INTRODUCTION
Micro level planning is inevitable for socio-economic development. Because, it identifies the genuine needs and available resources at the local level, moreover it involves the people’s participation in the planning and implementation, of which lacking, has been one of the basic reasons for unsuccessful implementation of different development schemes and planning. It can also be termed as “Planning at the grass root level”, which means (a) the participation of the beneficiaries, the local people in identifying needs (b) generating available resources in terms of (i) material inputs, (ii) cooperative action, (iii) creation of more resources through supportive efforts and (c) preparation of district, block or village level plans keeping in view the available resources.

The term micro level planning refers to the preparation of development plans for smaller areas such as the district development blocks and the villages. It is a logical outgrowth of regional planning which straddles national – local gap as it is concerned with the planning for an area with distinctive, economic and social characteristics and opportunities and problems which distinguish it from other parts of the country. It can neither be considered as economic planning alone, nor physical planning alone, instead it is such a form of planning whose core area of interest has in the synthesis of physical, social, economic, political etc. interest of the concerned region.

In such a conceptualization, there are no prior problems of a region which the regional planning is supposed to address, however inherent in such a concept is the existence of hierarchical multilevel but not in coherent setup of a regional system, which provides the planning unit to work upon. That is how; the component of space (region) gets ingrained into the process of planning. It implies that regional planning has to deal with the concerned region not in isolation but in integration with other regions constituting the regional space whole. It has often been pointed out that, there are three basic ways in which regional planning distinguishes it, from other types of planning, firstly regional planning operates in distinctive environmental setting characterized by the comprehensiveness of regional space. Secondly, it has a distinctive scale of operation, however the scale at which its action takes place cannot be standardized. It may vary both in time and space. Thirdly, it is distinctive in the sense that it is a coherent purpose thought and action translated into regional reality. It is a specific type of planning based on specific planning structure

1 Bhattachariya, L.S., Micro Level Planning - A Case study of Karnal Area, Haryana-India, K.B publications, New Delhi-1976, p-1
2 Choudhary, J.R., An introduction to development and regional planning, Orient Longman Ltd., Kolkata-2001, p-22
4 Chandana, R.C, Regional Planning and Development, Kalyani Publishers, New Delhi- 2004, pp 31-32
(regional system for inducing public action aimed at societal well being). It implies that regional planning is concerned fundamentally with the society in the context of space. It is considered as a control device in socio-economic development with the concrete idea of a region, as an area of special attributes. As the regional problems and characteristics differ by area but the major concern in this planning is the best location for economic activities, the proper complement of public capital investment to support and facilitate economic growth, the desirable pattern of private and public land uses, and the proper scope and role for urbanization.

Regional planning, while confining to the planning of regional space in the physical can hardly afford to overlook the economic, socio-cultural and political dimensions of the ever evolving regional organisms. Economically the right location of each economic activity, significant as it is constitutes one of the vital concerns of regional planning. It is one such single achievement, which can make the economy a self generating and ever-growing on its own. Socially, apart from seeking optimal location of such social function as educational institutions, health centers, post offices, police stations etc. creating a socially cohesive society is also the prime concern of regional planning. Similarly the political dimension of the human activity which finds also a spatial expression should be included in the ambit of regional planning. The ultimate challenge of regional planning lies in a response to the ever-changing society needs and is contributing maximum to the development. It is a unique synthesis of physical planning, social planning and economic planning in the context of unity of regional space. It has been considerably clarified in recent years as a result of the awakening of people everywhere to the issue of socio-economic development. As people have become concerned with the question of which resource allocations are to be made, they have become aware that the question of where the allocations are to be made is also important i.e. public policy is coming increasingly to recognize that it must be concerned with the equitable distribution of national wealth in terms of regions as well as of social classes.

The regional planning to supplement the national planning has been recognized as prime planning approaches every where, in the centrally planned economies of eastern Europe and in the mixed economies of western Europe. The developed countries of North America and Europe or the developing nation of Asia, Africa and South America.

