

# **Critical Review & Analysis of Eia Report of Lahore Orange Line Metro Train Project for Working Out the Eia Performance Index of Project**

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## **Abstract**

Environmental Impact Assessment (EIA) is necessary before starting any mega project. It is compulsory by PEPA Pakistan Environmental Protection Act 1997, under (Section 12). Present research study conducts EIA Performance Index for Orange line Mega train Project OLMTP. In the current era of development and advancement, time requires to make a strategy and smart evaluation of the gaps, errors, and mistakes in the previous projects to reduce the repetition chances of the same errors in the new or future projects. In this research study, we collect data from both primary and secondary sources. We use existing EIA Reports and gather data through designed Questionnaires. We pick out 43 experts, environmentalists, and related Faculty members from different Universities and consultancies. Primary Data was collected with the help of a Designed Questionnaire and Online Google Questionnaire form based on all EIA Process Stages and evaluated by sub-indices. Finally, evaluate the EIA Performance Index of OLMTP. The EIAI obtained value for OLMTP is 0.59. OLMTP shows EIAI (0.59) that reflects an average performance Index of EIA as good and effective index must show the value of at least (0.8). We conclude that the EIA Report of the Orange Line Mega train project has some flaws and gaps that need to cover and avoid these errors in future projects to meet sustainability goals. Recommendations include keeping the sustainable goals in view, during the planning and operational phases. During the construction of transportation projects, environmental consideration and green transportation keep in step ahead.

**Keywords:** Environmental Impact Assessment, Pakistan Environmental Protection Act 1997, PEPA, EIA Performance Index, OLMTP

## Introduction

Before the start of any mega project, Environmental Impact Assessment (EIA) is compulsory by PEPA Pakistan Env. Protection Act 1997, under (Section 12). Pakistan is considered as a quickly developing country in sense of economy just by the metropolitan development and high population rate. Many construction projects started in Pakistan. A list of the previous road and traffic line construction projects in collaboration with other countries is present in Pakistan that is designed for the monetary progress and improvement of a nation (Iftikhar et al., 2020). Lahore Orange line train project is one of the most famous Megaprojects started in 2015 in collaboration with China. The reality is that during the construction activities both the social and environmental aspects of society affected either may be in a positive or negative way. Unplanned use of natural resources and the ineffective planning of development projects not badly affect society but also have adverse effects on the environment (Saeed et al., 2012). Unplanned development creates a burden on the environment and natural resources. The Pakistan Government design and published many rules acts laws and regulations for the conservation of natural resources, rehabilitation of degraded environment, protection of biodiversity, improvement of society and environment, and to ensure sustainable development in the country. Pakistan Env. Protection Act 1997 is one of the most valuable regulations in order to conserve the atmosphere and surrounding environment and to reduce negative impacts occurring just because of any project on the environment (Alshuwaikhat et al., 2019).

In the situation of the Lahore Orange line train project (OLMTP), Environmental Impact Assessment (EIA) was conducted and taken into consideration, but is it effectively cover all the phases of EIA study or not? We design this research study to answer this question and to evaluate the negative concerns of the project toward the environment, strengths, and weaknesses of the project with the opinion of environmentalists, Consultants, and experts. The authors of this paper efficiently and deeply studied the EIA report of the OLMTP project and hunted to learn more about the intensity of the negative impacts and other environmental concerns on behalf of EIA experts and environmentalists. To find out cracks, the authors of this research work collect the opinion and views of the Environmentalist, Experts, and related Department staff or faculty members with the help of a designed Questionnaire to evaluate the validity of the EIA Report of the Orange line train Megaproject OLMTP.

The case of the Orange line Metro train project includes in the Questionnaire as a case study in order to evaluate and cross-check the expert answers. Further authors evaluate the EIA system by EIA Performance Index. Major problems that came into view first were roughly about the impending economic and social impacts, community involvement, and public issues. Although the project Environmental Impact Assessment EIA public hearing was held on 30, June 2015 at 11:00 am near the Gaddafi Stadium, at Alhamra Cultural Complex, according to the press released by Lahore Development Authority LDA, but the public issues remain the same.

In the case of the Lahore Orange line, Mega train project OLMTP general public is not aware of the negative impacts of a project on the environment even most of the Lahore local community not aware about the train project that was started in their own city. Thinking about the incapable EIA interaction plus restricted community cooperation, it's critical to assess the part of Social groups and (NGOs) in Environmental Impact Assessment growing public motive also aware the general public and speak networks and advancing reasonable turn of events (Khan et al., 2018).

