Factors of Rural Development Driver in Southeastern Bangladesh

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Abstract The study examines the patterns and driving factors of rural development in the Bandarban district of Bangladesh and identifies leading and lagging communities in terms of rural development indicators. To achieve this objective, twenty nine rural communities were selected randomly and their weighted scores on selected infrastructural facilities were used to ascertain the pattern and driving force of rural development. The relative strength of the driving factors was determined by factor analysis. The results reveal a disparity in the spatial distribution of rural development facilities, with communities close to the district headquarter performing better. Factor analysis revealed that there are 5 underlying factors that account for 82.413% of the total variance which implies that achievement of spatially even rural development will require the adoption of an integrated government approach.

Keywords: rural development, rural communities, rural infrastructure, spatial patterns, inequalities

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1. Introduction

Development is concerned generally with the enhancement of individuals' ability to shape their lives [14], can also be indicated as a transformation of society, a movement from traditional ways of thinking and traditional methods of production to more modern ways [16]. This indicates that, development must improve all aspects of peoples' lives that is what Servaes [15] called multi-dimensional development.

Following the multidimensional nature of development, the National Rural Development Board (2001, p. 11) describes rural development as a means of helping rural people set the priorities in their own communities through effective and democratic bodies. These bodies provide local capacity, invest in basic infrastructure and social services, and ensure the safety and security of the rural people particularly that of disadvantage group (rural women and children). According to the NRDP (2001), rural development is not a matter to be planned and delivered by outsiders; rather it is the responsibility of the people themselves, who must become the principal authors of their own future.

Bangladesh had four decades of development efforts to avert poverty, to achieve economic development and social change. Although large inflow of capital and foreign aid to augment meager domestic resources, the country plan efforts for development have not been able to free the country from its low economic growth trap and poverty [6,7]. The average per capita income is still low by the World standards (US$ 780) and near about one third (31.5 percent) of the country's population lives below poverty line. Nevertheless, the benefits of the development programs and strategies have not been equitable between the rural and urban areas as the former recorded 35.2 percent incidence of poverty compared to the later which was about 21.3 percent in 2010 [8]. Population boom, resource scarcity, environmental constraints, inefficient rural markets and absence of adequate technology are some factors responsible for slow rates of country's overall economic growth, economic disparities and poverty both rural and urban areas. Hence, the struggle to improve the rural area is still an important agenda to the government of Bangladesh in the next century.

As rural development is a multidimensional nature, various indicators and variables are used to examine the level of rural development in a particular community. In reality the number and scale of the indicators used are determined by nature of data availability in the literature. The indicators require frequent evaluation to ensure the accurately reflect changing conditions in rural areas with the change in time [13]. Notwithstanding, access to infrastructure facilities and other basic development facilities are the most satisfactory yardstick of such assessment because these show to what extent a community enjoys social amenities [10]. The importance of infrastructure lies in its capacity to help sustain daily

activities, quality of life, and an economic base in rural areas [4].

The spatial variation in availability and access to rural infrastructures are resulted in spatial disparities in living standards both within and between localities and areas [6,7]. Thus, inequalities exist between spatial units as they do between individuals [1,2,5,9]. The existence of disparities in standard of living therefore makes the analysis of the patterns of rural development imperative in order to identify areas of deprivation. Only through such an analysis can the imbalance in the achievement of rural development be understood.

The analysis is particularly important in developing countries like Bangladesh, where inadequate and ineffective rural infrastructure is a major characteristic of rural areas. The availability of rural infrastructure can therefore be effectively used as proxy indicator of the level of rural development in Bangladesh. However, the development level across space depends on dynamic processes involving complex physical, economic, cultural, and social variables in each community and on the strength of each variable [17]. This complexity makes it necessary to analyze the various factors contributing to development levels. Such analysis can explain the factors underlying the variations, providing a basis for policy intervention. The existing literature on rural studies in Bangladesh absences such analyses. To this backdrop, the present study aims to fill the gap.

