INTRODUCTION

Comprehensive or balanced development of a region presupposes reciprocal interaction between its urban and rural settlements. Thus, integration between urban and rural sectors –the two dichotomous subsets of settlements—is an important aspect of the process of development.

Disparate characteristically, but dependent mutually, are the two basic elements of settlements i.e., urban centres and their rural peripheries. The mutual dependence originates from a systematic functional interaction between them, which implies that the city draws primary products for the consumption of its residents, raw materials and labour force for its industries and services from its rural hinterland; the hinterland in turn depends on the city for the industrial inputs in its primary sectors, non-agricultural consumer goods, modern technology, services (health, education), urban culture, ideas etc. Thus, as Rao puts it "the region creates the city, and is recreated by the city".[1](Rao, 1983, pp.128). Again in Jefferson's opinion, "Cities do not grow of themselves; countrysides set them to do tasks that must be performed in central places."[2] (Jefferson, 1931, p.453)

In this interactive system, the city extends its influence to the tradition–bound countryside and the countryside reacts to this urban challenge through responses in spatial, demographic and socio-economic aspects. This process leads towards rural–urban equilibrium. Thus the process of urbanisation, which embraces "transformation of rural traditional economics into modern urban economics, as well as to overall transition from tradition to modernity"[3] (Bose, pp.289), acts as an equilibrating mechanism between urban and rural areas.

Theoretical Framework

A number of theories have been enunciated concerning the symbiotic relationship between city and its hinterland with an obvious focus on the role of urban centres in spatial organization and development.

In the Central Place Theory, Walter Christaller (1933) visualises a central place which serves a hexagonal hinterland of settlements of smaller order. The larger is the central place, larger will be its service area (hinterland).

Statement of the Problem

The above idea of development remains merely an ideal in developing countries where the spatial structure of urban centres does not provide a viable basis for rapid economic development. These countries have islands of over urbanisation in the vast ocean of rural poverty. India also typifies this picture with its top heavy character of urban structure, i.e. a disproportionate concentration of population in small number of conurbations. The settlement pyramid is represented by thousands of villages at the base and a few metropolis and class-I cities at the apex. This is a result of concentration of developmental benefits in some urban pockets which in turn leads to "development of underdevelopment in the vast rural hinterland and persistence of dysfunctional nodalities in the economy."[4] (Kundu,1980, p.20). Such a scenario of sharp rural-urban dichotomies is a perpetuation of the colonial heritage of the country.

In pre-colonial period, the Indian villages were very prominent with their self-sufficient economic and administrative functions. As Bhattacharya observes, "The Indian village offered everything, on a modest scale to its inhabitants. ...every village was a self-sufficient unit having servicemen for its essential needs, ranging from the political (administrative) to religious matters."[5](Bhattacharya,1979, p.289). But, during the colonial regime, the British developed certain centres which had all the benefits of urban life, industry, mercantile trade, business etc. The surrounding villages were neglected, although it is the villages which supplied the raw materials of progress, advance and welfare to the newly developed pockets. "The port cities in colonial India were permitted to grow but only as focal points of a suction mechanism for siphoning off surpluses generated in the country and consequently did not have much production linkages with their regional economies".[6](Kundu, 1989, p.306). As a result of the strong urban--backwash effect, the rural handicrafts decayed and the well-integrated agro-industrial economy of the rural hinterlands was ruined. The village community, the base of the Indian economy, was thus disintegrated losing both its economic and administrative functions and the centres of gravity of villages were diverted outside their soils, i.e., towards urban centres. The depleted self-sufficiency of rural economy could not provide effective demand support for the growth of urban--industrial economy, which further distorted the city--hinterland coordination.

After independence, the emphasis on industrial development had a bias in favour of large cities. The industrial units concentrated in large cities because of their

vocational and economic advantages inherited from the colonial regime. On the contrary, the already victimized rural areas continued to be confronted with many problems, such as inadequate investment in agriculture, low agricultural productivity, low income and demolished industrial bases. These rural settlements could not generate any.optimal hierarchy of settlement for themselves. This abject rural poverty in turn led to rural-urban migration. Villages became thus depleted of their food, raw materials, youth and culture. The disharmony between city and hinterland took a shape of undesirable rural-urban dichotomy.

Twin problems have emerged on account of this rural-urban disparity.

