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THE PERIODICITY AND SPATIO-TEMPORAL ASPECTS OF THE RURAL PERIODIC MARKETS IN DAKSHIN DINAJPUR DISTRICT, WEST BENGAL, INDIA

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Abstract: The universal phenomenon of the periodic marketing was distributed by transformation of the economy and rapid growth of urbanisation, and was replaced by permanent shops or markets in developed countries as well as in many parts of the developing world. A rural periodic market is the centre of the village, on which the social, economic and cultural activities of several villages depend. These markets are held periodically on same specific day or days of the week at same fixed locations and thus provide different goods and services to the rural masses. The variation of periodicity is a common feature of a rural periodic market. In Dakshin Dinajpur district, the periodic markets are organised either once, twice or trice in a week. These bi-weekly and tri-weekly markets lead to increase the market meeting day in a week. A Chi-square test is conducted to prove that the bi-weekly and tri-weekly markets lead to increase the market meeting for each day in a week above the expected meetings. The periodic markets are linked in space and time. This space-time relationship is called as spatio-temporal synchronisation. It is one of the important themes to explain the nature of periodic markets. A well-integrated marketing system should follow the most useful path 'Proximity in space implies separation in time' which derived by Fagerlund and Smith. This study is concerned with the periodicity and spatio-temporal characteristics as well as their future prospects of the rural periodic markets in Dakshin Dinajpur district.

Keywords: Rural Periodic Markets, Periodicity, Spatio-Temporal Synchronisation

1. Introduction

Rural periodic markets are the characteristics features of the present-day developing world. A rural periodic market is the centre of the village, on which the social, economic and cultural activities of several villages depend. Periodic markets are point for sale of farm produce into large sacks for sale in urban markets. The organization of these market centres is affected by the length of week. By arranging the days of the market week in a continuous circle, it is relatively easy to visualize a temporal distribution (Bromley, 1980). Periodicity is an important aspect of the rural market centres of all the developing and under developing worlds. The periodicity of rural markets can vary depending on the

location and density of the population. The distribution of market periodicities and market networks present a complex array of functionally distinct, contiguous and overlapping system – a kaleidoscopic pattern of place-time interrelationships (Good, 1973).

2. Study Area

Dakshin Dinajpur district extends from 25°10'55" North to 26°35'15" North latitudes and from 87°48'37" East to 89°00'30" East longitudes. This district is covered an area of 2,162 sq. km. and comprises 8 Community Development blocks in the district out of which Balurghat, Kumarganj, Tapan and Hili C.D. blocks are under Balurghat Subdivision while Kushmandi, Banshihari, Harirampur and Gangarampur are under Gangarampur Sub-division. This district is located on the India-Bangladesh border, which is known as a porous border. According to Dakshin Dinajpur Zilla Regulated Market Committee Report (2018), there are 182 rural periodic markets are organised in this district.

