



Impact of Bridge Construction for Improved Livelihood in Rural Area

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Abstract

Nepal has thousands of rivers flowing over its terrain. It needs many bridges for smooth transportation. In this background, this study highlights impact of road bridges like infrastructures on rural livelihood and importance of the local participation in such infrastructure development programme. The study area as the Zone of Influence of Chirdi Khola is ward no. 7 and 10 of Phalebas Municipality which has 1026 households and 4423 populations. Household survey, focus group discussion, key informant interview, observation techniques were used for collecting primary data whereas secondary data were generated from district profile and table review. This study reveals that the bridge has directly or indirectly played crucial role in increasing the freight volume, decreasing the freight cost, increase in number of peoples seeking health facilities through health centers. Local peoples participated to identify the need of bridge and cooperated during the construction of bridge for effective implementation. Motorable Bridge plays vital role in social upliftment and generating the new ideas of income generations. This study also put some light on how Motorable Bridges are constructed in local levels through different programmes, Departments of Nepal Government and the role of District Development Committees in Motorable Bridge projects.

Key words: Bridge, infrastructure development, livelihood, rural development, transport infrastructure, zone of influence

Introduction

Development is both a physical reality and a state of mind in which society has through some combination of social, economic and institutional process secured the means of obtaining a better life (Todaro & Smith, 2006). Infrastructure development has a key role to play in both economic growth and poverty reduction. The infrastructure supply and services are particularly poor in rural areas of Nepal. A massive investment campaign for the construction of new rural infrastructure and maintenance of existing infrastructure in low income developing countries is long overdue. Without such a campaign, the many plans, goals, and targets-including the Poverty Reduction Strategy Papers, the Millennium Development Goals, and many other declarations-wills not be achieved in Nepal.

Physical infrastructure refers to the basic physical structures required for an economy to function and survive, such as transportation networks, a power grid and sewerage and waste disposal systems (Das, 2017). Among different physical structures, transport infrastructures play primary role for uplift of rural livelihood. Isolation and lack of access (aggravated by absence of adequately

maintained local roads and Bridges connecting them) are one of the primary reasons for high incidence of rural poverty in Nepal. It is evident from the poverty disparity that there are strong connections between poverty and access to economic and social services (LRBP, 2014). It is not unusual for children to walk two to three hours to school, for a family to walk half a day to the nearest weekly market, and for a pregnant woman to walk two days to a health post. The performance of the agricultural sector, which generates about 30 percent GDP growth in agricultural output, reduced 1.5 percent on average per annum (LRBP, 2014). Most often, rural crops and products are not adequately sold in the markets. Lack of access like Motorable Bridges is a serious constraint for economic and social development, incurring huge economic costs like cost of travel, health cost and inflated prices of commodities for people (LRBP, 2014).

In rural development, roads are built to improve people's mobility and enhance access to markets, administrative centres, schools and health posts, and are credited with important socio-economic changes. In Nepal, due to its geological condition and higher population living in remote areas; rural infrastructure and transportation system is a major factor for country's development. Lack of access to roads with reliable motorable bridges is a significant constraint on economic and social development in Nepal and imposes huge economic costs on local people including increased costs for travel, health services and commodities. In response to this, the Government of Nepal (GoN) has prioritised improving access by building roads connected by bridges.

Motorable bridges are important for development of rural areas but at the same time construction is complicated process. Further, bridge construction should be emphasized in courses of engineering studies in various academic levels with the participation of local people and local government. It should be known that Bridges are very costly to construct and for country like Nepal, it is difficult task to construct Bridges to meet all Bridge demands. Local Roads Bridge Programme (LRBP) is one such bilateral project between Nepal and Swiss Government which has been working in generating knowledge and transfers of technologies to different stakeholders (LRBP, 2014).

