

Assessment of Users' Priority for Rural Road Development Work: A Case Study on Tangail District

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ABSTRACT

In Bangladesh, there is no such provision for assessment of users' priority in rural road development works. This study attempts to show the significance of this issue by assessing users' priority for different types of rural road development works. Users' priority varies from socio-economic characteristics of rural areas. Due to this variation, priority assessment is not the same for all upazilas which should be an important consideration in rural road development projects. In other Asian countries like India, Nepal, users' participation in rural road development projects is regarded as a crucial part. But in Bangladesh, there are no such initiatives for users' participation in planning, implementing and monitoring rural road development projects. For this reason, rural road development projects are not properly assessed the users' demand. This study explores such issues through the assessment of users' priorities which should be considered for sustaining the rural road development works and thus helping them to contribute a lot in the rural economy.

Keywords:-Rural road, user group, population, development

INTRODUCTION

Rural roads are one of the most important infrastructures for economic growth of the rural areas. According to 'Planning Guidelines for Rural Road Master Plan 2010', rural roads are the virtual lifelines for the vast multitude residing in rural areas. They contribute significantly to generating increased agricultural incomes and productive employment opportunities, promoting access to economic and social services. By providing rural access, they contribute to poverty alleviation [5]. In Bangladesh, about 76% of the total population lives in the rural areas and rural roads of about 3, 21,462 km which constitute almost 93% of the total roads

serve this huge population. But unfortunately it is acknowledged in the 7th Five Year Plan (quoted by Ministry of Local Government and Rural Development) that 14.5% of Upazila Road, 58.5% of Union Road and 82.1% of Village Road which constitute rural roads are unpaved in condition [7; 6]. In addition, above 50% of Union and Village roads are in poor conditions which have an adverse effect in the rural economy of Bangladesh. As rural roads serve a huge population, the rural economy has a significant dependency on them. So, to foster the rural economy, rural road development works should be in prime consideration.

According to the approach titled 'Strategy for Rural Road Development 1984', rural roads are considered as one of three primary infrastructural elements in the rural development projects initiated by the Govt. of Bangladesh. All the rural roads in Bangladesh are under the authorization of Local Government Engineering Department (LGED), so all the rural road development works are authorized by this department. Although LGED spends a considerable amount of resources for the improvement of rural roads, the selection of roads from a large number of candidate roads is not undertaken through a rational selection process. Consequently, many roads of higher priority often remain neglected while roads of lower priority are allocated resources for development and/or upgrading [6]. Beside these, geographical characteristics of rural areas and users' assessment should also be considered with importance which remains unassessed. Sometimes lack of assessment of priority issues becomes the underlying cause for the failure of the rural road development projects. In the developing countries like India, Nepal, participatory approach is a crucial part in the policy framework of their rural road development works in which users are involved in decision making, policy formulation and investment related issues [8; 4]. So, for the effective utilization of available resources, assessment of users' priorities is a dire need for planning, implementing and monitoring the rural road development works which further helps in sustaining the projects and achieving their goals [8]. This issue is also recommended in the study titled 'Bangladesh Rural Infrastructure Strategy Study, 1996' which was conducted by jointly GoB and the World Bank in 1996 [7].

But in the current practice of LGED, there is no standardized methodology for prioritization of rural roads and no provision for user participation in

planning, implementing and monitoring of rural road development projects whereas user participation in priority assessment is a decisive part in the rural road development works. Therefore, the study focuses on the assessment of users' priority for rural road development works. This assessment is based on some influencing factors; such as, socio-economic class of the user groups, nature of different rural road development works, geographical features of the rural areas. Subsequently, it attempts to identify particular users' priorities and issues which may remain unassessed by the authorities. So, this study firstly identifies the user group of the rural roads and then assesses their priorities in a concise manner.

METHODOLOGY OF THE STUDY

To conduct this study, all the upazilas of Tangail district are selected purposively as the study area because there have been recently conducted rural road development works which help to fulfil the purpose of assessing the users' priority. In each upazila, 3 roads were selected purposively by the LGED engineers and the criteria behind the selection are based on three category of rural road development work: improvement work (change in surface from earthening to Bituminous Carpeting (BC) or Herring-Bone-Bond (HBB) to BC), further improvement (change in surface from HBB to BC) and the last one is periodic maintenance (which was conducted about six months ago). All these roads were in the category of Village road A, B and Union road. Upazila Roads were not considered because the assessment is based only on the low traffic volume. Prior to this, review of relevant literatures, project documentation are conducted to identify and discuss some particular issues which are common for the study and the other issues which are seemed to be important and should be focused in this study. Relevant literature review helps to

find out those particular issues assessed by the user group which have an impact on rural road development works and to explore the variation of methodologies which are applied to assess those priorities in rural road development works. Checklist was formulated to identify the connected and adjacent villages of the rural roads to determine the threshold population served by the different category of rural roads. Both primary and secondary data are used in this study. Local people in total of 200 categorized by age and occupation group from 140 villages of all upazilas who are the users of the rural roads were surveyed to get information about the impact and priority assessment of rural road development works. A systematic random sampling technique was used for this surveying. From the meeting with LGED officials, information about recent rural road development work based on those three categories were collected. Population and Housing Census 2015, Economic Census of Tangail District 2013, Planning Guideline for Rural Road Master Plan 2010 were used to estimate the threshold population of the study roads and to gather information on socio-economic status within the upazilas of Tangail district and other relevant information used in this study. Finally, data were analyzed using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel. Mathematical tools like priority index and range are used and district map of Tangail was interpreted for further analysis.

AN OVERVIEW OF TANGAIL DISTRICT

Location

Tangail district is 13th largest district of Bangladesh by area and the fifth largest by population. In respect of Dhaka, it is the largest district of Dhaka division by area and the second largest by population following Dhaka. It lies between 24° 01' and 24° 47' north latitudes and between 89° 44' and 90° 18' east longitudes. This

district is surrounded by Jamalpur district on the north, Dhaka and Manikganj districts on the south, Mymensingh and Gazipur on the east, and the Jamuna River on the west. The district is crisscrossed by roads. National Highway 4 (NH 4), which connects Dhaka with North-west Bangladesh through Jamuna Bridge passes through this district. There are 12 Upazilas (sub-districts) and nine paurashavas (municipalities) within the district. Ghatail is the largest upazila in terms of area and Tangail Sadar is the largest upazila in terms of population size [6].

Demographic Information

Tangail district covers about 3,414.28 sq. km. The density of population is 1,056 per sq. km. Total population of Tangail District is 36, 05,083 where the urban population is 5, 43,785 and the rural population is 30, 61,298 which is about 85% of the total population. In case of rural population the total number of male is 14, 84,420 and total number of female is 15, 76,878 where female population is higher than male population [2].

