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Impact of Infrastructural Inefficiency on The Citizens of Karachi: A Case of Green Line Bus Project of Karachi

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Abstract

This research captures the impact of the infrastructural inefficiencies on the daily route of the public. "Green Line Project" is selected as a base model to execute this research. It is based on qualitative analysis by using one year development project and an under construction phase. The mentioned route for the project is from Surjani Town till Karachi City station. The main idea of research is to examine the project's impact on people using this route for their daily activities. It is observed that a significant delay in the project completion is hindering the daily routine of the public because the daily footfall on this route is very high as it is commonly used and highly populated route. Study also evaluates the unobserved socioeconomic cost that is normally ignored during the impact analysis of development projects. Therefore, the findings pave the way for including social impact cost at the inception of new development projects. A twofold research method is deployed where in general research survey is conducted using questionnaire approach and second questionnaire from experts. Based on the data gathered from these questionnaires, the research has conducted a cost benefit analysis of this project. The cost benefit analysis clearly depicts that people are affected both in terms of time and fuel consumption i.e., an estimated increase in travel time is more than one hour and .about 72liters of fuel consumption single user per day due to the construction of this project and per day delay will lead to this unseen cost to the general public. Hence the project construction has created hurdles for the public in their daily routine in

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terms of socioeconomic activities. The cost & time that people are paying is also worsening their living & health standards. The project is indicating & highlighting the two fold of the research paper, financial cost & socioeconomic cost that were not accounted before.

Key Words: Infrastructural developments, two fold model, financial cost, socioeconomic impact, infrastructural inefficiencies, construction, hurdles, qualitative analysis
JEL Codes: A14, C25, D24, H54, O18, L74

1 Introduction

Infrastructural development is the most vital aspect of overall economic health and growth. There are multifold advantages of infrastructural developments but there is also significant cost is associated with these types of projects. Unfortunately, when we discussed the cost of infrastructure related project, only financial cost is mainly considered and accounted for but a major cost which is the socioeconomic cost and related directly to the public is ignored. The socioeconomic impact is the unseen impact these development projects on the society and should be included while costing these development projects.

Infrastructure is the most integral part in the development of a village, city, country etc. Especially when we discuss metropolitan cities, infrastructural development is very vital. The infrastructure of a city is the measure of healthy and organized development and also depicts the level of advancement and modernization of the city (Xiaodong Yang, 2015). Urban infrastructure not only stimulates economic growth but also influence the noneconomic areas including political, environmental, social, technical, and ecological areas.

Investment in public sector especially in transport infrastructure has budget constraint because in developing countries there is a limited budget for such projects than in developed countries in order to have fiscal sustainability such projects has been curtained during the downturns of economy.

Efficiency basic two aspects, first is to achieve a given level of economic objectives with lower levels of investments and the second is to attain a larger economic goal within a given level of investment. That is why found a good number of studies on the subject of efficiency of infrastructure (Pritchett 2000, Gupta et al., 2014).

The basic idea in recent research is to capture the efficiency of infrastructure in the economic and the public sector. In this study we are trying to capture the other aspect whereby we are focusing on the aspect of infrastructural inefficiencies in public infrastructure and the objective is to capture the unseen impact of these inefficiencies on the society and overall financial stability of the society.

The basic idea that undergoes in our research discussion is to identify that what are the factors that influence the economic development & bring financial stability. Infrastructural efficiency not only helps out people to upgrade their living standards but also support them to become the earning member of the country. Infrastructure of an economy is the basic equipment that gear up the functionality of the life & enables the country to increase their productivity & providing good & valuable services decreases the cost of living. Todays in the world of industrialization a country with good infrastructure like roads, rail links, seaports, water generation, water preservation, irrigation system & electrical generation will have a valuable impact on the financial stability of their country & vice versa.

