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of Road Infrastructure under
CPEC: A Case of
Express Way-35

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Socio Economic Impacts of Road infrastructure under CPEC: A case of Express way-35

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Abstract

Investment under umbrella of China Pakistan Economic Corridor (CPEC) is subject to social and economic development of country at large. One of the key domains of the CPEC is road infrastructure. Development and expansion of the road infrastructure is intended to enhance connectivity for social and economic uplift of the regions. This study investigates the socio and economic impacts of the road infrastructure with special reference to E-35. Study concluded that long term impacts need time to emerge whereas the short-term impacts are being measured using household survey. It is also found that baseline survey with periodic repetition with representative sample from the selected region is required to assess the socio-economic impacts of road projects. A sample of size 2083 was drawn to measure the short-term impacts and it is found that the most immediate benefit of the road is improved access to the public services. However, lack of baseline data and other data constraints led to propose some recommendations at the end of study.

Keyword: Infrastructure, CPEC, E-35, socio economic, baseline

Introduction

Transport infrastructure is hypothesized for the socio and economic growth and is recognized as one of the key pre-requisites to initiate the economic activities. Significance of infrastructure is well recognized for economic development. The term “infrastructure” is very comprehensive as it includes various types of infrastructure. Broadly “infrastructure” is categorized into “hard infrastructure” and “soft infrastructure”. Human capital, skills, institutions, rules and regulations etc. are “soft infrastructure” whereas physical infrastructure consists of transport, communication network, energy, water and sanitation etc. This paper discusses the road infrastructure with reference to E-35 which is connected to motorway-1 under CPEC.

Transport infrastructure particularly road infrastructure is well recognized for its positive economic impacts and hypothesized as one of the key player for economic growth and a mean of connectivity. Developed countries paid significant importance to transport infrastructure and adopted new technologies, innovate transit management and transit services and encouraged privatization of transport sector (Gakenheimer, 1999). In case of developing countries, unavailability of sufficient transportation infrastructure is the major impediment towards economic growth. Lack of transport infrastructure resulted into lack of connectivity among the cities, regional centers and communities which leads to an unequal

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and imbalance socio and economic growth. Poor infrastructure not only hinders the connectivity among economic centers but also creates problems in mobility and accessibility. Lack of transport infrastructure could not make the regions able to attract foreign and private investments and businesses from the globe.

CPEC is the manifesto of bringing growth and prosperity in Pakistan, therefore investment under CPEC is dedicated to establishing pre-requisites for economic development. One of the key domain or sector under CPEC portfolio is transport infrastructure. It includes both rail network and road networks and are being related with socio economic uplift of the region. The research objective of this paper is to investigate the socio-economic impacts of the road projects. To measure the socio-economic impacts of road infrastructure, this study has taken the one of the road projects that is E-35 under CPEC as a case study.

This paper is divided in to five sections. First section reviewed the existing literature on road infrastructure and related socio-economic impacts. Second section described the characteristics of the E-35 followed by third section “Methodology” explained the sampling design, sample size and methods to measure the short term and long-term impacts. Fourth section “Results and Discussions”, presented the results and discussion while last section of the paper provides the findings and some recommendations.

Literature Review

Infrastructure development impacts socio-economic growth in a big way. However, the full potential of investment on developing road infrastructure are ‘significantly enhanced’ when countries invest in complementary infrastructure development, as well. This includes investments in telecommunication and power sectors. Without developing this complementary infrastructure, investments in roads do not pay off ⁽⁵⁾. In its early harvest projects, the CPEC is focussed around building infrastructure with an emphasis on development in power sector and telecommunications, including fibre optics.

Fran et al looked at the impacts of different development projects on poverty alleviation. They evaluated different development projects, including roads, education, poverty loans, telephone, electricity, agriculture research and development, and irrigation and compared each with its impact on poverty reduction. Interestingly, they found that development on roads ranked an impressive third in its impact on poverty reduction, surpassed only by agriculture development and research, and education ⁽⁶⁾.