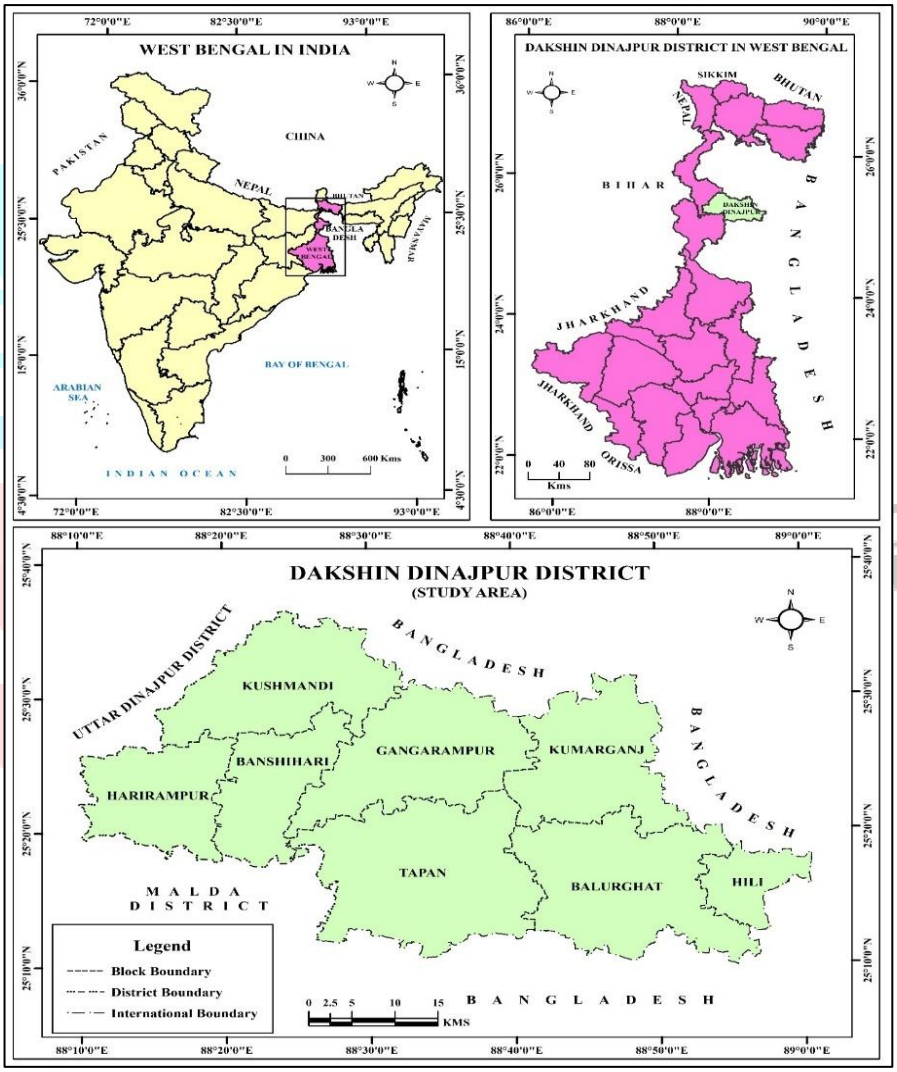


Figure 1: Location Map of the Study Area

3. Methodology

The variation of periodicity is a common feature of a rural periodic market. In Dakshin Dinajpur district, the rural periodic markets are organised either weekly, bi-weekly or tri-weekly in nature. The periodicity of markets is beneficial to the traders as well as the consumers. Chi-square test is conducted to prove that the bi-weekly and tri-weekly markets lead to increase the market meeting for each day in a week above the expected meetings. The maps are digitalised by ArcGIS software.

The spatio-temporal synchronisation of the periodic markets in Dakshin Dinajpur district has been analysis on the basis of the famous hypothesis 'proximity in space implies separation in time'. The space-time relation of these markets has been examined with the help of the market distance calculation. With the help of maps showing markets occurring same day, adjacent day, one day or two days before or after, the actual distance between them has been calculated and a mean distance obtained for each day as well as for each block and for the area as a whole. For same day markets, only between the nearest similar market distance has been measured. For Adjacent day markets, distance of forward and backward day market has been measured and mean has also been obtained. For example, for Sunday market, all the Sunday markets are joined with the nearest Monday and Saturday markets.

On the other hand, for one day before or after markets, all nearest +/-1 forward and backward day markets have been calculated. For example, for Sunday market, all Sunday markets are joined with the nearest Tuesday and Friday markets. The same calculation has been applied for all other measurements.

4. Significance of the Study

Periodicity is an essential aspect of rural markets. The variation in periodicity is a common feature of the periodic markets and in a region one can find markets held once, twice or trice in a week. But in Dakshin Dinajpur district, the most of the rural markets are held twice in a week. So, seller and buyers have the opportunities for choose the suitable market centres for selling and buying the needy commodities by suitable prices. Spatio-temporal synchronisation is a sign of level of integrity in periodic marketing system. But this district is not following the perfect arrangement of synchronisation in respect on space and time. Most of the same day markets are located within very short distance. That's why cut and throat of competition may arise between these same day markets and eventually disturb the attendants in the market centres.

5. Results and Discussion

5.1 Periodicity of the Rural Periodic Markets

In Dakshin Dinajpur district, there is large variation of periodicity of market days because most of the periodic markets (103 markets) are held twice in a week. Almost 77 periodic markets having weekly in nature and only 2 periodic markets are held trice in a week.

Table 1: Block-wise distribution of periodic market centres based on periodicity

Block	No. of the Rural Periodic Markets			Total
	Weekly	Bi-weekly	Tri-weekly	
Balurghat	13	14	0	27
Hili	0	6	0	6
Kumarganj	13	23	0	36
Tapan	19	17	0	36
Gangarampur	9	10	0	19
Harirampur	3	8	2	13
Banshihari	3	5	0	8
Kushmandi	17	20	0	37
Total	**77**	**103**	**2**	**182**