Our research is totally based on identification & emulsification of those areas that brings inefficiencies in the country & it also impacts the countries financial stability. Mostly in developing countries where majority of people living in rural areas are far away from public infrastructure especially where roads are stumpy, productivity is low, & people don't have easy access to food increases their cost of transportation & limit the use of local markets to sale their products. If roads are limited in rural areas than poor people will have limited access to social infrastructure such as education & health facilities.

Our research highlights the problems in one of the most highly dominated area of our country that is Karachi. Karachi is considered as one of the biggest metropolitan city of the world & its financial stability is restricted because of poor infrastructure. Karachi is the major trade junction & employment manufacturing hub of Pakistan, with worst grounded infrastructure hindering the economic development of the country.

The basic challenge in infrastructure related research is that it is difficult to quantify the impact of infrastructure related projects of financial sector. One of our main aims is to establish mechanism to capture these unseen impacts and to establish the importance of efficiency in infrastructural related projects. In this research we will try to find out how infrastructural inefficiencies effect human capital and also try to estimate the impact in financial terms.

Infrastructure in basic a very vast term and covers roads, buildings, sewage system, power supply etc. Research agreed that infrastructure is characterized by set of these variables, some on the authors study these variables separately while others try to study them in relationship (Palei, 2015). Keeping in view the scope of research and time limitation, we have only focused the transport infrastructure. Further in order to execute our research we have selected one of the recently on-going projects of "Green Line Project". Green line is basically a fast track long route plan of federal government which will expand on 35 Km in the first phase. The project started in 26 Feb 2016 and still under construction phase. The decided route for this project is from Surjani Town till Karachi City station. In our research we will examine the impact of this project on the public that is using the same route where this project is going on. As the project was aim to operational in Feburary 2017 but same is still under construction and the construction delay is hindering daily routine of the public.

1.1 Problem Statement and Objective

The impact of infrastructure inefficiencies on the socioeconomic activity of general public including traveling cost, traveling time and health & safely (unseen cost of infrastructural projects).

The basic objective of the research study is to identify the core infrastructural inefficiencies that impact the individuals in socio-economic levels. To see the impact of infrastructural inefficiencies on public and in order to see this impact it is aimed to find out some of the common factors which effect people at large in their daily routine. Also, the aim is to design a mechanism for studying the unseen aspect of infrastructural inefficiencies.

This study investigates that what is the impact of infrastructure inefficiencies on time cost? What is the impact of infrastructure inefficiencies on health cost? And what is the impact of infrastructure inefficiencies on energy consumption?

2 Literature Review

Dal Bó and Rossi (2007), investigated one of the unique & diversifying economical combinations that impact the comparative advantage of a nation & converts inputs into outputs enhance nation's economic performance. Economic efficiencies bring stability in a country by boosting infrastructural efficiencies increasing countries capacity to produce more & engaging factors of productions in efficient & powerful industries & vice versa. Economies where there is involvement of corruption their huge number of resources are engaged in brining little outputs. The main idea that increases the level of understanding by highlighting some key points for economical inefficiencies are corruption that hinder law & order Situation, increases inflation & public ownership of money making industries.

What this research paper concludes is truly supporting the idea that corrupted countries more resources are used to produce a given level of output as same goes with public firms

where substantial number of resources produces lesser outputs & bring inefficiencies in an economy when compared with stable economies.

Afonso, Romero and Monsalve (2013), explain that government spending is difficult to identify & recognize that either they are engaged in making countries output efficient or worst. The idea behind this research is to identify public sector efficacy & performance in comparative terms. Further it supports that public sector efficiency is inversely related to government outputs that mostly supports the economies of emerging markets. It also indicates that transparency; control on corruption & property rights increases output efficiency scores. A better understanding of internal policies increases countries worth internationally & domestically. Good quality indicators give easy access to information to transparent businesses of a country to know about their government policies & regulations affect or hinder their business activities. Government rules & regulations that allow privates business to flourish & help government to support & increases better outputs.