In 2005, Lumbila, K. N. showed that infrastructure development affects economic growth at several levels. Foremost, countries that have a developed infrastructure are able to reap disproportionately greater benefits on foreign and domestic investment, and economic growth ⁽⁷⁾. Lumbila also showed that countries with no or poor infrastructure are unable to reap any benefits on economic growth. Consequently, a poor infrastructure creates a vicious circle: it inhibits investor interest, thereby causing poor economic growth; and poor economic growth inhibits investments in infrastructure. His study showed that a minimal or a threshold of infrastructure development is essential for countries to come out of the poverty trap. This suggests that there are critical and interlinked infrastructure threshold levels that have to be reached before one can trace the growth and poverty reduction impacts of infrastructure investments. For example, most African countries have yet to reach such infrastructure threshold levels, and understanding this helps to explain why it has been difficult to detect

any significant correlation between infrastructure provision and growth in Africa. Institutional capacity constraints and infrastructure market distortions raise those threshold levels even further.

A comprehensive 2008 study on socio-economic impact assessment of the rehabilitation-reconstruction of Kabul to Kandahar road and the Kandahar to Herat road evaluated an area within the roads' zone of influence – 15 km wide on either side of the road ⁽⁸⁾. The study reported 'considerable travel benefits' that was 'coincident with a significant rise in enterprise and incomes within the roads' zone of influence'. The study also found several socio-economic factors affecting the population based within the roads' zone of influence:

- The villages and settlements appeared to be cultivating more irrigated land.
- Income levels of households increased in constant value terms
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- The total sales of shops in the villages increased in the five years leading to project completion
- More households had cars, generators, and wells as compared with five years ago
- The report also noted several social benefits with the roads' zone of influence:
- School attendance rates increased
- The number of clinics and/or hospitals increased
- Travel times to the clinic or hospitals decreased

The 141-km four-lane expressway in Hebei province, China was constructed in 1998. It has been in operation since 2000. The expressway increased accessibility in nine poor regions across Southern Hebei, where unemployment was high, and majority of villages along the expressway had limited access to roads. A case study on the impact assessment of the Hebei Expressway found significant socio-economic benefits for villages connected by the Expressway, and for people directly and/or indirectly involved in the project ⁽⁹⁾.

Upgrading and construction of the lowest chain of the network at the county and village levels has helped promote area-wide road network operations, linking the expressway with the surrounding networks to boost access for isolated rural areas and extend the socioeconomic benefits of the project. The project roads have benefited more than 6.8 million people in more than 14 counties. The village access roads have provided more than 156,000 rural people from 168 villages direct access to the main activity centers and the overall road network. During 1999-2003, the per capita income of the sample villages increased on average more than 10%. The area of cash crops grew by 72% over the same period. Today, some 1,400 permanent staff are employed in traffic management, maintenance, toll collection, and office management of the expressway. In addition, more than 500 temporary staff worked at the gas stations, hotels, restaurants, and shops in the four roadside stations.

The report on the Hebei Expressway concludes that the project is 'concrete evidence' that a sustainable road transport system improves quality of life.

A study presented empirical evidence on the association between infrastructure investment and economic growth in China. The author created a growth model from panel data of 24 Chinese provinces, between a 13-years period, from 1985 – 1998. The author concluded that transport facilities offer a key advantage and a main differentiating factor in explaining the growth gap ⁽¹⁰⁾.

A landmark study evaluated 100 pre- and post case-studies of Highway and Highway/intermodal projects and their impacts on economic development and land development in the United States ⁽¹¹⁾. The study was funded by the US Strategic Highway Research Program. The study considered all major road projects, including inter-city highways, urban beltways and local access roads. It also studied impacts of bridges, highway interchanges and intermodal road/rail terminals. The study reported the following findings:

- Transport projects guide economic development. They have the potential to impact employment, income, land use, and property values.
- Impacts of road projects unfold over time.
- 85% of the projects recorded positive economic impacts.
- Rural projects are time and cost limited, however so are their economic impact.
- Projects in economically vibrant areas with complementary infrastructure and zoning regulations generate more long-term jobs.
- Projects with coordinated economic development effort facilitate more long-term growth.

In 2007, the IRF Research Council published a report on the socio-economic benefits of roads in Europe ⁽¹²⁾. The report concluded that economic impact of roads and road transport-related sectors on the European economy is, as this study will demonstrate, tremendous. The economic and social indicators studied demonstrate the absolute importance of this sector for the European continent. Following socio-economic benefits of roads highlighted in the study:

- i. Roads and Productivity: Roads are instrumental in sustaining a modern supply chain. The global impact of road transport cannot be ignored: In Europe road freight companies employ hundreds and thousands of jobs in each country. In France, alone, they represent 2% of private sector employment.
- ii. Economic Impact of road construction: Development projects incur economic benefits directly, and indirectly. One benefit of road development projects arises from construction activities directly. Mega road projects create jobs directly related to construction works, during building work and in the planning phases. Road projects also boost production of construction materials which in turn create more employment opportunities. Construction-related investment revenues are also responsible for boosting the economy and creating jobs.
- iii. Revenues collected from road transport: In 2002, the European Commission released a report on vehicle taxation in the EU (13). The report revealed that vehicle-related taxes accounted for up to 10% of the total fiscal income of some EU member states.
- iv. Roads and proximal communities: Communities that are proximal to main roads have high job densities. They also have greater access to work, education, medical care and leisure.
- v. Some other benefits of social impact traced in the paper include access to:
 - Better information
 - Better mobility, migration and social participation and
 - Better quality of life

There is a general consensus that infrastructure matters to growth. In her paper, Munnell strongly concluded that public infrastructure investment has a 'significant, positive effect on output and growth' ⁽¹⁴⁾. Aschauer concluded that 'increases in GNP resulting from increased public infrastructure spending are estimated to exceed those from private investment by a factor of between two and five' ⁽¹⁵⁾.

However, it is equally important to determine which infrastructure matters and when. In 2012, Garsous conducted a meta-analysis of development studies focused exclusively on infrastructure ⁽¹⁶⁾. He noted that infrastructure development was more likely to have a positive impact on growth and output in developing countries compared with developed countries. This led him to conclude that less developed countries are more likely to benefit from infrastructure development.

Garsous' study concludes that infrastructure matters to developing countries. Over the last 20 years, the estimated growth effects of transport investments are not very strong in developed countries. However, the economic impact of transport infrastructure presents a different picture in developing countries ⁽¹⁷⁾. Estache-Fay concluded that roads are important to bridge difference across regions ⁽¹⁸⁾. And Buys et al reported that roads are needed for Africa to catch up with the rest of the world ⁽¹⁹⁾.

A study investigated the socio-economic impacts of Nairobi-Thika Highway Improvement Project in Kenya reported that the development of the road proved favorable to investors and households, who experienced 'increased and improved commercial activities'. The study also revealed that the road construction had opened the market for new ventures ⁽²⁰⁾.

In her paper, Chulanova - a visiting researcher at the Asian Development Bank Institute from July - December 2006 - discussed the importance of poverty eradication through infrastructure development. She concluded that roads are important because they create 'new opportunities for development in all branches of the economy, increases the mobility of the population, promotes social and business activities, opens the way to new markets, and increases the export potential of industrial production' ⁽²¹⁾.

Her paper highlights that roads create a greater access to transport services. Households close to major roads and highways utilize are able to utilize transport opportunities for taking up non-agriculture employment. Moreover, close proximity to roads also increases standard of living and helps eradicate poverty. Roads increase traffic performance ⁽²¹⁾. An efficient transport system shortens distances, which in turn affect the distribution of labour and productivity. There are some direct benefits associated with increased traffic efficiency due to improved roads. They are:

- Time efficiency, in transporting goods and connecting markets
- Fuel efficiency
- Reduced vehicle wear
- Reduced accident rate

Some indirect benefits of traffic efficiency include:

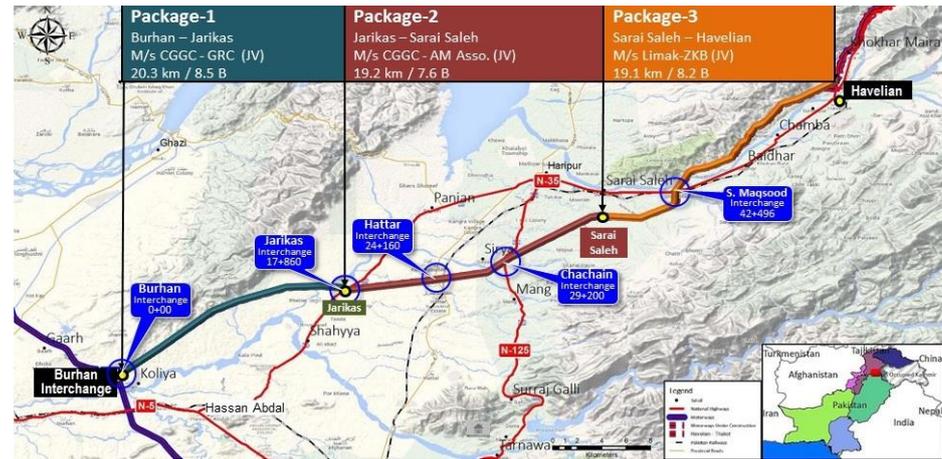
- A greater number of job opportunities
- Improved environmental conditions (noise, emissions) for the population along congested roads
- Growth in the value of the territory due to the creation of industrial and commercial zones
- Increased economical power of municipalities due to better accessibility of transport
- Improved territorial access for tourist's trade and population's leisure time
- Revival of building activity
- Sustainable territorial development

