TWO: ANALYSIS PART

CHAPTER III

TYPES OF FUNCTIONS AND FUNCTIONAL IMPORTANCE ON
THE MORPHOLOGY OF SETTLEMENTS
Types of functions and functional importance
on the Morphology of Settlements

3.1 Concept of Function

Function has been used for different notions. The following discussion may help to clarify the concept of function before taking up any detailed study. In biology, function is the normal operation of a living organism or any of its constituent system (Openheimer, 1963). Parts of organisms are structurally specialised for some particular functions. In biological material a special relationship exists between structure and function of a part, for one is meaningless without the other. Since life consists essentially of processes, the study of function, therefore, always remains paramount in consideration of biological material.

In mathematics, a quantity whose value depends on the value of certain other qualities is called a function of these other quantities (Shenton, 1963). The function itself is frequently called the dependent variable. For instance, the area of a triangle is a function of its three sides; the volume of a cone is a function of its base-radius and height. The symbols commonly use for a general function are $f(x)$, $F(x)$, $\phi(x)$, etc., called the $f$ function of $x$, the $F$ function of $x$, the $\phi$ function of $x$ respectively. As such, human activities are independent variables in the sense that it may expand or contract through time and place. So, settlements depend considerably upon human activities.

The term function may be defined as any condition of any state of affairs, resultant from operation of a unit of the type under consideration in terms of a
structure (Sills, 1968). In the study of social sciences, the unit is usually a system of action involving a set of one or more persons. The classification of a function or structure depends on the point of view from which the phenomena concerned are discussed. For an instance, what is a function from one point of view is a structure from another. The politeness of a child may be regarded as a structure of its behaviour or as a function of operating its discipline. The major difficulty associated with the general concept of function is due to the use of a single term to cover several distinctly different references.

In ordinary usage the term “function” is most generally identified with the term “eufunction”. With respect to a given unit, “eufunction” may be defined as any function which increases or maintains adaptation of the unit to the unit’s setting, Sills added. So the structural – functional analysis is not a new both in the pure and applied sciences.

By the turn of the 20th century, geographer’s interest on functional organisation of human settlements is prepared to increase the understanding of spatial structures and processes with the way geographers think about them. The study of human activities in terrestrial space is very much significant in this economic world, since the organisation of space is more important (Abler, John, Peter, 1971).

It is understood that man performs multi-functions in this economic world. His activities expressed through functions and measure the standard of living which in turn contributes to build the framework for organisation of a settlement system. So, functions of settlements are created and contributed by the activities of man. Thus, a
functional centre is a place wherein functions are located and all the residing individuals in an around the place enjoy the facilities provided by the functions. The analysis of functional characteristics of settlement is essential to understand the level of development of the settlements which represent in the present study area.

3.2 Types of Functions

Individual difference and regional variation cause to develop different types of functions to be possessed by settlements. Moreover, men are engaged in such functions that stimulate the growth of settlements of the present study area can be broadly classified into (i) Policy functions and (ii) Non-Policy functions. Policy functions are those functions taken up under certain policies and programmes. Non-policy functions are the individual oriented works of the people. Of the 171 functions given below, 101 functions belong to policy functions covering eleven categories of services sponsored by governments, semi-governments and organisational bodies. The 70 functions of Non-policy covering nine categories are chiefly private enterprises.
3.2.1 Policy Function

A. Education
1. Pre Primary/Primary/J.B/U.J.B. Schools
2. Middle/Junior High/Senior/Basic Schools
3. High/Higher Secondary Schools
4. Schools for Professional and other Education
5. College for general Education
6. College for Professional and other Education
7. Universities
8. Public Library

B. Health Centres
9. State Hospital
10. District Hospital
12. dispensaries and P.H.S.C.

C. Communication
13. Post Office
14. B.P.O.
15. Telegraph Office
16. Radio Station
17. Television Station

D. Financial Institutions
18. Government Banks (State and Central)
19. Agricultural Co-operative Society
20. Consumer Co-operative Society
21. Marketing Co-operative Society
22. Private Banks
23. Weaving Co-operative Society

E. Public Security Service
24. Police Station
25. Police Outpost
26. Excise Outpost
27. Fire Station
28. Inspection Bungalow (I.B.)
29. Tourist Spot
30. Forest Office
31. Petrol Bank
32. Water Supply
33. Court

F. Social Organisation
34. N.G.O.
35. Club
36. Organisation

G. Religious and Cultural Centers
37. Temple
38. Church
39. Mosque
40. Community Hall
41. Dance Academy
42. Shrine
43. Cinema Hall
44. Video Hall
45. Theatre Hall

H. Veterinary and animal Husbandry Service
46. State Level Veterinary Hospital
47. District Level Veterinary Hospital
48. Veterinary Dispensary
49. Veterinary Aid Centre
50. Regional Main A.C. Center
51. A.I. Sub Centre
52. Central cement collection cum A.I. centre
53. Central Dairy Farm
54. Veterinary Hospital
55. Rural Dairy Farm
56. Fooer Farm
57. Sheep wool extension Centre
58. Cattle Breeding Farm
59. Poultry Breeding/Rearing Farm
60. Duck Breeding/Rearing Farm
61. Pig Breeding Farm
62. Pony Breeding Farm
63. Mithun Rearing Farm