Socio-Economic Information

The total population in rural areas engaged in economic activities is 75.82% of the total population. As a whole, working male portion is 89.26% and working female portion is 10.74%. Major economic activities of the population are mainly commercial (wholesale and retail trade, repair of motor vehicles, manufacturing, transportation and storage) in which about 73% people are involved while others are involved in other economic activities like, education, accommodation and food service activities [3].

Overview of Upazilas of Tangail District

There are 12 Upazilas in Tangail district: Basail, Bhuapur, Delduar, Dhanbari, Ghatail, Gopalpur, Kalihati, Madhupur, Mirzapur, Nagorpur, Shakhipur and Tangail Sadar. An overview of these 12 upazilas and distribution of growth center

and rural markets across these upazilas are shown below in Table 1.

Table 1:-An Overview of Upazilas of Tangail District

Upazila Name	Area (sq. km)	Density (per sq.km)	Number of Growth Center	Number of Rural Markets
Basail	157.17	1017	4	36
Bhuapur	225	844	2	41
Delduar	184.54	1123	5	16
Dhanbari	133.75	1316	3	15
Ghatail	451.3	926	8	31
Gopalpur	193.37	1305	4	33
Kalihati	295.6	1388	6	72
Madhupur	366.92	809	12	21
Mirzapur	373.88	1091	4	51
Nagorpur	262.7	1097	3	74
Shakhipur	435.19	638	5	44
Tangail Sadar	334.26	1559	21	23

Source: LGED, 2016 (Collected from Planning and Prioritization of Rural Roads in Bangladesh, 2016)

In respect of area, Ghatail is the largest upazila and Dhanbari is the smallest one. Moreover, most densely populated upzaila is Tangail Sadar and least densely populated upazila is Shakhipur. Highest numbers of growth centers are located in Tangail Sadar and lowest numbers of growth centers are found in Nagorpur and Dhanbari where Nagorpur has 74 rural markets whereas Dhanbari has only 15 rural markets.

Rural Road Development Work in Tangail District The length of total road network in Tangail district is 7,592.36 km of which rural roads are in total 7,121.36 km maintained by LGED. Within the LGED network, Union Road, Village Type A and Village Type B roads are of 1,112.88 km (Unpaved 58%, Paved 42%), 2,868.08 km(Unpaved 86%, Paved 14%), and 2,243.36 km(Unpaved 95%, Paved 5%), respectively..

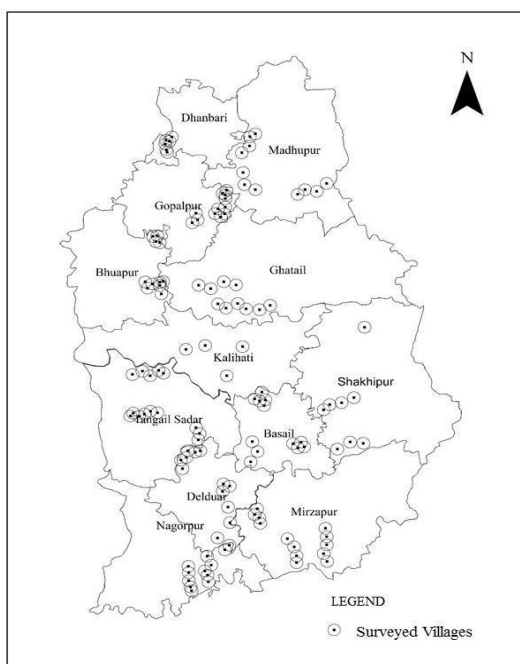


Fig.1:-Tangail District Map and Selected Villages for Surveying (Source: Field Survey, 2017)

This study mainly considers three types of rural road development works. They are: improvement work (change in surface from earthening to Bituminous Carpeting (BC)), further improvement (Herring-Bone-Bond (HBB) to Bituminous Carpeting (BC)), and the last one is periodic maintenance which was conducted about six months ago as mentioned earlier. The nature of these types of rural road development works are changed in such a way that when improvement work has been conducted, at a specific time later those roads are transferred to the authorization of the

periodic maintenance work. The further improvement works are also gone through this procedure. (LGED Interview, 2017). There were surveyed local people from 140 villages of 12 upazilas in Tangail district which were shown in Figure 1.

IDENTIFICATION OF USER GROUP

To assess users' priorities for rural road development work, firstly it is important to identify the user group based on their socio-economic profile: age, gender, occupation and income. It is necessary for the assessment of priorities against the socio-economic profile of user group.

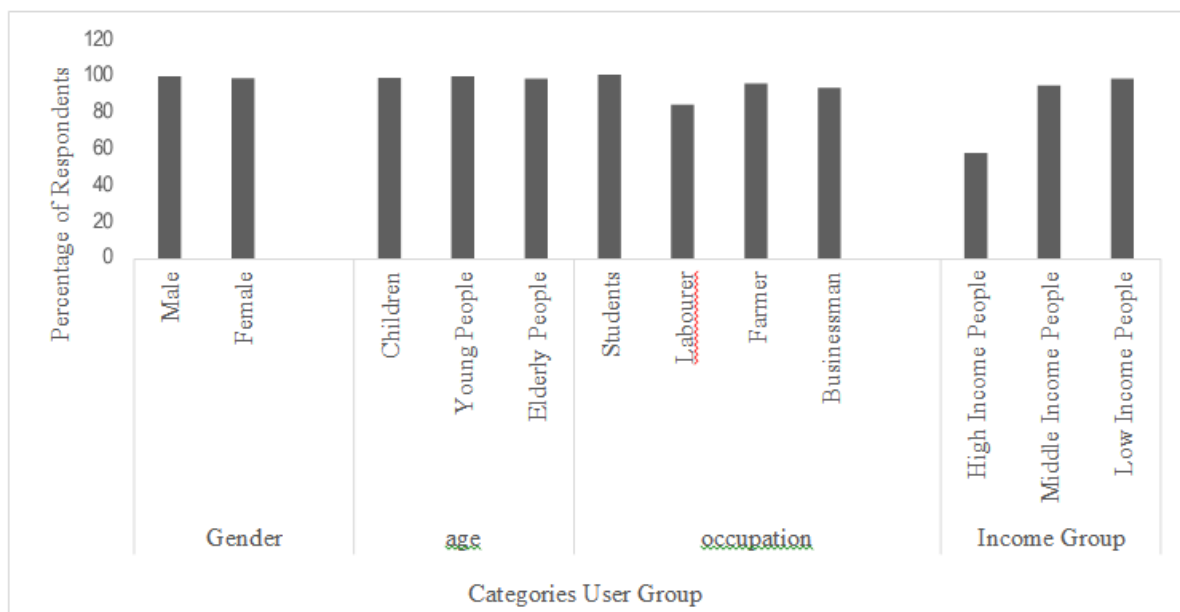


Fig.2:-User Group of Rural Roads (Source: Field Survey, 2017)

Figure 2 shows that percentage of respondents who identified the user group based on their gender, age, occupation and income group. It is seen that almost all user group use the rural roads while some respondents identified the least user group as high income group. Again, labor class uses the rural roads comparatively less than other social class of people according to the respondents. It also shows that male and female both equally use the rural roads.