Source: Field Survey Report, 2024

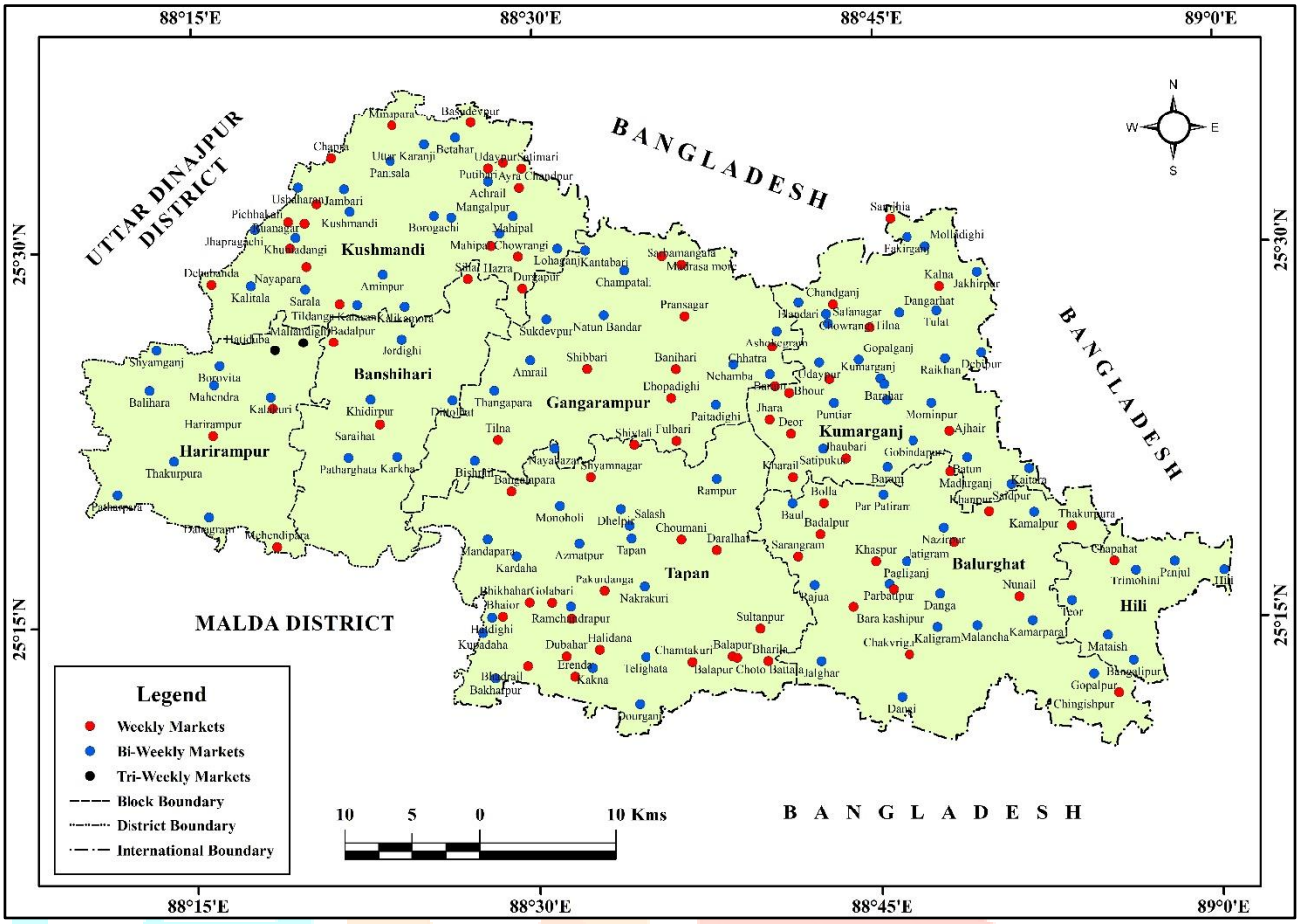


Figure 2: Distribution of the Rural Periodic Markets based on Periodicity in Dakshin Dinajpur District

In the region under study the Friday markets are most popular market day and are held at 64 market centres (22.22%), as followed by Tuesday, Wednesday, Monday and Sunday with the centres of 44, 44, 43 and 40 respectively. While, the minimum number of markets held on Saturday and Thursday i.e. 28 and 25 respectively.

Table 2: Block-wise Distribution of Market Days of the Rural Periodic Markets

Name of the Block	No. of Periodic Market	Day of the Week							Total Market Meeting
		Sun	Mon	Tue	Wed	Thur	Fri	Sat	
Balurghat	27	8	6	5	3	5	12	2	41
Hili	6	1	2	2	2	1	2	2	12
Kumarganj	36	5	8	8	11	4	15	7	58
Tapan	36	8	7	10	10	2	10	6	53
Gangarampur	19	4	5	5	4	3	8	1	30
Harirampur	13	2	4	4	3	5	3	4	25
Banshihari	8	2	2	2	2	1	4	0	13
Kushmandi	37	10	9	8	9	4	10	6	56
Total	182	40	43	44	44	25	64	28	288
In Percentage		13.89	14.93	15.28	15.28	8.68	22.22	9.72	100