Henckel and McKibbin (2010), mentioned how in the world of globalisation still countries are facing challenges of infrastructural inefficiencies, poor living standards less access to basic necessities & starvation. Education health shelter & access to factors of production in emerging economies is a challenge. This research states four different aspects of infrastructural inefficiencies, nature of infrastructure (rail, road, air, sea, energy, water, network externalities) return to infrastructure investment (to increase productivity by boosting living standards), how infrastructure be provided & last impact of infrastructure for emerging economies. It discusses that evaluation & delivery is prime responsibility of government to address the infrastructural inefficiencies & boost the economical & domestic well-being of their citizens.

The researcher discussed the relations in OECD countries & its impact on economies of scales & economic growth. The research paper highlighted the governments of OECD nation &

their performances bring up country's public sector performance while expenditures increase gradually. Dealing with these the main highlighted issues such as aging, increasing health care & pension cost becomes a threat for emerging economies. The citizens are demanding from government for their rights & held it accountable for taxpayer's money. Performance & & its role on budgetary evaluation reviews as key institutional drivers in this study. The discussion is not only restricted to transportation efficiencies that reduces cost also the importance of economic growth & development is highlighted in the case. Budgetary performance & related discussion is important to discuss because the underlying their points are based on it.

Palei, (2015), examines the relation of national competitiveness & infrastructure. Through best infrastructural policies & competitive environment of implementing those policies national competitiveness of a country increases. Effective infrastructure management can improve industrial policy & national competitiveness.

World Bank stresses that a country economic growth & national competitiveness can be influenced by several factors that include quality food education, health; institution, technology advancement, macroeconomic environment & many other tools are used to identify the relation between these two factors. These factors directly enhance a country's industrial capacity to produce more. National competitiveness openly discussed with industrial & institutional development supported by rail road's transport & electricity supply. Countries having good infrastructure can have easy access to main business units enhances level of output which impacts living standards both in urban & in rural areas.

Xiaodong Yang (2015), systematically identify urban structure to evaluate the impact of resources in cities & to measure the unreasonable allocation of resources & imbalances in cities & rural areas. In order to create an effective literature regarding infrastructure efficiency evaluation it creates inputs & outputs as an indicator of investment in infrastructure of urban

areas of china like Heilongjiang province. One of the most important things to evaluate a country's infrastructure is to measure its urban investment in its urban areas & their city's healthy & developments. Chines government has boosted its economy in investing in urban areas to gear up their systematic developments through engaging workforce in developmental projects & increasing the well-being & living standards. It's an important decision to make while involving diversified patterns & improved social awareness & sequential development to the market based economy. Investment in infrastructure has both positive & negative sides we already discussed positivity in detail but it has some drawback like rapid developments in Infrastructure with poor decision making make it useless allocation of resources & also causes environmental social ecological & technical challenges.

Kyriacou, Muinelo-Gallo and Roca-Sagalés (2018), explains the impact of transportation in 34 countries & their impact on economic stability by increasing capital movement via sea routes & thus enhancing their trade. In order to discuss impact of transportation we became able to know that how countries are importing products in large quantities to boost their economic development to engage their labour resources by increasing their production while utilizing their human resources in productive allocations. Trade is best to serve movement of labour & capital also by land through cutting their cross border differences. Transport & easy access to sea & land routes gives countries an edge to cut high cost of transportation while importing capital in neighbouring countries. Investment in public capital a key driver of economic growth as development programs relies more on transportation & boost economic development of country.

Curristine, Lonti and Joumard (2007), examines the key factors which may contribute in the improvement of efficiency of public sector. The major factor that are evident to improve the public sector are mainly the decentralization both politically and functionally, economy of scales and HRM practices. The

outcomes of the study are surprising as empirical evidences are not there to support and evaluate the impact on efficiency.

3 Methodology

Our research is based on qualitative instance. We are going to deploy a twofold research method where in one research survey will be conducted from the public and another questionnaire from experts. Then based on the results of both techniques data will be analysed. The variables of the survey have been derived from Environmental Impact Assessment (EIA) Green Line Bus Rapid Transit System.

