

Agricultural Regionalization of Khulna Division

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Abstract

Khulna Division with an area of 21643.30 sq km is bounded by Rajshahi division on the north, Bay of Bengal on the south, Dhaka and Barisal divisions on the east, West Bengal on the west. The Sundarbans is located in this division covering parts of Satkhira, Bagerhat and Khulna districts. Main occupation is agriculture 39.43%. For agricultural regionalization, some indicators related to agriculture development are selected based on data availability in secondary sources. Two techniques are used to attempt Agricultural Regionalization of Khulna. One is Proportional standardized mean method. It is a simple technique for preparation of composite index. Another is 0-1 transformation value technique. The result shows that there is only one highly agricultural developed district, Jessore. Considering on the less developed regions are Narail, Meherpur, Magura. And moderate developed regions are Chuadanga, Khulna, Bagerhat and lastly developed regions are Kushtia, Jhenaidah, Satkhira which are falling in these classes of both techniques.

Keywords: Khulna, Regionalization, Agriculture.

1. Introduction

1.1 Background of the Study

Khulna Division with an area of 21643.30 sq km, located in between 21°60' and 24°13' north latitudes and in between 88°34' and 89°58' east longitudes. It is bounded by Rajshahi, Natore and Pabna districts on the north, Bay of Bengal on the south, rajbari, faridpur, gopalganj, pirojpur and barguna districts on the east, west Bengal state of India on the west. The Sundarbans is located in this division covering southern parts of Satkhira, Khulna and Bagerhat districts.

Administration Khulna division consists of one city corporation, 10 districts, 28 municipalities, 5 thanas, 59 upazilas, 569 union parishads, 6093 mouzas, 256 wards, 709 mahallas and 9277 villages. The districts are Khulna, Satkhira, Bagerhat, Jessore, Jhenaidaha, Magura, Narail, Kushtia, Chuadanga, Meherpur (fig 01). Religious institutions Mosque 10737, tomb 68, temple 1959, church 47.

Total population of Khulna division is 14705229; male 51.05%, female 48.95%; Muslim 82.87%, Hindu 16.45% and others 0.68%.

Main rivers are Ganges (Padma), gorai-madhumati, jamuna, ichamati, kobadak, shibsa, kumar, rupsa-pasur, bhairab, chitra, Baleswari, Malancha, Haringhat, Arpangachhia, Raymangal and Mathabhangra.

Average literacy rate is 46.94%; male 50.87%, female 42.80%. Total Educational institutions are university 7, college 310, medical college 2, law college 4, teachers training college 14, secondary school 1984, primary school 19112, kindergarten 77, satellite school 303, madrasa 2041, others 120. Noted educational institutions are University of Khulna, Khulna University of Engineering and Technology, Khulna Medical College, Brajalal College, Khulna Public College, MA Majid College, MM College, Jhenaidah Cadet College, Michael Madhusudan University College, Jessore Zila School (1838), Magura Government Boys' High School, Narail Boys' High School (1854), Naldha Secondary School (1895), Baraipara Primary School (1850), Angra

Government Primary School (1918), Pragpur Government Primary School (1905), Shahbad Majidia Alia Madrasa (1950).

The main source income is agriculture 56.56%, non-agricultural labourer 4.04%, industry 1.72%, commerce 15.20%, transport and communication 3.47%, service 4.77%, construction 4.09%, religious service 0.51%, rent and remittance 0.5% and others 9.14%.