Study Project

Express way-35 (E-35)

Expressway-35 (E-35) is the road project chosen for this study is one of the projects initiated with inception of CPEC. This is Asian Development Bank (ADB) and UK department for international development (DFID) funded project started in March, 2015. It is designed to bridge the link between northern mountainous area and north south motorways with a total length of 59km and 26m in width running parallel to N-35. This road was designed in three phases/packages each with different length. The section of 45 km long has been completed in March 2017. This road will significantly reduce the travel time and cost for both commercial and domestic users.

Figure 1: development phases of E-35



Source: National Highway Authority

Scope of the Project

Scope of any project defined the key features of the project. This section described the key features of E-35 which would help to define significance of the project. This project was initially started as 4-lane project, but later expansion has been made and turned this 4-lane road to 6-lane road. It is a two-way road to support the movement of heavy vehicles with 05 interchanges/intersections. The availability of interchanges or intersections would increase the economic opportunities in the region. This road project will carry 25 bridges to keep the traffic flow smooth and to avoid accidents, traffic jam and rush.

First section after completion was formally inaugurated and opened for the traffic in December 2017. This project initiated with the expectation that with this development new vistas of opportunities will open for the people of this region. As the first section of the road is considered as an important section of the CPEC and will give the opportunities to existing businesses to export their output. This road will also connect these regions with other parts of the country hence reducing the time and cost not only for businesses but also for the common person.

Methodology

Literature reviewed has identified the key indicators both long term and short term to be considered for assessing the socio-economic impacts of E-35 on the life of common people. This needed to collect data from households to realize the fruits of this intervention reaped by the common people. Studies have been found measuring such changes within some defined period after implementation of the developmental project.

Long Term Impact Assessment

Table below listed the developmental projects with their socioeconomic assessment framework. These projects are chosen from the studies carried out by the donor agencies, World Bank, and other research institutes to find out the best practice. Selection of studies is made on two key factors; first, study must have addressed some kind of development project like education interventions, health interventions, road construction, investment fund, micro financing, agriculture, health and other second, it must have some socio-economic evaluation framework. In current study, we look at type of project, database, time period after implementation of project and unit of analysis.

Project Type	Type of database	Unit of analysis
Radio in Nicaragua	Baseline and post survey	Students
Text books in Kenya	Baseline and post analysis through survey	Students and teachers
Nutrition in Uganda	Baseline and post survey	Household
Rural road project in Vietnam	Baseline and post survey	Household
Social investment fund	Baseline and post analysis	Household
Road project in Afghanistan	Pre and post analysis	Household, businessman

Prime focus of the aforementioned projects was to improve the socio and economic conditions at household level. Therefore projects listed above conducted household surveys before and after the implementation of projects to find out the changes created by these projects. Post analysis conducted after five years on average with minimum 2 years, mostly 5 years and maximum after eight years which shows that such changes need time for their emergence. And it can also be concluded that such changes or impacts may classified as long term benefits or changes or impacts of any development projects which took time.

With the same conclusion it is expected that the long term impacts identified from the literature would also take time in case of E-35. As this road opened for traffic six months before, therefore, it would be too early to report the changes or impact at this stage. However, it is important to establish baseline for E-35. For the baseline, short interviews were conducted with relevant departments at “Pakistan Bureau of Statistics” and they strongly recommended to conduct household survey with true representative sample size which is also manifested in studies mentioned in above table. As the study project “E-35” has been opened for traffic six months before therefore, pre analysis is not possible to establish baseline.

If baseline data in is not available different evaluating techniques are being used in the literature for example “Labor Market Program” in Czech, and “PROBECAT” in Mexico

were evaluated using “matching technique”. In this technique, two groups are randomly selected, one is the experimental or participants and the other is controlled or no participative group. After defined period of time, survey is being conducted to match the results.

Based on above discussion, this section concludes that to evaluate any developmental project it is important to have baseline data followed by a survey after a defined period of time to detect the changes in the life of common people. So with this conclusion we have decided to measure the socio economic impacts of E-35 using “matching techniques” after 2 years.