Source: Field Survey Report, 2024

The block-wise market day analysis reveals that the Sunday periodic markets are more common in Kushmandi, Balurghat and Tapan block i.e. 10, 8 and 8 markets followed by Kumarganj, Gangarampur and Harirampur with 5, 4 and 2 market centres respectively. Most of the Monday markets are held in Kushmandi, Kumarganj and Tapan block with 9, 8 and 7 centres. While only 2 market centres of both Hili and Banshihari blocks are held in Monday. The number of Tuesday market meeting varies from 2 in Hili and Banshihari blocks to 10 in Tapan block, while this market is held in Kumarganj and Kushmandi blocks with 8 centres. Wednesday markets are more common in Kumarganj (11) and Tapan (10) blocks and is negligible for Hili, Banshihari and Harirampur blocks. The Thursday market is very less

in the study area. It is most common in Balurghat and Harirampur bocks with the number of 5 market centres for both blocks. It is saying earlier that Friday markets are more popular in this district. There are 15 Friday periodic market centres in Kumarganj block which is highest number of markets held on any week day in a block and 12 in Balurghat and 10 each in both Tapan and Kushmandi blocks. While only 2 and 3 periodic market centres of Hili and Harirampur blocks are held in Friday. There are 7 Saturday periodic marker centres are held in Kumarganj block. Gangarampur and Kushmandi blocks having 6 Saturday market centres. While the Saturday market is absent in Banshihari Block.

The selection of market day for a particular market centre depends on the several factors, such as arrival of commodities, demand of goods, proximity of other market, population and some social or religious concepts. Demand of goods create a useful impact for market periodicity. Sometimes high market demands of any region create two same market day market centres between two neighbouring villages. For example, Borogachi hat and Mangalpur hat in Kushmandi block. The distance between these two villages is almost 1 km. Although, the nature of these two market centres is different to each other, i.e. Mangalpur is an ordinary market and Borogachi is an ordinary and livestock market, but their market demands of goods are remain increase. Trinkler observed that, in the rural periodic market situation, the periodicity results from a realisation that direct competition would be self-defecting for both markets (Trinkler, 1973).

Sometimes, the population density which creates greater market demands also influenced on the market meeting. For this reason, in many cases, some small periodic markets are organised within 2-3 km of a major periodic markets at an interval of one or two day from the main periodic market day. In few periodic markets, villagers have confirmed that the market days has been selected with religious consideration, for example, Balapur hat is held in Saturday because this market located around a Kali Mata temple. In the muslim dominated area of the district most of the periodic markets are held in Friday because muslim dominated population have a tendency to meet on friday thus enabling people to combine their marketing and special Friday prayer at the mosque during a single trip.