2. Methodology

2.1. Study Area

Southeastern Bangladesh mainly Chittangong division is the largest of the seven administrative divisions of Bangladesh and comprises eleven districts namely: Brahmanbaria, Comilla, Chandpur, Lakshmipur, Noakhali, Feni, Chittagon, Khagrachhari, Rangamati, Bandarban and Cox's Bazar. It has a total population of 28,079,000 (2011 Census) and an area of 33,771.18 square kilometers. The upland districts of this division are Khagrachhari, Rangamati and Bandarban and these together known as the Chittagong Hill Tracts (CHT).

Bandarban district, our study area, has a land area of 4479.03 square kilometers and are located eastern part of the Southeastern Bangladesh (Figure 1). It comprises seven sub-districts (Upazilas) namely: BandarbanSadar, Thanchi, Lama, Naikhongchhari, Ali Kadam, Rowangchhari and Ruma (Figure 1).
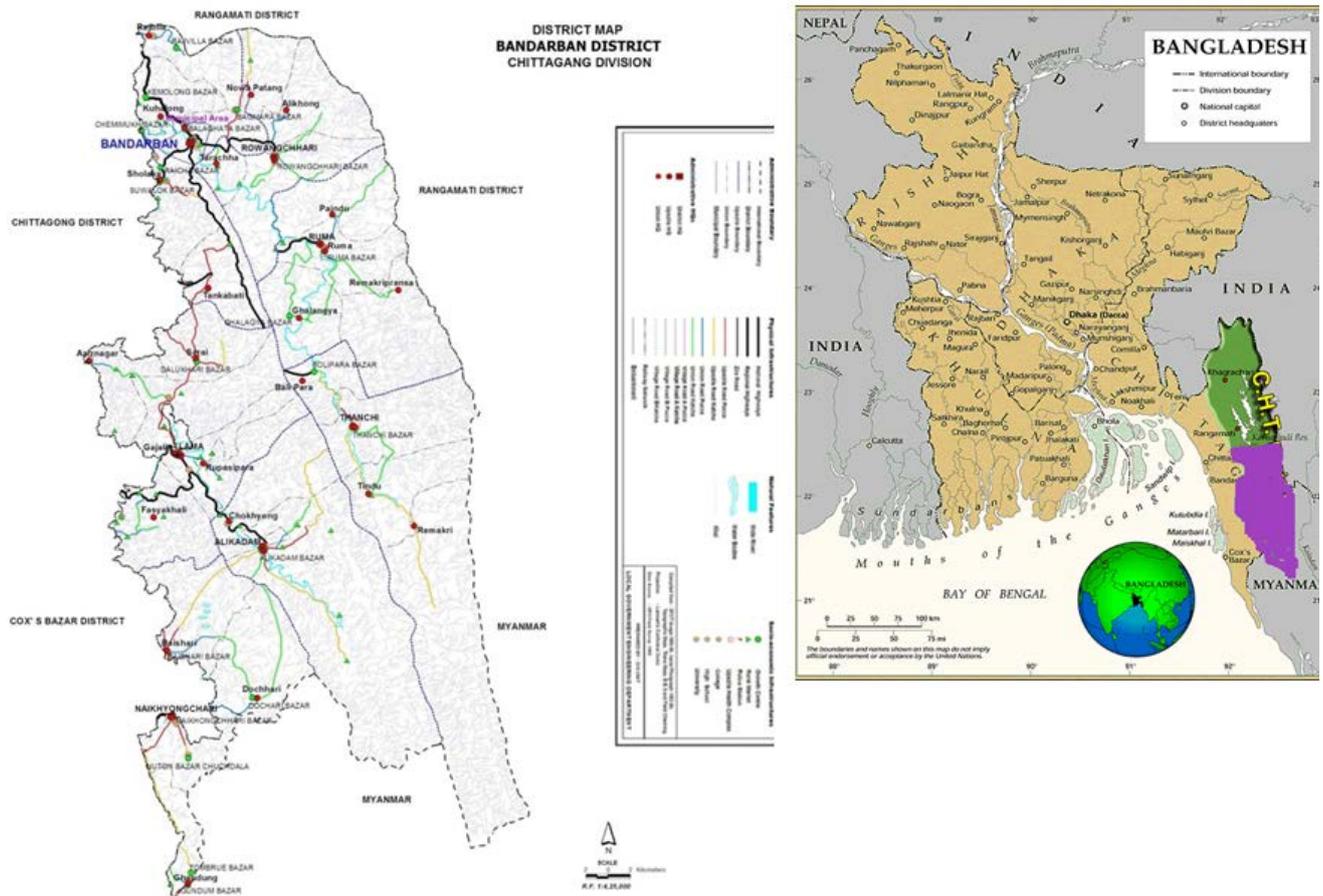