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Glikson, A., Regional planning and Development, Liden, Netherland, 1955, p-5
Work Review Done So Far

Many researches have been done in allocating, evaluating, distributing, and quantifying the determinants of the development in India and abroad. Some of the important works have been reviewed in sequent manner. The work on regional, micro level or spatial planning in India is inspired from the pioneering work of Von Thunen, (1826)\(^6\); Bentan Mackaye, (1928)\(^7\); Christaller, (1933)\(^8\); Losch, (1944)\(^9\). It gained momentum in India in fifties. Patnaik, (1953)\(^10\) and Mukherjee(1957)\(^11\) tried to examine the patterns of weekly and biweekly market and its influence on the socio-economic development of that region. Singh (1960)\(^12\) examined the influence of railways on Kawal town of Uttar Pradesh. Third five year plan\(^13\) for the development of Delhi Metropolitan region brought with Delhi Master Plan in 1961. Sen Gupta and Sdayusk(1961)\(^14\) have talked about planning region for the development of India. NCAER published a report on techno economic survey in 1962, which consists of analysis of physical resource base and economic structure of states, to ensure the optimum utilization of available resources, to ensure the optimum utilization of available resources for regional development\(^15\). Macro - regional survey of South India (1962)\(^16\) provided an applied strategy for regional planning. In1962 regional survey unit of the Indian statistical institute prepared a tentative regional framework for resource development for the country based on the analysis and synthesis of various distribution patterns of resources.\(^17\) Damodar valley survey report (1957)\(^18\) presented in 21\(^{st}\) International conference (1968) given an impetus to the diagnostic planning for regional development. One of the most significant works produced in India is of Wanamali (1970)\(^19\) deals with the central place, hierarchy of settlements, complementary regions of service centers and distribution of socio-economic facility by taking the Maharashtra as a case

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\(^7\) MacKayae, Benton (1928), New Exploration: A Philosophy of Regional Planning (New Edition in 1962), University of Illinois Press, Urbana.


\(^13\) Govt, of India, Delhi Master Plan, Delhi Development authority, Delhi, 1961.


\(^16\) Government of India, South India Macro-Regional Survey, Mimeo., ISI, New Delhi, 1962.


\(^18\) Joint Committee for Diagnostic survey of Damodar Valley Region, Calcutta, 1966.

study area. 1970 witnessed the work of Deshmukh\textsuperscript{20} and Singh\textsuperscript{21} who studied various aspects of planning for socio-economic development by examining the correlation between size of population and socio-economic facilities. Another important work by Sen\textsuperscript{22} in 1970 deals with the approach of integrated area development, which along with the Wanamali, became a driving force for the researchers to carry out the works on regional planning for development.

1971 also witnessed the work of Chandrashekhar\textsuperscript{23} regarding the planning of regions through harnessing local resource potentials and linking it to the other areas to get benefit of activity flow. Some other works were carried out was of Mishra (1972)\textsuperscript{24} on urban systems and rural development. Das & Sarkar (1972)\textsuperscript{25} on rural area development. Prasad(1972)\textsuperscript{26} on integrated area development, Wanamali\textsuperscript{27} (1972) on clustering of services as a function of population distance in the settlement systems. A ‘Pilot project’ Report of the Ford Foundation (1973)\textsuperscript{28} was published, in which a geographical approach was used to study the settlement planning for integrated area development. The work of L.S. Bhatt (1976)\textsuperscript{29} on micro level planning proved to be a seminal work and opened new vistas of researches, in this theme i.e. regional planning and development. The planning commission published Dantawala committee’s\textsuperscript{30} report on block level planning with applied suggestions for implementation of the report throughout the country. Sundaram (1978)\textsuperscript{31} studied the various aspects of centarlised planning for adequate provision of commodities and infrastructure. Swaminathan (1979)\textsuperscript{32} applied a quantitative approach to determine functional hierarchy of shopping centre. Decades of 1980 also witnessed the studies on the problems of education, health, transport, recreation, agriculture and aspects