## Research overview

### *Need and Significance of the Research work*

In the current era of development and advancement, it is the need of time to make a strategy and smart evaluation of the gaps errors, and mistakes in the previous projects in order to reduce the repetition chances of the same errors in the new or future projects. This research work requires the opinion of the experts on the Orange line Metro Train project pointing out the weakness & strengths of the project in the light of experts and Environmentalists' opinions and evaluates the EIA performance index of the said project. The importance of this work is that it fits in the context of EIA and also highlights the ways which might be avoided or adopted to achieve sustainability. In this research study, with the help of the EIA performance Index, we can easily point out the week points in the EIA process of the proposed project. This proposed research is very significant to reach long-term sustainable Development Goals.

### *Objectives of the Research work*

- To evaluate the EIA performance index of OLMTP.
- To finds the mitigation strategies in OLMTP.
- Point out the present environmental concerns of the project.
- To find the Gaps and errors during the EIA process.
- Assess the effectiveness of project toward the sustainable development.

### *Research Questions*

1. What are the week points in the EIA Report of Orange line Metro train projects?
2. What is the actual value of the Project EIA Report in the EIA Performance Index?
3. Could Project EIA Report address all negative environmental & social impacts of the project?
4. Could project EIA Experts involve stakeholders at every stage of the EIA process?
5. Could Experts suggest applicable alternatives and mitigation plans?

### *Outcomes of the Research*

- The present research will provide a clear overview of the strengthens and the weaknesses of the EIA Report of the Orange line Metro train project that can help to attain a sustainable approach in future projects by avoiding errors and mistakes that will be noted in this research.
- Provide a pathway toward sustainable development. Indirectly provide a smooth way to conserve natural resources and the environment by pointing out the factors that deplete them due to the mismanagement of the project stakeholders.
- Ensure the public participation and social assessment at every stage of the EIA process in future projects in order to
- To attain sustainability. Especially upcoming future projects get benefit from the findings of our research.

## Literature Review

The accommodation of EIA and its endorsement from the Environmental Protection Agency (EPA) is extremely fundamental as per the Provincial Punjab Environmental assurance (Revision) Act, 2012 of Pakistan Environmental Protection Act (PEPA), 1997. Section 12 Sub-Section (1) of PEPA-1997 expresses that (Pakistan Environmental Protection Agency, 2000)

"No defender of a Project will begin development or activity except if it was recorded by the EPD Provincial Agency an underlying natural assessment or, somewhere the Project is probably going to cause an unfavorable ecological impact, a natural effect appraisal, and has acquired from the Provincial Agency endorsement in regard thereof."

The motivation behind the EIA report is to give a sensible assertion of the expected effects of a proposition and estimates that could be achieved and engaged. An Environmental Impact Assessment (EIA) report should be significant, choice important also easy to use (Fitzpatrick et al., 2019).

EIA-Package of the Pakistan Environmental Protection Agency (EPA gives exhaustive data in regards to the elements of the EIA report. The primary topic report should give a legitimization for the requirement of the proposed project in a powerful manner (Saeed et al., 2012).

The extent of the EIA Study incorporates ecological assessment including the collection of the information identified with physical, natural, and financial climate, evaluation of effects which might be brought about by the project exercises, and mitigation measures for the decrease of expected natural effects alongside the measurement of relief cost (Han et al., 2013)

### ***Project related Environmental Hazards***

During the construction of any project, many adverse effects are created on the environment and biodiversity. The nature of the project determines the intensity of the effects on the environment. If the project is fall in the Schedule II category then the impacts on the environment also increase as compare to the projects that fall in Schedule I. Lahore being one of the largest and highly populated cities of the Punjab, Pakistan, allow much large transportation, business, fisheries, and educational projects for city development. People continuously moving toward Lahore causes the expansion of Lahore city day by day. This day by day increase of the population level in city ultimately increase the demand of more housing schemes, educational institutions construction related projects and transportation facility. So to meet the needs of the community new housing schemes and transportation projects were constructed. This unplanned development put pressure on the Lahore environment and also reduces open space for refreshment. Although due to the many development projects Lahore city reduces its trees and greenery at an extreme level. An area that contains greenery and plants are considered to be an area that is rich with a healthy environment because trees not only clean the air by absorbing

The pollution and contaminants present in the air but also provide a healthy and relaxing nature sight to the eye, and viewers feel more energetic, healthy, and fresh. More greenery in the city also improves the urban environment and atmosphere. But as we mentioned earlier that during the construction of the orange line project a large number of trees were removed from their place to clear the route for the train throughout the train line. This is the environmental loss of the city. Lahore also facing the major issue of smog for many years. One of the major causes of the Lahore smog is the air pollution of Lahore city and the reduction of the green belt of the city. As Hammad Naqi Khan, stated that "Lahore suffering from much environmental crisis". A major problem that Lahore faces due to the construction projects especially the Orange line mega train project is related to air pollution, noise pollution, water pollution, health-related issues, and traffic-related problems.