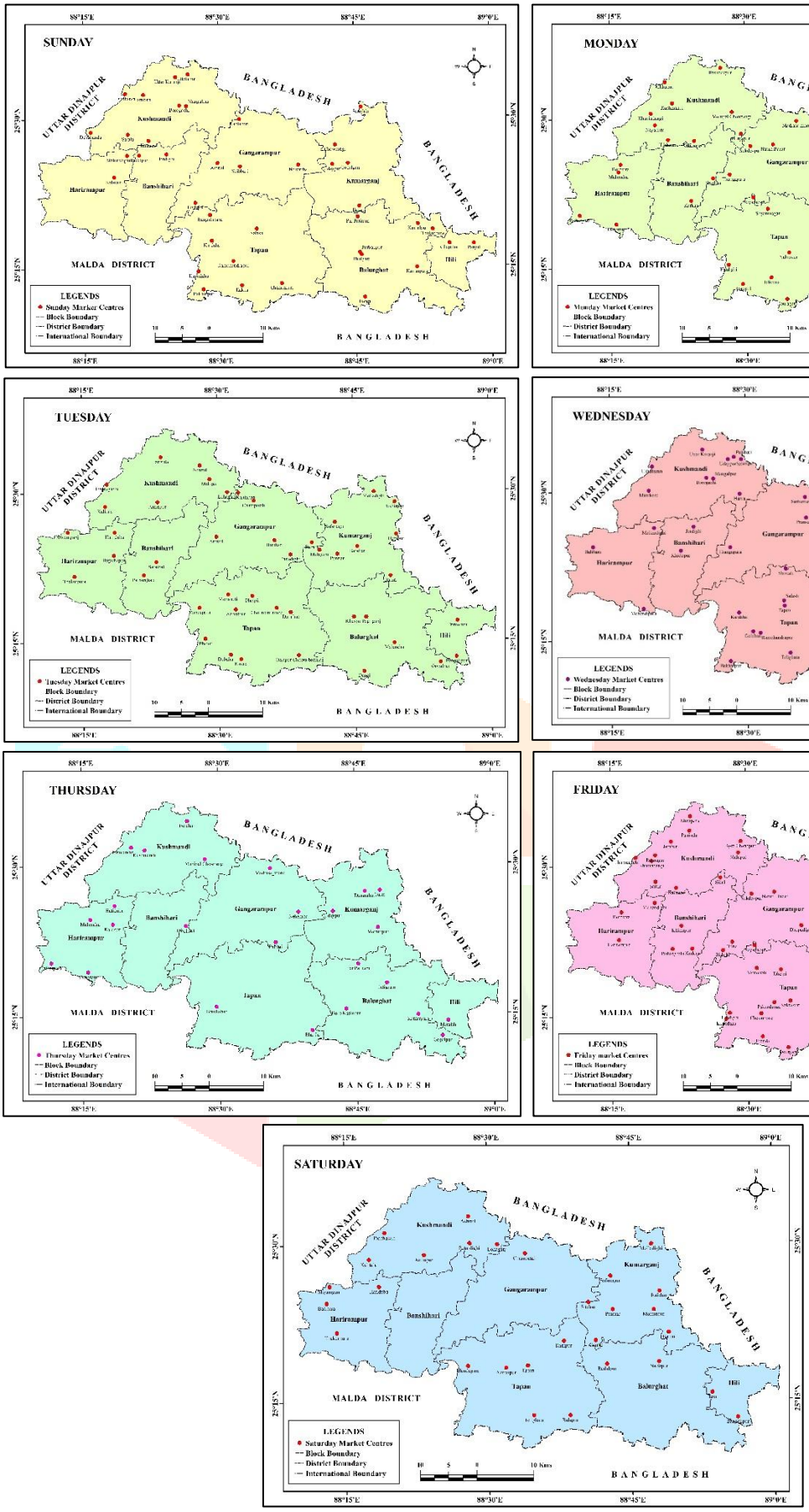


Figure 3: Day-wise Market Meeting of the Rural Periodic Markets in the Study Area

In table-3 it is noticed that the district has more market meeting days than the entire number of rural periodic markets. For example, Dakshin Dinajpur district has 182 rural periodic markets but the total number of market meeting days are 288. As some of the periodic markets of this district are organised twice or thrice in a week, the actual market meeting days are increased than the market numbers. That is why, the difference between actual market meeting and expected market meeting on each day of a week is created. A chi-square goodness fit test has been used to determine whether the actual number of market meeting on each day of the week differs significantly from the expected number of market meetings. The expected market meeting is also called the average number of market meeting of the week.

$$\text{Average market meeting} = \frac{\text{Total number of market meeting}}{\text{Total days of a week}}$$

Here, the average number of market meeting is 41.14. The Null hypothesis (Ho) is framed as below:

Ho = There is no significance difference between the actual number of market meetings on each day of a week and expected market meetings. **(Ho: fxo=fxe)**

Ha = Bi-weekly and tri-weekly markets lead to increase the availability of market days above the expected number of market meetings. **(Ha: fxo≠fxe)**

Test of Statistics = X^2

Significance level = 0.01, 0.05, 0.10;

Significance value (X^2) = 16.81, 12.59, 10.64

If calculated value of chi square is greater than the critical value at the significance level, reject the Null hypothesis (Ho).

Table 3: Chi-Square Test of Periodicity of the Rural Periodic Markets

Day of the Week	Observed Frequency (o)	Expected Frequency (e)	Residual (o-e)	$(o-e)^2$	$(o-e)^2/e$ or X^2
Sunday	40	41.14	-1.14	1.30	0.032
Monday	43	41.14	1.86	3.46	0.084
Tuesday	44	41.14	2.86	8.18	0.199
Wednesday	44	41.14	2.86	8.18	0.199
Thursday	25	41.14	-16.14	260.50	6.332
Friday	64	41.14	22.86	522.58	12.702
Saturday	28	41.14	-13.14	172.66	4.197
Total	**288**	**288**	**0**	**976.85**	**23.745**

Source: Computed by the Researcher, 2024

The calculated chi-square value of X^2 is 23.745, which is greater than the critical value 16.81, 12.59, 10.64 so the null hypothesis is rejected and alternative hypothesis is accepted at the significance level of 0.01, 0.05 and 0.1. So, it is clear that the bi-weekly and tri-weekly rural periodic markets lead to increase the market meeting of each day of a week above the expected market meetings.

5.2 Spatio-Temporal Synchronisation of the Rural Periodic Markets

The whole spatio-temporal synchronisation analysis based on the hypothesis 'proximity in space implies separation in time'. This hypothesis developed by Fagerlund and Smith.