\begin{itemize}
  \item L.S. Bhatt, 1976, op. cit.
  \item Govt. of India, Report of the Working Group on Block Level Planning (Dantawala Committee), Planning Commission,1977.
\end{itemize}
of location and planning. Raza Agarwal (1980) analyzed the distance decay and railway freight flows in India. Kayastha and Singh (1981) attempted to determine regional development through social planning. Amani and Ansari (1982) made a study on special organization of settlement and their importance in measuring the regional development. Tripathi and Chand (1983) studied the distribution of market facilities on micro-regional planning at district level through applying advanced statistical techniques. Betaal (1989) attempted to study the impact of social economic facilities on the distribution of the population by measuring the composite score of different facilities available in the industrial area. Maithani (1986) conducted a work on spatial analysis in micro level planning through social facilities and production infrastructure. Mishra (1987) carried out a study for the plausible solution for development at micro level by implying the service centre strategy in development planning. Rai (1988) made a micro level study of spatial organization and rural development based on various aspects of agriculture, socio-economic facilities and existing socio-economic services. Qureshi and Chand (1989) examined the locations of agro-economic facilities to formulate the micro regional plan for agricultural development. Sharma and Kumar (1989) have taken a serious attempt to identify the basic planning units for integrated area development planning. Rai and Singh (1990) carried a similar study to analyse the functional gaps among different settlement for integrated rural area development following the same line. Singh and Singh (1990) made a study to identify the functional gaps on the locations of socio-economic activities in different settlement.

Kanchan (1991) measured the level of regional development with the help of various parameters of development by taking Madhya Pradesh as a case study area. Tripathi (1991) in a study of U.P., identified the backward areas in human resource development and suggested suitable measures to eradicate the existing disparities. Mukherjee (1994) in his research paper on environment, for decentralized planning emphasized that the unit for planning purpose should be either district or sub-district in order to implement the decentralized planning. Sharma (1995) studied the micro regional disparities in levels of social development by taking into account different measures of socio-economic development, like, education, health, transport and banking facilities. Muneer and Ahmad (1996) made a study on inter district disparities in the levels of educational development by taking the state of U.P. as a case study area. Anjum (1997) studied the impact of environmental degradation on quality of life at micro level taking district as a unit. Sundaram (1997) emphasized for the decentralized planning by studying the various aspects of local level planning for integrated rural development. Joshi (1998) in a study of emerging scenario of decentralized planning and balanced regional development emphasized the importance of district level planning in order to bridge the existing socio-economic disparities in the development. Hemlata (1999) made an appraisal of educational development by measuring the indices of deprivation of education at district level in the state of Rajasthan. Pawar and Lokhande (2000) analyzed the spatial distribution of market centre in order to assess their relationship with demographic and agricultural determinants.

Mazumdar (2001) by using the technique multivariate analysis, assessed the quality of life in Indian cities and observed that the impact of social infrastructure is more than the physical infrastructure, and hence education and health play a vital role in the

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47 Mukherji, A. 'Environment for Decentralized Planning', IJRS, Calcutta, vol. 25, No. 1, 1993, pp. 24-31
48 Sharma, S.C. et al., 'Micro Regional Disparities in Levels of Social Development of Gandak Command Area UP', GRI, Vo. 57, No. 4, 1995, pp.28-33
quality of life in particular and socio-economic development as a whole. Agrawal and Hazarika(2002)\textsuperscript{56} adopted the technique of composite index to analyze the inter-district disparities in the socio-economic development of a region. Nagia and Ahluwaliya(2003)\textsuperscript{57} hierarchically arranged the urban settlements on the basis of composite centrality score attained by them. They estimated the centrality score based on types and number of existing functions provided by the settlement. Bharkar and Bhargava(2003)\textsuperscript{58} carried out a study to examine the extent of disparities of infrastructure in Rajasthan. Pawar and Lokhande(2004)\textsuperscript{59} analyzed the spatial distribution of market centres and examined their relations with the area and population of inhabited rural settlements and net sown area to analyze the role of market centres on the levels of socio-economic development. Ahmad and Ali(2005)\textsuperscript{60} analyzed the spatial pattern of settlement distribution in terms of size, spacing, concentration and dispersion. Ali(2006)\textsuperscript{61} examined the spatio-temporal variations of crop productivity in association with physico-cultural and socio-economic determinants and suggested the measures for development in agriculture. Hassan(2007)\textsuperscript{62} examined direction of change of regional inequality in infrastructural, industrial and agricultural development through using principle component analysis and composite index methods.