H. Marketing Service
64. Warehouse
65. Fair Price shop
66. Market Sheds

J. Transport
67. Transport Office
68. Bus Stations
69. Jeep Parking
70. Auto Parking
71. Rickshaw Parking
72. Toll Tax Station
73. Cheque point

K. Other Government Services and Industries
74. Education Department
75. Electricity Department
76. Irrigation and Flood Control Department
77. Food and civil supply Department
78. Parliament House
79. Statistics Department
80. Science and Technology Dept.
81. Public Works Department
82. Treasury Office
83. Secretariat Office
84. Land Revenue Department
85. Panchayat Office
86. Cooperative Registrar Office
87. Tourism Department
88. Agricultural Office
89. Information Centre
90. Government Quarters
91. S.D.O. Office
92. S.D.C. Office
93. Co-operative Office
94. Pollution Control Office
95. Police Head Quarter
96. Film Industry
97. Municipality Office
98. Spinning Mill
99. Sugar Factory
100. Mulberry and Tasar Industry
101. Sports and Games Complexes

3.2.2 Non-Policy Function

L. Academic Centre
102. Photostat Centre
103. Stationery
104. Book Store
105. Job centre
106. News Paper Dealer

M. Other Communication Centre
107. P.C.O.
108. P.C.O. and S.T.D.
109. Computer Centre
110. Computer and internet facility centre
111. Cable Network Centre
112. Typing Centre

N. Beautification Centre
113. Photo Studio
114. Beauty Parlor
115. Sound Recording Centre
116. Sound Service Centre
117. Laundry House
118. Video Parlour
119. Saloon

O. Feeding Centre
120. Hotel
121. Hotel with lodging facility
122. Restaurant
123. Fresh Fish Centre
124. Fresh Meet Centre
125. Vegetable Shop
126. Animal feeding Centre
P. Health and Sanitary
   127. Pharmacy
   128. Private clinic
   129. Public Toilet

Q. Handicraft
   130. Tailour
   131. Embroidery
   132. Painting Studio
   133. Dying Centre
   134. Individual Cottage Industry
   135. Handloom Centre
   136. Furniture House
   137. Bamboo and Cane product centre
   138. Toy selling shop
   139. Pottery shop
   140. Jewellery shop
   141. Gift Shop
   142. Screen Printing Centre
   143. Tent House

R. Retail shop
   144. Clothing shop
   145. Electrical shop
   146. Hardware shop
   147. Watch shop
   148. Cycle shop
   149. Glass Centre
   150. Optical Glass Centre
   151. Cement shop
   152. Dry fish shop
   153. Fruit centre
   154. Vegetable shop
   155. Women VENDOR
   156. Grocery
   157. Leather House
   158. Shoe Shop
   159. Utensil Shop
   160. Gas Dealer
   161. Lubricant Centre
   162. Stamp Making Centre
   163. Backery product shop

S. Household Mill
   164. Oil Mill
   165. Flour Moll
   166. Rice Mill
   167. Saw Mill

T. Workshop
   168. Cycle workshop
   169. Motor workshop (Two wheeler and light vehicles)
   170. Workshop (Heavy Vehicles)
   171. Electrical goods workshop.
These policy functions have been introduced one after another according to the requirement through the ages. Each function is governed by well decided policies and programmes under the supervision of either private bodies or the state or the central government. Development of settlement is expected through these functions present by promoting the status of settlements. Non-policy functions have also been added to the settlements mainly due to the diversified human activities relating to economic and social conditions. Their presence and services available among the settlements increase the progress of development.

In fact, these are the important selected functions for the present study and closely related to both rural and urban settlements. With the help of these functions, the researcher attempts to picture out the pattern, morphology, growth, hierarchy and spatial relation of settlements of the valley of Manipur.

3.3 Importance of Functions to Settlements

Functions are the creation of human activities. These functions are performed and distributed among the rural and urban settlements. Man used to live in the caves and forested spaces at the start of human history. His basic needs of the time were food, clothing and shelter. Hunting, lumbering and food gathering were the core activities of the period. But these activities have been expanded with the increase of human desires. Different individuals required to exchange of goods for goods before the invention of money. People faced a couple of problems when different individuals required different things at the same time, as individuals are different one from the
other. This primitive exchange of goods for goods has been modified through the invention of money and birth of rural markets. Functional centres like bank, educational institution, storehouse, post office, private and government offices and others come into existence with the process of urbanisation. Thus, urbanisation is another social index to measure standard of living and ultimately, the economic development of a country (Deka, P and Bhagabati, A, 1995).

Today, different nations are at differential stages of economic progress. Some nations are very advanced, some are on the way to industrialization and many are still in the third world category. Such different stages in the economic progress explain the disparities in the standard of living that exist in the part of world community. These differential economic activities may be partly explained by an analysis of the correlation between man and his environment (Das Gupta, A. 1985). Thus, growth of any rural or urban settlement depends on the availability of functional environments. Development of the settlement can take place only after a multi-functional presence in the settlement. The more function in a settlement the better is the growth and development in the part of the same settlement. In this way, functional presence may enlarge the pattern and structure of both rural and urban settlement units.