Figure 1. Bandarban district showing the component of sub-districts areas

Bandarban district, the study area, is a hill district and located at 21°11 and 22°30 North altitudes and 92°04 and 92°41 East latitudes (Figure 1). It comprises 29 local government areas which are called Unions (Figure 1). The region comprises 63 rural communities in terms of growth centres locally known as Bazars/Hats.

2.2. Sample Size and Data Collection

Twenty nine (29) rural communities were randomly selected for this research. The data for this study were come from both primary and secondary sources. Specially, a census of rural infrastructure facilities was conducted in

the 29 communities selected. The facilities enumerated are shown in Table 1. The primary data were supplemented with published and unpublished materials, including maps and government documents.

Table 1. Facilities used in assessing the level of rural development

Institutions/Establishment	Facilities	Institutions/Establishment	Facilities
Administration	1. Local government office	Industry	20. Goods grinding/processing mill
	2. Magistrate court		21. Bakery
	3. Police station		22. Garments
	4. Police post	Public utility	23. Electricity
	5. Sub-treasury		24. Gas
Agriculture	6. Veterinary clinic		25. Piped water
	7. Extension service	Recreation	26. Restaurant
Commercial	8. Bank		27. Hotel
	9. Cooperative societies		28. Tea stall
	10. NGOs		29. Village hall
	11. Petrol/gas station		30. Community centre
Education	12. College	Religious/social institutions	31. Mosque
	13. High school		32. Church
	14. Primary school		33. Temple
	15. Madrasa	Transport and communication	34. Express road
Health	16. Hospital		35. Local government/Tarred road
	17. Maternity clinic		36. Untarred/Kacha road
	18. Health centre		37. Motor park
	19. Pharmacy		38. Post office
			39. Postal agency

2.3. Data analysis

The computation of rural development level was based on the availability of infrastructure facilities in each community. This was done for the reasons offirstly; emphasizes the spatial pattern of rural development. Secondly, the more available those facilities are in an area, the greater is access to them. This is because the use of a facility is influenced by the distance between a household and the facility [11,18]. Specifically, within a hierarchy of central places, access to services will vary according to distance from the service centre, since cost, time, and effort tend to increase with distance [4]. Thirdly, although infrastructural facilities are not ends in themselves, they are means to achieving broader development goals. Therefore, the more available infrastructure facilities are in an area, the more they contribute to the goal of development, which invariably leads to greater living standards [3].

Using the availability of the infrastructure facilities, the score of rural development for each community was calculated as follows:

$$LRD = \sum\nolimits^{N} x_i x_{ij} \qquad (1)$$

Where LRD stands for the level of rural development and x_{ij} represents the weighted scores of the indicators. The weights were determined by assigning (1) to low-order facilities, (2) to higher order ones and (3) to the highest order facilities. The number of a facility in a community was used to multiply the weight of the facility and score summed up using equation (1) above. The relative rates of performance on the indicators were determined by location quotients (LQ) as follows:

$$LQ = \frac{\dfrac{X_1}{X}}{\dfrac{P_1}{P}} \qquad (2)$$

Where X_1 is the number of facilities for the ith community, P_1 is population of the ith community and

$$X = \sum\nolimits_{j=1}^{N} x_i$$

while $P = \sum\nolimits_{j=1}^{N} P_i$.