**Concept of Planning**

In the fast growing world economy, the economic growth and development remains the only condition for the survival of the nation and planning becomes inevitable. It is a process of setting goals (objective or target usually driven by specific future needs), developing strategies, and outlining task and schedule to accomplish the goals. Oxford dictionary of geography defines it “Planning presupposes an ability to foresee events and a capability for analyzing situations and solving problems”.\textsuperscript{63} Planning is both the organizational process of creating and maintaining a plan, and the psychological process of thinking about the activities required to create a desired future on some scale. It combines forecasting of development with the preparation of scenarios of how to react to them.


\textsuperscript{57} Nagia, S. and Ahluwaliya, D. ‘An analysis of inter-district disparity in agricultural development in Assam’, IURS, vol.35, no.02, 2003, pp. 87-95

\textsuperscript{58} Bhaskar, R.R and Bhargava, P. ‘Disparities in infrastructural development in Rajasthan’ IURS, vol.35, no.01, 2003, pp. 57-66


\textsuperscript{60} Ahmad Ateeque, Mustaquim, Md. And Ali, Julfikar, ‘Regional Imbalances in the levels of Literacy and its Determinants in West Bengal: A Quantitative Analysis’, Punjab Geographer, vol.01, no.02, Oct 2005 , pp 99-112


\textsuperscript{63} A Dictionary of Geography- Susani Mathew, Oxford University Press, London, 2004
Planning has different notions or forms in different countries but there is little consensus among their scholars on the concept of planning. The term has been used very loosely in economic literature. Any type of state interventions in economic affairs has also been treated as planning but the state can intervene even without making any plan. What then planning is? Planning is a technique, a means to an end, being the realization of certain predetermined and well defined aims and objectives laid down by a central planning authority. The end may be to achieve economic, social, political or military objectives. Therefore “the issue is not between a plan and no plan, it is between different kinds of plan.

Types of Planning

The nomenclature of planning varies in accordance with the nature of objective, duration it covers, the target it sets in, the philosophy it inculcates, the execution viewpoint it holds, the hierarchy it attains, the purpose it serves and the approach it follows. Whatever may be the difference in nature, the basic purpose of planning is to achieve definite targets and objectives within specified period of time. In the planning history of India, the nature of planning has taken different forms, sometimes replaced each other, sometimes supplemented each other, and sometimes co-existed together depends upon the defined objective and stipulated time. Sometimes physical and sometimes financial, the essence of financial planning is to ensure that demand and supplies are matched in a manner which exploits physical potentiality as fully as possible. When the long range targets are set, is called perspective planning, on the other hand there is short period plan and annual plan. If in the planning general guidelines or advisory nature prevails is called indicative planning, while imperative planning refers to the planning operate under strict direction of the state. If the people are associated at different successive steps in plan formulation is democratic planning, while totalitarian planning is under central control and direction, in accordance with single national plan. Centralized or decentralized planning is the division made from the viewpoint of the execution of plan. Planning done at the national level alone is termed as single level plan, but its formulation at several hierarchical stages is called multi level planning. If the planning has been done with special purpose to develop different sectors of the economy, viz. agriculture, industry etc. is called sectoral planning and if all the sectors are taken together of a spatial sub system or region for socio-economic development is called spatial planning. Despite all these mentioned approaches to planning for development, the fruits of planning could not make benefit to all sectors of the economy and all the regions of India. It is eagerly felt from the planning experience and its limited achievement, that, the planning’s objective from the top would only be successful, if it is
formulated and executed at micro level, to realize the unfulfilled dream of balanced regional development.

**Regional Planning in India**

Indian planning is essentially normative single-level economic planning, with a heavy reliance on the sectoral approach. Sectoral plans integrated into a single whole and fitted into framework of national goals and objectives, have been proposed and implemented since 1951, the year when the first five year plan was launched.\(^64\) There has been greater emphasis on plan formulation than on implementation. Indian planning is also marked to be centralized at the national level. Until very recently, no serious attempt has been made to prepare plans at lower territorial level such as the state, district, development block or region with the same competence and seriousness as at the national level\(^65\). In the initial stage of its development in the 1930's regional planning was generally understood to mean natural resource planning, and thus its role was confined to determining the ways and means of developing the natural resources of a region. However, with the passage of time, the emphasis on natural resources planning was reduced considerably as new dimensions of urban and metropolitan planning, environmental planning, human resource and community planning, planning for problems areas, etc., considerably emerged the scope and content of regional planning. In the beginning of planning era, it was exclusively at national level formulated at the centre. This sectoral macro level approach failed to attain success in reducing the poverty, unemployment and inter and intra regional inequalities in the region to attain balanced development. Consequently the planning process got decentralized to state level planning and new emphasis is laid on planning for regional development.