First, the symbiotic bi-directional relation between city and hinterland was replaced by the uni-directional one to some extent. Emergence of national markets for industrial raw materials, finished goods and even for agricultural products, coupled with the growth of transport and marketing institutions has enabled the modern cities to draw industrial raw materials from distant areas and dispose off their products nationally to far-away consumers. Hence, the dependence of modern Indian city on surrounding rural region is generally declining in importance to a certain extent. On the other hand, the poverty-stricken villages continue to look towards their neighbouring cities for important purposes e.g.

i) Economic – employment, transaction in terms of purchasing and selling off of essential commodities, banking facilities, agricultural inputs;

ii) Social – health services, educational services, transport/ communication facilities, recreation,

iii) Administrative.

iv) Legal & others.

The city ward dependence of the hinterland is much more well-defined than the other way round. The city-hinterland interaction has, therefore, become a parasitic one and the nature of dependence is not conducive to rural development.

Secondly, since the unabated rural-urban migration in general is not in response to the urban pull, but to rural push, the urban centres do not have the capacity to assimilate the rural exodus. On account of this fact of their being overburdened most of the cities in India "have reached a point of not only economic stagnation but also of economic regression".[7] (Misra & Misra, 1983).

This desolate picture of rural-urban interaction is detrimental to the advancement of both rural and urban areas. The development of rural areas, therefore, is not only beneficial to themselves but also to the urban centres and thereby to the nation as a whole. Realising this, the sixth five year plan[8] emphasised on the role of the small town in promoting rural development through their functions as growth centres. The seventh plan makes it clear that rural development should get priority over urban problems.[9] A contextual reference can be drawn from the experience of Kenya where the policy makers have contemplated that the interdependence of rural and urban development must proceed together to maintain a balance between them. "If rural development lags behind, people will migrate to the urban areas in search of better opportunities in such large numbers that the urban areas will not be able to accommodate them. If urban development proceeds too slowly, the rural areas will suffer from lack of access to supplies and weak demand for their products." [10] (Ministry of Finance and Planning, 1979, cited in Jones, 1986)

In the light of the growing concern for mutual urban-rural development, the objective of the present study may be enunciated as below:

Objectives

The proposed study intends to investigate the process of urban-rural interaction and its association with rural development in West Bengal at macro and micro levels. Speaking specifically, the objectives are the following:-

1. To identify the district-wise patterns of urbanisation and its causal relationship with rural development;
2. To explore the nature of different types of urban-rural interaction and the associated factors arising out of the villagers' access to urban services in view of distance and transport linkages of the selected villages with their nearest urban centres;
3. To explore the modes of interaction associated with the benefits derived by the rural people from the availability of urban services;
4. To examine the intensity of interaction and its underlying principles;
5. To investigate the levels of urban-rural interaction and its determinants;
6. To measure the distance-decay effect of urban influence on the characteristics of the respective villages;

7. To find out the association between urban-rural interaction and rural development at micro level;

8. To study peoples' perception about the process of urban-rural interaction in connection with rural development.

Hypotheses

The following hypotheses have been tested during the investigation of the study:-

1. The higher the extent of urbanisation, the higher will be the rural development, i.e., the areas having higher levels of urbanisation are expected to have higher levels of rural development and thus urbanisation, as a whole, has a positive impact on rural development.

Rationale: Since urbanisation is regarded as the concomitant of socio-economic development, therefore the higher level of urbanisation is expected to be accompanied with greater levels of regional development and the diffusion of urban benefits from towns to their rural peripheries. This process in turn will develop the socio economy of rural areas. That is why, the level of urbanisation is assumed to be directly correlated with the extent of rural development and the process of urbanisation will lead to development in rural areas.

2. The nature and modes of interaction are presumed to be negatively affected by the distance from the nearest town. Speaking specifically, there is a distance-decay effect on the proportions of rural households and rural population a) availing of urban services and b) deriving benefits of urban services from their nearest towns.

Rationale: Since an urban centre acts as the service centre for the population of its hinterland, a large influx of villagers from the closer periphery tend to commute to the core (nearest) town for satisfying their needs. On the other hand, the majority of the villagers of distant periphery of the town are rather compelled to be satisfied with the meagre resources either of their native places or of any neighbouring big village or semi-urban settlements.

3. The distance of the rural areas from their nearest town has an inverse relationship with the number of urban services availed of by the villagers.