Population was used to determine the LQ in the study instead of areal extent since the facilities are meant to serve people. An LQ equal to or exceeding 1 indicates that the community has achieved a comparatively more significant level of rural development more using the development indicators, while LQ less than 1 indicates that the community is disadvantaged.

SPSS was used to perform a factor analysis to determine the underlying factors and their relative strengths. Although many factors influence rural development, only the most important variables were considered. They are:

Variable	Variable description
X_1:	Distance to Local Government Headquarters
X_2:	Distance to the nearest urban centre
X_3:	Rural market accessibility
X_4:	Total lengths of road
X_5:	Road density
X_6:	Land area
X_7:	Size of farmland
X_8:	Population of a community
X_9:	Level of education of household head
X_{10}:	Household income
X_{11}:	Number of social and economic organizations
X_{12}:	Range of goods and services in the community market
X_{13}:	Trade links the surrounding communities have with a community
X_{14}:	Magnitude of links from a community to outside communities
X_{15}:	Aggregate market interlinkages involving a community

X₁₆: Use of electronic media

X_{16}: Use of electronic media
X_{17}: Scores of rural development

The relationships between the independent variables (X_1-X_{16}) and the scores on rural development, the dependent variable, (X_{17}) were therefore assessed using factor analysis. The relative contribution of the factors to each community was also obtained from the factor analysis.

3. Results and Discussion

3.1. The Spatial Manifestation of Rural Development

The result of the analysis of the distribution of rural infrastructural facilities shows that disparity exists among the rural communities (Table 2). The table shows that the leading communities are Bandarban, Suwalok, Chemi Dolupara, Taracha, and Rowangchhari, while Thumbru, Lemochari, Baishari, Gulistan, and Chibatalipara are the least developed communities.

The five leading communities account for 1374 out of the total score of 3366, representing 40.82% of the total score. However, Bandarban alone with a score of 485 accounts for 14.41% of the total scores. Based on its distinctive position on the development ladder and the number of urban functions in the community, it has been described as an emerging urban centre. The table also shows that the local government area headquarters, namely Alikadam, Bandarban, Lama, Rowangchhari, Ruma, and Thanchi all have LQs above 1. This is a result of government investment in infrastructural facilities for the maintenance of the secretariats. Other communities with location quotients more than one had ChemiDolupara, Suwalok, Pacchaptali, Taracha and Battali. These communities have relatively small population which is used as the denominator. This, therefore, accounts for their high location quotients since small number of people enjoys the relatively few available facilities. The implication is that more facilities are needed to satisfy the large number of people in these communities.

Other communities with LQs less than 1 have both small populations and a limited number of rural development facilities and so are equally disadvantaged. On the whole, a majority of the rural communities are disadvantaged in terms of population share of facilities since 38% of the communities have LQs upto the threshold value of 1.

The results of the factor analysis (Varimax rotated) produced a simple structure than can easily be interpreted. The 16 independent variables were reduced to 5 underlying dimensions or factors of rural development, with a cumulative percentage variance of 82.41%, thus leaving only 17.59% of the total variance in the original variance unexplained (Table 3). The factor loadings identified 5 underlying dimensions of rural development (Table 4).

Table 2. Rural development indicators for communities in the Bandarban district of Bangladesh

Sl. No.	Community	Score	Location quotient
1	Chibatalipara	51	0.65
2	Alikadam	65	1.15
3	Bagmara	123	0.99
4	ChemiDolupara	253	1.78
5	Bandarban	485	4.66
6	Suwalok	295	3.15
7	Tankaboti	101	0.98
8	ChambiMafiz	97	0.61
9	Daluchari	85	0.91
10	Gajalia	78	0.39
11	Lama	115	1.16
12	Dhardari	78	0.78
13	Gulistan	49	0.49
14	Baishari	45	0.23
15	Lemochari	38	0.14
16	Nuton bazar	64	0.32
17	Thumbru	28	0.15
18	Anthapara	129	0.97
19	Pacchaptali	131	1.12
20	Rowangchhari	143	2.26
21	Taracha	198	3.21
22	KaikKhongUhiri	113	0.99
23	Ruma	123	2.10
24	Battali	121	1.41
25	Galanga	109	0.94
26	Bolipara	65	0.68
27	Thanchi	71	1.20
28	Tirndu	60	0.77
29	Remakri	53	0.69