The first event which proved to be forebear of regional or micro level planning in India is the setting up of planning commission in 1950 and subsequent setup of national development council in 1952 to ensure the balanced and rapid development of all parts of the country. First Five year Plan(1951-56) emphasized the initiation of a process of all round balanced development which would ensure a rising national income and steady improvement in the living standards over a period of time\(^66\). In Second Five Year Plan (1956-61) term, two surveys were conducted, in context with regional planning, namely pilot regional survey of the Mysore State during 1956-58, and a diagnostic survey of

\(^{65}\) Ibid., p. 10
\(^{66}\) Government of India, Planning Commission, First Five Year Plan, 1956, p. 32
Damodar valley region in 1957, for making an appraisal of existing resources and suggesting strategies for regional development. During this time "Intensive Area Development programme (IADP) was launched in 1960 in seven selected district of seven states. In 1956, Elwin committee recommended the approach for tribal areas. Consequently in 1957, “tribal development block” (TDB) approach was adopted. Due to wide regional disparities in India, the planners emphasized on the balanced regional development ever since the initiation of the planning process in India and perceived that the pattern of investment must be devised as to lead to balanced regional development.\(^{67}\) In the Third Five year Plan (1961-66) for the first time some serious concern has been expressed to the problem of balanced regional development. This plan devoted a separate (chapter IX)\(^{68}\) to “Balanced Regional Development”. It was once again emphasized that balanced development of different parts of the country, extension of the benefits of economic progress to the less developed regions and widespread diffusions of industry are among the major aims of planned development. The approach in this plan was to (i) help the states in reducing intra state disparities (disparities among different region of the same state) and (ii) initiate new programme and extend programme adopted in the previous plans to reduce inter-state inequalities (i.e. inequalities between different states). The three tier administration was developed during this plan, such as panchayat at village level, panchayat samities at the block level (group of about 100 or less number of villages) and zila parishad at the district level were actually meant to be associated with plan formulation and implementation. But their association with the plan was more formal than operational. Fourth Five year Plan (1969-74) witnessed, an introduction of a number of schemes for the benefits of the rural poor such as, small farmer’s development agency, marginal farmer and agricultural laborer’s development agency, drought prone area programme, crash scheme for rural employment, pilot intensive rural employment project, integrated tribal developmental programme. Since large numbers of rural poor live in relatively less developed regions, all these programme were expected to benefit the less developed regions were in comparison with the developed regions for purposes of granting concessions and financial assistance to industries established in such areas and weightage to backward states in the allocation of central assistance. In this plan the multilevel planning was started stressing the formulation of plans at district and lower level to provide adequate infrastructure facilities, simply the planning for socio-economic development at several

\(^{67}\) Government of India, Planning Commission, Second Five Year Plan, 1956, p. 36

\(^{68}\) Government of India, Planning Commission, Third Five Year Plan, 1961, p. 14
territorial levels, instead of at a single national level is known as multi-level planning. Fifth Five Year Plan (1974-79) aimed that the strategy of the removal of regional imbalances of fourth plan would be kept continue in the fifth plan also on treatment to the approach of concepts of “Growth centre” and “central place” strategies. The various areas development programme undertaken during this plan period are, drought prone area programme, the command area development programme, hill area development, the desert development programme, SFDA programme, the tribal development agency project and sub-plan for the hills and tribal areas. Sixth Five Year Plan (1980-85) placed great emphasis to provide an integrated approach to the problems of regional inequalities, the mechanism of area planning was adopted. In this plan special importance was given to follow the decentralized planning for eliminating inter and intra district socio-economic imbalances. Seventh Five Year Plan (1985-90) plan correctly recognized that two criteria determinants of a region’s economic status were agricultural productivity, and human resource potential and reduction in inter-regional disparities in these two elements would help greatly in the task of reducing regional imbalances. Eight Five year Plan (1992-97) has not placed any improvement over the earlier policies to remove regional disparity. Ninth Five Year Plan (1997-2002) advocated the continuation of earlier policies in achieving the regional balance. Tenth Five Year Plan (2002-2007) emphasized the development of regions by ensuring the socio-economic development in order to ensuring the harmony with an environment for developing an optimal spatial organization of the society. The Damodar Valley Corporation (DVC) and the National Capital Region (NCR) are the two significant regional planning efforts of the country. The partial success of the DVC and distinguished poor performance of the NCR, reveals the official apathy to the spirit of regional planning in India. Recently the 73rd and 74th amendments of the Indian constitution have a new hope. These amendments have given a new direction to the planning process in the country. These are aimed at decentralizing the entire process of planning by introducing the concept of planning at grass root level.