Short term impact assessment:

The second part of analysis, focusing on short term and immediate impacts generated out of E-35 construction. This part of analysis is divided into two sections first, addresses the views of common people from selected sample about E-35 in terms of harm/loss and benefit second, addresses the direct benefit they got in this short period of time.

Sampling Design and Sample Size

To measure the short term impacts household survey has been conducted. A sort self-administered questionnaire has been designed to know the short term impacts.

Two areas are identified benefitted and non-benefitted. All those areas/towns/villages/tehsils from tehsil Haripur and Ghazi directly connected with the road are classified as benefitted areas and other which are not directly linked with road are classified as non-benefitted.

Unit of analysis: individuals with age 18 years and above were selected for the current study from both tehsils.

Sample Size: to draw representative sample from both tehsils, two stage stratified proportionate random sampling technique has been used. A first stratum was defined as a benefitted or non-benefitted and second stratum was defined as urban or rural as presented in the fig 1.

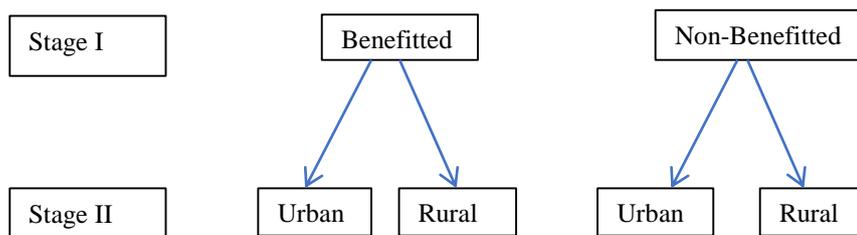


Fig 2: Sample Strata

From each strata selection was made using simple random sampling. A random sample of size 2083 has been drawn from both tehsils with respect to population at 5% precision level.

Self-administered survey was conducted in both tehsils to take the views on two important aspects (instrument attached in annex-I).

Results and Discussion

Descriptive analysis has been made the results are presented in the following tables;

Table I describes the demographic of respondents. From a total sample of size 2083, 78% of respondents were from tehsil Haripur and 22% from tehsil Ghazi. It is because the population of Haripur is greater than tehsil Ghazi. 38% of respondents were from those areas classified as benefit one and 62% of the respondents were part of non-benefit area. 28% of total sample were from urban and 72% from rural areas. It is because tehsil Haripur has both rural and urban units whereas tehsil Ghazi is totally rural area with no urban unit. 25% of the respondents were male and rest were female as it was a household survey therefore majority of the respondents at home were female.

Table 1: Demographic Statistics

Sample Size	2083
Tehsil Haripur (%)	78
Tehsil Ghazi(%))	22
Benefit (%)	38
Non-benefit (%)	62
Urban (%)	28
Rural (%)	72
Male (%)	25
Female (%)	75

Analysis of Section I

Views about E-35:

This section covered two important considerations;

- i. Harm/injury/loss/accident/property loss/ and
- ii. Usefulness for the community

Out of total sample 5% reported that they suffered from the construction of this road development, whereas 78% of total respondents reported the usefulness of this road to the community. Fig 2 shows that 7% of the respondents from the benefited areas also reported some kind of loss and 78% of them agreed with the usefulness of the road. 79% of the

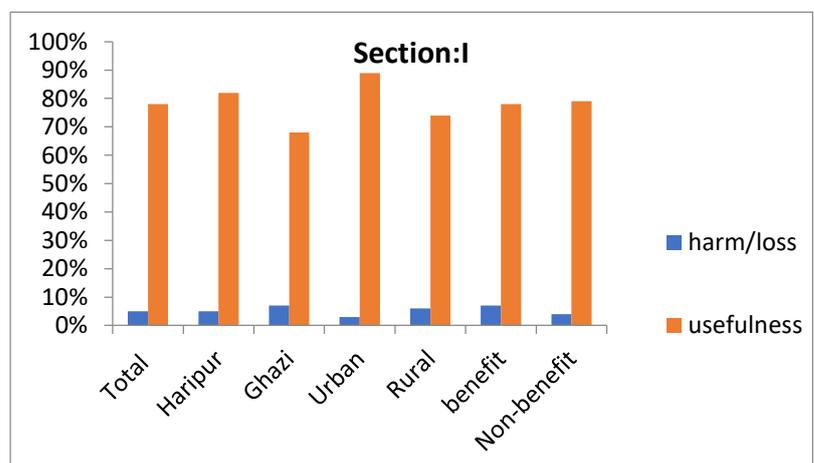


Figure 3: Graphical representation of Section I

respondents from non-benefitted areas reported the usefulness of the road whereas, 4% of reported loss as a result of road construction.