### ***Noise pollution***

During the construction phase of the Orange line train project, the city faces an extreme level of heavy noise. This noise situation not only ends with the construction phase of the project but remains the same and constant during the project running phase. As per the report of Advocate Ahmed Rauf before the Court, the building of the flyover at Raiwand, Rind road, and Kalama juncture almost 50% on the noise issue was resolved after completion of the construction phase of the train project. But the situation of the city ground is totally different from the Government report that present to the court. During peak hours junctions face high noise. Additionally, the metro bus service also started to facilitate the public and reduce the vehicle load on the roads that ultimately reduce the noise level on roads. But in reality, the Metro bus also continuously enhances the city noise pollution instead of reducing it. The NESPAK conducted an EIA report of the project and claimed that the project was a totally feasible project in terms of the noise standard. But in general, trains move on the metal rail track that creates noise of 100dB and the EIA report conducted by NESPAK remains silent in this aspect of the noise pollution.

### ***Transportation congestion***

With the increase in Lahore population, the traffic load on roads also increases, which creates a mess on the roads. This increase in the number of vehicles on roads leads to many road accidents resulting in death or everyday cases of traffic jams mostly during peak hours. To reduce the road vehicles numbers Government of Punjab spent billions on OLMTP. The project was designed to decrease the transportation and vehicle load on the Lahore roads but there are still 350,000 cars and 850,000 motorbikes are present on the Lahore roads (Nawaz et al., 2019). This reflects that the Orange line train project has not achieved the goal of sharing the Lahore road traffic load. According to the Rapid mass transit system of Lahore, the main goal of the Orange line train project is to reduce road accidents and traffic jams on Lahore roads but there are still cases of traffic jams and accidents are been recorded in the city. This shows the poor management and unplanned project development at the end of the Government and other responsible departments. One the main missing element is that there is no availability of any alternative road provided to the local public during the construction activates that makes the worse situations during the peak and off-hour (Iftikhar et al., 2020).

### ***Project Related Physical hazard***

During the construction of the mega train project, many physical hazards related to the conventional & urban issues were raised. Population displacement and urban sprawl were some of the major concerns of the community people.

### ***Conservational issues***

The culture and heritage of any community have their own importance in society. In ancient times old people think that it's their first and most important responsibility to conserve and protect their culture and heritage. But today, many cultural infrastructures, old buildings, mosques, and tombs were demolished in the name of development. As criticized by Prof. Ajaz Anwar (Information Secretary, Lahore Conservation Society) "it must not be allowable to finish the Lahore identity through Orange line project, in the name of development". The EIA report of OLMTP is given by NESPAK (National Engineering Services Pakistan), and they provide clear provision to integrate the conservational issues like "integration with design techniques that reduce the construction impacts on-site and nearby heritage infrastructure and public property as well. And in the case of an unavoidable situation, the previous consultation needed to develop an agreement on options rebuilding and approved compensation in any other form. But implementation of the stated consensus not be viewed accordingly. United Nation

Educational Scientific and Cultural Organization (UNESCO) also arises many serious concerns regarding Government negligence for not taking carrying up the problem previous to the launch of the project in front of Shalamar Gardens.

### ***Urban issue***

Due to the orange line mega train project construction, land requirements occurred. The compensation on the public and private properties, houses, buildings, and other infrastructures were made according to law. But in general, the people not received the confirmed amount of compensation by order. The worried situation of people was real and at that time when they were displaced with their businesses and lost houses and many more land assets. The community peoples suffer emotionally also. During our research survey experts also claim that the report of the project prepared by NESPAK was not reflected the same situation that was actually present.

Public displacement is one issue, many issues like loss of open space, less land availability for houses & business. “Objection has been filed with the Environmental Protection Department EPD regarding the long-term sustainability of the project. It said that the raised up BRTS track threatened the historical beauty of numerous traditional sites and would also result in a decline of the assets values”

### ***Impact of Orange line train project on community health***

Among other industries, especially the construction industry is one of the most dangerous and we can say that the harmful industry in sense of human diseases and injuries. A large number of workers were present in literature that lost their body parts and suffered from chronic and risky diseases due to construction activities. Although the constructions project leads to the formation of many illnesses both mental and physical illness community population that nearby the construction site.

According to EU-OSHA “the damages of the health and decline in mortality rate is more due to construction industry as compare to the other industries”. Many diseases like pneumonia, breathing diseases, cough, asthma, cardiac disease, stroke, premature death, and type 2 diabetes were caused due to construction and site activates. According to the Global pollution estimation, the pollution and contamination during construction activities generally affected 23% of the air quality of the city, caused 40% water pollution, 50% release of the gas that influence climate change, and 50% landfill pollution (Ambrey et al., 2013).

