ABSTRACT

Planning 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. It presupposes an ability to foresee events and a capability for analyzing situations and solving problems. It 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. 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 fast growing world economy, the economic growth and development remains the only basis for the survival of the nation and planning becomes inevitable and, India is not an exception.

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. But it remained highly centralized, formulated at the centre by the planning commission for the different sectors of the national economy. This sectoral macro-level approach failed to attain success in reducing the mass poverty, unemployment, inter and intra regional disparities as well as inter personal disparities in the country. This happened owing to its failure to address the regional or local problems, and assessing the local resources to devise a purposeful planning strategy. The fourth five year plan has marked a historic departure and emphasized on district level planning. Consequently, the idea of decentralization in Indian planning process has emerged and the issue of regional planning got addressed and many strategies have been devised to achieve the desired objectives. Some attempts have been made at regional level which has not yielded fruitful results. In order to realize the unfulfilled dream of balanced regional development, regional level planning is desired to be opted on priority basis both at the level of formulation and execution. Hence, the need for micro-level planning, the logical outgrowth of regional planning
arises to take care of what sectoral plans failed to accomplish. The term refers, 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. It 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.

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.

The district although falls in the region of most advanced agriculturally developed regions in Uttar Pradesh India where 81% of the land use is devoted to agriculture, well irrigated, registering high agricultural productivity and considerable contribution to country’s food production is not narrating the whole story of the region. It is also one of the regions where the socio-economic indicator like literacy level is below from the national average of both male and female and also rural and urban. Bulandshahar belongs
to that band of districts which are educationally backward in the list prepared by Ministry of Education, Govt. of India. The gender gap is very much visible in the district in every respect. The existing socio-economic amenities and facilities are not sufficient enough to the desired level. Besides, it is suffering with the intra-district disparities at block level, at nyaya panchayat level and even at gram panchayat level, which needs to be tackled with, if the dream of a balanced regional development is to be materialised. The district is spread over in an area of 4253 sq. km with a population of 2913122 persons as per 2001 census is consist of 1138 settlements of which 1122 rural and 16 urban settlements varies in size from few hundred to several thousands.

**Objectives of the study**

The objectives of the present study are 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 complementary 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 complementary 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,

\[
R_n = \frac{1}{2} \cdot \frac{D_o}{D_e} \quad \text{and} \quad D_e = \frac{1}{\sqrt{2} \cdot N/A}
\]

Where, \( R_n \) = Nearest Neighbour Index,
\( D_o \) = mean observed distance of nearest neighbour settlements,
\( D_e \) = mean expected distance of settlements,
\( N \) = total number of settlements,
\( A \) = total area of the concerned region

N N Scale: \( R_n = 0 \) (clustered pattern)
\( R_n = \) up to 2.15(approaching uniform)
\( R_n = \) more than 2.15 (random pattern)

- Mather’s model of Mean Spacing is calculated from the following formula,
\[ D = 1.0746 \sqrt{N/A} \]

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 of concentration is as follows,

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

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.

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:

\[
Z_i = \frac{X_i - \bar{X}}{\sigma}
\]

Where, \( Z_i \) is the standard score or Z-score of ith variable,
\( X_i \) is the individual observation,
\( \bar{X} \) is the mean of variable, and
\( \sigma \) denotes standard deviation

- The model of composite mean Z-score is thus,
\[
\text{C.S} = \frac{\sum \text{Zij}}{N}
\]

Where, C.S refers to the composite mean Z-score, Zij 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 provided by the central place. Based on the functional gravity, the central laces have been arranged in hierarchical order.

The complementary region or hinterland of central paces 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 is as follows.

\[
\text{S.I} = \frac{\text{TC}}{\text{CA}}
\]

\[
\text{R} = \sqrt{\frac{\text{TC}}{\text{CA}}}
\]

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 complementary region and the study area as a whole has been determined using simple arithmetic technique viz., ratio of population between the complementary region and whole of the district is divided by the ratio of the composite facilities of the complementary region and the study region. The Spatio-functional gap of facilities of all complementary 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 is as follows;
\[ R_{ij} = \frac{P}{P_1} \times \frac{F_i}{F} \]

- \( R_{ij} \) = Relative level or the ratio of ith function between the jth 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 ith function of central place including its complementary region.
- \( F \) = The Total centrality score of ith function of study area (Araniya block) as a whole.

When the ratio of functions within the complementary region to the study region as a whole is more than 01, the area is supposed to be adequately served, while the ratio is less than 01, area is inadequately served. Again, the ratio high near to ‘0’ indicate higher functional gap while ratio moving from ‘0’ to 01 explain functional gap is reducing.

- The model of computing projected population is as follows;

\[ PP = P_1 + rt \]
\[ R = \frac{(P_2 - P_1)}{10} \]

Where, \( PP \) = projected population,
- \( P_1 \) = succeeding year of base year,
- \( P_2 \) = 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 units 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 ii 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 iii 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 iv 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 v 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 complementary 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 vi 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.