Analysis of Section II

Section II covered the direct and immediate impacts of road to the common people of the surrounding areas. Prime focus of this section was to identify the direct impact people get from this road. This section has four responses;

- i. No benefit
- ii. Improve access to public services (education, health and other) and access to market and other connected towns
- iii. Direct employment they get from the construction of road
- iv. Economic opportunities (tea or other stall, shops etc)

Responses against aforementioned are graphically mentioned in the figure 3 below;

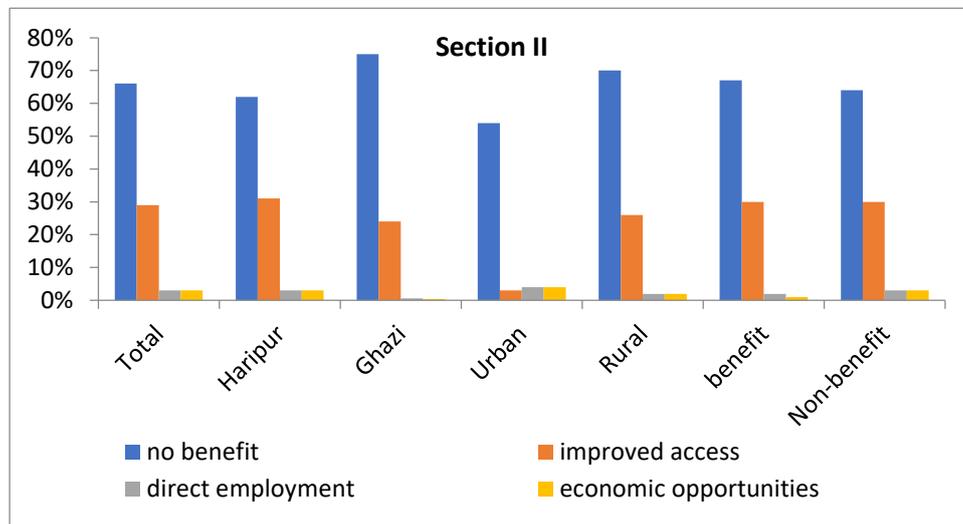


Figure 4: Section II analysis

From figure 3, it can be seen that 66% of total sample reported no direct benefit of the road whereas 29% reported that access to market, public services and connected towns/villages has improved with this road. 3% of total sample reported that they got jobs in construction phase and 3% reported that economic activities increased with road development. If we look at tehsil level, in Haripur tehsil 31% of respondents from this tehsil relate this road with improved and quick access whereas in Ghazi tehsil this percentage is lower than Haripur. If we compare the responses taken from benefited and non-benefitted areas, it is found that both groups have same response toward improve access. 3% of households from non-benefitted group reported employment and economic activities generated with the initialization of this project. Percentage response for the employment opportunities is very low which shows that this road did not open much jobs for the local residents of this region but it is worth mentioning that the number of workers employed for this project mostly were Pakistani.

Conclusion and Recommendations

Transport infrastructure particularly road is the cheapest mean of connectivity. A well connected region with improved and efficient road networks not only catches further investment but also boost the scope of economic activities. With same expectation, E-35 has been developed to strengthen the region socially and economically. Jobs which have been created in construction phase were temporary however the permanent addition in physical infrastructure would generate and facilitate the socio and economic growth this lead to generation of long lasting job opportunities and sustainable development. However, this study found short term impacts of road construction including, temporary jobs, improved access to the available public services including education, health and child maternal health. It is also found that although percentage of Pakistani labor force was higher in construction phase but the survey evident that local participation was low in development and construction of this road project.

Based on the literature review and conclusion drawn above, following recommendations are suggested;

- i. For effective implementation of projects it is suggested that monitoring and evaluation of the project should be part of project framework.
- ii. Every project which is being relate with the improvement of life of common people, should have some baseline data.
- iii. Project implementers themselves work to establish baselines or some kind of pre project analysis.
- iv. Wild life movement hindered with the development of this road projects has increased the resentment of people of that area which make us to put a recommendation to involve local residents to minimize the damages may occur as result of project.
- v. It is also recommended to include the comments of local people in pre-feasibility of every project by the implementers.

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