In the opinion of Bhat, L. S. (1988), the factors contributing the emergence of few but selected number of settlements as nodes are (i) situation, (ii) demographic and socio economic attributes of settlements and (iii) availability of infrastructure facilities and amenities. Such similar factors can also be studied for the present study
area under three settlement groups: (i) rural settlement, (ii) sub-urban settlement, and (iii) urban settlement.

3.3.1 Rural Settlement

For the study of settlement, geographers are paying attention to examine the permanent settlements of different regions of the world. Nearly, three fifths of the world population is still residing in the rural areas or villages. A settlement may be temporary or permanent depending on the nature and quality of resources and from the rural settlements they may acquire the status of urban centres. Unstable settlements are confined in the semi-desert and desert areas, equatorial forests, mountainous area and tundra regions, counting less than two percent of the total population of the world.

Rural settlement is pertaining to the country life as opposed to the town. Rural people used to live in the country having the standing qualities or manners of peasants or country-folk, engaging in county occupations of agricultural or pastoral (The oxford English Dictionary, 1970). But, in practice, it is difficult to distinguish truly rural areas because of the blurring of the rural and sub-urban and urban fringe, Mayhew, Sushan (1997). He accepted rural settlement as the settlement existing in the country, but emphasised that the clearest indication of rurality in society should be the distance to large urban centres. In the opinion of Kumar, Ashok (2004), any settlement in which most of he people are engaged in agriculture, forestry, mining and fishing is known as a rural settlement. Rana, P.B. (1977) has defined rural or
village settlement as a human aggregation with a definite position and area bearing a particular place name and usually surrounded by agricultural lands associated within its territory. Wibberley (1972) has presented that settlements of the rural areas is a sign of extensive use of land, or it may be an extension of the city resulting from the development of the commuter train and the private motor car.

3.3.1.1 Functions of Rural Settlements

Generally, people living in the rural areas are engaged in various primary occupations, viz., agriculture, fisheries, forestry and mining. Of them, agriculture is the most important occupation. The main function of rural settlement, therefore, is usually related to collection and distribution of products of the surrounding land. Apart from cultivation of crops and domestication of animal, these rural settlements perform other functions. Its religious centre like temple, church, mosque or gurdwara with one or a few shops is a centre of religious and social activities. The village panchayats in India and village councils in other countries perform some administrative and judicial functions (Mandal, 1989).

Villages also function as small trade centres and they use to export their surplus products to the nearby surrounding area. It is also possible that multiple functions are performed by the rural settlements if the physical environment is feasible for locating many facilities. In general, subsistence of rural settlements maintained through the surroundings. The immediate surrounding is agricultural fields, and then connects with markets and neighboring villages. Each house may
have the store place, rearing of livestock, rooms for feeding and bathing, etc. The courtyard, in rural areas is used for different occasions of festivals, ceremonials and even in daily life. In this way, the village dwellings and its surroundings are the expression of a way of living and resultantly a way of viewing the world which help in comparing one village or region to another.

3.3.1.2 Rural Service Center and its Centrality

Rural service center is concerned with the relationship among rural centers wherein activities other than agriculture assume significant proportions (Caruthers, 1958). People from the surrounding areas are always looking for the facilities like retail shopping, entertainment, cultural, professional and amenities from such service centers. The less important service center depends upon other more important service centers. The rise of multi functional service center in larger village of the region is due to the development of non-agricultural activities. Advancement in science and technology brings about modernisation in agriculture and sets about new industrial sites. Then functional interaction and interdependence of settlement structure serve satisfaction of three major needs of people viz., the productive needs, political and administrative needs and individual needs (Barnum, 1966). All facilities essential to satisfy these needs are located within and between the settlements.

The importance or centrality of service centre in the provision of goods and services to the surrounding hinterland population is indicated by the number of services it provides and by the proportion of these services supported solely by the
tributary population (Johnston, 1966). This centrality of service center can be measured either through (i) Direct measurement technique, (ii) Indirect measurement technique (iii) Sophisticated measurement technique and (iv) Indices of potential functional status (Davies, 1966). The direct measurement technique is a simple addition of all the functions that are found in any centre of service. Indirect measurement technique deals with the measurement of the attractive power of centers by determining the dominance of the center of its link with the countryside. The sophisticated measurement technique involves the statistical techniques to group various functions. The indices of potential functional status are calculated by determining the potential of individual centre in relation to the potential of the region as a whole, to classify the centre according to their relative importance.

In order to measure the centrality of a particular village, direct measurement technique of Davies with modification, has been applied. Medical services, communication facilities, transport facilities, educational services, commercial institutions and markets have been presumed as the key criteria for the determination. A number of basic functional units were listed in each group and such units were graded according to their relative importance into primary, secondary and tertiary orders. The relative importance of a settlement is measured according to the hierarchy of these basic units present in it. At least four or more key functions are available in any settlement, it has been declared to be a service center. The hierarchy of a service center will be dependent upon the hierarchy of basic function with the key criteria present.
Table 3: Hierarchy of Basic Functions within the Key Criteria.