Source: Field survey (2012)

Table 3. Matrix of factors influencing rural development in the Bandarban district of Bangladesh (Varimax rotated)

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
X1	-0.559	-0.466	0.191	0.143	-0.060
X2	-0.656*	-0.407	0.269	-0.162	0.124
X3	-0.758*	-0.410	0.271	-0.065	0.191
X4	0.253	0.843*	-0.189	0.077	0.183
X5	-0.043	-0.196	0.164	0.900*	0.228
X6	0.208	0.793*	-0.311	-0.356	-0.029
X7	0.079	0.144	-0.300	0.751*	-0.401
X8	-0.236	-0.201	0.919*	-0.002	-0.103
X9	-0.233	-0.207	0.917*	-0.006	-0.103
X10	0.489	0.475	0.380	-0.020	-0.083
X11	0.529	0.704*	-0.130	0.077	0.071
X12	0.892*	0.073	-0.135	-0.051	-0.205
X13	0.789*	0.464	-0.096	0.055	0.003
X14	-0.054	0.153	-0.194	0.012	0.925*
X15	0.849*	0.110	-0.166	0.034	0.242
X16	0.567	0.521	-0.097	-0.167	0.149

Table 4. The underlying dimensions of rural development in the Bandarban district of Bangladesh

Factor	Description	Eigenvalue	% of variance	Cumulative % of variance
1	Rural market development	5.397	31.745	31.745
2	Accessibility	3.312	19.484	51.229
3	Community development	2.384	14.026	65.255
4	Land resource	1.601	9.416	74.671
5	Relative location	1.316	7.742	82.413

3.2. Interpretation of the Underlying Factors of Rural Development in the Bandarban District

The factor analysis succeeded in reducing the 16 independent variables to 5 underlying factors of rural development with a cumulative percentage variance of 82.41%, thus leaving 17.59% of the total variance in the variables unexplained.

Factor 1 has significant loadings on 5 independent variables namely: X_2 (distance to the nearest urban center), X_3, (Rural market accessibility), X_{12} (Range of goods and services in the community market) which is an index of functional efficiency of rural markets, X_{13} (Trade links the surrounding communities have with a community) which measures the popularity of a market in terms of number of attendance and X_{15} (Aggregate market interlinkages involving a community) that is an indication of how integrated a market is within the rural systems has eigenvalue of 5.397 and explains 31.745% of the total variance. The factor, therefore, highlights the importance of rural markets to rural development. Distance to the nearest urban centres and rural market accessibility are also indication of the rural development and relative location of the rural communities. Furthermore, they emphasize the importance of government influence on rural development, since a local government headquarters is the centre of administration in a given area. The nearer a community to a local government headquarters, the more administrative influence the community receives and the greater tendency for it to develop. Market accessibility also indicates that how products and services are moved from rural to urban and urban to rural and also determined the degree of interactions within rural communities and between the rural communities and urban centres. The interactions on the other hand affect the rate of innovation diffusion and adoption, degree of socialization, inter-community cooperation in implementing or raising funds for rural development projects, and degree of access to goods and services, ease access to the rural markets. Thus, the underlying factor has been identified as rural market development.

Factor 2 has high positive loadings on X_4 (total length of roads), X_6 (road density) and X_{11} (number of social organization). The factor thus, relates to the availability of road transport which affects the ease to which goods and services move in and out of a community. Social organizations bring people of different socioeconomic status together and help members to introduce what they have learnt or experienced outside their villages to their home communities. Hence, the building of bus stops, postal agencies, motor parks, auditorium among other structures by age grades, social clubs and other organizations. The factor highlights agents through which innovations can be introduced into a rural community. Longer the road length spread up the communication and raise the innovation. Road length and road density primarily introduce to establish more social organization where people move easily for their daily needs. The underlying dimension is, thus level of accessibility and this explains 19.484% of the total variance.