**Discussion & Analysis**

The planning has been done for the socio-economic development of the region concerned and this planning depends upon the socio-economic facilities existing in different settlements and their desired demand and also potentialities of the region to support the facilities. The goal of micro-level planning can be achieved by providing adequate facilities to the settlements at economically accessible, socially desirable and environmentally sustainable. Therefore, analysis of spatial organization of settlements has been done for the said purpose. The study of growth, size, and spacing patterns of settlements and functional structures are the two important aspects of settlement system to identify the nature of spatial organization of settlements for the formulation of micro level planning to achieve balanced regional development. Organization of settlement exhibits an uneven distribution of settlement in the district. The district has 3.08 inhabited average settlements at per 10 km² in 2001. It varies from 1.45 to 3.65 settlements /10km² at block level. The highest density of settlements is observed in Gulaothi (3.65 settlements /10 km²), and lowest density of settlement is observed in Lakhaothi, (1.45 settlements/10 km²). The observed variation in the density of settlements is attributed to the fact that,
high and very high density of settlements are characterized by fertile soil, efficient irrigation system and uniform level plain and vice versa. The district has an average size of 3.24 sq.km of settlements, with a maximum of 6.72 sq.km in Lakhaothi to a minimum of 2.70 sq.km in Gulaaothi. The relationship between settlement size in terms of area and population both and settlement density reveals negative correlation meaning thereby, as size of settlement both in terms of area and population increases, density tend to decrease and vice versa. Also, 6.59 percent settlements are small in size with population of less than 500 persons in each and sharing only 0.80 percent population of the district. Most of the settlements, (about 55 per cent) belong to medium size-category in which population lies in between 500 to 1999 persons and they accommodate 26.70 percent population of the district. Moreover 19.20 percent settlements belong to the range of 2000 to 4999, accommodating 36.79 percent of population of district. The large size villages and towns, 72 in number (6.24 per cent) accommodate 35.71 percent of total population of study area with a break up of 23.15 percent in urban centre and 12.56 percent in big villages. Gini’s coefficient of concentration of 0.097 indicates the lack of concentration and Rn value of 1.48 reveals an approaching uniform pattern in the distribution of settlements. The district has an average mean spacing of 2.06 km, while the blocks mean spacing lies in between 1.78 km in Gulaaothi, to 2.82 km in Lakhaothi. This difference in spacing is attributed to the fact that, high spacing areas are generally found with relatively less fertile infested with usar land and low potentials of irrigation, where as low spacing has contrary to these factors. The relationship between spacing and size of settlement shows a significant positive correlation between the two variables.

Existing 46 socio-economic facilities have been taken into consideration for the study and have been classified into 10 main categories. Among them, lower order facilities like primary school, fair price shop, milk collection centre etc are more uniformly distributed than the higher order services. The distribution pattern of facilities does not fully follow any rational and systematic trend, and clearly reveals the purposeful planning strategy is lacking.

On the basis of combination of existing facilities, the assessed level of development brings out explicit disparities in the district at the block level and also within the block at the nyaya panchayat level. Araniya block has emerged as the least developed block in the district Bulandshahar in almost every sector like education, health, communication, transportation, market, agriculture, finance,
veterinary and recreation followed by Danpur block. The disparities in the distribution of socio-economic facilities and resultant level of development which is not uniform in the district in different blocks desires a planning to bridge the gap among different blocks and develop them as their potentialities support to its fullest extent.