<table>
<thead>
<tr>
<th>Key criteria</th>
<th>Basic Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Medical</td>
<td>I. Health Center / Clinic</td>
</tr>
<tr>
<td></td>
<td>Postal service</td>
</tr>
<tr>
<td>b. Communication</td>
<td>Dispensary / Clinic</td>
</tr>
<tr>
<td></td>
<td>BPO</td>
</tr>
<tr>
<td>c. Transport</td>
<td>I. Telephone Exchange</td>
</tr>
<tr>
<td></td>
<td>II. Public call office &amp; Postal service</td>
</tr>
<tr>
<td></td>
<td>II. Aerodrome</td>
</tr>
<tr>
<td>d. Education</td>
<td>Bus station (Metal led road within 1 km of center)</td>
</tr>
<tr>
<td></td>
<td>Railway Station (within 2km of centre)</td>
</tr>
<tr>
<td>e. Commercial</td>
<td>I. Cooperative Society</td>
</tr>
<tr>
<td></td>
<td>I. Bank / Finance Co.</td>
</tr>
<tr>
<td></td>
<td>II. Market facility</td>
</tr>
<tr>
<td></td>
<td>College</td>
</tr>
<tr>
<td></td>
<td>I. Bank and Insurance Co</td>
</tr>
</tbody>
</table>

Application:

I. Presence of any four functions from Primary group (column I) – Rural.

Service center

II. Presence of any four functions from Secondary group (column II) – Rurban.

III. Presence of any four functions from Tertiary group (Column III) – urban.
Table 4: Districtwise Settlements with Primary, Secondary and Tertiary Services, 2001

<table>
<thead>
<tr>
<th>Districts</th>
<th>Settlement with primary services</th>
<th>Settlement with secondary services</th>
<th>Settlement with tertiary services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imphal East</td>
<td>156</td>
<td>193</td>
<td>32</td>
</tr>
<tr>
<td>Imphal West</td>
<td>199</td>
<td>251</td>
<td>58</td>
</tr>
<tr>
<td>Bishnupur</td>
<td>79</td>
<td>102</td>
<td>25</td>
</tr>
<tr>
<td>Thoubal</td>
<td>94</td>
<td>176</td>
<td>26</td>
</tr>
<tr>
<td>Valley</td>
<td>528</td>
<td>722</td>
<td>141</td>
</tr>
<tr>
<td>Manipur</td>
<td>961</td>
<td>1237</td>
<td>212</td>
</tr>
</tbody>
</table>

Note: Here, a settlement in which both primary and secondary services are available is counted twice or repeatedly according to the methodology stated above. So, depending on the types of services / functions available the frequency of settlements is entered.


Applying the above method, 1250 rural settlements possess primary and secondary services in the entire valley. The groupings of functions for calculation of primary, secondary and tertiary services are abcd, abde and adbe respectively (Table 3, key criteria column). Out of these, 528 are settlements with primary services and 722 are secondary services (Table 4). There are 141 tertiary service centres which will be considered for the determination of settlement hierarchy in chapter V. The Central Place theory clearly states that such tertiary centres serve their own areas as well as the hinterlands by providing goods and services from the functions available with them. Hence, such settlements may be called service centres, otherwise they are central places.
3.3.1.3 Rural Service Centres and Population

Rural service centres are closely related to population, besides the functions present. The following table shows the relationship of rural service centres with their densities of population for eight sub-divisions of Manipur valley. There is a clear cut tendency that larger the population or density of centres there is decrease of space between service centres in the study area.

Table 5: Relationship between Density of Population and Rural Service Centres.

<table>
<thead>
<tr>
<th>Sub-Division</th>
<th>Settlements* with primary and secondary services</th>
<th>Density of rural population</th>
<th>Average spacing in Km (D=1.0746/√d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imphal East I</td>
<td>146</td>
<td>195</td>
<td>2.99</td>
</tr>
<tr>
<td>Imphal East II</td>
<td>203</td>
<td>208</td>
<td>2.03</td>
</tr>
<tr>
<td>Imphal west I</td>
<td>238</td>
<td>209</td>
<td>2.10</td>
</tr>
<tr>
<td>Imphal west II</td>
<td>212</td>
<td>172</td>
<td>2.87</td>
</tr>
<tr>
<td>Bishnupur Sub-Division</td>
<td>95</td>
<td>141</td>
<td>2.84</td>
</tr>
<tr>
<td>Moirang Sub-Division</td>
<td>86</td>
<td>128</td>
<td>4.39</td>
</tr>
<tr>
<td>Thoubal Sub-division</td>
<td>132</td>
<td>231</td>
<td>2.11</td>
</tr>
<tr>
<td>Kakching Sub-Division</td>
<td>138</td>
<td>221</td>
<td>2.07</td>
</tr>
</tbody>
</table>

*Here, the frequency of settlement is repeatedly counted depending on the available services.