ASSESSMENT OF USERS' PRIORITY FOR RURAL ROAD DEVELOPMENT

WORK

Priority Criteria for Rural Road Development Works

As mentioned earlier, three types of rural road development works are assessed in this study. Rural road improvement work is the first one which means changing the road surface from earthen to HBB/ BC. The criteria selected for this type of rural road development work on which users give their priorities are: Population Served, Facilities Served (Institutions, Hospitals etc.), Growth Center (GC)/Rural Markets served, Connectivity to higher roads and

other centers, Presence of gap and Duration of submergence. For Rural Road further development work, the selected criteria to be prioritized are: Traffic Volume (Number of vehicles), Road Geometry (Width, lane number), Pavement Type (Bituminous, HBB), Road type (Upazila, Union and Village), Population served, Facilities Served (Institutions, Hospitals etc.) , Growth Center (GC)/Rural Markets served , Connectivity to higher roads and other centers , Presence of gap , Duration of submergence. And for Rural Road Maintenance Work, the selected criteria to be prioritized are: Number of vehicles for maintenance, Last maintenance year, Road type (Upazila, Union and Village), Population Served, Facilities Served (Institutions, Hospitals etc.), Growth Center (GC)/Rural Markets served, Connectivity to higher roads and other centers, Presence of gap, Duration of submergence.

Assessment of Users Priorities Based on their Socio-Economic Profile

Due to variation in criteria of rural road development works, the priorities vary from user to user based on their behavior and socio-economic profile. It is seen that population served is the highest priority criteria for all class of people. These figures also show some important issues such as, highest priority criteria for shopkeeper is growth center/rural roads served whereas facilities like institutions and hospitals served has got the highest priority for the students. It is prominent that users' priority is much dependent on their socio-economic because they prioritize only those criteria which serve their own purpose and facilitate them to lead their life. It is also another major finding that there is no such variation in their priorities based on their socio-economic profile for different type of rural road development works.

Assessment of Users' Priorities within all Upazilas of Tangail District for Specific Rural Road Development Works

To assess users' priority within all upazilas of Tangail district for rural road development work, priority index and range are used. These two mathematical operations help to assess the variation of users' priorities for different rural road development work within 12 Upazilas of Tangail District.

Priority Index

PI of a particular criteria for a specific rural road development work in a particular Upazila = ((Highest Priority Index * No of respondents given highest priority) + (Moderate Priority index

No of respondents given moderate priority) + (Least Priority Index)* (No of Respondents given least priority))/ Total Number of Respondents responded for that criteria. The scale determined for highest priority is '3', moderate priority is '2' and least priority is '1'.

As example:

PI of Population Served in Basail Upazila for Rural Road Improvement Work= $(22 * 3 + 0 * 2 + 0 * 1) / 22 = 3$; where No of respondents given highest priority=22; No of respondents given moderate priority=0; No of Respondents given least priority=0; Total Number of Respondents responded for Population Served=22.

Range

Range of priority criteria for a specific rural road development work in a particular Upazila = Highest Priority Index of Priority Criteria- Lowest Priority Index of Priority Criteria

As example: In Basail Upazila, for Rural road improvement work, Priority Index of Population Served, Facilities Served (Institutions, Hospitals etc.), Growth Center (GC)/Rural Markets served,

Connectivity to higher roads and other centers, Presence of gap and Duration of submergence are respectively 3, 2.5, 2.82, 2.41, 2.45, and 2.64.

So, Here Highest PI is for Population Served (3) and Lowest Priority Index is for Connectivity to Higher Road and other centers (2.41). Range of Priorities of Basail Upazila or Rural Road improvement work = Highest PI –Lowest PI = 3-2.41=0.59.

If the value of range of particular Upazila/ Upazilas is comparatively less than the others, it implies that that upazila / those particular upazilas give almost the same importance for all of the criteria for that specific rural road development work. The higher value of range implies that there is a variation of priorities which means that one or more than one criteria may get highest priority and others are not so much important in that Upazila for that specific rural road development work.

Variation of Priorities in Different Upazilas for Rural Road Improvement Work

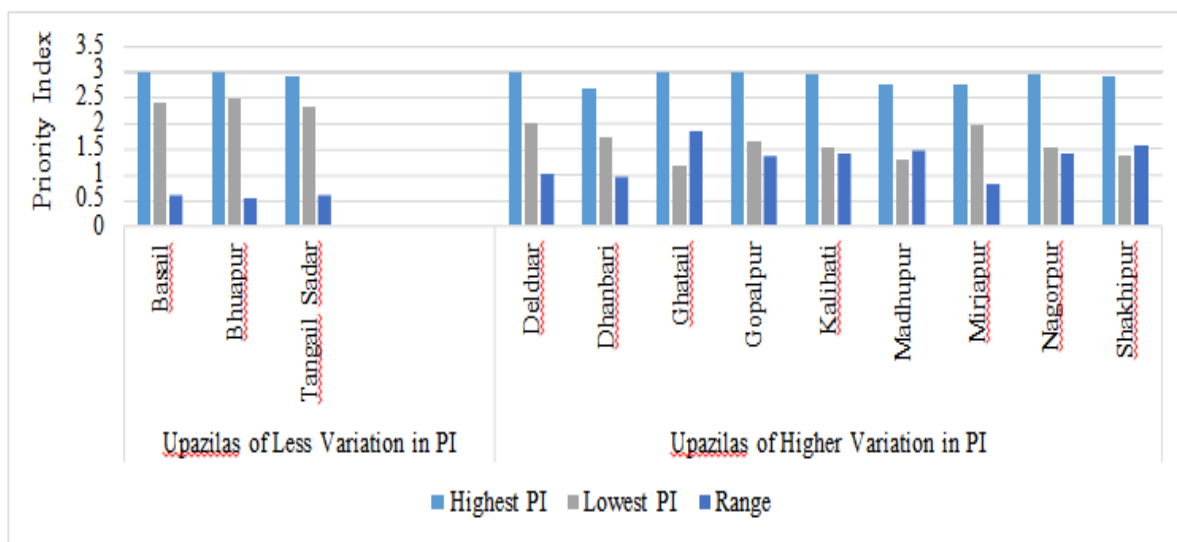


Fig.3:-Variation of Priorities in Different Upazilas for Rural Road Improvement Work (Source: Field Survey, 2017)

In Figure 3, it is found that variation in priority indexes for different criteria in Basail, Bhuapur and Tangail Sadar are very little (range is less than 0.6) which implies that respondents of this zone has prioritized almost all the criteria while the other upazilas have some particular priorities whereas other upazilas show a higher variation in priorities which ranges about 0.8 to 1.83..