3.1 Research design:

The basic aim of the research is to capture the unseen impact of infrastructure inefficiencies of the public. In order to capture the impact and monetized the failure of infrastructure we are going to take a sample case from Karachi. The sample selected for the subject study is the "green line project route; an ongoing venture for providing long route bus service to the citizen of Karachi. In our research, we will precede our research using two methods, one is the expert's opinion and other is a close end questionnaire survey from the public who are using this route. Experts are selected based on the convenient sampling. Based on the questionnaire response cost benefit analysis of the project will be done. For cost benefit analysis we are creating hurdle index. By combine the results of indicators use to gage the pre, current and expected post experience of people regarding infrastructure position, we have developed and hurdle index and with mean comparison we will analysis the impact. Following are the factors which are used for the creation of hurdle index. Condition of Road infrastructure, condition of Public transport, condition of Air Pollution, condition of traffic flow on the route and impact on Health of People.

3.2 Research Model & theoretical Background

Theoretical backing of our research comes from the endogenous growth theory which says that economic growth and financial wellbeing comes from investing in your human capital, education and innovation. Here we are trying to establish that if

we do not considered wellbeing of our people in infrastructural project how it will cost us in financial terms. This research is aim to identify certain elements of inefficiency and also supposed to perform a comparative analysis of the overall impact and to suggest the way forward.

4 Data Collection

We are using two methods for data collection in our research. One is survey questionnaire which is designed on Likert scale. This questionnaire is circulated amongst the user of green line route for their feedback on the project and the effect on the project on their routine life. This questionnaire will be circulated through online and field survey. We will collect feedback on 150 to 200 individuals using this survey questionnaire.

The second method is a close ended interview questionnaire which is shared with urban planning and civil engineering experts in order to get an expert opinion on the project feasibility and effectiveness. These interviews will highlight that which is the factor which is considered in planning of public infrastructure related projects and which are some of the factors which should be considered.

4.1 Scope of study

This study is limited to the infrastructural inefficiency in the green bus project and aims to study the impact on the people which are using the route where the project is in construction phase.

4.2 Limitation

The limitation of the study is that we are conducting online survey wherein we could not capture the responses of those public which is not able to submit the response using only mode.

5 Data Analysis

Our data analysis consists of two parts, first is the analysis of the online survey questionnaire and second is the review of the expert's opinion.

Figure 1 indicates the segregate route user from non-user in order to get response from the relevant audience. Also 64% of the responded are the user of green line route for their routine traveling which is a high number and it shows the importance of this route in the routine traveling of the individual specially the residents of this particular route.

Figure 1
Users of green line bus project

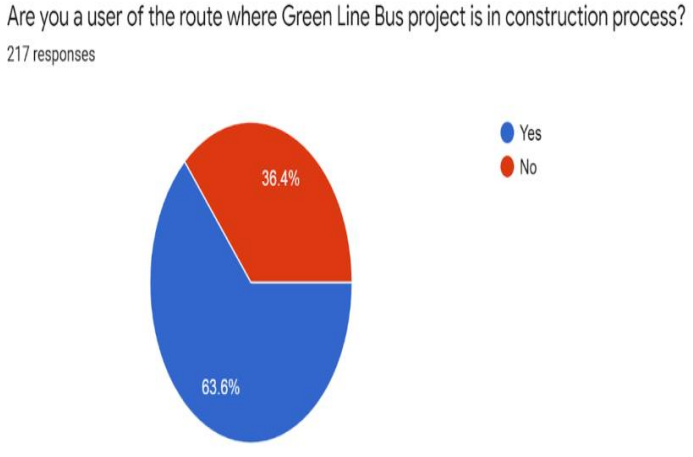


Table 1 show the frequency of traveling of both genders. Frequency of tarvel is gage in order to identify the intensity or the level of association of the respondent from the route. Here is almost 68% of the user are using the route on daily basis.