It is clear from the Table 5 that the more crowded areas of Thoubal Sub-division, where the density of population is around 231 persons receives 2.11 km as the average spacing of service centres. Likewise, Imphal West I and East II get relatively less spacing between settlements. Moirang sub-division, having the least density of rural population (128 per km²), has got the highest average spacing of villages, 4.39 Km.
As such, the rural service centres serve the primary needs of villages, and the distribution of these service centres has followed a natural and spontaneous pattern. As a rule, most of the service centres in the area perform some centralized services for their immediate surroundings and most of the centres have developed like satellites, surrounding the district headquarters, larger towns and cities. An interesting pattern is recorded when examining the primary and secondary service centres under the composition of basic functions. The examination has been done at the district level, and more than 90 percent of the service centres have four functions namely (a) rural health centre, (b) postal service, (c) bus station and (d) middle school. In the case of secondary service centres, about two-thirds of the centres have the combination of (a) dispensary / clinic (b) BPO (d) high school and (e) bank / financial co. But in all the service centres the railway station is absent.

3.3.2 Sub-urban Settlement

The study of sub-urban settlement has assumed an important significance in this modern era of urban expansion. There are vast scholarly literatures on the rural urban fringe, suburb, rurban and rural-urban continuum. But no unique definition has yet emerged. This is because of the fact that there is no specific point at which rurality disappears and urbanity begins. Such a sub-urban settlement has been variously described again as ‘rurban community’ by Galpin, C.J.(1915), ‘rurban settlement’ by Singh, R.L.(1960), ‘sub-town’ by Smailes, A.E.(1944) and ‘urban village’ by Dickinson, R.E.(1932). A sub-urban settlement is the interface between a town and the surrounding countryside (Smith, 1979). Thus the character of a sub-
urban settlement is of half rurality and half urbanity. This is a transitional zone between rural and urban way of living (Yadav, 1987).

3.3.2.1 Classification of Sub-urban settlements

There is a difficulty in the classification of sub-urban centres in the areas where less industrialisation prevails. Special care has been taken to identify the sub-urban centres for the present study area by using a simple direct measurement technique. The criteria used in the present analysis to determine the spatial arrangement of sub-urban settlements in the valley are as follows.

i) Settlements having population not less than 2000 persons by 2001 census

ii) Neighbouring settlement to an urban center

iii) At least 20 percent population engaged in non-agricultural activities.

Applying the aforesaid method, 43 sub-urban settlements have been identified. The sub-divisional ranks of the sub-urban settlements have also been calculated based on the distribution of sub-urban settlements (Table 6). The highest number of sub-urban centre is recorded in the Bishnupur sub-division. This indicates that many sub-urban settlements of the sub-division are distributed nearer to urban centres than the rest. Contrary to this situation, Imphal East II sub-division has the least rank with only three sub-urban centres. It is also clear from the same table that sub-urban centres in the Bishnupur sub-division are easily accessible that supports the establishment of sub-urban patterns and structures. The most dispersed sub-urban settlement form is recorded in the Imphal East II sub-division.
**Table 6: Distribution of Sub-urban Settlements and their Density and Spacing, 2001**

<table>
<thead>
<tr>
<th>District sub-division</th>
<th>Population</th>
<th>No. of Sub-urban settlements</th>
<th>Rank</th>
<th>Density of sub urban per 100 km²</th>
<th>Average spacing km.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bishnupur sub-division</td>
<td>28935</td>
<td>8</td>
<td>1</td>
<td>6.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Imphal East I sub-division</td>
<td>32910</td>
<td>7</td>
<td>2</td>
<td>1.9</td>
<td>7.8</td>
</tr>
<tr>
<td>Thoubal sub-division</td>
<td>25319</td>
<td>6</td>
<td>3</td>
<td>1.7</td>
<td>8.2</td>
</tr>
<tr>
<td>Imphal West II sub-division</td>
<td>14542</td>
<td>5</td>
<td>4</td>
<td>2.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Kakching sub-division</td>
<td>26160</td>
<td>5</td>
<td>5</td>
<td>1.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Moirang sub-division</td>
<td>27938</td>
<td>5</td>
<td>6</td>
<td>1.4</td>
<td>9.1</td>
</tr>
<tr>
<td>Imphal West I sub-division</td>
<td>16946</td>
<td>4</td>
<td>7</td>
<td>1.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Imphal East II sub-division</td>
<td>15678</td>
<td>3</td>
<td>8</td>
<td>0.9</td>
<td>11.4</td>
</tr>
<tr>
<td>Manipur valley</td>
<td>188428</td>
<td>43</td>
<td></td>
<td>2.15</td>
<td>8.15</td>
</tr>
</tbody>
</table>

3.3.2.2 **Density and Spacing of sub-urban Settlements**

The study of density and spacing of settlements is vital to the present day settlement studies. The most valuable part of an existing landmass, from the view of land utilization, is the settlement area. How they are arranged in a limited given space is worth studying. Levels of settlement density and settlement space are different one from the other. With the knowledge of scarcity of land, the utilization of land has been of economic concern. Other facilities like office, market centre, playground etc. are added through the expansion of human activities. The density and spacing of sub-urban settlements in the present study area have been presented in Table 6 above.
In all the eight sub-districts of the valley the density of sub-urban settlements is very low i.e., < 10 sub-urban settlements per 100 Km$^2$. The highest sub-urban density i.e., 6 sub-urban settlements per 100 Km$^2$ is recorded in the Bishnupur sub-division. The lowest sub-urban density i.e., 0.9 sub-urban settlements per 100 Km$^2$ is found in the Imphal East II sub-division. Thus, the sub-divisions having lower densities have the high spacing, and vice-versa.