Rationale: Being facilitated by the locational proximity, the people from nearby villages of the town generally commute to the (nearest) town for various purposes. On

the contrary, the villagers of the distant places move to the (nearest) town only for their essential and urgent necessities, because of the locational disadvantages of their native places, represented by greater distance from the town. That is why, villagers of closer areas can avail of more urban services from their nearest town than the villagers of distant places.

4. The intensity of urban-rural interaction will decrease with the increasing distance from towns.

Rationale: Generally, the frequencies of commuting are more from the nearby villages of a town and decline farther away from the city. Beyond a certain distance from cities, daily movements are replaced by weekly or even irregular movements. Because of this, the distribution of city-services to the surrounding villages, and the quantum of supply of agricultural production from villages to towns diminish with distance from towns. Hence, the hypothesis of distance-decay effect may be put forward to examine the intensity of city-hinterland interaction.

5. The levels of urban-rural interaction will decline with increasing distance from towns.

Rationale: It is an usual tendency that more people from closer villages come to their nearest towns to have access to larger number of urban services and to avail of more benefits accrued from the services as compared to the distant villages; again, the frequencies of their movement to towns is more than the distant villagers. Thus, as a net result, the levels of interaction of less distant villages with the nearest towns are higher than that of the distant villages.

6. Distant villages with better transport linkage with their nearest towns in terms of greater frequencies of buses, lesser travel time and lesser transport fare will have higher levels of interaction as a whole with their core towns than the lesser distant villages with poor communication. This hypothesis may be specified as follows:

a) Distant villages with more frequencies of buses (a component of transport linkage) plying from their nearest town, have higher levels of interaction with their nearest town than that of the nearer villages with lesser bus-frequencies.

b) Distant villages with lesser travel time (a component of transport linkage) to reach their nearest town, have higher levels of interaction with their nearest towns as compared to the nearer villages with more travel time because of circuitous route.

c) More is the transport fare (as a component of transport linkage) from the villages to their nearest town, lesser will be the levels of interaction with their nearest towns.

Rationale: The good connection including direct metalled road linkage and a good number of transports (buses) minimise the travel time of the distant villagers to their core towns and thus increase their propensity to move to the towns to access urban services. Moreover, it eases the flow of materials and people also from urban sides. On the contrary, mobility of people and goods of a lesser distant village to their nearest town may be hindered by its poor communication linkage with the concerned town. Hence, villagers from distant places of better transport linkages with their nearest towns may have higher levels of interaction

7. Among the socio-eco-demographic characteristics, the population density, growth rate of population, literacy rate, percentage of workers in secondary sector, percentage of workers in tertiary sector, agricultural labourer-cultivator ratio, infrastructures of the concerned hinterland are assumed to wane off with the increasing distance from towns, while sex ratio, work participation rate, percentage of workers in primary sector are expected to rise as distance increases from the towns.

Rationale: As population density, growth rate of population, literacy rate, percentage of workers in secondary and tertiary sectors, availability of infrastructures are basically urban type traits, such characteristics tend to become reversed, as one progresses from the urban centres. Again, because of the predominance of agriculture in the remoter rural hinterland than in the closer rural peripheries of a town, the cultivators' proportions are assumed to be higher in the former areas; in contrast, the proportion of agricultural labourers may be assumed to be increased in the closer hinterland because of the more availability of alternative employment nearer to urban areas.

Since, primary activities typify rural settlements, the percentage of workers in primary sector is assumed to have a positive relationship with distance from towns.

Because of the selective male migration from the remote rural areas to the immediate surroundings of the town for better employment opportunities, the proportion of male population is larger than the female population near an urban centre. That is why, sex ratio is lower near an urban centre and it increases with distance from the urban centre.

On account of the rural poverty and also for the labour-intensiveness of agriculture, the work participation rate of the remote rural areas is assumed to be higher than that in the close peripheries of an urban centre.

8. The greater the levels of interaction between a town and its hinterland, the higher may be the levels development of hinterlands (rural development), and vice versa, i.e. the levels of rural-urban interaction and levels of development of villages are directly correlated. Further, the process of urban-rural interaction has a positive impact on the levels of development of the villages.

Rationale: A higher degree of urban-rural interaction affords more urban contacts with the rural people; it will favour the greater accessibility of urban innovation and modernisation to rural areas. These may be reflected on rural development.