Significance of the study

In the light of above discussion regarding the importance of planning at the grass root level, an effort has been made to conceptualise a diagnostic planning for Bulandshahr
district with some limitations. Although Bulandshahr district falls in the area of very high agricultural production and productivity due to diffusion of agricultural innovation of new package programme (green revolution). Yet it has failed to harness its full potentialities owing to inadequate and uneven distribution of socio-economic facilities in the district. The literacy level and gender gap is miserable. The disparities within the district is cause of concern and do not hold good for the execution of planning measures initiated by government. The study has been done, keeping in view that, different areas have different problems both of nature and degree, which needs to be dealt with differently. Hence the following objectives have been devised to examine the nature of the problem and to come out with a plausible solution.

**Objectives of the study**

The objective of the present study is as follows;

i) to examine the physico cultural and socio-economic factors affecting the spatial systems of settlements,

ii) to analyse the spatial variation of the settlement in terms of size, spacing, concentration and dispersion,

iii) to analyse the spatial patterns of socio-economic facilities

iv) to measure the levels of regional disparities pertaining to socio economic development at district and block level both.

v) to identify the level of central places and its hierarchical arrangement and to examine spatio-functional gaps of central places and its complimentary region.

vi) To propose the diagnostic planning, formulation and execution of pragmatic model to achieve balanced regional development.

**Hypotheses**

The following hypotheses have been formulated to test the ground reality and also to give a specific direction to the solution of the problems in the present study;

i) Spacing is the function of size of settlements.

ii) Availability of socio economic facilities is the function of size of population of settlements.

iii) Agriculture productivity is function of agricultural facilities.

iv) Centrality score of central places is directly proportional to its population, dependent population, and, dependent area.
Database and Methodology

The methodological principles adopted for the study is based on primary and secondary sources of data obtained from conducting field survey and visiting various offices and agencies such as, NIC, Bulandshahr; Office of the Statistical officer, Bulandshahr; Bureau of Applied Economics and Statistics- U.P.; Office of The Registrar General and Census Commissioner of India, New Delhi; Office of the District Irrigation and Agriculture Department, Bulandshahr; District Library; District Head Post Office, Bulandshahr; Office of The District Animal Resource and Development, Bulandshahr. All the Statistics are meant for the year 2001.

The secondary data has been used to analyse the spatial organization of settlements, distribution of facilities and to arrange the central places in hierarchical order at district level whereas the primary data has been used to delineate the complimentary region and to identify the Spatio-functional gap of facilities. Both the qualitative and quantitative methods have been used in the present study.

To examine the distribution and spatial variation of settlements and socio economic facilities standard statistical technique like 'Nearest Neighbour Index', Mather's model of mean spacing, Gini's technique of coefficient of concentration has been used. The formula's are as follows,

- For Nearest Neighbour Index\(^74\),

$$Rn = \frac{do}{de} \quad \text{and} \quad de = \frac{1}{2\sqrt{\frac{N}{A}}}$$

Where, \(Rn\) = Nearest Neighbour Index,

- \(Do\) = mean observed distance of nearest neighbour settlements,
- \(De\) = mean expected distance of settlements,
- \(N\) = total number of settlements,
- \(A\) = total area of the concerned region

\(NN\) Scale: \(Rn = 0\) (clustered pattern)

\(Rn = \text{upto} 2.15\) (approaching uniform)

\(Rn = \text{more than} 2.15\) (random pattern)

Mather's model\textsuperscript{75} of Mean Spacing is calculated from the following formula,

\[ D = 1.0746 \sqrt{\frac{N}{A}} \]