Table 1
Users of green line bus project

Frequency * Gender Cross tabulation				
		Male	**Female**	**Total**
Frequency	Daily	68	23	91
	In a Week	13	4	17
	In two Weeks	6	5	11
	In a Month	6	3	9
	In two Months	3	1	4
Total		96	36	132

Source: Author's own calculations from survey

5.1 Descriptive Summary of Respondent

Table 2
Descriptive summary of respondents

Gender		
Male	96	73%
Female	36	27%
Age		
Less than 20 Years	13	10%
20 to 40 Years	113	86%
41 to 60 Years	6	5%
Education		
Intermediate or Below	10	8%
Bachelors	76	58%
Masters	45	34%
Doctorate	1	1%

Residence Location		
New Karachi	7	5%
North Karachi	22	17%
North Nazimabad	30	23%
Nazimabad	41	31%
Garden and adjacent areas	8	6%
Saddar and adjacent areas	22	17%
Occupation		
Student	63	48%
Private Sector Employee	55	42%
Government Employee	4	3%
Self Employed	10	8%

Source: Author's own calculations

As per the descriptive statistic, both male and female respondents have participated in the survey, whereas the most of our respondent are between 20 to 40 years of age. Education level of the respondent is mostly graduation and above. Further we are able to receive response from all the areas which the green line route is covering. Further, more than 90% of the respondents are students or private sector employee.

Figure 2 gauge an overall impact on the project of the public. we have gathered response on the responded on Likert scale from best to Worst (5 to 1) on customer pre-experience, current experience and expected post experience on the route. The above graph shows the pre-construction phase experience, where the response most between average to worst on the provided indicators on infrastructure condition.

Figure 2
Impact of project on User's health (Pre-project Phase)

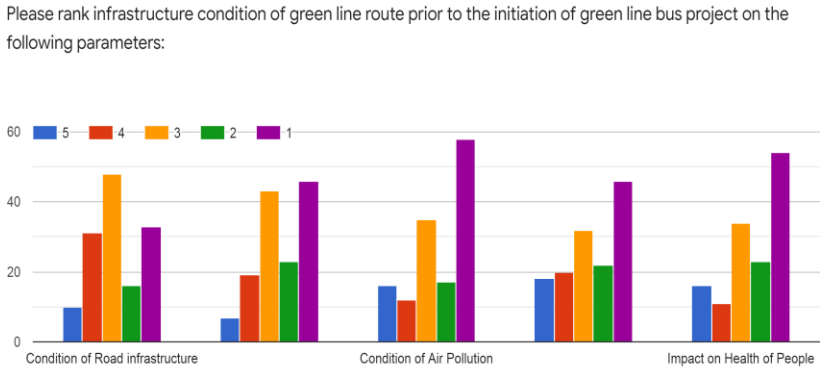


Figure 3 shows the construction phase experience, where the response most between bad to worst on the provided indicators on infrastructure condition which show that the ongoing project in adding hurdles for the general public.

Figure 3
Impact of project on User's health (During Project Phase)

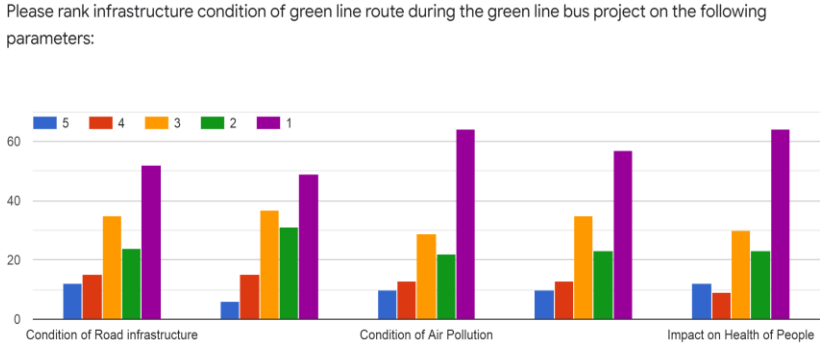
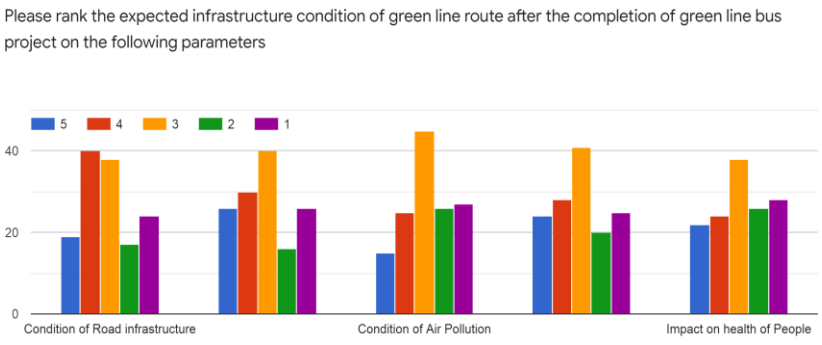