9. Higher the status of an urban centre, greater will be its impact on the development of the villages of its hinterland.

Rationale: An urban centre of higher order, in terms of the administrative hierarchy, may be expected to possess more benefits than an urban centre of lower status. Therefore, a district capital may be expected to have greater spread-effect on its hinterland with more urban infrastructure, than that of a subdivision town. In other words, the levels of development of the hinterland of a district town may be assumed to be higher, in general, than that of the hinterland of a subdivision town.

Rationale for selection of the Study Area

The foci in this evaluation-study of urban-rural interaction and rural development are the villages around some towns of Koch Bihar and Jalpaiguri districts of West Bengal. The basis for selecting the state of West Bengal, in particular, is analysed here below:

Among the four major regional systems of cities in the northern, southern, eastern and western part respectively formed by the four metropolises, viz., Delhi, Chennai, Kolkata and Mumbai, the eastern region is the most important because of its historicity. It is where stands as an evidence of colonisation in India. In this region, West Bengal is the most important state, which epitomises the dismal picture of urbanisation, inherited from the colonial era. Therefore the present study has dealt with West Bengal as a macro area of study.

For micro level study, the districts of Jalpaiguri and Koch Bihar have been selected for the following reasons:

1) The colonial impact on these two districts of North Bengal is of different nature than that of the districts of the southern part of the state. The urban and rural settlements are the products of plantation agriculture in major part of Jalpaiguri district, while in Koch Bihar those are the by-products of the once princely state of Koch Bihar.

2) The phenomenon of urbanisation is recently developing in both of these districts as manifested in the low percentage of urban population, i.e., 17.84% and 9.10% respectively in Jalpaiguri and Koch Bihar according to 2001 Census. Indeed, there is a difference between the processes which led to urbanisation here. In Jalpaiguri, urbanisation is partly a concomitant development of tea and timber industry. In Koch Bihar, industrialisation has not yet penetrated much to have its impact on urbanisation. It is basically an agrarian district. While the town of Jalpaiguri has attained the status of a class I town with a population of 100,348 in 2001, Koch Bihar urban agglomeration, a class II district town in 1991 with a population of 92,820, upgraded itself into a class I urban agglomeration with 122,795 population in 2001. The town of Alipurduar has a base of 70,313 heads, although the Alipurduar Urban Agglomeration has a population base of 114,035 in 2001. Apart from these recently formed class I towns, basically medium and small towns dominate the urban scenario of these districts. Again, the size of the class I towns is not at all large.

In the context of rural development, the role of small and medium towns is important as these towns are tied more closely with their immediate rural peripheries.

With this idea in mind, villages from the hinterland of towns of different categories have been selected from these two districts. First, from the administrative viewpoint, the district headquarters (*Koch Bihar* and *Jalpaiguri*) have been considered in order to judge the comparative nature of impact on their rural surroundings. Secondly, considering the size of towns (in terms of population), three medium size subdivisional towns (two from Koch Bihar—viz. *Dinhata* and *Tufanganj* and one from Jalpaiguri---viz., *Alipurduar*) have been selected from each of these districts. Among these three subdivisional towns, the class I town of Alipurduar urban agglomeration has a larger population base than Dinhata and Tufanganj.

Categorising in such a manner, the urban-rural interaction may be perceived in relation to rural development in an urbanisationally backward region, which yet is experiencing urbanisation as a new phenomenon.

Variables

Suitable variables have been categorised as indicators of different aspects, which are as follows:-

A) *Indicators of Urbanisation* (District- level)

1. Percentage of urban population to total population,
2. Urban-Rural ratio (in percentage),
3. Rate of Urbanisation (in percentage)
4. Urban centres per 10, 00,000 rural populations
5. Town Density (Urban settlements per 1000 sq km),
6. Percentage of class I cities to total urban settlements,
7. Urban population density (per sq. km),
8. Decadal growth rate of urban population (in percentage)

B) *Indicators of Rural Development* (District-level)