Due to the construction of the orange line mega train project, the community population faces many serious respiratory problems. A large amount of particulate matter PM expanded in the atmosphere throughout the project construction phase. This PM remains one of the biggest problems for the nearby residence. Most of the community people claimed that they were suffered from eye problems due to dust and the general public that moved near to the construction site also face the issue of heavy PM and dust in the air that not only create difficulty in breathing but also reduce the visibility level of the local public.

## **Methodology**

### ***Study Zone***

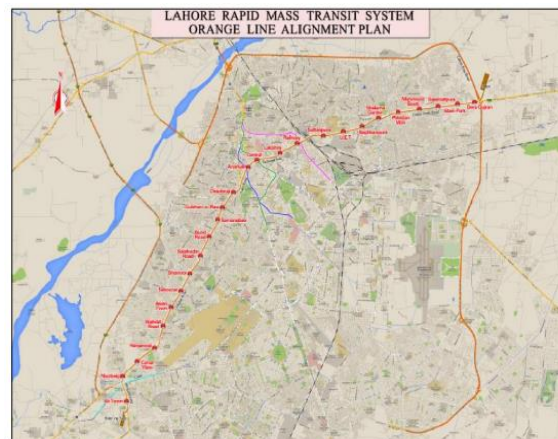
The projected city Lahore second biggest populace city of Pakistan with a current population of 13,095,000 in 2021 with a 3.58% growth rate According to the Pakistan Bureau of Statistics. The total population of 2020 was 12,642,000 and the growth rate was up to 3.72% from 2019. According to Urban Gazette in 2019 the Lahore population was 12,188,000 and

the growth up rate was 3.83% from 2018. In 2018 estimated population was 11,738,000 and 4.22% increment from 2017.

The absolute region is 1,772 square kilometers (684 sq mi). The predicted population of Lahore city in 2025 is 16.2 Million that could be calculated or predicted on the behalf of existing population growing rate recognized at 3%. Day by day population of the Lahore city increases and the human burden increases on the resources present in Lahore.

It is the need of time to build more housing societies in the Lahore to fulfill the need of houses for human but the train project not only reduce the land for planting new trees, markets, business but also reduce the landscape for the house even demolish the existing housing apartments that exist in the route of the train.

It's right that the project contains benefits for the Lahore population by reducing the need for private transport and by providing cheap and efficient public transport facilities but reduce the open space for the Lahore community people and destroy the many historical buildings and places where people come for an outing with their families and friends for refreshment (Nawaz et al., 2019).



**Figure 1.** Lahore Rapid Mass Transit System (LRMTS) - Network Orange line Train Alignment Plan (SOURCE, EPD PUNJAB)

Public Authority Punjab has arranged the advancement of LRMTS Orange Line going from side to side Multan Road, McLeod Road, Railway Station, Raiwind Road, and GT Road. The zone of Lahore municipality is 2,300 km<sup>2</sup> and the measurement of road net is more than 2,000 kilometers.

The above-mentioned project was designed to fulfill the traveling needs of the population of Lahore to provide a public transport facility that not only reduces the traffic load on roads but is also fruitful in reducing accidents.

### **Material & Methods**

Data were collected from both primary and secondary sources, existing EIA Reports, and through a designed Questionnaire. We selected 43 Experts, Consultants, and Environmentalist to fill out the research Questionnaire. Note the opinion of the experts through designed questionnaire and put index formula to calculate the exact value. The questionnaire contains the questions related to the EIA stages and process and the Investigation of EIA report comprises the assessment of rules, organization arrangement, screening, perusing, civic support, moderation of effects, authoritative arrangements, and checking.

For every question, we provide 3 choices First is “Strongly agree” and a score of “1” is might be assigned to every response of “strongly agree” Second is “Agree” and their score is “0.5” of agree, and “0” score for the third option that is “don’t agree”. Every angle was allocated a most extreme estimation of "100" and a base (0) worth and sub-records were viewed as utilizing the recipe = (got esteem least worth/greatest worth least worth) 100.

Formula = (obtained value-minimum value/maximum value-minimum value) 100

Supplementary formula for calculating the Screening Decision Index (SDI), Screening Legal Provision Index (SLPI), Impact Identification Index (III), Baseline Efficiency Index (BEI), Impact Analysis Index (IAI), Alternative Suggestion Index (ASI), Stakeholders Involvement Index (SII), Public Participation Index (PPI), Water Quality NEQs Index (WQI), Traffic Management system Index (TMSI), Effective planning Index (EPI), Environmental Management & Monitoring Index (EMMPI), Social Assessment Index (SAI), Unbiased Approval Index (UAI), Effective Stakeholders Index (ESI), EIA Quality Index (EIAQI), Authorized Reviewing Process Index (ARPI), EIA Effective Implementation Index (EIAEII), Legal Institutions Index (LII), EIA Human Resource Index (EIAHRI), EIA Legal framework Index (EIALFI) sub-indices is Obtained value divided by Total value. And finally, evaluate the EIA Performance Index of OLMTP by adding all indices values and taking their average.

