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A Study on Spatio-Temporal Aspects of Rural Periodic Market Centres in Uttar Dinajpur District, West Bengal, India

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Abstract: *The development of an area should be judged on the basis availability of services which ultimate would benefit the residents in terms of every aspect. It is the rural periodic market centres which are the authorized public gathering of rural as well as urban populace of the nearby area treated as a service centre and cater the services to its surroundings. But obviously as the periodic market held on periodic basis it is the periodicity of the market centre which bears some considerable impact in marketing transaction on that area. In addition the spatial distribution pattern also leaves the significance effect on the degree of convergence of participants on that area. Cut and throat of competition may arise due to clustering distribution of periodic markets or regular distribution of periodic markets compel some buyers or consumers to travel long distance and eventually disturb the attendants in the market centres. Short temporal spacing with more spatial distance may enhance the encouragement to attendants to attend the periodic markets. So, let better to integrate the periodic market system along the well through line of spatial and temporal aspects. A well integrated marketing system should follow the well defined path of 'Proximity in Place implied separation in time' the famous notion devised by Ferguland and Smith. Uttar Dinajpur district has an occupant of agrarian people who always has an intention to be engaged in agricultural production and disposal of the said produce in nearby or long distance periodic market centres. In this regard they have to be acknowledged about the schedule of periodic markets apart from the distance spacing of the market centres. The frequency of visit of that participant largely depends on the pattern of distribution of periodic markets in the district. The focus of the study is to highlight the nature of spatio-temporal aspects of periodic markets and necessity of well integrated marketing system in order to keep maintenance of threshold level and development of the region.*

Keywords: *Spatial, Temporal, Periodicity, Nearest Neighbour, Synchronization*

1. INTRODUCTION

Markets are the most widespread exchange system and play a dynamic role not only in the rural socio-economic development but also performed the significant role in the regional level. The role of markets in rural development planning is the need of the hour to study. A market is a place where distribution of goods and services take place. Marketing can therefore be described as a transaction of goods and services in a given place and pricing system. Marketing has always been in existence even before the advent of money when trade by- barter was being used as a way of exchange it had revolved round marketing. Marketing is the backbone of economic activities; it is involved in different stages of production and making the final products reach the final consumers. It can also be described as the direct flow of goods and services from producers to the users in such a way the utility in time, place and ownership enhanced. Rural populace in Uttar Dinajpur district always intends to attend the maximum number of periodic markets in order to sustain the income level. In this regard the periodicity and locational spacing of periodic markets play as a dominant factor for frequency of visit. Efficiency of market cycle would be depended on the integrity in between the schedule of day spacing and spatial distance in between the said market centres. The district has a glimpse of weekly, biweekly and tri weekly market centres. Apart from the periodicity spatial pattern of distribution in between market centres have a significant role for the threshold gathering in the said market centres. The evenly distribution of market centres signify the considerable impact on the spatio-temporal synchronization of market centres.

2. THE STUDY AREA

Uttar Dinajpur district in West Bengal lies within the coordinate of latitude 25°11' N to 26°49' N and longitude 87°49'E to 90°00'E occupying an area of 3142 km² enclosed by Panchagarh, Thakurgaon and Dinajpur district of Bangladesh in the east, Kishanganj, Purnia and Katihar districts of Bihar on the west, Darjeeling district and Jalpaiguri district on the north and Malda district and Dakshin Dinajpur district on the south. The district has been subdivided into two sub-divisions viz. Raiganj and Islampur, 110 km (68 mi) apart from each other and comprising mainly of Bengali speaking population while Islampur has a large number of Urdu and Hindi speaking people. There are 4 Municipalities, 9 Blocks and 97 Panchayats covering 3263 inhabited villages. The district comprises 1505 mouzas and four municipality viz. Raiganj, Kaliyaganj, Dalkhola and Islampur. The district has a border length of 227 km (approx) in the east with Bangladesh. The regional topography is generally flat with a gentle southerly slope towards along which the main rivers like Kulik, Nagar, and Mahananda etc. are flowing. The district experiences average slope 1.32˚ as followed by maximum slope 2.6˚ and minimum slope 0.03˚. Rainfall patterns vary quite widely within Uttar Dinajpur, with sharp divergence in annual precipitation between the five southern blocks of Karandighi, Raiganj, Hemtabad, Kaliaganj and Itahar, and the four terai blocks of Chopra, Islampur, Goalpokhar-I and Goalpokhar-II. Local climatic patterns also have an important bearing on agricultural and occupational profiles in the different Uttar Dinajpur Blocks. The district economy bears the agrarian characteristics. Seasonality in cropping pattern is prevalent in the district.