Every year there is huge number of demands of motorable bridges in Nepal which is impossible to meet all at same year or planning phase. So, selection of demands is a strong challenge, which needs to be addressed by proper bridge selection and prioritization criteria including various factors to select by using scoring method. DoLIDAR has already initiated with one such process which is very helpful and scientific at same time. There is no denying that motorable bridges are very important for development of rural areas and the whole country, so it has great prospects in Nepal for economic and social development of the rural people.

Thematic Review: Rural Development

There is no universally accepted definition of rural development. The term is used in different ways in vastly divergent contexts. As a concept, it connotes overall development of rural areas with a view to improve the quality of life rural of people. As a phenomenon, it is the result of various physical, technological, economic, socio-cultural and institutional factors. As a discipline, it is multi-disciplinary in nature representing an intersection of agricultural, social, behavioral and management of sciences. In short, rural development is a process that aims at improving the standard of living of the people living in the rural areas. To bring out the overall development, rural development is a strategy. Rural development is one of the reliable means for overall development and agriculture road is a part

of rural development. The concept of rural development encompasses a wide spectrum. Diversity of views exists regarding the term rural development. It is one of the most vital issues of the day. Various schemes to promote rural development have been launched but the concept of rural development is still vague. In this sense, rural development is general multi-dimensions. In the purely economic sense, it covers development of the agriculture and allied activities and social facilities, beside development of human resource in the rural areas.

Infrastructure and Transport Infrastructures

Economists and urban planners distinguish two types of infrastructure: economic infrastructure and social infrastructure. Economic infrastructure is defined as the infrastructure that promotes economic activity, such as roads, highways, railroads, airports, electricity, telecommunications, water supply and sanitation. Social infrastructure as schools, libraries, universities, clinics, hospitals, courts, museums, theatres, playgrounds, parks, fountains and statues is defined as the infrastructure that promotes the health, education and cultural standards of the population – activities that have both direct and indirect impact on the welfare. All these institutions entail capital goods that have some public use (Fourie, 2006).

Transport infrastructure refers to the framework that supports our transport system. It provides a basis for economic activities in the rural areas in the long term. Difficult topography and unstable geology make the road condition difficult in the rural hills of Nepal. Beside the predominantly absolute poverty in the region realizes the essence of the appropriate approach in the road construction. With its approach of providing to be a sustainable way of constructing rural roads. Environment friendly construction techniques, participatory and decentralization approach, optimum utilization of natural resources, simple technology, local capacity building, and self-help efforts justified green road approach as the best way of constructing rural roads in hilly districts of Nepal (Mulmi et al, 2009).

A bridge is a structure built to span physical obstacles without closing the way underneath such as a body of water, valley, or road, for the purpose of providing passage over the obstacle, usually something that can be detrimental to cross otherwise. There are many different designs that each serve a particular purpose and apply to different situations. Designs of bridges vary depending on its function, the nature of the terrain where it is constructed and anchored, the material used, and the funds available. Most likely the earliest Bridges were fallen trees and stepping stones, while Neolithic people built boardwalk Bridges across marshland.

Road/Bridge Infrastructure and Rural Livelihood

Administrative classification of roads is intended for assigning national importance and level of government responsible for overall management and methods of financing. According to this classification, roads are classified into: National Highways (East to west and North to South), feeder roads (connect district headquarters, major economic centers, tourism centers to national highways or other feeder roads), district roads (important roads within districts serving area of production markets, connecting each other or with the main highways), urban roads (roads servicing within urban municipalities). In Nepal, overall management of National highways and feeder roads comes within the responsibility of Department of Road (DOR) and these roads are collectively called Strategic Road Network (SRN) roads. District roads and urban roads are managed by Department of Local Infrastructure Development and Agricultural Roads (DOLIDAR) and these roads are collectively called Local Roads

Network (LRN) roads (NRS, 2013). As per Nepal Bridge standards 2067, Bridges are classified as: Culvert (length up to 6meter), Minor Bridge (When length ≤ 50 m (with span ≤ 25 m), Major Bridge (When span > 25 m or length > 50 m (with smaller spans), Special Bridge : require special design considerations, whose construction features (e.g. concrete girder bridges with > 50 m span, steel trusses > 100 m span, arch Bridges, suspension bridges, cable-stayed bridges and other nonstandard bridges) (NBS, 2010).