**Table 1.** *EIA Stages Measuring Variables in Questionnaire*

<b>MEASURING VARIABLES</b>	<b>EIA STAGES</b>
<b>Screening Decision</b>	<b>Screening</b>
<b>Legal Provision for Screening</b>	
<b>Impact Identification</b>	<b>Scoping</b>
<b>Baseline Survey</b>	
<b>Impact Analysis &amp; Prediction</b>	
<b>Alternative Suggestion</b>	
<b>Stakeholders Involvement</b>	
<b>Public participation</b>	<b>EMP</b>
<b>Mitigation water &amp; air quality NEQs</b>	
<b>Traffic Management system</b>	
<b>Effective planning</b>	
<b>Management &amp; Monitoring plan</b>	<b>Review &amp; Monitoring</b>
<b>Social Assessment</b>	
<b>Unbiased Approval</b>	<b>Reporting</b>
<b>Effective Stakeholders</b>	
<b>Report Quality</b>	<b>Legal</b>
<b>Authorized Reviewing Process</b>	
<b>EIA Implementation</b>	
<b>Legal institutions</b>	
<b>Human Resource Framework</b>	
<b>Legal framework for EIA</b>	



## **Eia Stages**

### ***Surrounding Environment and Project Description***

A brief explanation of the project mainly contains the topography, need of a project, project stakeholders, project budget, the magnitude of the project, size of the project either it may be a Megaproject or Small project to determine the need of IEE & EIA as well as the project area, physical environment, geographical location, human capital, and available resources.

### ***Screening***

It is the first step of the EIA process that determines the major social and environmental concerns of the proposed project. This is the step in EIA Stages where decide project requires IEE or EIA (Ali et al, 2019). Mainly the cost plus the capacity of the project determines either it needs IEE or EIA before execution. Projects related to agriculture, transport, fisheries, energy, livestock, manufacturing and processing, water management, and water supply treatment are included in schedule I, which require initial environmental examination (projects with the total cost of less than 5 million), while schedule II includes the projects in the environmentally sensitive sectors like agriculture, livestock, and fisheries, of worth more than 5 million rupees.

### ***Scoping***

The second stage of the EIA process provides sufficient knowledge to decision-makers in the decision-making process. Elaborate the significant effects and factors that need to be considered to attain the goal of sustainability and to conserve the environment from degradation. This stage provides and highlights the important environmental concerns and describes the available alternatives of the project also elaborates their use during the project construction phase. In this stage possibly occurring impacts of any project are identified logically. Scoping stage briefly describes the pre-construction, construction, and operational impacts of any project (Saeed et al., 2012). During the construction of the project many types of impacts occurred, either may be direct, indirect, cumulative, and residual impacts. In the case of OLMTP EIA Report could not cover or highlight all types of impacts that have been occurred during the project construction. Scoping contains the data of all physical, biological environmental, and socio-economic aspects.

### ***Physical environment***

This segment contains the list of impacts on-air features, ambient noise, shallow water & groundwater quality, land-use practices, and soil productiveness.

### ***Biological environment***

A list of the project influences on plants, vegetation cover, and wildlife is included in this segment.

### ***Socio-economic environment***

List of effects just because of project activities on structure, service, occupational & public health and safety, folk properties, ethics, and aesthetics.

In the case of the Lahore Orange line train project, the EIA Report experts take many tests of the area around the construction project. Consultants take the test of both ambient air quality and for water quality of the construction site and their nearby area.

### ***EIA Report Preparation***

The final report that is designed to assess the project impacts was called with different names, but mostly used terms are Environmental Impact Statement (EIS) and Environmental Impact Assessment (EIA). Provide the main findings of the potentially occurring impacts of the project on the environment and community is the primary purpose of the report. A good EIA Report might be user-friendly, applicable, or actionable, describe all possible alternatives and mitigate and monitor all potential issues (Saeed et al., 2012). But in the Lahore Orange line train project case, the EIA report just prepares to attain approval from the EPA. The Orange line train project EIA Report contains the number of vehicles but there is no sensible interlink between the project, infrastructure, development, and economy of Lahore city.