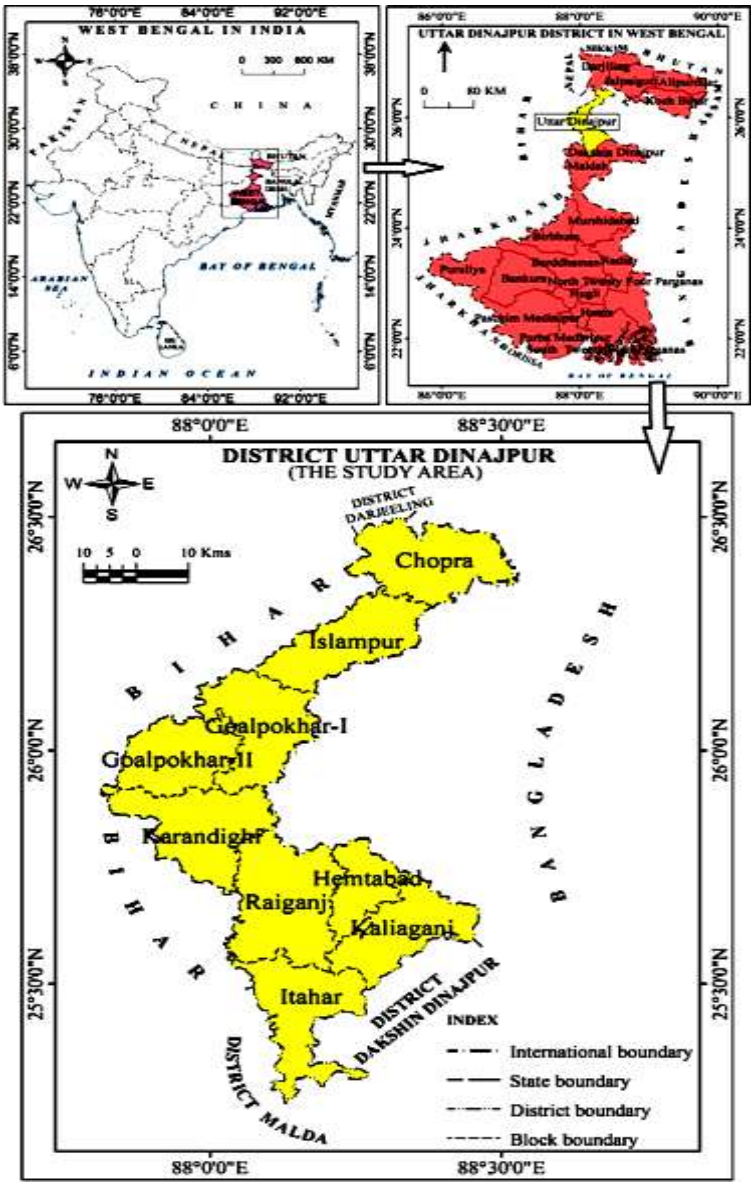

Figure1. *The Study Area*

3. METHODOLOGY:

The spatial temporal spacing offers a rational option for buyers to minimize travel cost for the same day, adjacent day and one day ahead or after Market Places (Tamaskar, 1978). The spatio-temporal sequencing of a set of periodic market places is expected to be such that each one is able to serve a threshold number of buyers at each meeting to keep up its existence in a thriving state. Plainly, the nearest market place in a space should come about as far apart in time as possible to be capable to ensure a threshold number of vendors at each market meetings. Marketplace separated by comparatively long distance can set their meetings simultaneously on the same day without facing cut throat competition. In any area therefore it is possible to assess the stage of spatial and temporal synchronization or integration of periodic market places. Highly integrated subsets have an inverse relationship between spatial and temporal proximity, while poorly integrated groups indicate a direct relationship between the two. The complete synchronization of market places is an exception in the real world situation (Smith, 1972). An analysis of the pattern of distribution and the development of periodic market network can be useful to identify the processes, which give rise to the locational spacing. The relationship between temporal and locational spacing is a fundamental characteristic of periodic marketing system in Uttar Dinajpur district. In this research paper an attempt has been made to show correlation ship between temporal separation and loactional spacing of periodic market places. The efficiency of spatio-temporal synchronization is assessed by measurements of average locational spacing of market meeting on the same day, adjacent day, one or two days apart. The spatio-temporal relation of periodic markets within the Uttar Dinajpur District has been examined with the help of distances calculated and a mean obtained for each day. With the aid of maps showing markets occurring on the same day, adjacent day, one daytime interval and two days interval, actual distances between them has been calculated and a mean obtained for each day for each block of the territorial dominion. In the adjacent day market, distances for prior and after day market has been measured and mean has also been received. For object lesson, for Sunday markets, all Sunday markets were joined with nearest Monday and Saturday markets. The same practice