For 1991

1. Rural Population Density (per sq. km),
2. Rural Female Literacy Rate (in percentage),
3. Rural Work Participation Rate (in percentage),
4. Agricultural labourer/Cultivator Ratio (per100) (Rural),
5. Percentage of Rural Workers in Non-agricultural activities,
6. Percentage of Rural Male main workers in Secondary Activities,
7. Percentage of Rural Male main workers in Tertiary Activities,
8. Percentage of Rural households occupying permanent houses
9. Number of PHC s per one lakh rural population
10. Percentage of Rural households with Toilet, Electricity, Safe Drinking Water
11. Percentage of Villages with Communication
12. Percentage of Villages with Power supply

For 2001

1. Rural Population Density (per sq. km)
2. Rural Female Literacy Rate (in percentage)
3. Percentage of Rural Workers in non-agricultural activities
4. Percentage of Rural Male main workers in Secondary and Tertiary Activities
5. Percentage of Rural households with Electricity
6. Percentage of Rural households with Toilet

7. Percentage of Rural households occupying permanent houses

8. Percentage of factories, workshop, and work shed to occupied census houses (Rural)

Since data on all aspects (considered in 1991) are not yet available for 2001, the Indicators of Rural Development for 2001 are fewer than that in 1991.

C) ***Indicators for identifying Distance-Zones***

1. Distance (km) from the selected towns

2. Distance (km) from the villages to the nearest (selected) towns

D) ***Indicators for delineating the hinterland of urban areas***

1. Distance (km) between two towns

2. Population size of those towns

3. Number of indoor patients admitted per week/per month to the town hospital from places outside the town

4. Number of students coming to the colleges of the towns from places outside the town

5. The virtual limit (outside the municipal boundaries) up to which newspaper from the urban centres is circulated

6. The distance of the villages wherefrom agricultural products are supplied to the towns

E) ***Indicators of Transport Linkage***

1. Frequency of buses plying from the urban centres to the selected villages

2. Travel time (minutes)

3. Transport fare (rupees)

F) ***Indicators of Urban-Rural Interaction***

I. The *Nature of Interaction* has been explored in terms of movement of the villagers to their nearest town for *availing of different urban services*, e.g.

1. Percentage of Rural households availing themselves of medical treatment and advices from town (a) on regular basis (b) in case of emergency.

2. Percentage of Rural households depending on the nearest town for (a) regular educational service at town, (b) only private education (c) both regular and private education,

3. Percentage of Rural households using the nearest urban centres as their market places; in this case households have further been classified as—

(a) those purchasing daily items from the nearest town, (b) those purchasing items only for special purposes from the nearest town and (c) those purchasing both daily and special items from the nearest town.

4. Percentage of Rural households selling off their agricultural products to the markets of the relevant nearest town or towns,

5. Percentage of Rural households depending on different administrative and legal services offered by the nearest town,

6. Percentage of Rural households depending on the banking services of the nearest town,

7. Percentage of Rural Households depending on the postal services of the nearest town indicating the provision of urban communication services.

II. Again the *Modes of Interaction* have been evaluated in terms of the movement of the villagers to their nearest town for obtaining different *benefits of urban services*, e.g.

1. Percentage of Rural workers employed in the nearest urban centre,

2. Percentage of Rural workers in different categories of occupation in the nearest urban centre,

3. Percentage of Rural workers working in their nearest urban centres according to different levels of income,

4. Percentage of Rural households availing of recreation opportunities in the nearest town either (a) frequently, or (b) occasionally

5. Percentage of Rural households meeting relatives in the nearest town

6. Percentage of Rural households attending political meeting or party offices in the nearest town.

III. The *intensity of interaction* has been assessed by analysing the *frequencies of commuting* of the rural people to towns. Rural households have been categorized according to the frequencies and so the indicators selected for this purpose are:-

1. Percentage of Rural households with members commuting to core town more than once a day

2. Percentage of Rural households with members commuting to core town once a day

3. Percentage of Rural households with members commuting to core town four days per week

4. Percentage of Rural households with members commuting to core town bi-weekly

5. Percentage of Rural households with members commuting to core town weekly

6. Percentage of Rural households with members commuting to core town fortnightly

7. Percentage of Rural households with members commuting to core town monthly

8. Percentage of Rural households with members commuting to core town three monthly

9. Percentage of Rural households with members commuting to core town six monthly

10. Percentage of Rural households with members commuting to core town annually

G) *Indicators to evaluate Urban Influence on Rural hinterlands*

1. Density of Population (per sq km)
2. Growth Rate of Population (in percentage)
3. Sex Ratio (per 1000)
4. Literacy Rate (in percentage)
5. Work participation rate (in percentage)
6. Percentage of workers in Primary sector
7. Percentage of workers in Secondary sector
8. Percentage of workers in Tertiary Workers.
9. Agricultural labourer-Cultivator ratio (per 100)
10. Composite index of Infrastructures in the village