### ***Participation & Consultation***

Public participation is the main element in the EIA process. This is the important stage that has more influence on the project execution process. This is all about public engagement with project stakeholders, getting public opinion on the project, and listening and solving the public issues regarding the project. All stakeholders of the project are restricted to make sure their presence during the public consultation process (Ali et al, 2019). It is written in the EIA Rules Manual which guides that Project all Stakeholders should be available and accessed throughout the whole procedure. If we talk about the public consultation in the case of the Orange line train project so this section of the report is very weak. The public has many issues regarding the project but after hearing the public issues no step would be taken to solve public problems. After effectively reviewing the EIA Report of OLMTP we noted that the proper public consultation could not happen during the project while EIA Report stated that the stakeholders have been consulted but in most cases, proper consultation could not happen. Although the Shalimar colony resident not satisfied with the construction go the project so it also lead to poor planning. Because public participation could not be ensured so the project could not be accepted on a psychological level that is the basic level of project implementation (Nawaz et al., 2019).

### ***EIA Review and decision making***

Decision making & Review process is the ending process of the EIA Report and the purpose of the review is to check the completeness of the report and the check the quality of gathered information. This is the final check after that decision on the report taken by the EPD and higher authorities. EIA Report either accepted or give NOC to the project or rejected for the further editing or addition in the report decided during reviewing process. The third parts also involve in reviewing process. Involving the third festivity is the most significant piece of the Pakistan Environmental Impact Assessment (EIA) process scheme (Khan et al., 2018).

## **Results & Discussions**

### ***Results***

Results show the least scoring 15% for the alternative suggestion for the project. The authorized reviewing process of the report showed almost 67.4% and for efficiency of the stakeholders is 70.9% that is considering to be well compared to the authorized reviewing process of the Orange line train report. Baseline surveys have their importance in any project for better implementation. The baseline survey for OLMTP scoring 44%.

While Unbiased Approval scoring is 33% that reflects the error and gap that need to be fulfilled and avoid in future projects. Traffic management system scoring is 77% and if we talk about the Water & Air Quality NEQs it's scoping up to 69%. Influence and the hiring of the

relevant human resource during the whole project scoring the 46% and the role and interference of the legal institutions during the project construction scoring 69%. Plan for the monitoring and the overall management scoring 52%. Role of legal institutions for the implementations of the EIA policy during the project construction phase scoring round about 73%. Effective planning is 60% that shows a certain level of inefficiency of the planning team of the project.

Results of the survey also showed that during the project designing, infrastructure, and construction phase the potential environmental damages could not keep in view that has significant changes occur in reality. Impact analysis & prediction scoring is 26% that reflects the negligence of management to identify the possibly occurring impacts.

**Table 2.** *Measuring Variable Scoring for EIA Stages for OLMTP*

<b>EIA Stages</b>	<b>Measuring Variables</b>	<b>Score</b>	<b>Scoring Percentage</b>
<b>Screening</b>	Screening Decision	27	62.8
	Legal Provision for Screening	36.5	84.9
<b>Scoping</b>	Impact Identification	20.5	47.6
	Baseline Survey	19	44.1
<b>Mitigation</b>	Impact Analysis & Prediction	11.5	26.7
	Alternative Suggestion Stakeholders Involvement	6.5 29	15.1 67.4
	Public participation	17.5	40.7
	water & air quality NEQs	30	69.7
<b>Environmental Management Plan (EMP)</b>	Traffic Management system Effective planning	33.5 26	77.9 60.4
	Management & Monitoring plan	22.5	52.3
		18	41.8
<b>Review &amp; Monitoring</b>	Social Assessment Unbiased Approval	24	33.8
	Effective Stakeholders	30.5	70.9
<b>Reporting</b>	Report Quality	34.5	80.2
	Authorized Reviewing Process	29.5	67.4
<b>Legal framework</b>	EIA Implementation	34.5	80.2
	Legal institutions	30	69.7
	Human Resource	20.5	46.5
	Legal framework for EIA	31.5	73.2

**Table 3.** *Sub-Indices Scales & Obtained Values for OLMTF*

<b>EIA Stages</b>	<b>Sub Indices Scale</b>	<b>Sub Indices Scores</b>
<b>Screening</b>	Screening Decision Index (SDI)	0.62
	Screening Legal Provision Index (SLPI)	0.84
<b>Scoping</b>	Impact Identification Index (III)	0.47
	Baseline Efficiency Index (BEI)	0.44
	Impact Analysis Index (IAI)	0.26
	Alternative Suggestion Index (ASI)	0.15
<b>Mitigation</b>	Stakeholders Involvement Index (SII)	0.67
	Public Participation Index (PPI)	0.40
	Water Quality NEQs Index (WQI)	0.69
	Traffic Management system Index (TMSI)	0.77
<b>Environmental Management Plan (EMP)</b>	Effective planning Index (EPI)	0.60
	Environmental Management & Monitoring Index (EMMPI)	0.52
	Social Assessment Index (SAI)	0.41
	Unbiased Approval Index (UAI)	0.33
<b>Review &amp; Monitoring</b>	Effective Stakeholders Index (ESI)	0.70
	EIA Quality Index (EIAQI)	0.80
<b>Reporting</b>	Authorized Reviewing Process Index (ARPI)	0.67
	EIA Implementation Index (EIAII)	0.80
	Legal Institutions Index (LII)	0.69
	EIA Human Resource Index (EIAHRI)	0.46
<b>Legal framework</b>	EIA Legal framework Index (EIALFI)	0.73