has been done in all other computations. The values obtained have been tabulated and graphs for each day have been drawn for further analysis. A consequence of periodicity is the partial substitution of temporal for spatial competition between centres (Hodder & Ukwo, 1969). It is generally believed that market meetings are organized in space and time to achieve an "optimal" sequence (Smith, 1971). Periodic market systems provide excellent examples of the complex spatial and temporal components present in most development problems. The spatio-temporal synchronization of periodic market system is an intensively studied area in marketing geography. R.H.T. Smith (in 1971, 1972) in particular has made comparative studies of a number of periodic market systems throughout the world. He pioneered a method of testing the spatial-temporal synchronization or it was named later, integration of a market arrangement.

4. SIGNIFICANCE OF THE STUDY

The synchronization is more consistent between marketplaces whose meeting share held on the same day and adjacent days locational spacing and inversion occurs when long temporal separations are taken into account. The district shows the honorable exceptions where market meetings may be taken on the same day at two places, not far apart from each other in space, one earlier, traced by the other later in time. This is pitted by the en block shift and relocation of the market meeting at another place at a short distance on the same day. So it may be remarked that a perfect integrated trading system in between periodic market centres maintain the inverse relation between spatial location of periodic markets with those of temporal placement. The optimality of periodic market centres as spatio-temporal systems have to be viewed in the light of the participation capacity of buyers and sellers. It is expected that there should be an optimal succession of market meetings which will maximize attendance of both buyers and sellers on succeeding days.

5. RESULT AND ANALYSIS

The district shows that the distribution pattern ranges from random towards regularity. The 'Rn'value varies from minimum i.e. 1.01 in Karandighi Block to maximum i.e. 1.62 in Kaliyaganj Block. So the distributional pattern of periodic market Centres bears the characteristic of perfect randomness in Karandighi Block. Simultaneously, a tendency is getting from randomness to the regular distributional pattern of periodic market Centres. In Raiganj Block as the Rn value varies from 1.37, as followed by