Figure 4 shows the post construction phase expectations, where the response most between best to worst on the provided indicators on infrastructure condition and people are expected better infrastructure position after the project completion.

Figure 4
Impact of project on User's health (Post-Project Phase)



5.2 Hurdle Index

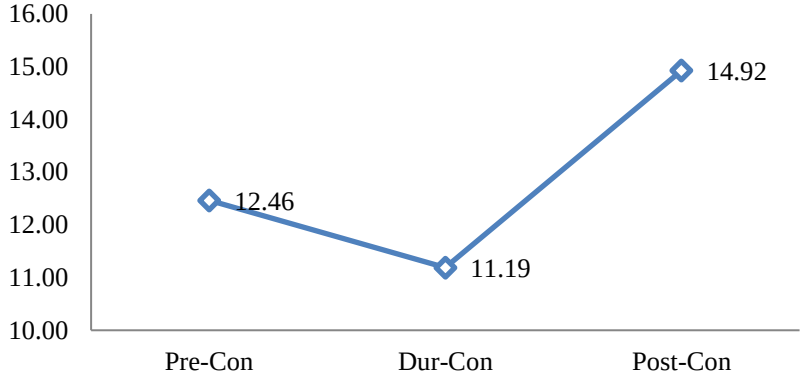
By combine the results of indicators use to gage the pre, current and expected post experience of people regarding infrastructure position, we have developed and hurdle index and with mean comparison we will analysis the impact.

Table 3
Estimates of Hurdle Index

Statistics				
		Preconstruction position	**During construction position**	**Post construction position**
N	Valid	132	132	132
Mean		12.4621	11.1894	14.9242
Std. Deviation		5.87712	5.95676	6.02364
Range		20.00	20.00	20.00
Minimum		5.00	5.00	5.00
Maximum		25.00	25.00	25.00

The hurdle index shows a mean value of 12.46 on per-experience, which declines to 11.19 during its construction phase and the expected mean value after completion is 14.92 which clearly shows the decline is public experience after the construction states and the construction delay is hindering their daily routine. Further the upward shift in expected mean shows the people expect a better infrastructure position after the completion of the project. Same is depicted graphically in the appended graph as figure 5.

Figure 5
Infrastructure Position



5.3 Cost benefits Analysis

Further we have also conducted a cost benefit analysis based on the travel and time cost.

Table 4
Cost Benefit Analysis

Travel time Effect					
Impact Factor	**No. of Hours**	**Avg No. of Hours**	**Freq**	**Average Hours**	**Average Hours per person**
No Impact	0	0	17	0	0.77
Increased Less than	0 to 0.5	0.25	44	11	

half hour					
Increased b/w half hour to one hour	0.5 to 1	0.75	47	35.25	
Increased b/w one to two hours	1 to 2	1.5	14	21	
Increased more than two hours	2 to 5	3.5	10	35	