**Table 4.** *Indices Scales & Obtained Value, EIA Performance Index (EIAI) Value for OLMTP*

Sub Indices Name	Sub Indices Values	Index Name	Index Values
Screening Decision Index (SDI)	0.62	Appropriate Screening Index (ASI)	0.73
Screening Legal Provision Index (SLPI)	0.84		
Impact Identification Index (III)	0.47	Scoping Efficiency Index (SEI)	0.33
Baseline Efficiency Index (BEI)	0.44		
Impact Analysis Index (IAI)	0.26		
Alternative Suggestion Index (ASI)	0.15		
Stakeholders Involvement Index (SII)	0.67	Mitigation Index (MI)	0.63
Public Participation Index (PPI)	0.40		
Water Quality NEQs Index (WQI)	0.69		
Traffic Management system Index (TMSI)	0.77		
Effective planning Index (EPI)	0.60		
Environmental Management, Planning & Monitoring Index (EMPMI)	0.52	Environmental Management & Monitoring Index (EMMP)	0.51
Social Assessment Index (SAI)	0.41	Environmental Institution Performance Index (EIPI)	0.51
Unbiased Approval Index (UAI)	0.33		
Effective Stakeholders Index (ESI)	0.70	Reviewing efficiency Index (REI)	0.73
EIA Quality Index (EIAQI)	0.80		
Authorized Reviewing Process Index (ARPI)	0.67		
EIA Implementation Index (EIAII)	0.80	legal framework Index (LFI)	0.67
Legal Institutions Index (LII)	0.69		
EIA Human Resource Index (EIAHRI)	0.46		
EIA Legal framework Index (EIALFI)	0.73		
<b>EIA Performance INDEX (EIAPI)</b>			<b>0.59</b>

Likewise, the list of scores and the percentage scoring for all variables shows in table 2. Sub-indices values showed in table no 3 and table no 4 below reflects the value of all indices and also show the EIA Performance Index.

The calculation methods and the formula is mention earlier in the methodology. All values mentioned in the above tables were achieved after applying the formula and evaluating methods. Under the light of results values, the EIA Index for Orange line mega train project (OLMTP) shows (0.59) that reflect an average performance Index of EIA as good and effective index must show the value of at least (0.8). According to the expert's opinion and calculation in Table 4 the weak and poorest area of the EIA Index in case of OLMTP is Alternative

suggestion, effective planning, lack of Social Assessment, biased approval, lack of public participation, impact analysis and lack of experts and proper human resource.

### ***Discussion***

Throughout the construction phase of the Train Project, a large number of the machinery was used outside Zurgham Lukhesar's law office. Bulldozers affecting the earth, lifters moving or shifting construction materials, and blenders formulating protected concrete (Arshad, Y., 2017). During all these construction activities vibration generates, that is so strong even cause the breakage or leakage of the office building water pipes. The office situation getting so worst that they placed buckets in the office to prevent the floor from getting wet. Construction practices have led to the devastation of masjid following Lukhesar's office. Some valuable portions of the neighboring Mughal-era shrine of Baba Mauj Darya have been likewise destroyed. Many Churches and mosques, that were as old as St Andrew's Church that was constructed in 1860, either dragged down or seriously threatened due to construction activities (Aziz, A., Nadeem, M., & Afzal, L., 2018). Prof. Ajaz Anwar (Information Secretary, Lahore Conservation Society), stated that "In the name of development, it must not be allowed to culminate Lahore's identity through projects like Orange Line Project". Lahore Orange Line Metro Train Project is also affecting two major markers of the city, Shalamar Gardens and Chauburji (Nawaz et al., 2019). Construction work was caused by cutting down almost 620 grown-up trees for the Orange line train route that was 27.1km long. According to the Report of the World bank published in 2017, cutting down trees and unsustainable development leads to environmental degradation that is costing almost Rs: 1 Billion rupees in Pakistan every day (Aziz, A., Nadeem, M., & Afzal, L., 2018).