Peoples' Participation in Infrastructure Development Projects

The concept of people's participation has gained much significance in the rural development programmes. Participation in development is usually said to mean the full involvement of the people in development which affect their lives regardless of gender, race, age, class, sexual orientation or disability. People's participation has been widely used in the discourse of development for last few decades and it has become a worldwide phenomenon, without which. It is impossible for administration to function effectively. The failure of past development efforts was largely distributed to the lack of people's participation. Development was carried out for the people, but not by them. In response, the emphasis shifted to total development efforts and involvement of people in development activities. Participation has come to be recognized as an absolute imperative for development. Some even argue that development, in fact is participation (Shodh Ganga, 2019).

Transport Infrastructure Development Status

The rural transportation infrastructures are very essential elements for the development of the country. In ancient Nepal, there are several trade routes connecting India and China. At that period the entire mode of transport was non-motorized. The country developed motorized transport system only after 1951. The development of rural transportation infrastructures was done only after the people movement 1990. Motorable bridges are a major contributor in supporting rural transportation system. Transportation is very important for development of socio-economic condition of any country and its rural areas. Without transportation, people will be away from the access of goods and services and falls behind the development line.

Since bridge connects local population to each other, provides improved access to service and facilities and its construction plays vital role in rural development of nation. Due to this reason, Nepal is building different types of road bridges in road network. In strategic road network DoR is constructing the bridge projects form its bridge section and DoLIDAR is constructing road bridges in local road network in order to make the road sections all weather. Local Roads Bridge Programme is the main programme through which motorable Bridges are being built and maintained in local road network throughout the country. List of Bridges are being maintained by Bridge information management system and technical assistance is being provided from SDC funded Local Roads Bridge Support Unit. Bridge construction in Nepal is in increasing trend from which it is expected to improve the livelihood of adjoining populations.

Methods and Materials

The research based on to investigate the impact of motorable bridge on rural people's livelihood activities and benefits to them with the use of both the qualitative and quantitative nature of the data. Quantitative data is analyzed and interpreted quantitatively with the help of statistical

tools as frequency, percentage whereas qualitative information was analyzed through the process of discovering, generalizing, classifying and analyzing. Parbat district is a hilly area of Nepal with diversified geographical features. Empirically, this study was conducted in ward no 7 and 10 of Phalewas Municipality of Parbat District focused on the Zone of Influence (ZOI) of Chirdi Khola Motorable Bridge. Phalewas Municipality covers an area of 85.70 km² and has a population of 24,687. Karkineta, Thapathana, Shankarpokhari, Mudikuwa, Khanigaun, Devasthan, Limithana, Thanamaula, Bhangara, Pangrang and some parts of Kurgha Village Development Committees (VDCs) were incorporated to form Phalewas Municipality. This municipality came into existence on 10 March 2017. This bridge lies on alternative road to the Butwal. The bridge plays vital role to connect people of southern area to reach Kusma bazaar for services and facilities. The available means of transportation is bus, truck, tractors and jeep. These means help farmers to transport their farm products to markets, promotes the export of cash crops and import construction materials, consumer goods. In ZoI, there is 19.11 km earthen road and one motorable bridge is constructed.

Results: Change in Freight Cost and Freight Volume

Basically, transportation infrastructure including roads, bridges shows different impacts for the rural livelihood improvements of rural people. The impacts generated are both beneficial as well as adverse but there are more benefits. The food sufficiency level is one of the most important indicator and tool of mapping poverty and assessing vulnerability. Transportation infrastructure provide surplus amount of production of food grains. As increase in rural transportation facilities, it leads to decrease in freight cost and increase in freight volume. Basically, food products like rice, cereals, cooking oil, and cooking gas etc. are imported to rural areas while seasonal fruits, vegetables and milk products are directly exported from rural areas to the other parts of the country. Rural people are benefitted by increased transportation infrastructure as it leads to export and import of daily needs and provide markets to sell their local products.