Mather's formula (1944), i.e. $D = 1.0746/\sqrt{d}$ has been applied for the calculation of sub-urban spacing. In this formula, $D$ is the theoretical distance between points in hexagonal arrangement and $d$ is the density of settlements per unit area (km$^2$). The highest sub-urban spacing, 11.4 km with lowest sub-urban density, 0.9 per 100 km$^2$ is found in the Imphal East II sub-division. The lowest sub-urban spacing, 4.4 km with highest sub-urban density, 6 per 100 km$^2$ is recorded in the Bishnupur sub-division (Table 6). These can be compared with the valley’s average sub-urban spacing 8.15 km with the average sub-urban density 2.15 per 100 km$^2$. The above mentioned are responsible for getting different values of density and space of sub-urban settlements.

3.3.3 Urban Settlement

Urban settlement is the most attractive form of settlement in the world. The level of urban development always reflects the level of economic development of a region. Earlier urban settlements were developed in the fertile valleys and deltas of the world. The rise of technology allowed increasing population to shift from rural to
urban settlements (Alikhan, 1987). This migration of rural population into towns and cities leads a change of employment structure from agriculture and cottage industries to mass production and service industries. In this way, urbanisation causes a social change. In the opinion of Deva (1998), urbanisation is an indicator of development and an important process in the transformation of human society. It also influences significantly the structure of the settlement system of a region.

Urbanization is the process of becoming urban (Munsi, 1993). Some other experts in this field have argued that urbanisation is the inevitable result of economic growth, with the rise of specialized craftsmen, merchants and administrators. It is relatively a recent process in the third world like in India. Urbanisation of the world occurred in the Middle East first and in other parts of the world later (Cann and Irwin, 1981). Modern urbanisation is the outcome of the industrial and technological revolution of the last two hundred years. In the opinion of Dubey (1985), the urban development of an area has a great bearing on its development processes. Traditionally, it has been recognized both as a factor and a consequence of development. Urbanisation and development accelerate one another.

In India, the process of modern urbanisation becomes active only after 1947. A large number of studies (Hoselitz 1959, Bose 1970, Lall and Tithra 1971, Mukerji 1973, Munsi 1975, Noble and Dutt 1977 and Pathak 1980) have been conducted on Indian urbanisation. But the lone exception has been received from the work of Murkerji (1973) for his attempt to measure the level of urban development in the suitable Indian context. In Manipur, many works have been emerged to study the
urban settlements of the state. Yet, studies conducted by Yaima (1982) and Dava (1998) are some of the urban settlement studies in the state, that show the actual process of urbanization revealing physical, socio-economic and cultural backgrounds of the region. The economic backbone of the state is agriculture and so, the agro-based processes of urbanisation have largely contributed to generate the growth and development of urban settlements.

3.3.3.1 Functional importance of Urban Settlements

Nelson classified the American cities in terms of deviations in the year 1950 and found out the standard deviation (S.D) from the average in particular function of towns. This method is helpful for comparison between different functions of cities or towns. Through this method he tried to categories the towns; which fall below the average value as diversified towns and which fall in average value in a particular function as average towns. This method is still widely applied. The economic base of a town can express the functional character of the town. The functions of the urban centre can be grouped into (i) basic and (ii) non-basic. All the city forming functions serving a large number of populations in far off distances from the city like industries, firms, commercial centres etc. are the basic functions. It involves production, transportation and distribution of goods and services to serve both the local and surrounding populations. The non-basic activities serve the local settlement through production and distribution of goods and services. Almost all the urban settlements of the study area are associated with non-basic type of activities as they depend on the local resources in terms of their economic growth.
The analysis of the functional character of town at sub-divisional level of the Manipur valley indicates the degree of dynamism in the process of urbanization for which workers of economic activities of 2001 census are considered. The applied formula as devised by Nelson is being employed for the purpose.

In 2001 (Annexure II) the total population of the valley engaged in ten occupational categories is 4,06,203. The least percentage (0.02 percent) of population is recorded in mining and quarrying (Table 7). Imphal West-I has the highest number of population engaged in other services. The function of cultivation is recorded high in all the seven sub-divisions, except the Imphal East-I sub-division. This indicates that most of the Sub-divisions are dominated by agricultural based functions.