Once a time when Lahore was called the city of Garden but know the green belt of Lahore removed rapidly. Disappearing of green belt not only reduce the natural beauty of the city but also pollute, damage and deplete environment (Fitzpatrick et al., 2019). Many newborn plants and mature trees were cut to clear the route for the orange line train. To clear the area for project execution 42 schools and colleges were completely demolished. Many community people lost their homes without sufficient compensation due to the project. No proper law has been made to relocate the general public. The land area in the opposite direction of the Mauj Darya shrine unaccompanied would see almost 100 protests between August 2015 and January 2016. A group of civil society activists joined the objections in September 2015. Luther (Owner of the law office that effected due to project construction) would far along submit 15 additional petitions on behalf of individuals living in an old site noticeable for destruction. Under Article 184(3) of the Constitution of Pakistan, Supreme Court has strong jurisdiction powers by entertaining the petitions of public concerns and to clean environment, this could bring the great question of community people significance (Pakistan Environmental Protection Agency, 2000). Many people and property owners protest again the project and finally Court release the order to stay or discontinue the construction activities of the Train project in 2016. The decision, given by Justice Ejaz Afzal Khan, established 31 conditions that are in favor of the public and environment. These conditions were set for Government before it could restart construction work on the train project. The work start again just a day next the decision was delivered.

## **Conclusion & Recommendations**

### ***Conclusion***

Based on the results and investigations of this research work we conclude that the construction projects in Pakistan especially construction-related projects need modification and

adopt effective planning to meet the long-term sustainability and make resilient infrastructure. Before starting any project proper planning must conduct to mitigate the possible negative impacts. One of the main and big problems of planning in Pakistan is that the Planner mostly ignores the long-term spatial and regional impacts of the project during the planning phase that lead to geographical disturbance and spatial inequity and also invite too many dangerous events. Moreover, the data and the management and monitoring approaches used in the monitoring process or OLMTP were insufficient to meet the sustainability goals. Also, the least public participation and mostly suggestion were ignored. According to the expert's opinion and calculation of this research work we reached out that the weak and poorest area of the EIA Index in case of OLMTP is Alternative suggestion, effective planning, lack of Social Assessment, biased approval, lack of public participation, impact analysis and lack of experts and proper human resource.

The main purpose of this research study is to evaluate the weaknesses of the project and to calculate the EIA performance Index with the help of Experts opinions and find out cracks that help to point out the exact problem present in the project to avoid error repetitions and to meet the sustainability in future projects.

### ***Recommendations***

- ✓ We recommend that during the construction of transportation projects, environmental consideration and green transportation keep in step ahead.
- ✓ Governmental agencies must play their part to ensure proper public participation during project operation.
- ✓ Effective planning must require before starting any project.
- ✓ Keep in view the sustainable goals, during the planning and operational phases.
- ✓ Adopt effective strategies to minimize the project-related socio-economic & environmental impacts.
- ✓ Promote and adopt green transportation mode to protect the environment.
- ✓ Cost-benefit analysis must be evaluated before starting any project.

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## Appendix

### Appendix # 1

#### List of Abbreviations

<b>EIA</b>	Environmental Impact Assessment
<b>OLMTP</b>	Orange Line Mega Train Project
<b>SDI</b>	Screening Decision Index
<b>SLPI</b>	Screening Legal Provision Index
<b>III</b>	Impact Identification Index
<b>BEI</b>	Baseline Efficiency Index
<b>IAI</b>	Impact Analysis Index
<b>ASI</b>	Alternative Suggestion Index
<b>SII</b>	Stakeholders Involvement Index
<b>PPI</b>	Public Participation Index
<b>WQI</b>	Water Quality NEQs Index
<b>TMSI</b>	Traffic Management system Index
<b>EPI</b>	Effective planning Index
<b>EMMPI</b>	Environmental Management & Monitoring Index
<b>SAI</b>	Social Assessment Index
<b>UAI</b>	Unbiased Approval Index
<b>ESI</b>	Effective Stakeholders Index
<b>EIAQI</b>	EIA Quality Index
<b>ARPI</b>	Authorized Reviewing Process Index
<b>EIAHRI</b>	EIA Human Resource Index
<b>LII</b>	Legal Institutions Index
<b>EIAEII</b>	EIA Efficiency Implementation Index
<b>EIALFI</b>	EIA Legal framework Index



*Appendix # 2*

**LIST OF FIGURES**

**FIGURE**

Figure1. Lahore Rapid Mass Transit System (LRMTS)

*Appendix # 3*

**LIST OF TABLES**

**TABLES**

Table 1. EIA Stages Measuring Variables in Questionnaire

Table 2. Measuring Variable Scoring for EIA Stages for OLMTP

Table 3. Sub-Indices Scales & Obtained Values for OLMTP

Table 4.Indices Scales & Obtained Value, (EIAI)