Where, \( D \) = mean spacing in unit length.
\( A \) = area of a given region
\( N \) = number of settlement in a given region
1.0746 = spacing constant

The formula for computing Gini's coefficient\textsuperscript{76} of concentration is as follows,

\[ G_i = \frac{1}{10,000} \sum_{i=1}^{n} (X_iY_i+1)-(X_i+1*Y_i) = 0.097 \]

Where \( X_i \) = The cumulative percentage distribution of attribute X
\( Y_i \) = The cumulative percentage distribution of attribute Y
\( n \) = The number of observations

The causal relationship between dependent and independent variables has been analyzed using Karl Pearson's technique of correlation of coefficient and linear regression technique. The testing of hypothesis and findings of level of significance of correlations between the variables has been done with student's 't' test.

Karl Pearson's Model of Correlation

\[ r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}} \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}} \]

Where, \( r \) refers to coefficient of correlation
\( x \) and \( y \) are independent and dependent variables
\( N \) denotes number of observation

Significance test of coefficient of correlation

\[ T = r \sqrt{\frac{N-2}{1-r^2}} \]

Where, \( T = \text{Calculated 't' value,} \)
\( r = \text{Coefficient of correlation,} \)
\( n = \text{Number of observation.} \)

Linear regression
\[
Y = a + bx
\]
where
\[
b = \frac{\sum XY - \left( \frac{\sum X \sum Y}{N} \right)}{\sum X^2 - \left( \frac{(\sum X)^2}{N} \right)}
\]
\[a = Y - bx \]

\( x \) and \( y \) are independent and dependent variables

Regional disparities in the levels of socio economic development have been examined using Z-score or standard score technique. In this method each variable has got standardized. The scores measure the departure of individual observations expressed in a comparable form. It is a linear transformation of the original data based on the composite mean Z-score the index of development of each component aerial unit has been estimated.

- The model of Z-score method is as follows:
\[
Z_i = \frac{X_i - \bar{X}}{\delta}
\]
where, \( Z_i \) is the standard score or Z-score of \( i \)-th variable,
\( X_i \) is the individual observation,
\( \bar{X} \) is the mean of variable, and
\( \delta \) denotes standard deviation

- The model of composite mean Z-score is thus,
\[
C.S = \frac{\sum Z_{ij}}{N}
\]
where, \( C.S \) refers to the composite mean Z-score,
\( Z_{ij} \) is Z-score of an indicator \( j \) in area \( i \), and
\( N \) is the number of variables

Median population threshold (MPT) of each facility has been estimated using modified ‘Reed Muench’ method. The value of facilities is obtained by assigning arbitrarily weightage value one, to the lowest order facility and next to it is obtained by dividing their MPT by the lowest MPT value of facility. The centrality score or functional gravity of central place is the representation of total weightage value of facilities

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provided by the central place. Based on the functional gravity, the central laces have been arranged in hierarchical order.

The complimentary region or hinterland of central places has been delineated using modified quantitative technique of V.L.S. Prakash Rao and empirical observation pertaining to movement of behavior of consumer to the respective central place of the region.

• Mathematical equation of method devised by V.L.S Prakash Rao\(^78\) is as follows,

\[
S.I = \frac{TC}{CA} \quad R = \sqrt{\frac{TC}{CA}}
\]

Where,  
S.I = Sphere of influence of central place (in sq. km)  
TC = Total centrality score of central place  
A = Total area (sq.km) of the study region,  
C = Total centrality score of all central places, and  
R = Radius of circle indicating the sphere of influence (in km)

The Spatio-Functional gap of facilities between the complimentary region and the study area as a whole has been determined using simple arithmetic technique viz., ratio of population between the complimentary region and whole of the district is divided by the ratio of the composite facilities of the complimentary region and the study region. The Spatio-functional gap of facilities of all complimentary regions has been identified based on the projected population of 2021 of each settlement of the case study area.

• The rule of computing spatio-functional gaps\(^79\) is as follows;

\[
R_{ij} = \frac{\frac{P}{F_1} \times \frac{F_i}{F}}{\frac{P_1}{F}}
\]

Where,  
\(R_{ij}\) = Relative level or the ratio of \(i\)th function between the \(j\)th central place including its complementary region and the study area as a whole.