Considering fuel inflation, the average freight cost is decreased by 16.67 percent. Before Bridge construction, the common mode of transport for freight was truck/tractor, which cost approximately NRs. 0.060/kg/km. In order to quantify the decrease rate, inflation price of diesel is considered here as – When diesel price = NRs. 81/-, freight cost = NPR 0.05/kg/km.

When diesel price = NRs. 91/-, then expected freight cost per kg/km = $0.05 \times 91/81$
= 0.06

But, actual price per kg when diesel price = NRs. 91/- is NRs. 0.05/kg/km

Hence, % decrease in freight cost = $\frac{\text{Expected Price} - \text{Actual Price}}{\text{Expected Price}} \times 100$
= $0.06 - 0.05 / 0.06 \times 100 = 16.67\%$

Thus, as shown above the actual decrease in freight cost is 16.67 percent. Respondents responded that before bridge construction, transportation was totally closed for about three months during monsoon but motorable bridge, vehicles are crossing Chirdi Khola without any difficulty during monsoon. This shows that peoples in the ZoI are benefitted for easy transportation of food materials and other consumables by Bridge construction.

The freight volume as per informants for year 2018/2019 is 41,458 kg/month. In which mostly food product like rice, dal, oil, gas, vegetable etc. are imported. Before bridge construction, freight volume altogether was 31,650 kg/month which shows that the freight volume increased by 30 percent.

Most of the seasonal fruits like orange, banana and milk are directly exported by business personal from ZoI themselves and some of Seasonal fruits and vegetables such as orange and honey are locally sold by shopkeeper.

Change in taking physical (education and health) facilities: Adequate and reliable transport services are fundamental to healthy rural communities, as it touches many aspects of a personal life. Transportation can affect a person's access to proper education and health care services. Poor transportation infrastructure may result in missed or delayed health care, increased health expenditure and overall poorer health outcomes as well as poor education facilities. Rural people are more benefitted by developed transportation infrastructure, as people are getting better access towards sound health facility. Therefore, transportation also can be a vehicle for wellness of rural people. For the assessment of accessibility of such physical facilities, the facilities were classified as primary school, secondary school, college, telephone, medical centers, sub health posts, health posts, hospital, veterinary service centers, agriculture service centers, local markets, district markets, district headquarters and road head. Information was gathered with regard to these facilities in terms of location, travel time, and mode of transport.

Table 1. Facilities and Services based on Travel Time and Cost

Facilities/Services	Walking time (minutes)	Vehicle time (minutes)	One-way travel cost (Rs)	Frequency (annual)
Primary School	14.59	0	0	
Higher Secondary (+2)	29.71	9.72	9.52	
College	53.30	27.83	36.38	
Health /Sub health post	38.99	27.00	29.78	11
Medical/Clinical facilities	27.20	31.25	60.00	10
District hospital	40.67	130.00	250.00	4
Veterinary Center	39.50	42.90	69.59	3
Local Market	23.79	12.27	18.04	
Main Market	52.58	88.10	174.34	11
District headquarter	42.93	130.00	250.00	9
Road head	5.86			

(Field Survey, 2019)

Effects on agricultural development: Agriculture plays an important role in the process of economic development of rural areas. Not only provide food to the people, agriculture, also releases labor, provides saving, contributes to market of industrial goods. So, road, bridges type of transport infrastructure plays an important role in agricultural development. This is because it is the major means of transporting agricultural produce from the farms to the markets as well as to the various urban communities. The development of rural infrastructure helps to enlarge markets with greater access to factor of production. Similarly, the female labor participation rate increases as traditional taboos against it are overcome. A good road system also aids agriculture indirectly by breaking up the isolation of villages, spreading education and creating a general sense of awakening.