Fuel Consumption Effect

Impact Factor	No. of Liters	Avg No. of Liters	Frequency	Average Liter	Average Liter per person
No Impact	0	0	22	0	
Increased less than half liter	0 to 0.5	0.25	42	10.5	
Increased b/w half and one liter	0.5 to 1	0.75	41	30.75	0.72
Increased b/w one to two liters	1 to 2	1.5	14	21	
Increased more than two liters	2 to 3	2.5	13	32.5	

Travel time Effect

Impact Factor	No. of Hours	Avg No. of	Frequenc	Average Hours	Average Hours per

		Hours	y		person
No Impact	0	0	22	0	
Save less than half hour	0 to 0.5	0.25	53	13.25	
Save b/w half hour to one hour	0.5 to 1	0.75	42	31.5	0.62
Save b/w one to two hours	1 to 2	1.5	8	12	
Save more than two hours	2 to 5	3.5	7	24.5	

Fuel Consumption Effect

Impact Factor	No. of Liters	Avg No. of Liters	Freq	Average Liter	Average Liter per person
No Impact	0	0	30	0	
Save less than half liter	0 to 0.5	0.25	54	13.5	
Save b/w half and one liter	0.5 to 1	0.75	38	28.5	0.58
Save b/w one to five liters	1 to 5	3	8	24	
Save more than 5 liters	5	5	2	10	

The result shows that a daily average impact as far as traveling time is concern is one hour and 17 minutes on average and there in average increase in fuel consumption by 0.72 liters. Further the expected time saving after the completion of the project on average which is expected per person is one hour and the fuel saving per person is .58 liters which shows that per day delay in the project has huge opportunity cost.

5.4 Expert Survey Analysis:

Data has been collected from 22 urban planners regarding their opinion on the project and its impact on the public through questionnaire and the summarized analysis of their response is appended.

Table 4
Expert Survey Analysis

Factor	Responses	
	Number	**Percentage**
Better Project Management		
Timely Budget Allocation	11	27.50%
Project Management Trainings	10	25.00%
Impact Factor Analysis	8	20.00%
Hurdle Management during project		
Traffic Management during Peak Hours	17	37.00%
Alternate Route Plan	15	32.60%
Health and Safety awareness	12	26.10%
Major Costs of project		
Environmental pollution	15	28.30%

Increase Fuel Consumption	12	22.60%
Extensive Travel Hour	10	18.90%
Health Hazards	9	17.00%
Major Benefits of project		
Improvement in Public Transport	18	32.10%
Reduced traffic load on the route	14	25.00%
Affordable traveling for Masses	12	21.40%
Reduction in traveling time	12	21.40%

There are two possible interpretations. First is simply comparing total time and travel cost with expected benefit.

Net Travel Cost = Per day travel cost – Per day travel benefit. 46min – 37min = 9min

Net Fuel Cost = Per day fuel cost – Per day fuel benefit. 0.72 liter – 0.58 liter = 0.14 liter

The second and a better interpretation is to consider the future benefit for project as opportunity cost and include with the current cost in order to find out the impact.

Total Travel Cost Per day = Per day travel cost + Per day travel benefit forgone. 46min + 37min = 83 min

Total Fuel Cost Per day = Per day fuel cost + Per day fuel benefit forgone. 0.72 liter + 0.58 liter = 1.3 liter

6 Conclusion

The basic object of the study was to capture the unseen impact of infrastructural inefficiencies on the lives of people. For this we have conducted in online survey from the user of the route and conduct an online review from the experts in the

project management field. The results of the survey then quantified based on the response on the responded. As per the response we have created a hurdle index and the value of index shows a very clear impact on the green line project delay on the lives of people. Mean comparison is done to check the impact. Further the travel time and fuel cost effect is also measured based on the response and also the expected saving after the completion of project. The cost benefit analysis also clearly depict that people impacted both in terms on time and fuel consumption i.e., and estimated increase in travel time is more than one hour and .72 liters is fuel consumption per user per day. Further as per the expert review, the project construction is creating hurdles for the public in their daily routine in terms of socioeconomic factors specially the increase in environmental pollution, increase in travel time and fuel cost and also impacting the health of citizens.

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