After calculation the internal distance of same day, adjacent day, one or two-days interval markets, there are some interesting facts identified, these are given below:

In Balurghat block the weekly mean distance of same days markets are widely located than the other categories and the mean distance is 8.62 km. In case of all other categories, i.e. adjacent day, one-day or two-days interval markets have more or less very little variation in weekly mean distance. It is only 7.495, 7.698 and 8.096 respectively. So, this block partially supports the hypothesis 'proximity in space implies separation in time'. The obtained data has also been displayed in the graph which confirm that the same day markets are widely located from the adjacent and other markets.

Table 4: Spatio-Temporal Synchronisation of the Periodic Market Centres in Balurghat Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Balurghat	Sunday	7	9.75	7.468	8.253
	Monday	4.45	9.564	8.907	7.235
	Tuesday	7.73	7.493	7.617	7.133
	Wednesday	9.3	5.69	7.89	8.4
	Thursday	10.525	6.517	7.7	9.376
	Friday	6.333	7.032	8.017	7.79
	Saturday	15	6.422	6.286	8.483
	Weekly average	8.620	7.495	7.698	8.096

Source: Computed by the Researcher, 2024

The Hili block not support the hypothesis 'proximity in space implies separation in time'. All categories of weekly mean market distance of this block have more or less variation. These are 8.743, 7.61, 7.22 and 8.767 respectively. So, the market meeting integration completely create an ambiguity and cut throat competition situation among the traders and consumers.

Table 5: Spatio-Temporal Synchronisation of the Periodic Market Centres in Hili Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Hili	Sunday	5.2	7.525	6.4	8.26
	Monday	18	7.6	9.875	8.275
	Tuesday	8.7	6.4	5.62	6.125
	Wednesday	13	8.82	7.78	8.55
	Thursday	5.7	6.4	5.433	12.267
	Friday	3.1	8.55	5.56	9.316
	Saturday	7.5	7.975	9.875	8.575
	Weekly average	8.743	7.610	7.220	8.767

Source: Computed by the Researcher, 2024

In this block the same day, adjacent days and other days markets are widely located from each other and their mean distance is 7.346, 6.005, 6.604 and 5.719 respectively. So, this block perfectly follows the hypothesis

'proximity in space implies separation in time'. That's why it does not create any competition situation among the traders and consumers to choose the market on any market day.

Table 6: Spatio-Temporal Synchronisation of the Periodic Market Centres in Kumarganj Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Kumarganj	Sunday	7.96	6.833	5.006	6.657
	Monday	3.95	6.717	6.28	5.358
	Tuesday	9.287	5.644	6.813	4.756
	Wednesday	7.956	5.962	6.79	5.859
	Thursday	7.667	6.04	7.05	5.784
	Friday	5.358	5.579	6.258	5.867
	Saturday	9.243	5.263	8.031	5.752
	Weekly average	7.346	6.005	6.604	5.719

Source: Computed by the Researcher, 2024

If look at the table-7, it can see that the weekly average distance is maximum in same day market (9.73 km), but it constantly decreases from adjacent day towards the two days interval market. So, it proved that the all categories of markets of Tapan block widely distributed from each other. That means these markets are fully harmonised with the hypothesis of space and time.

Table 7: Spatio-Temporal Synchronisation of the Periodic Market Centres in Tapan Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Tapan	Sunday	7.571	7.804	5.984	6.237
	Monday	7.483	7.756	7.67	7.011
	Tuesday	7.22	7.628	6.861	6.659
	Wednesday	7.587	6.866	7.694	7.167
	Thursday	24	6.6	6.933	6.522
	Friday	6.089	7.817	6.577	6.661
	Saturday	8.16	5.915	8.6	5.882
	Weekly average	9.73	7.198	7.188	6.591

Source: Computed by the Researcher, 2024

The Gangarampur block do not accord this hypothesis, because all four categories of markets are more or less very little variation in the mean distance of markets. It is only 9.96, 7.672, 8.377 and 9.657. As the mean distance of two days interval markets is greater the adjacent day and one day interval markets, the aforesaid hypothesis highly rejected for the spatio-temporal distribution of these markets.

Table 8: Spatio-Temporal Synchronisation of the Periodic Market Centres in Gangarampur Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Gangarampur	Sunday	10.533	5.814	7.04	10.245
	Monday	11.3	5.31	7.72	10
	Tuesday	11.2	7.244	9.35	8.35
	Wednesday	11.2	6.1	7.809	9.482
	Thursday	11.95	6.092	8.25	11.286
	Friday	6.64	12.72	8.09	8.686

	Saturday	6.9	10.425	10.38	9.55
	Weekly average	9.960	7.672	8.377	9.657

Source: Computed by the Researcher, 2024

In Banshihari block the all-market days are attain the inverse relationship of spatial and temporal aspect. The all categories of market days are nearly located to each other. The markets of the block are rejected the hypothesis.