Factor 3 has an egienvalue of 2.384 and explains 14.026% of the total variance. The factor has significant loadings on X_8 (population) and X_9 (education). Population and education are important factors of rural development, particularly at study area where it has been established that it is mostly achieved through community development approach. As a result of the approach, the more the population, the more the human resources that are mobilized. Even when the government provides the amenities, communities that have large population and education are usually favoured because it is more economical and viable to establish them in such populous communities. The more the educated people, the more the investment projects for tackling rural development policy, the more the experiences. This is also an indication of literacy level which also affects the social status of the individual. High social status entails better job and consequent high income, more access to position of authority and greater access to innovation which are all channeled to rural development. Thus, the underlying factor here community development.

Factor 4 also has significant loading on 2 variables but has eivenvalue of 1.601 and explains 9.416% of total variance. The variables are X_5 (land area) and X_7 (farm size). It is known fact that the size of the farm land dependent on the size of the land area. It is one of the important factor in the sense that most of the areas are dependent on agriculture and in the country perspective larger the farm size larger the production and larger the access of production, which is essential for the country like Bangladesh. The investment of the rural areas are also depends on size of the area which also indication of the rural development. Both variables stress the importance of land resources, which include agricultural land, forest, river, and food resources. Therefore, the underlying factor is labeled availability of land resources.

Finally, factor 5 has significant loading on variable X_{14} (Magnitude of links from a community to outside communities) which measures number of visits from a community to rural markets outside the community. This is dependent of the location of the area and number of the goods and services available of that area. For administrative purpose people randomly visit those areas that are very close to the local government area. People also visit those areas that are famous for especial goods and services. Therefore, this variable measure the degree of the spatial linkages a community has with outside communities, which in turn is dependent on relative

location of the community. Thus the underlying factor is the relative location of the community.

3.3. Relative Importance of the Underlying Factors

The factors identified do not have equal influence on all the communities studied. The magnitudes of the influence of the factors in each community are shown in Table 5. The table shows that the highest scores for Factor 1 (level of rural market development) are for Bandarban (0.792), Suwalok (0.579), Taracha (0.565), ChemiDolupara (0.479), Rowangchhari (0.445) and Thanchi (0.426). These scores imply that market development contributes more to rural development in these communities than in others. Our field investigation reveals that more accessibility of these areas is more potential in the rural development and more developed the markets.

Factor 2 (accessibility) indicates again that the dominant influence of the factor is found those areas that are local government area. The highest scores are for Gajalia (1.415), Ruma (1.407), Alikadam (1.382) and Rowangchhari (1.353). The concentration of road development on the local government headquarters have been one of the major contribution factors to rural development in the area. In fact much of the development of these communities is attributed to road network development.