Effects on Social and Cultural Aspects

Out of the total 280 respondents, the highest proportion i.e. 212 (75.7%) reported that the bridge affected positively in social and cultural properties (Table 2). Likewise, among 280 respondents, the lowest proportion i.e. 68 (24.3%) reported the bridge did not affect on social and cultural properties. Some informants informed about the high mobility of different people both in and out from the study area. People are even forgetting local culture and heading towards modernization. They are leaving their land barren and expending money in fast food and imported food items is increasing. Thus, the invention of new development can affect directly and indirectly in different sectors of rural society. Development of roads, construction of bridges may also be known as the development of modern technology in rural areas of Nepal, which have both positive and negative impacts on social and cultural aspects or properties of rural life. Such developed services directly and indirectly affect in traditional attitude, eating, speaking, clothing and behavior of rural people. However, such facilities may draw the people especially the youth towards a type of urban modernization. Further, the movement of people to-and-fro exchanges the knowledge, new technologies, beliefs, values and interlinks the people.

Table 2. Effect in Social and Culture Aspects

Effect	Number	Percent
Yes	212	75.7
No	68	24.3
Total	280	100.0

(Field Survey, 2019)

Establishment of Micro Industries and Business

As reported by the informants, there are huge productions of Orange, Ginger, Amliso, oney and milk in the Zone of Influence area. Before construction of Chirdi Khola motorable bridge, these products were transported using porters and sold in markets in low price. But after construction of bridge, producers are transporting their products in District Headquarter, Pokhara and other market centers and are getting more returns. Also, people are benefitted to transport their agriculture products (rice, wheat, cereal crops, and vegetables) from left bank to right bank of the river and vice versa. Traditional agricultural systems are being modernized to enhance income generation due to access to new technologies. After construction of bridge, one milk cooling center, one poultry farm, one storage center, few grocery and small hotels are stabilized in the area. This showed that the people's livelihood is enhanced by the construction of bridge.

Local People Participation in Bridge Construction Project

People's participation is essential for better implementation of any development activity. People's participation keeps the problems of the community and ensures efficient and smooth implementation of the various plans and rural development programmes. In this regard, participation of local people for construction were as following. Problem identification and demand: Informants responded that local people including political leaders, businessmen, and social workers were gathered to understand the basic problems of the people of the locality. They identified problems to transport local products, food, poor access to health, education, employment.

Cooperativeness to solve problems: Most of the informants responded that the local mass was very cooperative towards bridge construction. As reported by the respondents, local people were not

involved in project planning, formulating the plan but get encouraged from DDC/DTO to support in bridge construction activities. Local people's cooperativeness resulted in successful implementation of bridge project.

Involvement during construction: Majority of people involved in coordination and problem-solving activities whereas few numbers engaged directly in construction work. Locals were involved in gabion wall construction, masonry wall construction and concrete transportation. Since there are more technical tasks in bridge construction, skilled workers were hired from another part of country and even from India. However local peoples were involved for other supports like coordination, local problem solving, supporting technicians for quality control, identifying the source of materials, maintaining safety at the working site etc.

Conclusion

The availability of adequate infrastructure plays an essential role for both economic growth and poverty elimination. As the government of Nepal has realized the need of rural roads, bridges like infrastructures and puts the major emphasis on rural road network development one of the important sectors within the framework of its Ninth Plan. Improved infrastructure leads to expansions of markets and economies of scale. Therefore, any investment that helps to increase rural production, income and employment is expected to reduce poverty. Access to better health and education usually improves more rapidly along roads than elsewhere. Rural roads link communities to the main transport system and market. It plays a key role in promoting rural income growth and reducing poverty.

Based on the result, it can be concluded that the motorable bridge is very important as more than eighty percent respondents were using this bridge. Life of the community people was very difficult to get access towards service and facilities before bridge. After the construction of this ridge, it enhanced the transportation system and provided easy access towards service and facilities. It makes easy to transport the food and materials and other commodities to make their life easier. Local productions got better value in market centers and income generation became better than before. Moreover, the movement of people to-and-fro helped to enhance the knowledge, skills and access to new technologies on different aspect.

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