [viii], [ix], [x], [xi], [xxi]
Traffic Congestion	 Latest signal-free junctions and U-turns cannot calm down this congestion and the citizens still seems to face traffic jams during peak hours For a mass transit system to be efficient, it should accommodate at least 20% of the city's daily ridership, and the metro bus only covers 3.3 percent figure In order to address traffic congestion, a project of "Canal Widening" was introduced which ignored that fact that widened roads only end up drawing more traffic 	[xi], [xii], [xiii], [xiv], [xv]
Conservational Issues	1. In case of Orange line project, it has been observed that there has been no feasibility study on its sustainability with conservational sites, and neither any public consultation. It appeared that the prime objective was merely to finish it as quickly as possible and gift it to the public as a "Done Job".	[xv], [xvi], [xvii]
Urban Issues	 The compensation to the <u>affectees</u> in land acquisition for Orange Line project, was not transparent and has generated chaos The "Canal widening project" also includes the cutting down of several thousand old trees and have lost over 50 acres of the green belt, which will surely lead to a number of environmental problems 	[xiii], [xviii], [xix], [xx], [xxi], [xxii]

VI. CONCLUSIONS & RECOMMENDATIONS

On the basis of above investigations and deliberations, following conclusions and recommendations are derived: Transportation related projects including modifications in the existing infrastructure or construction of new physical structures involve a whole ecological environment. Proper planning and designs for which may provide an opportunity to reduce or mitigate the adverse environmental impacts as well as to make the environmental conditions even better through these projects.

In addition to other important dimensions that are ignored during planning and designing of these projects, the large scale and long term spatial and regional impacts of these projects are also ignored resulting in regional disparities, social inequalities and job-population imbalances. Proper research must back up these projects with all such considerations dually taken into account.

There are also large loopholes in our legal structures specially to incorporate the indirect impacts of these large-scale transportation projects. More attention must be devoted to predicting and assessing.

The methods and data used for environmental assessment are insufficient to meet the objectives of sustainable development. Also public participation and involvement is considered the least. Improvements in assessment methods through public participation must be done. Integration of environmental considerations early in the projects and consideration of green transportation modes must be the first step ahead.

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