Table 5. Standardized factor scores of variables influencing rural development

Sl. No.	Name of the community	Factor scores				
		1	2	3	4	5
1	Chibatalipara	0.213	1.350	3.563	2.079	3.701
2	Alikadam	0.364	1.382	3.467	2.334	3.367
3	Bagmara	0.357	1.103	3.577	1.806	3.068
4	ChemiDolupara	0.479	0.949	3.608	1.952	2.973
5	Bandarban	0.792	1.048	3.754	2.068	2.140
6	Suwalok	0.579	1.150	3.675	2.239	2.786
7	Tankaboti	0.299	1.210	3.552	2.179	3.251
8	ChambiMafiz	0.283	1.111	3.648	1.866	3.603
9	Daluchari	0.249	1.104	3.515	2.112	3.374
10	Gajalia	0.258	1.415	4.020	2.002	3.361
11	Lama	0.425	1.341	3.597	2.419	2.954
12	Dhardari	0.280	1.138	3.541	1.740	3.736
13	Gulistan	0.208	1.090	3.502	1.631	3.806
14	Baishari	0.195	1.094	3.635	2.247	3.142
15	Lemochari	0.237	1.171	3.797	2.427	3.563
16	Nuton bazaar	0.142	0.989	3.623	1.763	3.870
17	Thumbru	0.088	0.842	3.484	1.852	0.844
18	Anthapara	0.310	1.250	3.593	2.506	2.990
19	Pacchaptali .	0.346	1.307	3.640	2.496	3.691
20	Rowangchhari	0.445	1.353	3.563	2.206	2.731
21	Taracha	0.565	1.181	3.580	2.017	3.316
22	KaikKhongUhiri	0.260	1.252	3.532	2.007	3.157
23	Ruma	0.381	1.407	3.437	2.294	2.982
24	Battali	0.288	1.218	3.556	2.308	3.887
25	Galanga	0.283	1.144	3.598	1.822	3.627
26	Bolipara	0.262	1.027	3.516	2.119	3.702
27	Thanchi	0.426	1.175	3.486	2.020	3.392
28	Tirndu	0.152	1.002	3.388	2.197	3.596
29	Remakri	0.114	0.812	3.288	2.321	3.558

Factor 3 (community development) the dominant scores are those for Gajalia (4.020), Lemochari (3.797), Bandarban (3.754) and Suwalok (3.675). These communities have high rural population and level of literacy and these accounts for their high factor scores. In fact, Lemochari and Gajalia with population of 20,700 and 15,172 ranks first and third position respectively in the area. On the other hand, in terms of education Bandarban and Suwalok ranks first and second position. These two areas bear high score because of large concentration of civil servants who work in the local government secretariat. High literacy level has a strong factor in the development of these communities because it has enabled the people to obtain high income which is mobilized for rural development. More precisely, higher educational qualification and literacy level have enabled the people from these communities to occupy prominent positions in government which they have used to attract more social

amenities. The communities with low scores on factor 3 are Remakri (3.288) and Tirndu (3.388). These communities have small population and less literacy base and these accounts for the low factor scores.

Factor 4 (land resource) has greatest influence at Anthapara (2.506), Pacchaptali (2.496). Land resources contribute more to the development of communities in Naikhyongchari and Ruma than in other local government areas. In these areas, large farm sizes and fertile soils are strong factors of rural development. High agricultural productivity has not only brought about high rural income but has also brought about influx of rural migrants to the areas for farming.

Factor 5 (relative location) dominant scores are for Battali (3.887),Nuton bazaar (3.870), Gulistan (3.806), Dhardari (3.736) and Bolipara (3.702) and the least is for Thumbru (0.844). This factor also contributes little to the present level of rural development in Thumbru which is located in remote parts of the study area. The achievement of rural development of this community is, therefore, limited by their disadvantaged locations relative to other communities.

The pattern of the factor loadings indicates that rural development is multidimensional and therefore requires an integrated approach. The overall implication is that the achievement of rural development in the region hinges on the adoption of an integrated strategy. There is also the need for the establishment of a relevant institutional framework to articulate and coordinate the various facets of rural development in the area. The institutional framework is currently lacking not only in the region but in the country in general.

While the need exists to improve and upgrade existing infrastructure facilities in the region, there is equally the need to reduce inequality between the communities in the provision of such facilities. Inequality produces an unfavourable environment for economic growth and development. Even development in the region cannot be achieved without reducing inequalities in development between the rural communities. The social cohesion and stability of the region, or any region, depend on the extent to which the constituent communities consider that they belong and the extent to which the disparities are reduced between them. Government failure to address inequalities can result unrest, agitation and conflicts, which will hinder further rural development.

4. Conclusion

Rural development is multifaceted and thus requires an integrated approach for its achievement. This analysis of rural development patterns and the assessment of the underlying factors are important for identifying gaps and recommending appropriate policies to address them. The methods used herein and the suggested policy remedies can be applied in other regions with similar geographical settings and socioeconomic levels of development.

Statement of Competing Interests

The authors have no competing interests.

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