Hemtabad block 1.35, Itahar 1.38, Chopra1.4, Islampur1.3, Goalpokhar I 1.45 and Goalpokhar II 1.46 shows a tendency of randomness to regular distributional pattern. The highest Rn value 1.62 is observed in Kaliyaganj Block which signifies the distributional pattern as Regular in scale. It has also estimated from the inquiry that in medieval and Zaminder's period periodic market originated as a solution to maintain the prestige and honor, but in recent era for the convenience of traders, markets are set in their visiting perspective in such a manner that the smaller and less attendant's markets are working to abolish. Abolition of small periodic markets in accordance with the origin of larger and growing market Centres leads to spring up a tendency from Random to Regularity. As Raiganj block predominates considerable number of periodic markets in Uttar Dinajpur an excellent assessment of spatial-temporal synchronization analysis has been prepared. Spatial and temporal competition is complementary; that is markets located, closer to each other, are separated by a longer time interval, and vice versa (Smith and Good, 1971 and 1972). Though the famous hypothesis *'**Proximity in place implies separation in time'*** (Ferguland and Smith, 1970) do not follow in Raiganj block. Equally, it has been proved in previous chapter that spatial distribution pattern of periodic market centres in Raiganj block signifies a regular form and it is not always maintain the decorum for when the time gap is less, the spatial position of markets will be apart and vice versa. Inference drawn from the below exposition may be summed up as follows: Market place meeting on two day apart in relation to Sunday signify mean distance 10.0 Km in comparison to same day market meetings i.e.3.39 Km. In case of Monday market meetings and its adjacent day, one day apart and two day apart are partially accorded with the hypothesis as one day apart market meeting in respect of Monday is 3.44 Km of mean distance in comparison to adjacent day and same day i.e.5.56 Km,4.84 Km accordingly. Tuesday market meeting completely creating an ambiguity and creat cut throat competition among the traders and consumers as the same day market meetings is less distance than that of the adjacent one day and two day market meetings. Wednesday markets also do not accord with the hypothesis 'Proximity in place implies separation in time'. Thursday, Friday, and Saturday market meetings are fully harmonized with the hypothesis as the computed spatial distance value on the same day (5.612Km, 10.139Km, 7.63 Km) market meetings are more than that of the spatial distant value of adjacent, one or two days apart markets. So it is proved that the integration of market centres is not feasible within the block. Periodic market places in Raiganj Block cater the demands of the heavy amount of buyers and sellers in rural counterpart. The district witness with agricultural activities and remoteness, inaccessibility, low density of demand, low per capita income has compelled the area and residents to set up periodic markets in adjacent counterpart. Since spatio-temporal synchronization of periodic markets does not accord with the integrated set up -'The distance of the periodic markets on the same day is more than that of the market on the other days in a week' so it is very much essential to rethink about the spacing of periodic markets for the sake of smaller rural markets for avoiding cutthroat competition with the larger markets and could survive in within the range of large market area. The famous hypothesis 'Proximity in place implies separation in time' (Ferguland and Smith, 1970) follows the same principle to some extent in Hemtabad block. Inference drawn from the below exposition may be summed up as follows: Most of the market place meeting on Monday, Tuesday, Wednesday, Thursday, Friday & Saturday maintain the same path as 'Proximity in place implies separation in time' in spatio-temporal spacing. Except Sunday partially accept the famous norm 'Proximity in place implies separation in time'. It can be said as the spatial, temporal arrangement of periodic market centres signify some sort of inverse relation in terms of spatial and temporal distance between periodic markets and it is also the indication of most integrated marketing systems. This space-time arrangement of periodic markets ensures a premium return from waiting for demand and supply of goods and services (Wanmali 1988).So it can be said that, periodic market centres in Hemtabad block more or less integrated in comparison to others blocks and participants of these market centres are can escape from some sort of cut and throat competition. In Kaliyaganj block Tuesday, Wednesday and Thursday only maintain the ideal relationship of spatio-temporal spacing as followed by Itahar Block on Monday and Wednesday. But the rest of the day trader face a cut throat competition due to converse relationship of spatio-temporal spacing of periodic market centres. Karandighi block has the more integrity in respect of the arrangement in spatial and temporal spacing. So, Karandighi Block show more integrity in spatio temporal arrangement of periodic markets than that of the Islampur block as the former follow the inverse spatio-temporal spacing for four days of the week e.g. Monday, Tuesday, Thursday, Friday whereas the later follow the same for two days of

the week. Goalpokhar-I and Goalpokhar-II follows the ideal spacing for one day and two days only as follows. Whereas Chopra block attain the inverse relationship of spatial and temporal spacing for three days e.g. Sunday, Tuesday, and Wednesday as follows.

Table1. *Distributional Pattern of Periodic market Centres based on Nearest Neighbour Analysis (Method based on Evans and Clark)*

Blocks	Observed Distance (do)	Expected Distance (de)	Rn value	Chi square test $X^2 = \frac{(o-e)^2}{E}$	Remarks
Raiganj	2.64	1.92	1.37	0.27	Random to Regular
Hemtabad	1.96	1.45	1.35	0.18	Random to Regular
Kaliyaganj	4.06	2.5	1.62	0.97	Almost Regular
Itahar	2.94	2.12	1.38	0.31	Random to Regular
Chopra	6.1	4.36	1.40	0.69	Random to Regular
Islampur	3.43	2.62	1.30	0.25	Random to Regular
Goalpokhar-I	6.15	4.21	1.45	0.98	Random to Regular
Goalpokhar-II	4.46	3.05	1.46	0.65	Random to Regular
Karandighi	2.79	2.74	1.01	0.00	Random