In Figure 4, it is clear that Basail, Tangail Sadar are geographically located close to each other which has an indirect influence

in their priority assessment. Besides these, establishment pattern and economic status in Basail and Bhuapur district is quite similar. In case of total percentage of establishment, there are only 3.77 to 8.30% establishments located in Basail and Bhuapur which are comparatively low to the other upazilas and similar scenario is seen for economic status of both of these upazilas. On the other hand, Tangail Sadar is one of the most economically influenced upazilas in Tangail District. This economic status can have an indirect impact for such priority assessment.

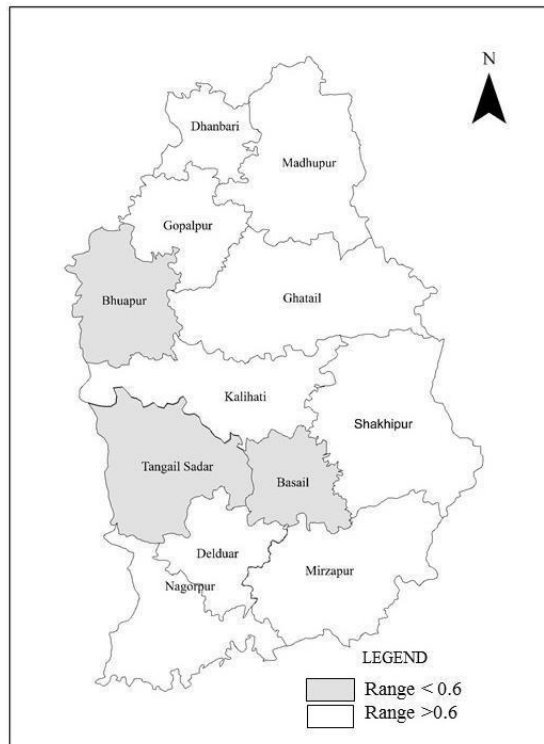


Fig.4:- Variation of Priorities in Different Upazilas for Rural Road Improvement Work (Source: Field Survey, 2017)

Variation of Priorities in Different Upazilas for Rural Road Further Improvement Work and Rural Road Maintenance Work

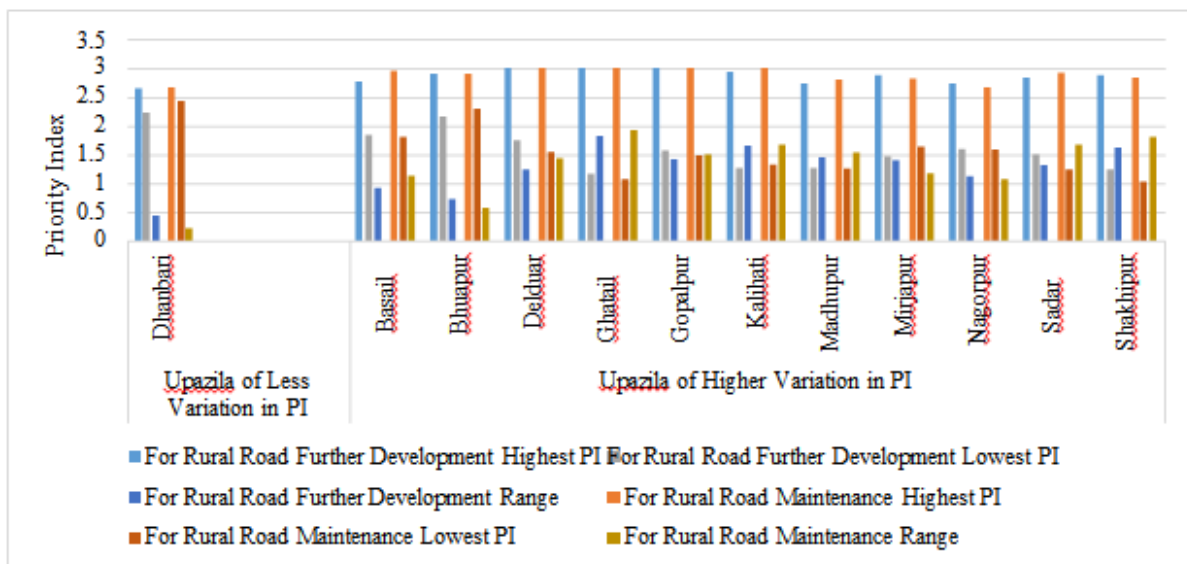


Fig.5:- Variation of Priorities in Different Upazilas for Rural Road Further Improvement Work and Rural Road Maintenance Work (Source: Field Survey, 2017)

In Figure 5, it is seen that Dhanbari has the least variation in priorities of other upazilas for both rural road further improvement (Range is 0.44) and rural

road development work (Range is 0.22). It depicts that users of Dhanbari upazila give almost the same importance for all priority criteria whereas other upazilas have their

particular issues. To assess this issue, Dhanbari is the smallest upazila in Tangail district (in respect of area) (Table 1). The total percentage of establishment and engaged people in economic activities are respectively 5% and 4% which are comparatively less than other upazilas [3]. Besides these, there are only 3 growth centers and 15 rural markets which are found as least number of all upazilas in Tangail district (Table 1). So, it is prominent that Dhanbari is comparatively less affluent than other upazilas in Tangail district which has an indirect impact in such priority assessment for rural road development works.

Comparative Assessment of Users Priority for Rural Road Development Work

Three categories of criteria are clearly delineated as below.

- Common highest and least priority criteria in all upazilas for rural road development works;
- Common highest priority criteria in all upazilas for specific rural road development work and
- Specific criteria which has got especially higher priority in some particular upazilas due to their geographical location.

These categories of priority criteria are assessed in the following sections.