To deal with the problem of the unplanned allocation of facilities in disorganized manner among different size group of settlements and the resultant regional disparity in the levels of socio-economic developments and to achieve a balanced, optimum regional development. Christaller’s central place theory has been adopted as a tool of planning, as the basic assumptions i.e. the isotropic surface doesn’t exist in reality but the basic ideas like range of goods, threshold population, complementary region of central place is universally found and are the guiding principles for any kind of development planning. The identified block for planning purpose is having 26 central places of which 24 being the first order central place and 2. being the second order central place. Also the central place i.e. Khurja of 6th order, Pahasu of 4th order and Shikarpur of 3rd order lies in the close proximity to the Araniya block and serving it well. These central places of higher order although connected with the transportation network but consumer had to travel a longer distance and also public means of transportation is not very much efficient. The central place provide services and functions to the people of surrounding settlement, while the people of dependent settlement provide demand for the goods and services, which results an interaction pattern between central place and its surrounding area. The area over which the central place exerts influence is referred as zone of influence or complementary region or hinter land or service area of central place. The complementary region of each central place, when delineated on the basis of V.L.S. Prakash Rao(modified method) failed to serve the purpose as some areas get over lapped and others remain unserved. Avoiding this, complementary regions have been delineated on the basis of empirical observation. In the present analysis the dependent population and area has been estimated according to the census record of 2001, dependent population of each central place has also been estimated for the year 2021 after estimating projected population of each settlement in the Araniya block. Total population and area of the Araniya block are being served by 26(Muni and Karora are second order central place and by virtue
first order too) first order central places among these Muni serves largest number of population of 11,687 persons and area of 21.43 sq.km, which is expected again to serve 15,726 person in 2021 followed by Karaura which is serving 10,861 persons in 2001 and expected to serve 14,615 persons in 2021. Lowest population of 974 is served by central place Nayesar with an area of 1.55 sq.km. is expected to serve 1,311 persons in 2021. It is also observed that the central place Muni scored highest centrality value of 224.20 followed by Karaura with 202.28. During field study it has been observed that the first order (lowest order) central place provides lower order functions with an exception of two first order central places that also provides second order functions like Muni and Karaura. It is surprising that the Block headquarter, which falls in the third order functional hierarchy is located is Araniya Khurd a first order central place, with a centrality score of only 47.63. In the case study block only two second order central places have been identified. Total population and area of the block are not covered by the identified two second order central places. Almost 30% of the area and settlement remained unserved, and do not come under the ambit of any of these two central places, especially of south eastern and north western part of the study block, north western part is served by Khurja a sixth order hierarchy central place, while south eastern settlements are served by Pahasu, a fourth order central place, is very well linked with the transportation network. Also some northern settlements are served by Shikarpur a third order central place. These three central places, namely Khurja, Pahasu and Shikarpur lies outside the study block Araniya. By virtue these three central places are also second order central place. Based on the market range of goods and services or traveling pattern of people to obtain the facilities of second hierarchical order of function at shortest distance with minimum traveling expenditure, dependent population and area of each second order central place has been estimated and their region has been delineated. Among the second order central places Muni and its complementary region with highest centrality score of 683.53 serves a total population of 42,363 persons including its own population (3,398) while it is expected to serve the total population of 56,753 persons in the year 2021, covers the largest area of 56.3 sq.km. On the other hand Karaura and its complementary region with a centrality score of 488.52 serve 40,215 persons including its own population of 6,414 estimated to serve 54,213 persons in 2021. The central place of Khurja
serves 15465 people, Pahasu serve 8412 persons and expected to serve 19464 and 11519 persons respectively. While Shikarpur serves 6251 persons in 2001 and expected to serve 8845 persons respectively in 2021. During field study it has been observed that whole the Araniya block is dependent on Khurja a sixth order central place for higher order functions.

In the study region 24 first order and two second order central places serving different socio-economic functions to the inhabitants are located at the mean distance of 3.15 km and 11.36 km. respectively. While nearest neighbour analysis (N-N index) with Rn value 1.072 of first order central places shows their approaching uniform pattern of distribution in the block, while second order central places are randomly distributed, with Rn value of 3.35.

After discussing the dependent population of central places in 2001 and expected dependent population in 2021 and the nature of distribution of settlements being served by these central places, the task remains to evolve a purposeful planning model for the plausible solution of the problems in the block Araniya. This has been done through identifying the functional gaps of each individual facility existing in the block, in the different complementary regions. The functional gap has been determined on the basis of functional ratio calculated from the variables related to the population and centrality score of the complementary regions with the help of quantitative technique. Taking the existing facility constant in 2021, the gap is found to increase demands an addition of facilities in the existing number. The available facilities have been found inadequate not only in terms of numbers but also distribution, is the testimony of the fact that the locations of the facilities do not involve any rational planning. Among the educational facilities, primary school has been found most widely distributed, but the complementary region like Naiphal is found inadequately served in 2001 and the gap further estimated to increase in 2021. While, Gworli Bhojgarhi complementary region is adequately served in both the year 2001 and 2021. This is one example of unplanned distribution and quantum of facilities. This sort of imbalance has been found in almost all the facilities, requires immediate attention. To bridge the functional gap, additional facilities have been proposed and optimal locations have been chosen, keeping in view the accessibility, public preference and median population threshold to achieve the balanced regional development. 49 primary schools have been proposed at 29
settlements, 19 middle schools at 19 settlements, and like wise where ever and in what quantity facilities are required have been proposed. Also some facilities like hospital, cold store etc, which is found absent is proposed for 2021, because the complementary region of Muni and Karora have been estimated to sustain these facilities. Muni and Karora, are the central places best suited for the location of most of the facilities, having the potential to climb up the hierarchy from the second order central place and make the future promise for the location of more higher order functions, which the people avail presently through visiting Khurja, a sixth order central place outside the Araniya block.

The proposed model for diagnostic planning to reduce regional disparities at micro level in the identified block – Araniya i.e. most least developed area of the region and suits to every region with same ecological setting. Being its pragmatic character, it has wider applicability in every area of research, which lays its emphasis on spatial planning and development. In present day of globalization, where multinationals and many other investors looking forward to establish their outsourcing business for maximizing profit will be more benefited if they go by this approach of spatial planning. Besides, it is also proved to be more instrumental to all the governmental agency, quasi governmental agencies, NGOs, for the formulation of any plan at micro level to attain balanced regional development.