Source: *Computed by Author*

The district shows that the distribution pattern of periodic market centres is running from random towards regularity. The 'Rn' values range from 1.01 in Karandighi Block to 1.62 in Kaliyaganj Block. So, the distributional pattern of periodic market Centres bears the characteristic of perfect random in Karandighi Block. Simultaneously, a tendency is getting from random to regular distributional pattern of periodic market Centres. In Raiganj Block as the Rn value varies from 1.37, as followed by Hemtabad block 1.35, Itahar 1.38, Chopra 1.4, Islampur 1.3, Goalpokhar I 1.45 and Goalpokhar II 1.46 shows a tendency of random to regular distributional pattern. The highest Rn value 1.62 is observed in Kaliyaganj Block which signifies the distributional pattern as regular in scale. It has also estimated from the inquiry that in medieval and Zaminder's period periodic market originated as a solution to maintain the prestige and honor, but in recent era for the convenience of traders, markets are set in their visiting perspective in such a manner that the smaller and less attendant's markets are working for catering the services to local people. As the synchronization effect does not create the viability in the entire study area, the area witness some abolishment of smaller scale market and hence a tendency towards regularity.

Figure2

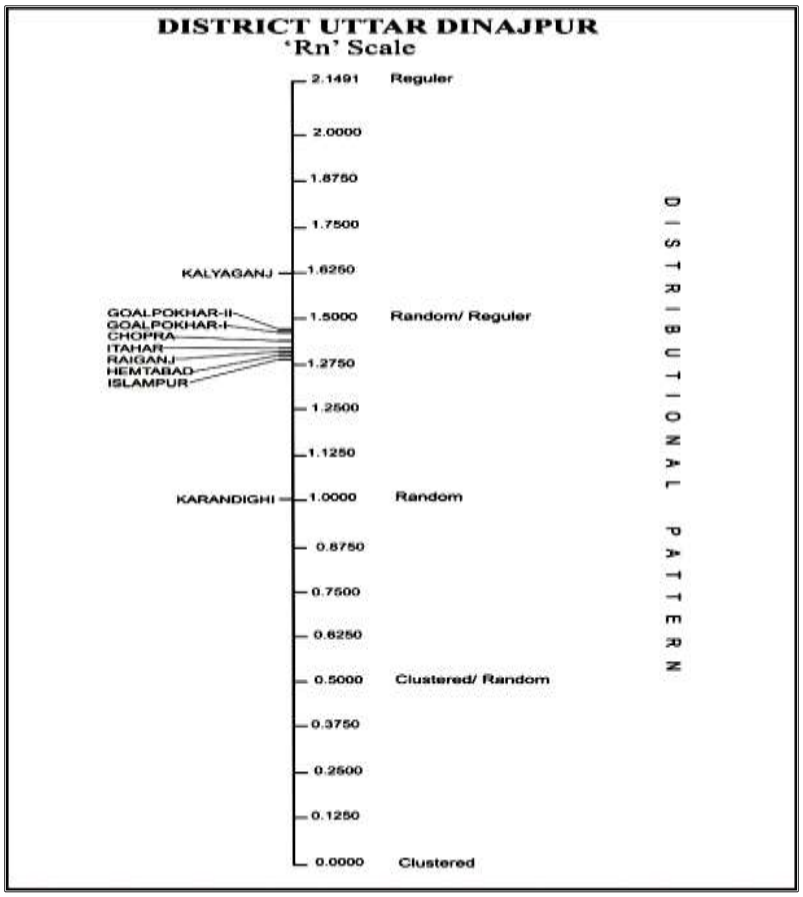

Figure3

Table2. *Block-wise Periodic Distribution of Periodic Market Centres*

Blocks	Weekly	Bi-weekly	Tri- Weekly	Total
Chopra	2	15	0	17
Goalpokhar-I	0	10	0	10
Goalpokhar-II	1	9	0	10
Hemtabad	7	14	1	22
Itahar	25	5	1	31
Islampur	1	20	0	21
Kaliyaganj	9	13	1	23
Karandighi	5	17	0	22
Raiganj	24	23	2	49
Total	74	126	5	205