Assessment of Common Highest and Least Priorities in All Upazilas for Rural Road Development Work

In the first category, population served, growth center served and facilities served got the highest priority in common and presence of gap has got the least priority in common for all rural road development works.

Population Served, Growth Center Served and Facilities Served as the Highest Priority Criteria in Common for Rural Road Development Works



Fig.6:-Priority Index of Population Served, GC Served and Facilities Served for Rural Road Development works (Source: Field Survey, 2017)

Figure 6 shows that Population served, facilities served and growth center / rural market served are the common highest priority criteria for rural road development works in almost all upazilas in Tangail

District except Ghatail. In case of socio-economic condition in respect of other upazila, Ghatail upazila is much affluent in case of higher percentage of total establishment and total person engaged in

economic activities. Besides these, number of growth center (8) and rural markets (31) are sufficient in respect of area and population of this upazila (Table 1). So, intensity of economic activities of these upazilas has an influence on this issue.

For assessment of this issue, firstly significance of these priority criteria should be understood. For better understanding, relevant literature helps in this regard by showing how these priorities act in the rural road development projects in the neighboring countries like India and Nepal.

Rural Road Development Project in Andhra Pradesh, India

Population served, growth center served and facilities served these three criteria are interrelated to each other and they are an integral part of rural road development project. The rural road policy framework of 'Rural Road Development Project in Andhra Pradesh' in India is to emphasize the importance of basic access which ensures accessibility from villages to markets and social services and also the quality of life for rural population. Population served is used in this framework for cost evaluation. Projects are ranked according to their cost effectiveness in which growth center served and facilities served must be ensured. In their rural road master planning projects, 3,000 km roads were selected (about 1,000 km in each district) from the core network of 9,000 km on the basis of ranking of cost-effectiveness according to the number of population served per unit amount of investment [8].

Pradhan Mantri Gram Sadak Yojana (PMGSY), India

In the guidelines of Pradhan Mantri Gram Sadak Yojana (PMGSY) (rural road

development program undertaken by the govt. of India), population served acts as a deciding factor for ranking the rural road projects as seen before. Here, population size was determined by a radius of 500m of the path distance. The primary objective of the PMGSY is to provide connectivity, by way of an all-weather accessible road to the eligible unconnected habitations in rural areas generally so as to enable access to the nearest market center, in such a way that: habitations with a population of 1000 persons and above are covered in the first stage. All habitations with a population of 500 persons and above are covered in the next stage. The PMGSY program, now part of the 'Bharat Nirman Initiative I', is running into the 7th year of Implementation. Until the end of November 2007, connectivity has been provided to about 42,019 eligible habitations. A total of 1, 00,000 km of roads have been constructed, serving about 45 million rural people. Villages were connected to the rural markets of the main road. Previously only 20% of agricultural products were reached to the rural markets, now the transport cost and time both were reduced after the projects. The projects also achieved about 20% increase in enrolment rate since the past one year and 60% of these students were girls. So, here also population served as well as rural market and facilities served act together in the rural road development projects [9]

Rural Roads Projects, Nepal

Besides India, to rank the rural road projects of Nepal, population served per km, facilities served and access to rural markets are included in as social aspects which is the main three parameters used to rank the rural road projects. In most of the schemes of Nepal, facilities served got the highest priority among the two criteria. Evaluating all these multi criteria by probability distribution, the projects were ranked [4].

Presence of Gap as the Least Priority Criteria for Rural Road Development Works

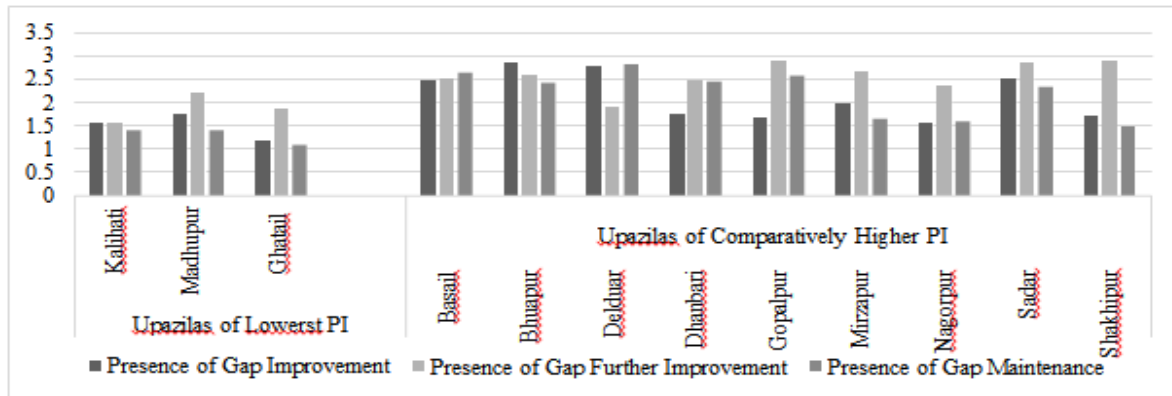


Fig.7:-Priority Index of Presence of Gap for Rural Road Development works (Source: Field Survey, 2017)

Presence of gap is the common least priority criteria for almost all upazilas. Though it got the least priority in common for almost all upazilas, in Figure 7, it is found that this criteria got the lowest priority in Kalihati, Madhupur and Ghatail compared to the other districts. Figure 8 depicts that geographical location of these upazilas are relatively closed to each other.

Alongside their socio- economic status are comparatively similar in respect of total establishments (See Annex 1: Figure 5). So, geographical proximity of these upazilas has an influence in similar socio-economic status which influences similarity in priority assessment of rural road development works.

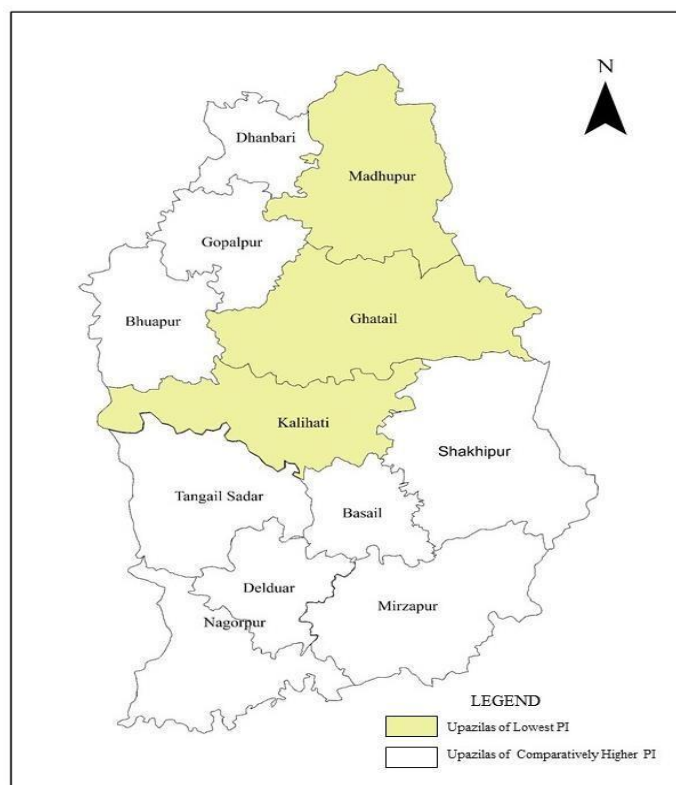


Fig.8:-Comparative Assessment of Priority Index of presence of Gap for Rural Road Development Works in Tangail District (Source: Field Survey, 2017)