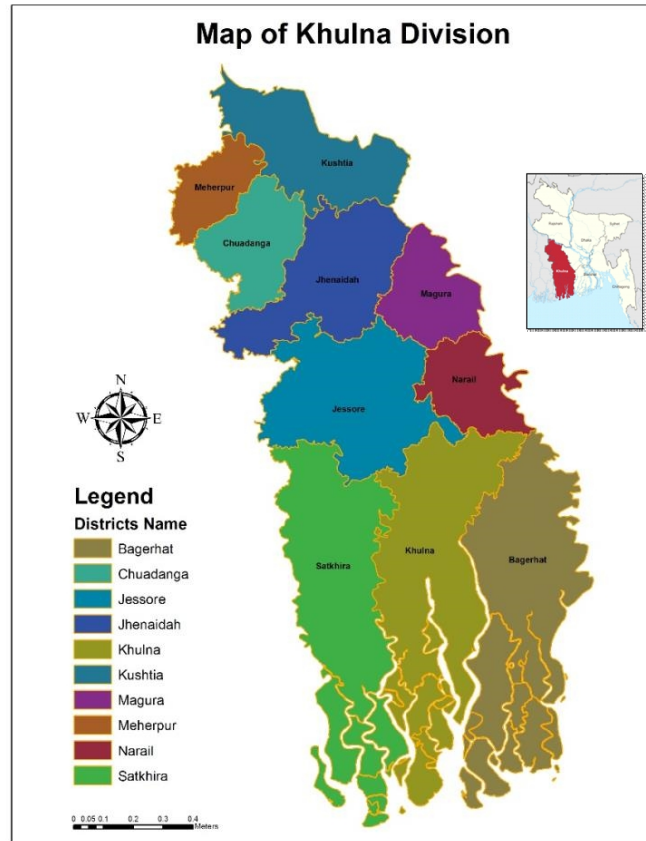


Figure 1. Study Area Khulna Division

The health centers are as Hospital 17, clinic 54, upazila health complex 75, family planning centre 183, satellite clinic 191, union health centre 148, eye hospital 8, diabetic hospital 4, maternity and child welfare centre 14, chest disease hospital 3, mission hospital 5, and veterinary hospital 7.

Main crops Paddy, jute, betel leaf, sugarcane, potato, turmeric, oil seeds mulberry plant, and vegetable. (*Banglapedia, 2014*).

1.2 Goal and Objectives

The goal of the study is to find out the agricultural regionalization of Khulna division.

To fulfill the goal there are some objectives. The objectives are as follows:

- ✓ To find out the indicators for agricultural regionalization
- ✓ To regionalize Khulna division with respect to agriculture

1.3 Scope of the Study

The outcome of the study is the agricultural regionalization of Khulna division. The agricultural researchers will find it helpful for their research. Any physical development of Khulna would be benefitted from this study.

1.4 Limitations of the Study

There are some limitations of the study. They are as follows:

- ✓ The time and budget is short
- ✓ The dependency of secondary data

2 Indicators of Agriculture Developed Regions

To prepare regionalization map, five indicators related to agriculture development are selected based on data availability in agriculture sample survey 2008, Bangladesh Bureau of Statistics (BBS) to compare all spatial districts of Khulna division in Bangladesh. The indicators are:

1. Total population engaged on Agricultural works (percentage of people engaged with agricultural works) - Higher percentage of people engaged with agricultural works that increased the agricultural development.
2. Agri labor households (percentage of total holdings)- higher number of holding occupied by agriculture labor ensures higher employment in agriculture sector leading to higher crop production reduces food storage .
3. Net cropped area – the higher the net cropped area the higher the agriculture development.
4. Holding reporting irrigation-- higher number of holding reporting irrigation defines higher number of agriculture production.
5. Holding reporting taken loan—higher amount of holding reporting taken loan defines the higher involvement of agricultural sector works.

3 Agricultural Regionalization of Khulna Division

Two techniques are used to attempt regionalization:

3.1 Proportional Standardized Mean Method

It is a simple technique for preparation of composite index. As all the indicators of development are not equally important, different weights can be assigned on logical assessment to different indicators by the method of percent proportional standardized mean. This is expressed by the equation number (1).

$$\text{Composite Index (CI)} = \frac{X_1W_1 + X_2W_2 + X_3W_3 + \dots + X_nW_n}{W_1 + W_2 + W_3 + \dots + W_n} \quad (1)$$

Calculation of composite index and districts given in composite index has been divided into four groups by quartile grouping method as shown in Table 1. in Appendix.

3.2 0-1 Transformation Value Technique

Zero to one scoring transformation method has been used to standardized the indicators and then to compute the composite indices. This method transforms the value of the indicators from 0-1. Here 0 values show the poorest condition and 1 value shows the best condition of spatial unit. The higher transfer value exhibits the better status of indicator of the districts. This is expressed by the equation number (2).

$$\text{Transformed Value (TV)} = \frac{X_{ij} - X_i(\text{minimum})}{X_{\max} - X_{\min}} \quad (2)$$

Calculation of transformed value and districts given in total transformed value (composite index) has been divided into four groups by quartile grouping method as shown in Table 2. in Appendix.