Source: *West Bengal State Marketing Board 2013*

The frequency of market meetings varies from market to market. 35.9% of the markets meet weekly, 61.2% meet twice weekly, 2.4% meet three times weekly. The system of periodicity provides an adjustment to the agricultural system. Only one marketing day in a seven-day- week means six rest days or days of other agricultural activity and rural folk get sufficient time for relaxation as well as for preparation for the next visit to the market. The frequency of occurrence of these markets varies widely, so that meeting occurs at a given place every second, third or nth day where n rarely is greater than three. In order to perform these special functions the markets are held at predetermined specific sites according to set of temporal schedules on every second, third or nth day where rarely is greater than seven. The periodic markets studied in the Uttar Dinajpur District have specific market days, where the dominant economic function is bulking and distribution of farm produce and local food processing products. So from the point of view of functional organization, periodic markets are one of the most important characteristics of the functioning of the marketplace sub-organizations. Periodicity of market center in the district do not observed the only single market day, but there is maximum periodic markets held bi-weekly lead to increase the market meetings of the week more than expected

number of market meetings. During field study it was very much critical to judge that which factors are responsible for the occurrence and persistence of the periodicity regime. It is interesting to note that the district have more market days than the entire number of markets (table-22). For example, in Uttar Dinajpur district, there are 205 periodic market Centres in all and 311 market days. This is because many markets are taken for more than one day in a workweek. In areas served by bi-weekly markets, therefore, market availability increases above the required number by the number of days by which market gathering increases above one. The Chi-Square goodness of fit test has been used to determine whether the actual number of market meetings on each day of the week differs significantly from the expected number of market meetings. The expected market meeting in this case, is 44.43. The average number of market meetings on each day, i.e. total number of market meetings divided by the market days of the week. The Null Hypothesis (Ho) framed is as under: 'There is no significant difference between the actual number of market meetings on each day of week and expected number of market meetings'. Subsequently alternative hypothesis is proposed as 'Bi-weekly markets lead to increase the availability of market days above the expected number of market days'.

Ho: fxo=fxe

Where, fxo observed frequency and fxe expected frequency

Ha: fxo ≠ fxe

Test statistics: $\mathbf{X^2}$

df=7-1=6

df means to degree of freedom

Significance=0.01, 0.05, 0.10

Decision Rule: Reject Ho if the calculated value of chi square is greater than the critical value (X^2value>16.81, 12.59, 10.64) at the chosen significance level.

Table1. *Chi-Squared Test of Periodicity of Market Centres*

Days of The week	Observed Frequency (o)	Expected Frequency (e)	Residuals (o-e)	$(o-e)^2$	$(o-e)^2/e$ Or X^2
Sunday	49	44.43	4.57	20.9	0.47
Monday	38	44.43	-6.43	41.34	0.93
Tuesday	45	44.43	0.57	0.32	0.007
Wednesday	48	44.43	3.57	12.74	0.29
Thursday	50	44.43	5.57	31.02	0.7
Friday	36	44.43	-8.43	71.06	1.6
Saturday	44	44.43	-0.43	0.18	0.004
Total	311	311	0	177.56	4

Source: *Computed by Researcher*

Since the result indicates that the estimated value of x^2 is 4 which is too much smaller than that of the critical value 16.81, 12.59, 10.64 so the Null hypothesis is accepted and alternative hypothesis is rejected at 0.01, 0.05, 0.10 significance level in certain degree of freedom. Significance test confirms the fact that market activity in the district held on each day of the week not vary significantly in terms of expected number of market day.

6. CONCLUSION

Synchronization of periodic markets in respect of space and time is a mark of level of integrity in marketing system. But the district show some different from the point of view of integral arrangement. Instead of having a lot of periodic markets in Raiganj Block the block experiences lack of integrity in respect of synchronization. On the other hand the resident of Hemtabad and Kaliyaganj block can take wise decision in respect of attending periodic market centres rather they become because of integral arrangement of periodic markets. Though Thursday, Friday and Saturday markets has been harmonized in respect of spatio-temporal sequencing but Monday, Tuesday and Thursday don't show integral spatio temeporal sequencing of periodic market centres.

In order to achieve well integrated marketing activities the district should have to be arranged in a rational manner i.e. the inverse relation between spatial locations of periodic markets with those of

temporal placement. The spatio-temporal sequencing of a set of periodic market places is expected to be such that each one is able to serve a threshold number of buyers at each meeting to keep up its existence in a thriving state. Simply, the nearest market places in space should come about as far apart in time as possible to be capable to ensure a threshold number of vendors at each market meeting. Marketplace separated by comparatively long distances can arrange their meeting simultaneously without cut throat competition.