Assessment of Highest Priority Criteria in all Upazilas for Specific Rural Road Development Work

Three types of rural road development works are considered as mentioned earlier. Now this section discusses on those particular priority criteria which are specially got the highest priority for each type of rural road development work (See Annex 1: Table 5). As example, for rural road improvement work, population served, growth center and facilities served got the highest priority, For rural road further development, traffic volume has got the highest priority and for rural road maintenance work, number of volumes has got the highest priority in all upazilas. As priority assessment of population served,

facilities served and growth center served have been discussed in section 5.5.1, this is not further discussed for rural road improvement work in the following sections.

Traffic Volume as the Highest Priority Criteria for Rural Road Further Improvement Work

Traffic volume is an important criterion for determining the priority of any road development project [6]. Traffic Volume has got the highest priority in almost all upazilas (Figure 9). To assess this priority, impact assessment of this criteria after rural road further development is necessary to evaluate the priority assessment of the users.

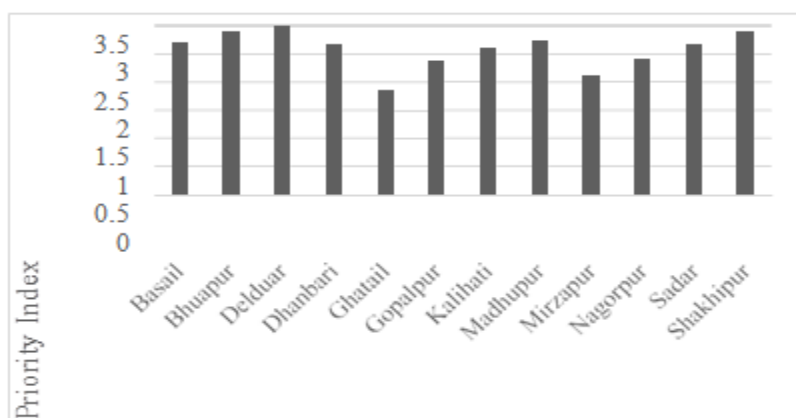


Fig.9:-Priority Index of Traffic Volume for Rural Road further Improvement Work in Tangail District (Source: Field Survey, 2017)

Impact Assessment of Traffic Volume for Rural Road Further Improvement Work

There have been recently conducted rural road further improvement works in the twelve upazilas of Tangail district. A field survey had been conducted for the impact assessment of traffic volume after the rural road development work. The impact assessment of traffic volume of some selected roads is shown for 12 upazilas in Tangail district below. Based on the response of the users, as a whole, 80% of users stated that traffic volume significantly increased, 16% users stated slightly increased and others stated not

significantly increased after the further improvement (Figure 10).

However, traffic volume in Basail is slightly increased and in Delduar, Mirzapur and Shakhipur is not significantly increased after further improvement. In case of other upazilas except Bhuapur, Dhanbari, Madhupur, Gopalpur and Nagorpur, traffic volume is significantly increased after the work (Figure 11). Due to lack of data availability of rural road further improvement for those upazilas, traffic impact assessment cannot be shown for those upazilas in the below figure.

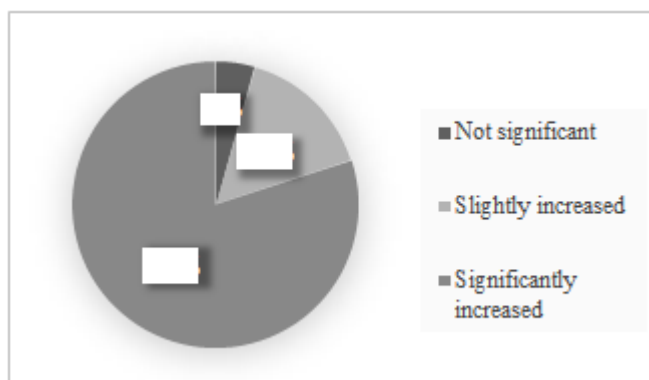


Fig.10:-Percentage of Users for Impact Assessment of Traffic Volume for Rural Road Further Improvement Work (Source: Field Survey, 2017).

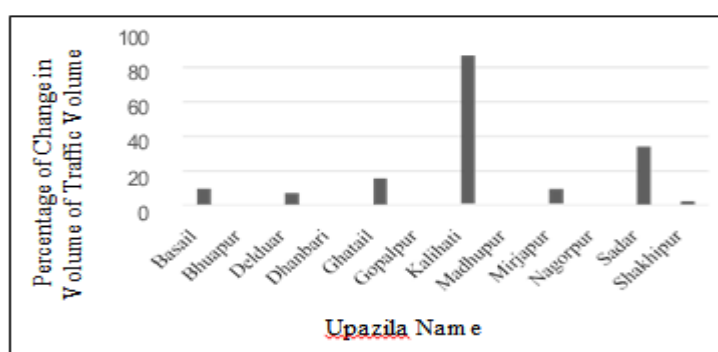


Fig.11:-Percentage of Change in Traffic Volume in Different Upazilas of Tangail district for Rural Road Further Improvement Work (Source: Field Survey, 2017).

In Figure 11, it is easily interpreted that Kalihati, Ghatail and Sadar upazila have a significant increase in traffic volume compared to other upazilas though Kalihati has got the highest increase in traffic volume. According to Economic Census 2013: District Report Tangail, more than 25,000 economic establishments (Cottage Industries, Small Industries, Medium Industries, Large Industries, Small & Large Industries) are located in these upazilas and besides TPE (Total Person Engaged) in these upazilas are significantly higher (about 70,000 to 90,000) than other upazilas ([3]; See Annex 1: Figure 5&6). Due to the high intensity of economic activities of these upazilas, impact of rural road further development work in traffic volume is significantly higher than other upazilas. So, it is seen that intensity of economic activity influences the impact of rural road

development works in case of traffic volume. As traffic volume is increased after the rural road further improvement work, so it can be said that users' priority is assessed for this rural road development work in Tangail district.