Table 1. The two techniques' results comparison

Class	Proportional standardized mean method	0-1 transformation value technique
Less developed agricultural region	Narail, Meherpur, Magura	Narail, Meherpur, Magura
Moderately developed agricultural region	Chuadanga, Khulna, Bagerhat	Chuadanga, Khulna, Bagerhat
Developed agricultural region	Kushtia, Jhenaidah, Satkhira	Kushtia, Jhenaidah, Satkhira
Highly developed agricultural region	Jessore	Jessore

The finding reveals that there is no difference between the recognition techniques of standardized mean technique and 0-1 transformation value technique. Regionalization map (Figure 2) for agricultural development

are divided into 4 regions, less developed agricultural region, moderately developed agricultural region, Developed agricultural region, highly developed agricultural region. The result shows that there is only one highly agricultural developed district, Jessore. This district is agriculturally high developed area in terms of Total population engaged on Agricultural works , Agricultural labor households , Net cropped area, Holding reporting irrigation and Holding reporting taken loan. Considering on the less developed regions are Narail, Meherpur, Magura. And moderate developed regions are Chuadanga, Khulna, and Bagerhat and lastly developed regions are Kushtia, Jhenaidah, and Satkhira which are falling in these classes of both techniques.

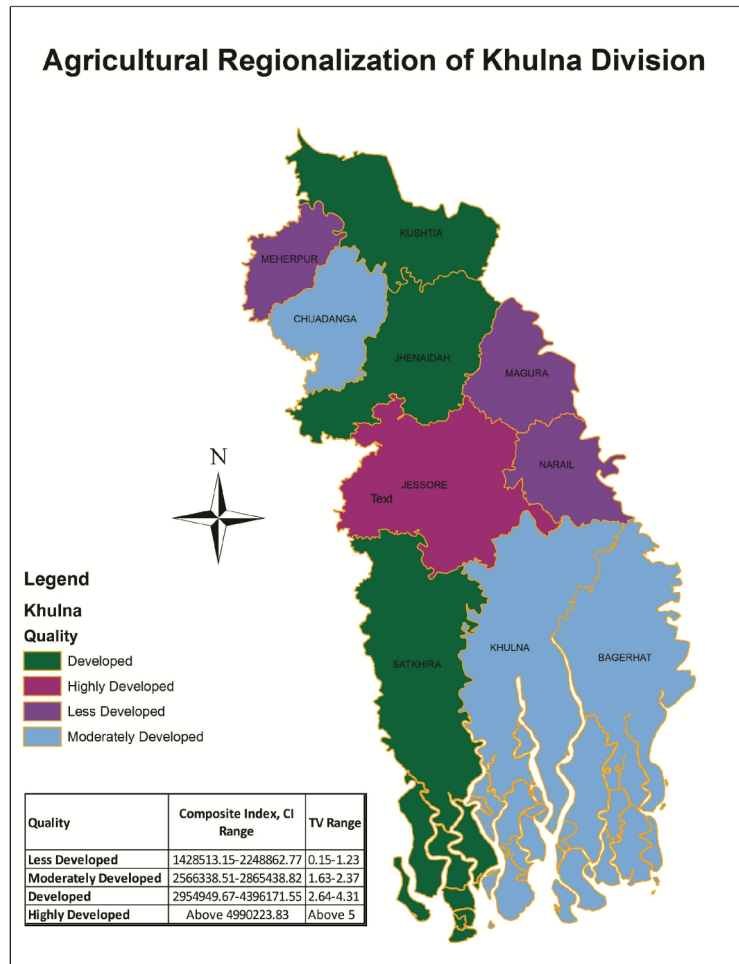


Figure 2. Regionalization map of Khulna Division

4 Conclusion

Five indicators which are total population engaged in agricultural works, agricultural labor households, net cropped area, holding reporting irrigation and holding reporting taken loan, are used for regionalization. The area is divided into 4 regions such as less developed agricultural region, moderately developed agricultural region, developed agricultural region, highly developed agricultural region. The result shows that there is only one highly agricultural developed district, Jessore. Considering on the less developed regions are Narail, Meherpur, Magura. And moderate developed regions are Chuadanga, Khulna, and Bagerhat and lastly developed regions are Kushtia, Jhenaidah, and Satkhira which are falling in these classes of both techniques.

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Appendix

Table 1: Calculation of composite index by proportional standardized mean method and districts given in composite index has been divided into four groups by quartile grouping method.