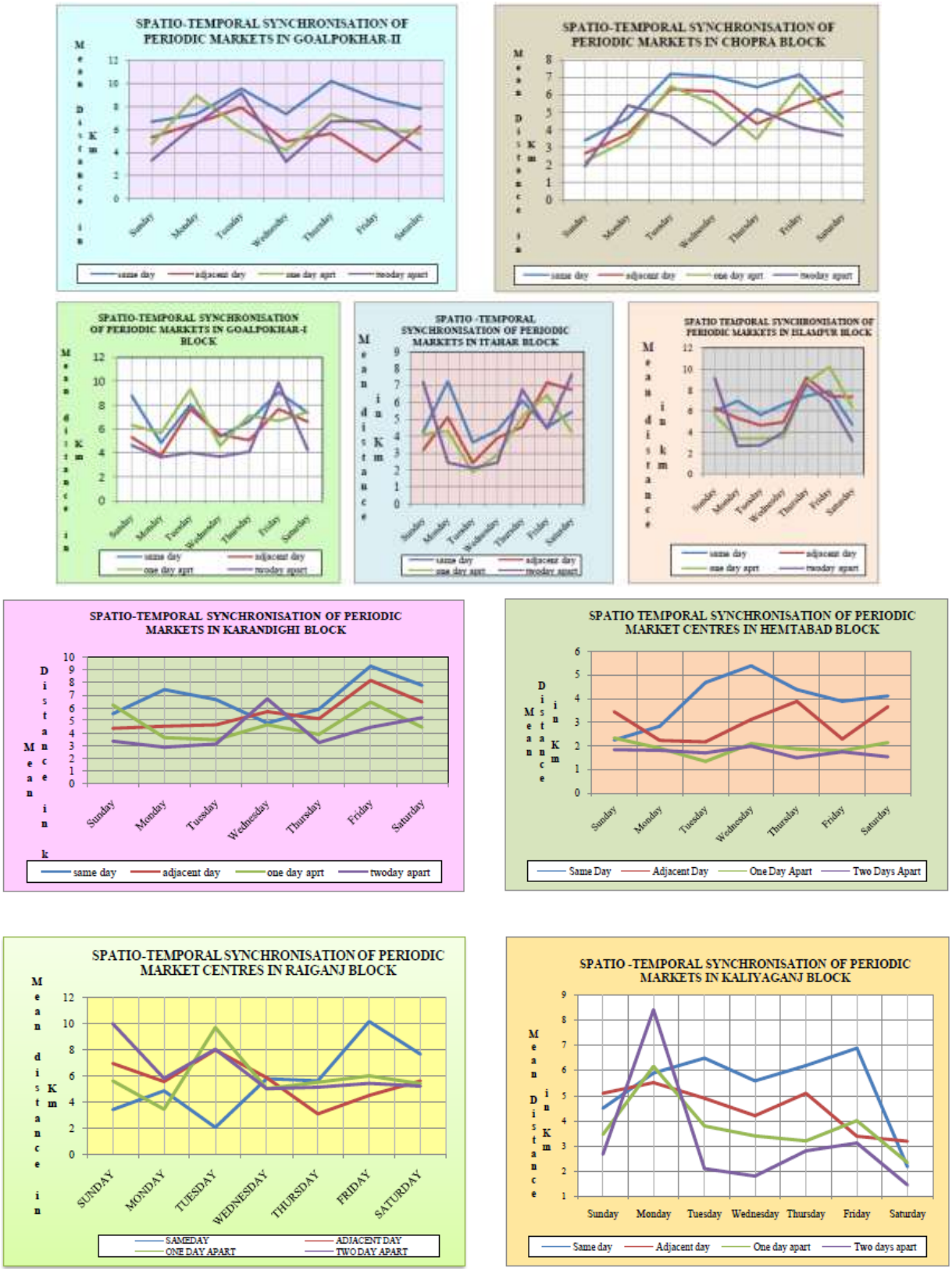

Figure4.

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Area of Interest: Cartography, Population Geography, Agricultural Geography, Geography of Rural Development, Remote Sensing & GIS

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