Number of Vehicles as the Highest Priority Criteria in Common for Rural Road Maintenance Work

When an old road is rehabilitated, the prior effects fell upon the increase in traffic volume or increase in number of vehicles plying on the road [9]. It is because when roads connects the communities, accessibility is increased in terms of number of trips carried out by the user group which ultimately results in increase in number of vehicles plying on the road [5]. In Tangail district, number of vehicles has got the highest priority in all upazilas of Tangail district for rural road

maintenance work (Figure 12). To assess this priority criteria, firstly it is shown the response of users for the change in number of trips after rural road maintenance work and then change in number of vehicles will be reviewed for all upazilas in Tangail district. In Figure 13, it is seen that majority of the users (89%) stated that

number of trips have been increased after the rural road maintenance work in which about 61% stated that number of trips have been increased by more than 5 than before and others 17% responded for the increase by 6 to 15 and the remaining 11% responded for the increase by more than 15 (Field Survey, 2017).

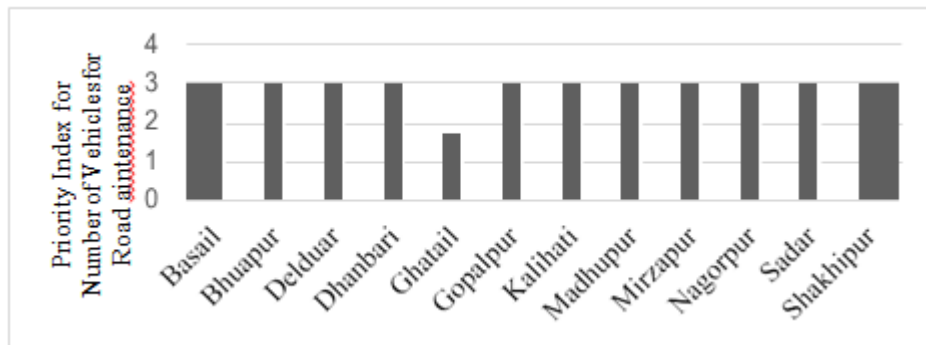


Fig.12:-Priority Index for Number of Vehicles in Different Upazilas of Tangail district for Rural Road Maintenance Work (Source: Field Survey, 2017).

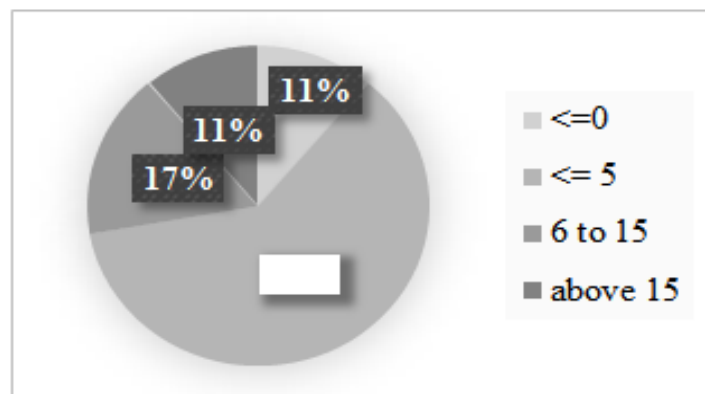


Fig.13:-Percentage of Users who stated Increase in Number of trips for Rural Road Maintenance Work (Source: Field Survey, 2017)

Impact Assessment of Number of Vehicles for Rural Road Maintenance Work

Due to data unavailability, percentage of change in number of vehicles cannot be assessed for Delduar, Dhanbari, Gopalpur and Madhupur districts. Figure 14 shows that all of the upazilas (except those upazilas) have an increase in the number of vehicles in which Bhuapur and Kalihati upazilas show the highest percentage of increase in number of vehicles. So, rural

road maintenance work influences the number of trips made by the users which increase the number of vehicles plying on the road.

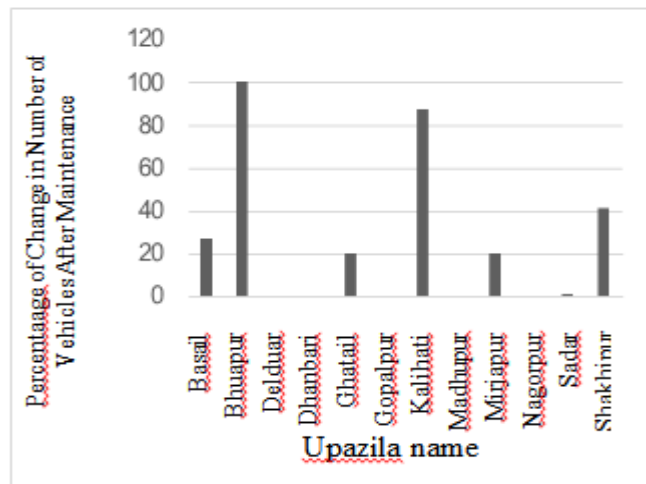


Fig.14:-Percentage of Change in Number of Vehicles in Different Upazilas of Tangail district for Rural Road Maintenance Work (Source: Field Survey, 2017)

Connectivity to Higher Road as the Highest Priority Criteria in Tangail Sadar for Rural Road Maintenance Work

It is seen that connectivity to higher roads has got the highest priority in Tangail Sadar upazila for rural road maintenance work (See Annex 1: Table 4). As mentioned earlier, Tangail Sadar is an economically affluent upazila not only in respect of Tangail district but also in Bangladesh. Cottage industries in Tangail Sadar contribute to a lot in the rural economy as a whole [1]. So, connectivity

to higher road is an important issue due to the economic status of this upazila. In figure 15, it is seen that National Highway, Regional Highway cross along the eastern edges of the upazila whereas these highways cross along the middle portion of almost all upazilas which rises the need for connectivity to higher road in this upazila for rural road development works. In addition, it is seen that road layout within the upazila has an impact on users' priority assessment as like the socio-economic status.