\(P\) = The population of study area (Araniya block) as a whole.

\(P_1\) = The population of central place including its complementary region.

\(F_i\) = The total centrality score of \(i\)th function of central place including its complementary region.

\(F\) = The Total centrality score of \(i\)th function of study area (Araniya block) as a whole.


\(^79\) Babu, P. Krishna, Regional Planning in India, Chugh Publication, Allahabad, 198, pp 33-41
When the ratio of functions within the complimentary region to the study region as a whole is more than 0.1, the area is supposed to be adequately served, while the ratio is less than 0.1, area is inadequately served. Again, the ratio high near to ‘0’ indicate higher functional gap while ratio moving from ‘0’ to 0.1 explain functional gap is reducing.

- The model of computing projected population is as follows:

\[ PP = P_t + rt \]

\[ R = (P_2 - P_1) / 10 \]

Where, \( PP \) = projected population,
\( P_t \) = succeeding year of base year,
\( P_2 \) = population of base year
\( P_1 \) = population of base year
\( R \) = annual growth rate, and
\( T \) = time interval between the base year and the year of which projected population would be estimated

The administrative unit like district, block, nyaya panchayat and village have been considered for the analysis of necessary attributes at different levels. Aspect like, Land use pattern, cropping pattern, decadal growth of population and settlements (1901-2001) etc has been dealt. The levels of socio-economic development based on distribution of socio-economic facilities have been estimated at the block level as well at nyaya panchayat level. Most of the analysis concerning spatial distribution of settlements and facilities has been done at village level. Final study relating to the determination of new locations for required facility is met at village level (micro level) for planning proposal at grass root level.

**Organization of the Work**

In view of the problems, objectives and methodological principles the present study has been organized into six chapters excluding introduction and summary & conclusion.

Introduction deals with concept of micro level planning, work review done so far, significance of the study, review of regional planning in India, objectives of the study, hypothesis, database and methodology.

**Chapter-1:** presents an account of geographical profile of the study area consisting of physico-cultural and socio-economic characteristics of the region. It is assumed that these attributes have direct bearing on the spatial variation of the settlements and socio-economic facilities, essential for balanced regional development.

**Chapter-2:** explains the spatial variations of settlements in terms of area, population, size, spacing, concentration and dispersion using standard statistical techniques. It further deals with the causal relationship between mean spacing and mean size of settlements.
Chapter-3: deals with the spatial analysis of distribution of socio-economic facilities. The facilities have been divided into ten categories and each category has been further subdivided according to their qualities. Thus the 46 facilities in total have been taken into consideration for the present analysis.

Chapter-4: examine the existing regional imbalances in the levels of socio-economic developments at the district and block level both. The levels of development of each variable viz., education, health, communication and transportation, market, agriculture, finance and veterinary service and recreational development has been measured. The overall levels of regional disparities taking into account the composite index of all said variables pertaining to socio-economic development have been examined at block level.

Chapter-5: deals with the planning model block – Araniya, its synoptic view, describes the basic concepts of central place theory. Based on the computed MPT a certain weightage value has been assigned to each facility and composite of weightage score of all functions rendered by a settlement referred its centrality score. It further deals that the centrality score provides the best for arranging the hierarchy of central places. It also explains the nature and extent of relationship between the availability of socio-economic facilities and distribution of population among the size group of settlements and also each facility has been analyzed with reference to size, function, relationship using standard statistical technique, relationship between centrality score of central places and their total population. It deals with the analysis of spatial interaction and organization of central places in the region (i.e Araniya block). Based on the consumers’ movement to a particular central place to obtain the goods and services to sustain their needs, the complimentary regions or hinterland of each central place have been delineated. A causal relationship between centrality score of central places and their dependent population and dependent area, has been computed using co-relation and linear regression technique.

Chapter-6: examines the existing spatio-functional gap of each function in 2001 and likely to exist in 2021, based on the projected population of the year 2021. It also proposes a diagnostic planning model suggesting required number of facilities and their optimal new location in the pilot study area to achieve balanced regional socio-economic development in the district keeping pace with estimated increase of population till 2021.

Last part presents the summary, conclusion and suggestions to attain balanced regional development in the district.