Total Population Engaged in Agri. Work, X_1	W_1X_1	Agri. Labour Households, X_2	W_2X_2	Net Cropped Area, X_3	W_3X_3	Holdings Reporting Irrigation, X_4	W_4X_4	Holdings Reporting Taken Loan, X_5	W_5X_5	Composite Index, CI	Rank	Condition of Local Units
183759	454915.8642	69138	149429.9149	150741	477701.5397	106446	222080.5107	50987	124385.3171	1428513.147	1	Low Developed
250504	620150.5431	47722	103142.9083	152340	482768.8059	73870	154116.5222	44037	107430.4472	1467609.227	1	Low Developed
315105	780077.5113	63254	136712.6592	188747	598143.3885	111075	231738.0899	75717	184715.3795	1931387.029	1	Low Developed
444228	1099735.874	102661	221884.1229	226032	716300.3724	153041	319292.6313	85723	209125.5132	2566338.514	2	Moderately Developed
409259	1013166.221	144350	311987.7377	282783	896145.5378	100670	210029.9214	107315	261800.2688	2693129.687	2	Moderately Developed
413017	1022469.569	144577	312478.3592	307843	975561.2282	64702	134989.1325	135447	330429.6791	2775927.968	2	Moderately Developed
391591	969427.1203	152738	330116.9594	276024	874726.1184	194142	405042.5051	153978	375636.9733	2954949.676	3	Developed
610356	1511004.235	152857	330374.1574	342988	1086936.505	204584	426827.8676	134381	327829.1192	3682971.884	3	Developed
637862	1579098.401	227847	492452.1654	280730	889639.5357	197581	412217.3626	175734	428711.8151	3802119.279	3	Developed
809232	2003343.916	240843	520540.7878	431466	1367325.23	314445	656033.164	181583	442980.7409	4990223.839	4	Highly Developed
446491.3		134598.7		263969.4		152055.6		114490.2				
180355.9762		62275.91664		83296.80358		72882.1739		46930.87547				
2.47561134		2.161328283		3.169021963		2.086320864		2.439549633				

Class	Class Interval	No of District	Name of District	Class	Median	Position	Calculation
Min to Q_1	1428513.15-2248862.77	3	Narail, Meherpur, Magura	1st quartile, Q_1	3	Average of 3rd & 4th position	2248862.771
Q_1 to Q_2	2566338.51-2865438.82	3	Chuadanga, Khulna, Bagerhat	2nd quartile, Q_2	6	average of 6th & 7th position	2865438.822
Q_2 to Q_3	2954949.67-4396171.55	3	Kushtia, Jhenaidah, Satkhira	3rd quartile, Q_3	9	average of 9th & 10th position	4396171.559
Q_3 to Max	Above 4990223.83	1	Jessore				

Table 2: Calculation of transformation value (composite index) by 0-1 transformation value technique and districts given in composite index has been divided into four groups by quartile grouping method.

Districts	Total Population Engaged in Agri. Work, V_1	TV_1	Agri. Labour Households, V_2	TV_2	Net Cropped Area, V_3	TV_3	Holdings Reporting Irrigation, V_4	TV_4	Holdings Reporting Loan, V_5	TV_5	Total TV	Rank	Condition of Local Units
Narail	250504	0.106711	47722	0	152340	0.005696	73870	0.03671	44037	0	0.149117	1	Low Developed
Meherpur	183759	0	69138	0.110894	150741	0	106446	0.167148	50987	0.050529	0.328571	1	Low Developed
Magura	315105	0.209995	63254	0.080426	188747	0.135385	111075	0.185683	75717	0.230323	0.841812	1	Low Developed
Chuadanga	444228	0.416435	102661	0.28448	226032	0.268202	153041	0.35372	85723	0.30307	1.625906	2	Moderately Developed
Khulna	409259	0.360527	144350	0.50035	282783	0.470361	100670	0.14402	107315	0.46005	1.935307	2	Moderately Developed
Bagerhat	413017	0.366535	144577	0.501525	307843	0.55963	64702	0	135447	0.664578	2.092268	2	Moderately Developed
Kushtia	391591	0.33228	152738	0.543783	276024	0.446284	194142	0.518293	153978	0.799304	2.639943	3	Developed
Jhenaidah	610356	0.682039	152857	0.5444	342988	0.684823	204584	0.560104	134381	0.656828	3.128193	3	Developed
Satkhira	637862	0.726015	227847	0.932705	280730	0.463047	197581	0.532063	175734	0.957476	3.611307	3	Developed
Jessore	809232	1	240843	1	431466	1	314445	1	181583	1	5	4	Highly Developed
Maximum	809232		240843		431466		314445		181583				
Minimum	183759		47722		150741		64702		44037				
Range	625473		193121		280725		249743		137546				

Class	Class Interval	No of District	Name of District
Min to Q_1	0.15-1.23	3	Narail, Meherpur, Magura
Q_1 to Q_2	1.63-2.37	3	Chuadanga, Khulna, Bagerhat
Q_2 to Q_3	2.64-4.31	3	Kushtia, Jhenaidah, Satkhira
Q_3 to Max	Above 5	1	Jessore

Class	Median	Position	Calculation
1st quartile, Q_1	3	Average of 3rd & 4th position	1.23
2nd quartile, Q_2	6	average of 6th & 7th position	2.37
3rd quartile, Q_3	9	average of 9th & 10th position	4.31