**Table 7: Functional Importance of Settlements in the Manipur Valley**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>% of total</th>
<th>Difference $d = 100/10$</th>
<th>$d^2$</th>
<th>$\sum d^2$</th>
<th>$\sum d^2/n$</th>
<th>S.D. = $\sqrt{\frac{\sum d^2}{n}}$</th>
<th>Average $+ (1 \times \text{S.D.})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>46.9</td>
<td>+36.9</td>
<td>1361.61</td>
<td>1361.61</td>
<td>1361.61</td>
<td>36.9</td>
<td>46.9</td>
</tr>
<tr>
<td>II</td>
<td>10.1</td>
<td>+0.1</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.1</td>
<td>10.1</td>
</tr>
<tr>
<td>III</td>
<td>2.5</td>
<td>-7.5</td>
<td>56.25</td>
<td>56.25</td>
<td>56.25</td>
<td>7.5</td>
<td>17.5</td>
</tr>
<tr>
<td>IV</td>
<td>0.1</td>
<td>-9.9</td>
<td>98.01</td>
<td>98.01</td>
<td>98.01</td>
<td>9.9</td>
<td>19.9</td>
</tr>
<tr>
<td>V</td>
<td>9.4</td>
<td>-0.6</td>
<td>0.36</td>
<td>0.36</td>
<td>0.36</td>
<td>0.6</td>
<td>10.6</td>
</tr>
<tr>
<td>VI</td>
<td>3.7</td>
<td>-6.3</td>
<td>39.69</td>
<td>39.69</td>
<td>39.69</td>
<td>6.3</td>
<td>16.3</td>
</tr>
<tr>
<td>VII</td>
<td>2.6</td>
<td>-7.4</td>
<td>54.76</td>
<td>54.76</td>
<td>54.76</td>
<td>7.4</td>
<td>17.4</td>
</tr>
<tr>
<td>VIII</td>
<td>5.6</td>
<td>-4.4</td>
<td>19.36</td>
<td>19.36</td>
<td>19.36</td>
<td>4.4</td>
<td>14.4</td>
</tr>
<tr>
<td>IX</td>
<td>1.8</td>
<td>-8.2</td>
<td>67.24</td>
<td>67.24</td>
<td>67.24</td>
<td>8.2</td>
<td>18.2</td>
</tr>
<tr>
<td>X</td>
<td>17.3</td>
<td>+7.3</td>
<td>53.29</td>
<td>53.29</td>
<td>53.29</td>
<td>7.3</td>
<td>17.3</td>
</tr>
</tbody>
</table>

So far as the specialisation of the occupational structure at Sub-division level of the Manipur valley is concerned, agricultural workers and other services are predominant indicating that all the Sub-divisions have agricultural based towns. It is obvious that the fertile plain of the study area supports to have agricultural practices
for the inhabitants and with such economic condition the settlements will have organisation.

3.4 Settlement Morphology

The presence of more functions can shape the structure of both village and urban settlements. The patterns of settlement are the expressions of space organisation by a culture group (Ghosh, Sumita 2003). A society's culture and level of technology imposed determine how it perceives the environment and how it interacts with it. Variation in this causes difference in the forms of settlements. The two vital restrictive factors are terrain and water source. Since every settlement is associated with the level of technology developed, it is difficult for it to overcome the restrictions imposed by the ruggedness or slope of the terrain. It is uncommon for a village in rugged terrain to be compact. And most of the buildings in the settlements of the world are usually found on the gentler slopes. This is also seen in the present study area.

3.4.1 Morphology of Rural Settlement

The forms and patterns of settlements are excellent indicators of the resources as well as the culture of a region. It is necessary to clarify some terms that will be frequently used in referring to village shape. Morphology itself may be defined as the study of settlement shape and ground plan. The ground plan of rural dwellings indicates minimum living space. Form is used to denote geometric shapes of rural
settlements such as radial, linear and rectangular. The term pattern describes interbuilding distances such as dispersed and clustered patterns. Some Indian scholars use type to distinguish between dispersed and compact settlements and pattern to describe shape (linear pattern, circular pattern etc.).

Under the influence of different natural and cultural environments village forms may vary. For example, the hamleted pattern of villages is the characteristic settlement unit throughout most of the southern and eastern Europe; the villages in the Kraals of Kenya are circular fenced formation; a typical English village shows a single street cluster with scattered farmsteads; villages in the northern plains of India, where water is abundant and gentle relief, both clustered and dispersed patterns are found; villages in the Jodhpur district of Rajasthan are small tight rectangular clusters; while the villages along the coast of Kerala are the representation of dispersed houses with little means of distinguishing one village from the other. Rural settlement is a type of human clonisation, which always reflects the reciprocal relationship between nature and man. Interestingly, the internal arrangement and the external layout will reflect the desires of the people who actually need in their settlement processes.

3.4.2 Major Settlement types

Satellite IRS-1B images and toposheet no. 83 H/13, 14, 15, L1, L2 and L3 of the Manipur valley show some interesting rural settlement types. Because of the plain area, the location of Loktak lake, marshy lands and courses of the Manipur river and
its tributaries determine to find out the following types of settlements viz., Compact settlement (or agglomerated settlement), Linear settlement, Semi-compact settlement and sprinkled settlement / semi-sprinkled settlement. Figure 10 represents these four rural settlement types. Compact or agglomerated settlements have narrow lanes and much trodden streets separating the houses with lower inter-building spaces. Sprinkled or dispersed settlements reveal privacy marked by scattered dwellings made by peasants in their provided fields. In between these, semi-compact and semi-sprinkled types are found and they are greater in number. A settlement of only one hamlet is called dispersed settlement, while a settlement having one large hamlet and one or two smaller sub-hamlets falls in the group of semi-compact settlement. Likewise, a settlement having a number of hamlets without a recognizable central site is the type of semi-sprinkled settlement. Most of the compact and semi-compact rural settlements in this valley exhibit rectangular in shape. Majority of the sprinkled and semi-sprinkled rural settlements reveal linear pattern. Linear settlement is observed due to the rural habitation along the rivers, roads and lake-shore areas in the valley.