Table 9: Spatio-Temporal Synchronisation of the Periodic Market Centres in Banshihari Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Harirampur	Sunday	6	8.213	5.325	8.557
	Monday	5.4	8.421	7.84	6.642
	Tuesday	9.6	6.915	6.582	6.127
	Wednesday	17	7.344	8.9	8.633
	Thursday	6.2	7.523	5.811	6.055
	Friday	7.05	5.667	8.725	5.709
	Saturday	7.4	8.05	7.01	9.514
	Weekly average	8.379	7.448	7.170	7.320

Source: Computed by the Researcher, 2024

Harirampur block has the more integrity in respect of the arrangement in spatio- temporal aspect than the other block in this district. There are all categories of market days i.e. same day, adjacent day, one day or two interval markets are widely located from each other. Thus, the markets of the block generally support the hypothesis 'proximity in space implies separation in time'.

Table 10: Spatio-Temporal Synchronisation of the Periodic Market Centres in Harirampur Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Banshihari	Sunday	5.5	11.325	6.84	8.62
	Monday	8.2	8.543	8.25	6.775
	Tuesday	4	5	8.88	4.18
	Wednesday	6.1	6.62	8.275	6.033
	Thursday	18	8.9	7.75	11.067
	Friday	8.275	8.533	9.625	7.8
	Saturday	0	0	0	0
	Weekly average	7.154	6.989	7.089	6.354

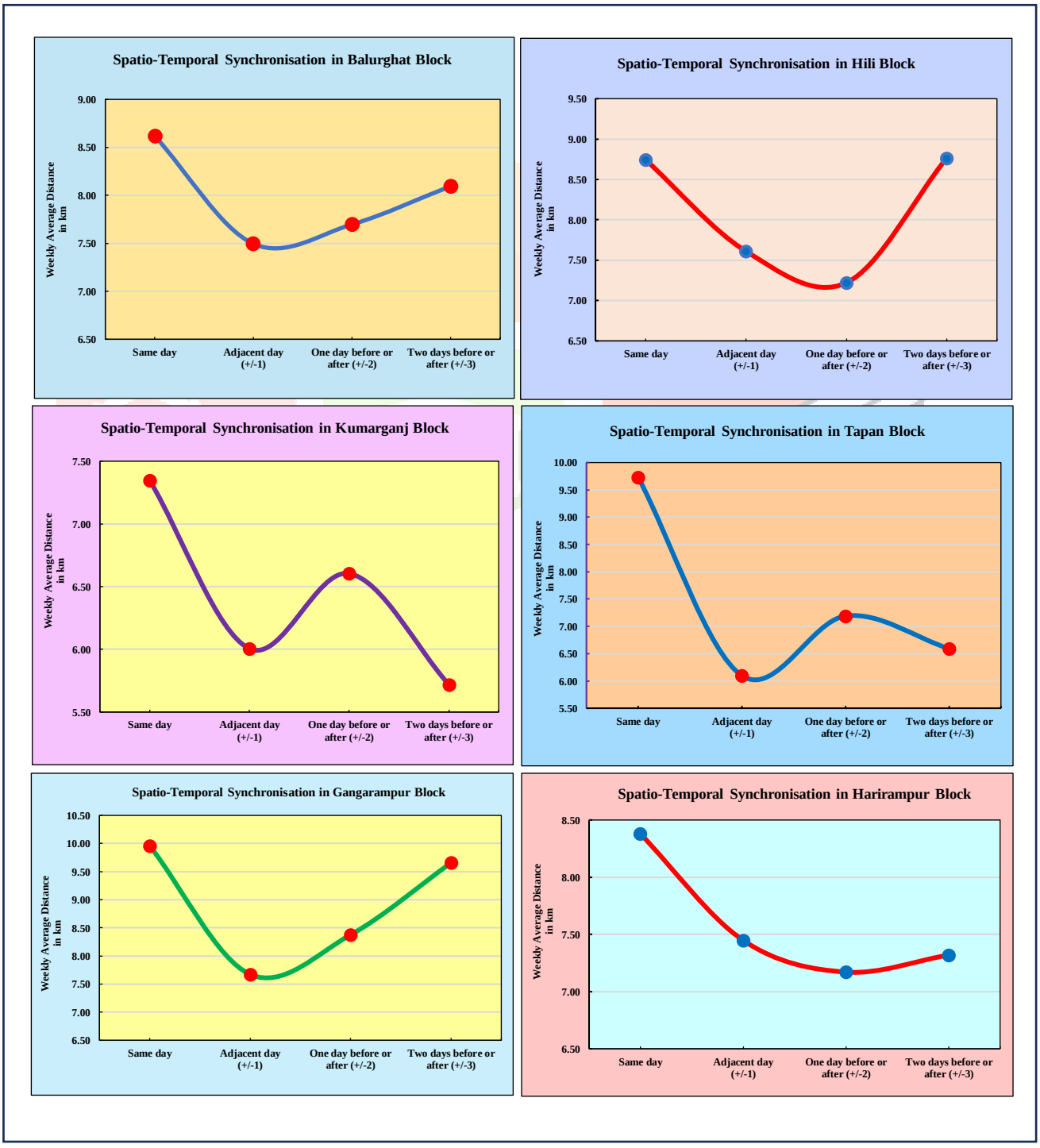
Source: Computed by the Researcher, 2024