H) *Indicators of Rural Development* (Village-level)

1) Percentage of Rural households with family income of Rs.12,000/month

2) Percentage of Rural households with per capita income of Rs.1001-2500/month

3) Percentage of the Rural household-heads with Higher Secondary level of education

4) Percentage of Rural households with more than 75% of Non-Farming Workers

5) Percentage of Rural households reading Newspapers

6) Percentage of Rural households with Pucca Houses

7) Percentage of Rural houses with electricity

8) Percentage of Rural houses with toilet

9) Percentage of Rural houses with Bathroom

10) Percentage of Rural households with Tape recorder

11) Percentage of Rural households with Refrigerator

12) Percentage of Rural households with Television

13) Percentage of Rural households with Motorbike

Methodology

To fulfil the aforementioned objectives, the proposed study has been conducted at three levels.

A) At *macro level*, a district-wise analysis has been carried out concerning the first objective. That is to say, the identification of patterns of urbanisation in relation to rural development has been studied at the district level. For this purpose, district-wise data on various important variables of urbanisation along with the indicators of rural development have been collected. The district-wise pattern of urbanisation has been correlated with the levels of rural development.

1. To have comprehensive pictures of urbanisation and rural development, two composite indices have been worked out to construct two new variables which have been respectively termed as *'Index of Effective Urbanisation'* (EUI) and *'Index of Rural Development'* (RDI). For constructing composite indices, the method of First Principal Component of the technique of Principal Component Analysis has been used. This technique justifies its application as it explicitly takes account of the problem of multicollinearity among original indicators by orthogonalisation of the whole set of variables and also gives objective mathematical weight for constructing a composite index by linear aggregation. The first principal component is thus a linear combination of the standard scores of the given variables.

The *'Index of Effective Urbanisation'* (EUI) has been formed with the first five (A1—A5) indicators of urbanisation, mentioned earlier in 'variables' section. (The reason for selecting the first five indicators has been given in chapter III). Similarly the *'Index of Rural Development'* (RDI) at district level for both 1991 and 2001 has been prepared with help of the indicators mentioned in 'variables' B section. Thus EUI and RDI may be respectively expressed as follows:

EUI (X) = $W_1 * xs_1 + ... Wn * xsn$ [W: weights or scores of first principal component, $xs_1 ... xsn$= standardised variable of $x_1 ... xn$]

RDI (Y) = $W_1 * ys_1 + ... Wn * ysn$ [ys1...ysn= standardised variable of $y_1 ... yn$]

2. The causal relationship between urbanisation and rural development has been worked out with the help of both Pearson's product moment correlation (r) and

Spearman's Rank Correlation (rho) (ρ). Correlation has been computed between EUI and RDI. Taking RDI as the dependent variable and EUI as the independent variable, regression coefficient has been worked out to understand the impact of urbanisation on rural development.

Here, the regression equation of $Y= a + bX + u$, may be expressed as:

$RDI= a + b(EUI) + u$ [where, a= regression constant, b=regression coefficient, Y=dependent variable (RDI), X= independent variable (EUI), u=error term].

3. The values of EUI and of RDI have been represented cartographically on map with the help of choropleth technique. These scores have been superimposed to obtain a visual illustration of the relationship.

B) At *meso level*, the hinterlands or the areas of influence of the selected towns have been demarcated and the villages have been selected from each hinterland.

1. At the outset, the hinterland has been delineated by applying Reilly's 'Law of Retail Gravitation'[11] (Haggett, Cliff, Frey, 1977, p.32) which is represented by the following formula taking the indicators D1 and D2.

The formula used is $Bij= Dij/1+Pi/Pj$

Where, Bij= Boundary between the Town i and the Town j,

Dij= Distance between the Town i and the Town j,

Pi=Population of the Town i,

Pj= Population of the Town j

Using this formula, the zones of influence or complementary zones have been demarcated for the respective towns to obtain an approximate idea of the concerned hinterlands.