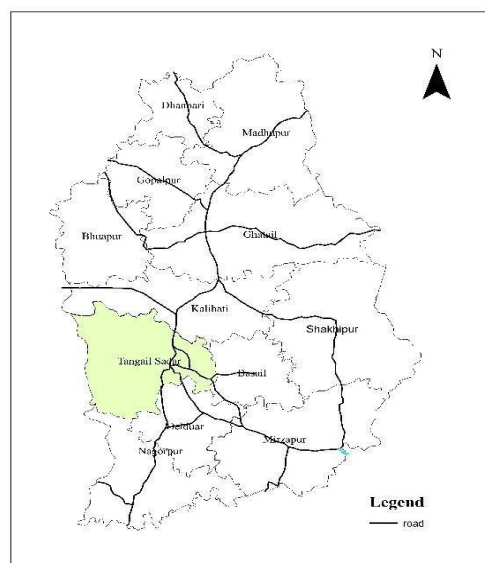


Fig.15:-Connectivity to higher road in Tangail Sadar upazila in respect of Tangail district (Source: Field Survey, 2017)

Assessment of Users’ Priority based on Spatial Feature for Rural Road Development Work

It is found that geographical location of Tangail district has an influence on all weather accessibility in the rural road

development works in some particular upazilas. So, duration of submerge has got the highest priority in those particular upazilas which are closely located in the river flow zone.

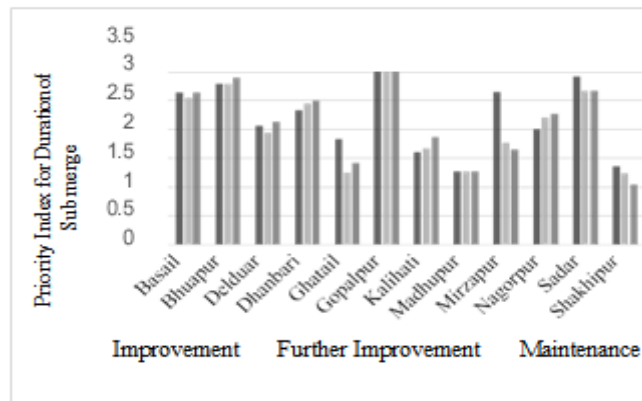


Fig.16:-Priority Index for all upazilas of Tangail district for rural road development works (Source: Field Survey, 2017)

In Figure 16, it is seen that duration of submerge has got the highest priority in Basail, Bhuapur, Gopalpur and Sadar upazila of Tangail district.

In case of geographical characteristics of Tangail District, the Bramhaputra River flows along the western edges of Gopalpur, Bhuapur and Tangail Sadar upazilas and the Bongshai Rivers crosses

along Sadar and Basail upazilas (Figure 17). These geographical characteristics have an influence in rural road development work. These upazilas need additional attention for rural road development works to ensure all weather accessibility which is the basic requirement for all rural road development projects [5]. This issue is reflected in the assessment of the users’ priority.

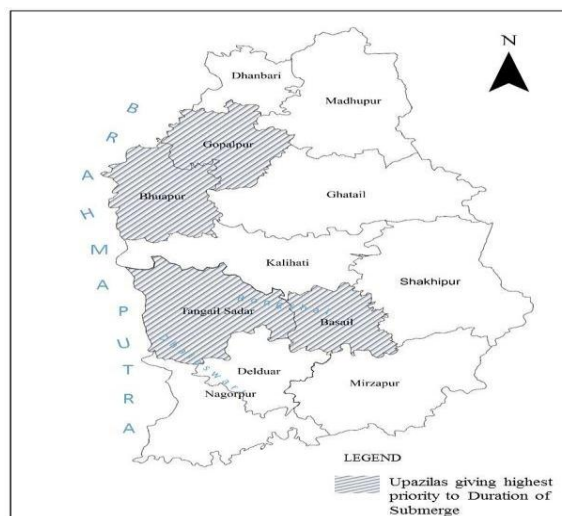


Fig.17:-Identification of Upazilas for giving highest priority to Duration of Submerge for rural road development work (Source: Field Survey, 2017)

RESULTS AND DISCUSSION

Assessment of users' priority is a crucial part in rural road development works. But unfortunately in Bangladesh, there is no such methodology for proper assessment of users' priority compared to the neighboring countries. The following results which depict some particular factors which influence much in users' priority assessment are discussed below:

- Economically and administratively, Tangail is an important district in respect of Bangladesh. Here economic activities of rural people somehow contribute to the whole rural economy in Bangladesh. For their easement of life, their priority assessment is a dire need in rural road development work.
- Geographical proximity within the upazilas has an influence in similar socio-economic structure for which users' priority assessment is quite similar for those particular upazilas.
- Geographical proximity to the river flow zone has an influence on users' priority assessment. Demands for all weather accessible roads are higher for those upazilas than others which do not lie in the river flow zone.
- Economic affluency of upazilas influences users' priority assessment such as, all of the priority criteria get almost similar importance for those upazilas which are socio-economically unstable whereas economically affluent upazilas has some particular priority criteria of higher importance like increase in traffic volume is significantly higher in these upazilas after rural development work which is also reflected in their users' priority assessment.
- Layout of higher road connectivity within the rural areas influences the users' priority. Distance from the rural areas to the highways increases the higher need of connectivity to higher road for rural road development

works.

- Intensity of rural road development works sometimes influence some particular priority criteria to get least importance like, presence of gap has got the least priority in Tangail district because there are recently conducted such rural road development works which are constructed bridges, culverts in their schemes to minimize the gap between the roads and help in increasing proper accessibility. Due to this scenario, this criteria got the least priority to the user group for all rural road development works.
- There are found some particular criteria which are not assessed with importance by the users. Such as, typology of roads and road geometry do not get prioritized for rural road further improvement works and last year of maintenance is not seemed important to the user group for rural road maintenance work.

CONCLUSION

This study shows how geographical characteristics, demography, socio-economic structure of rural areas and also socio-economic profile of users influence their priority for rural road development works. In Bangladesh, there is no such methodology for assessing these priorities. But this assessment is an important issue for sustaining the rural road development projects because geographical characteristics, demography, socio-economic structure of rural areas are not the same. Due to these variations, each rural area has a particular need for rural road development works and intensity and nature of these works will vary based on these needs and priorities. If these issues are not assessed, users' priorities as well as local demand remain unassessed and budget will be allocated to the roads of least importance which fails to fulfil the users' demand as well as fails to sustain in the long run. So, users' participation in

rural road development projects should be enforced in planning, budget allocation and monitoring for rural road projects like other neighboring countries. Moreover, population served can be used for cost evaluation of the projects in which growth centers and facilities served must be ensured like rural development projects in India, Nepal. Besides these, data availability is a must for the impact assessment of the projects which helps to evaluate the users' priorities. This study is a partial attempt to signify the importance of assessment of users' priority which should be reinforced in rural road development works.

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