In terms of market distribution, the Kushmandi block has create a complex situation. The same days markets are widely located and the mean distance is 7.302 km. But in case of other 3 categories i.e. adjacent days, one day or two days interval markets, there is very little variation in the distance of the markets. That's why the markets of Kushmandi block are partially accept the 'proximity in space implies separation in time' hypothesis.

Table 11: Spatio-Temporal Synchronisation of the Periodic Market Centres in Kushmandi Block

Block	Days	Mean distance (km) between market centres			
		Same day	Adjacent day (+/-1)	One day before or after (+/-2)	Two days before or after (+/-3)
Kushmandi	Sunday	6.337	5.484	6.909	6.817
	Monday	6.542	5.45	6.131	5.282
	Tuesday	8.657	6.213	6.52	5.986
	Wednesday	5.725	5.296	4.743	5.861
	Thursday	9.625	4.572	6.235	4.606
	Friday	4.5	6.148	6.254	4.824
	Saturday	9.725	5.39	6.31	6.128
	Weekly average	7.302	5.508	6.157	5.643

Source: Computed by the Researcher, 2024



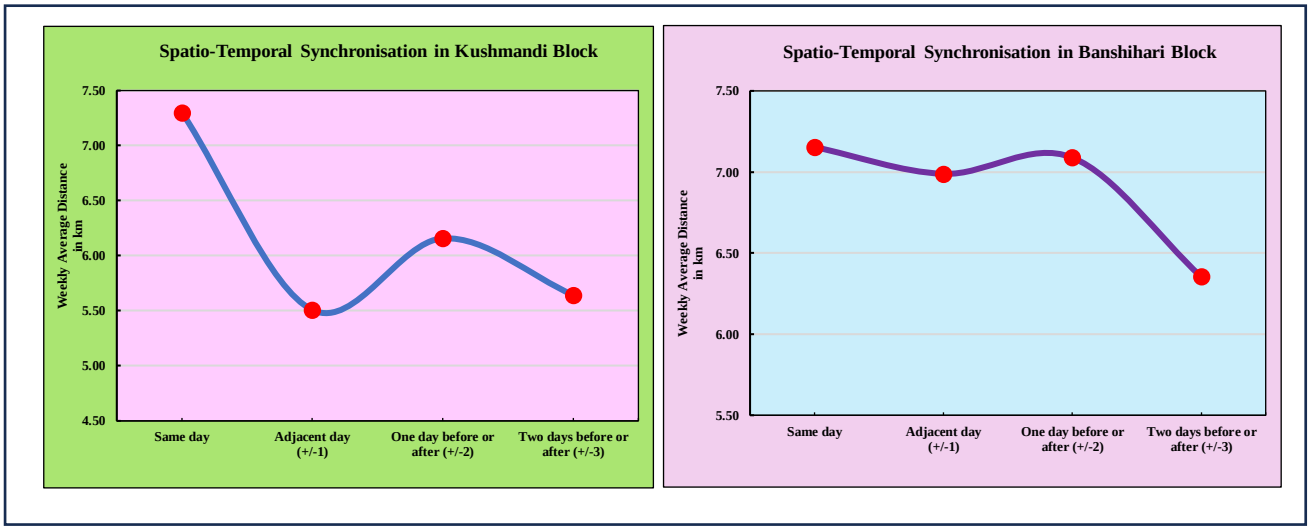


Figure 4: Spatio-Temporal Synchronisation of the Rural Periodic Markets of Different Blocks

6. Conclusion

After explanation the spatio-temporal nature of the rural periodic market centres of Dakshin Dinajpur district, some interesting facts were seen, most of the periodic markets are in this district are bi-weekly in nature, villagers have the opportunity to visit the market on most days of a week and allowing them to easily sell their surplus agricultural produce. These bi-weekly and tri-weekly markets lead to increase the market meeting of each day of a week above the expected market meetings.

Although spatio-temporal synchronisation of the periodic markets is a sign of the level of integrity in the market system. But in terms of integral arrangement, it looks a little different in the district. Balurghat, Hili, Banshihari, Kushmandi and Gangarampur block experiences lack of integrity in respect of synchronisation. On the other hand, Tapan and Harirampur block can take perfect decision in the joining the rural periodic markets with the integral system.

7. Acknowledgement

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