2. At the next step, five consecutive distance circles with the radii of 5km each, from the centre of the selected towns, up to a distance of 25 km have been drawn. Considering the fact that these ideally drawn distance circles may not match with the real distance--measured along the thoroughfare between the village and the town--- isolines have been drawn showing villages with equal distances from their nearest towns (the five selected towns in this case). The distance circles have been superimposed by these distance-isolines to have an idea about the deviation between them. At this stage, two indicators, i.e. C1 and C2 have been considered.

3. Then from these superimposed distance zones only those villages have been sampled which fall in the distance zones categorised in the two aforesaid approaches. From each distance-zones of each selected urban hinterland, 7% sample of villages has been selected. Hence, the villages have been *distance-stratified.* The total number of sampled villages in the present study is 42. The logic behind limiting the distance limit up to 25 km from the respective urban centres is that the process of interaction between an urban core and its hinterland is not expected to be manifesting much after that, especially for an area composed of medium-sized urban centres. During the selection of villages, the transport linkage of the villages with their nearest towns has also been taken into account.

4. To evaluate the transport services to the villages from their nearest towns, flow maps have been drawn which represent the frequencies of buses plying between the town and the villages. The transport linkage between a village and its nearest town has been assessed with the help of the indicators E1—E3. The transport linkage of each village has been evaluated in terms of their distance from the respective nearest towns.

5. Additionally, isolines have been drawn only for the two district towns to demarcate the medical hinterland, educational hinterland, newspaper circulation zone and supply zone of agricultural products, using the indicators D3—D6 respectively. These isolines have been superimposed on the complementary zones, demarcated after Reilly's model, to have an idea of the deviation between them.

The reasons for considering only the district towns in this regard is that it may be presumed that these two towns would serve larger catchments and may even engulf the service areas of the lower order urban centres.

For this purpose, the data concerning bus services, newspaper circulation have been collected from different offices of the towns. The towns' educational institutions and hospitals have been enquired into to get the source location of the students and of the patients so that the educational and medical catchment areas can be delineated. Again, the areas supplying different agricultural products have been identified from the town markets.

C) At the *micro level*, 1) village households have been selected for an in-depth study of the pattern urban-rural interaction.

The selection of households has been made by adopting the *method of stratified random sampling*. At the outset, an exhaustive list of the village households has been

prepared with the help of the panchayet-members of the respective villages. The listed households have been classified according to different income groups, which are as follows:

a) higher income group (family income Rs. 12,000/ and above per month),

b) middle income group (family income Rs. 5000-12,000/ per month) and

c) lower income group (family income less than Rs.5000/ per month).

Then from each group, a stratified random sample of households has been drawn giving proportional allocation in respect of the income strata to arrive at the final sample for the study. A sample of 7% of households has been drawn for the final selection. The total number of sampled households is 1559.

2. A household level questionnaire has been used for conducting the household survey and to generate data relating to their interaction with the nearest town and also the levels of their development. Aggregating the household level information, a picture of village-level interaction and development has been obtained.

3. The household level enquiries relating to *nature* and *modes of urban-rural interaction* have been converted into simple percentages as manifested by the indicators F I (1—7) and F II (1—6) given in section 'variables'.

4. Again, to measure the *Intensity of Interaction*, the information on frequency of commuting of the villagers (indicators F III 1—10) to towns has been converted into average frequency values using the following formula:

$CF(a) = \Sigma XY/Y$ where,

CF (a) =Average frequency of commuting,

X= Frequencies converted into daily frequency,

Y= Number of Households having 'X' frequencies.

5. To obtain a comprehensive picture of the *Levels of Urban-Rural Interaction*, a composite index of interaction coined as '*Index of Urban-Rural Interaction*' has been worked out with the help of the First Principal Component method. Some select indicators of F I, F II and F III, which are inter-correlated, have been considered for this index, since the technique of Principal Component Analysis considers the inter-correlated variables. The chosen indicators are as follows:

a. Rural working Population (%) employed at the nearest town

b. Rural households (%) availing of regular Medical services from the nearest town

c. Rural households (%) availing of Medical services from the nearest town in emergencies

d. Rural households (%) whose members depend on Regular Educational services from the nearest town

e. Rural households (%) whose members depend on Regular and Private Educational services from the nearest town

f. Rural households (%) whose members Shopping all items from the nearest town

g. Rural households (%) depending on Banking services at the nearest town

h. Rural households (%) availing of Recreational facilities at the nearest town frequently

i. Rural households (%) availing of Recreational facilities at the nearest town occasionally

j. Average values of Commuting Frequencies

6. For finding out the causal relationship between the distance of the villages from nearest town and the Index of Urban-Rural Interaction, correlation coefficient and bi-variate regression have been computed taking distance as the independent variable and the Index of Urban-Rural Interaction as the dependent variable. Again, the method of step-wise multiple regression has been applied to determine the influence of the dominant variable and also to identify the joint influence of the variables explaining the process of urban-rural interaction. The variables selected for this purpose are:

Independent	Dependent
Distance (km) of the villages from the nearest Town (X_1)	Index of Urban-Rural Interaction (Y)
Frequency of buses (X_2)	
Travel time (minutes) (X_3)	
Transport fare (rupees) (X_4)	

Here X_2, X_3 and X_4 represent transport linkage (indicators E1—E3) between the village and the nearest town.

Thus, the regression equation of $Y= a+ b_1 X_1+ b_2 X_2+ b_3 X_3+ b_4X_4+ u$, may be written as:

Index of Urban-Rural Interaction = a + b_1 Distance + b_2 Frequency of buses + b_3 Travel time + b_4 Transport fare + u, [where, a= regression constant, b= regression coefficient and u=error term].

7. At the next step, percentages have been calculated from the information on household level development, which are represented as the *Indicators of Rural Development* (Village-level) numbered as H1—H13. These indicators have been clubbed into a composite index, termed as '*Index of Development*' applying the same method of First Principal Component.

8. Based on the two indices of 'Index of Urban-Rural Interaction' and 'Index of Development' at the village level, the magnitude of rural development (at village-level) has been compared in relation to the interaction level of the villages and their distance from the town. For this, correlation coefficient has been worked out to examine the causality between them. Simple regression has also been computed taking the 'Index of Urban-Rural Interaction' as the independent variable and the 'Index of Development' as the dependent variable to measure any impact of urban–rural interaction on rural development, which is the basic intention of the study.

Thus, in this case, the regression equation of Y= a + bX + u may be expressed as:

Index of Development' = a + b ('Index of Urban-Rural Interaction') + u

[where, a= regression constant, b= regression coefficient and u=error term]

9. For identifying urban influence on rural surroundings, some demographic and socio-economic characteristics of the hinterland villages have been taken into account that are spelt out as indicators G1--G10. Simple mean of these indicators have been calculated for each distance-zone of each hinterland. In few cases, these characteristics have been correlated with the distance of the villages from their nearest town to verify the relationship statistically. At this stage, the analysis is based on the secondary sources of data.

10. To calculate the *Composite Index of Infrastructure* available to the villages, the following formula has been applied:

$C_{ij} = \Sigma X_{ij}.W_{ij}$ where,

C_{ij}= Composite Index of the 'i'th function in the 'j'th settlement,

X_{ij}= Number of 'i'th function in the 'j'th settlements

W_{ij}=Weightage of the 'i'th function =N/Fi where,

N= Total number of settlements

Fi= Number of settlements having 'i'th function

After calculating the composite indices averages of those values have been worked out for the hinterland villages of each distance-zone.

11. A cartographic representation of the index of urban-rural interaction and the index of development has been made by the technique of choropleth. The values of these two indices have been superimposed on same maps to illustrate the relationship between urban-rural interaction and rural development vividly.

Data Base

The research work is basically field physics and so the major data source is primary survey, i.e., interviewing the villagers with a schedule of questions. The questionnaire is enclosed in Appendix V.

The secondary data bases are:-

1. Census of India, West Bengal including District Census Hand book, 1981, 1991, 2001.
2. Statistical abstract of West Bengal.
3. Statistical Handbook of West Bengal.
4. Economic Review of West Bengal.
5. Various records of educational institutions, hospitals, transport offices, newspaper offices, markets of different towns.

District maps with block and mouza boundaries and cadastral maps and Topographical maps of selected regions have also been consulted.

Research Design

The study is spelt out into seven chapters following the present "Introduction".

Chapter I deals with the legacy of urban-rural interaction with reference to the Indian context and presents an overview of relevant literature.

Chapter II identifies the area under investigation.

Chapter III presents a district-level analysis of existing pattern of urbanisation in relation to rural development in West Bengal.

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