3.4.3 Morphology of Urban Settlement

A brief study about the structure of urban settlements in the valley of Manipur has been discussed in Chapter II. Urban structure is determined by a number of predetermined general principles of land use and location. However, a stage may come when form and structure are determined largely by other factors like modes of production and social structure. There are various models explaining urban
TYPES OF RURAL SETTLEMENT

(a) Compact: Lairikyengbam Leikai
(b) Semi-compact: Chingamgham Leikai

SCALE
0.375 Ch = 0.1 km

(c) Semi-sprinkled: Tenha
(d) Sprinkled: Laiket

Legend:
- Black dot: House
- Red dot: Road
- Green dot: Ground level
- Blue dot: Water level
- Yellow dot: Hill
- Orange dot: Church
- Green bar: Tomb
- Brown dot: Temple
- Blue line: Canal
- Red line: Road

Fig. 10
morphology. Of them, the pioneering work is the concentric model introduced by Burgess, E.M. of the Chicago School of Sociology in 1923.

This theory suggests that as cities expand, the introduction of people and their political, social and economic organisations form rings of urban growth. The main city centre is the area of commercial activity of the Central Business District (CBD). He recognized five concentric zones, Figure 11.

![Diagram of urban land use zones]

**Figure 11.** Urban land use in American cities after Burgess, E.W (1925).

The idea of sector or wedge like pattern of urban land use is really an improvement on the concentric zone theory which was developed by Hurd, R.M. and Hoyt, Homer in 1939 to clear the concept of axial development of landuse pattern along main transportation routes or lines of least resistance to create a star-shaped city. The whole city area is considered to be a circle and various areas to be sectors radiating out from the centre of the circle. A high rent residential area in the eastern
quadrant of the city would tend to shift outward in the eastern quadrant only (Figure 12).

Harris and Ullman (1945) developed the hypothetical pattern of Meckenzi (1933) in a Multiple Nuclei Model. In their opinion, landuse patterns of a city do not develop around a single centre, but develop around several discrete locations. Such as concentration of landuse systems around different nuclei creates the city a cellular morphology (Fig. 13). This type of multiple nuclei structure of settlement is helpful in explaining the structure of Indian cities which are decorated by definite periods of growth with frequent combination of new and old sections of the city for growth and development.

3.4.3.1 Urban Morphology of the Valley of Manipur:

Imphal city

After a brief discussion of the classical models of urban settlement, a brief analysis of the urban morphology can be taken up selecting some urban centres from the study area. Imphal city being one of the oldest urban settlements in the entire north eastern India extends over an area of 29.57 km² with a division of 27 wards altogether (2001).

This inner zone of the Imphal city is similar to the first zone of the concentric zone model of. Burgess, E.M. (1923). The central older part was planned by the British from the eve of 19th century to the middle of 20th century. This inner zone is the commercial centre of the city. The main commercial shopping centres are Thangal
Fig. 12: The Sector Model of H. Hoyt (1939)
1. CBD, 2. Wholesale & light manufacturing, 3. Low-class residential, 4. Middle-class residential, 5. High-class residential

Fig. 13: Multiple Nuclei Model of C.O. Harris & E.L. Ullman (1945)
No. 1 to 5 are equal to the areas in Fig. 13
Bazar and Paona Bazar. The present Nagamapal and Wahengleikai markets in the west are the recent expansion of this CBD. Most of the main government offices are situated around 'Kangla' (Figure 14-A). The State Assembly, Rajbhavan, C.M. Bungalow, Minister's Bungalow, P.W.D., Secretariat, Motor Transport Office, Head Post Office, Telephone Bhavan, State Guest House, Forest Office, Veterinary Office, Agriculture Office and Government Quarters at Sanjenthong and Babupara cover a greater part of this area. The overall business is performed by mixed population of Manipuris, Punjabis, Marwaris etc.

Around this CBD, the inner zone lays this middle zone which is primarily of residential areas. The density of houses is high and, therefore, vertical expansion of housing takes place. The largest inhabitants are Meiteis with a little population of Muslims, Tribals and non Manipuris. These residential dwellings are well connected by transport roads from different directions. Temples, Mosques, Churches, educational institutions, tea hotels, restaurants etc. are usually mingled with these residential buildings. This zone extends upto a radius of 2 km from the centre of Imphal city.

The immediate surrounding of the middle zone is the outer zone. Close settlement pattern is found upto a radius of four kilometers and beyond this is the residential dwellings extending outwards along the transportation lines. The residents of this zone are mainly Meiteis and also served by the sub-urban markets viz., Lamlong market in the north-east, Chingmeirong and Mantripukhri markets in the north, Kwakeithel market in the south-west, Heirangoithong and Singjamei markets
in the south. The urban structure of this zone is found dealt with five government established nuclei: (a) Lamphelpat complex in the west is a low lying area consisting of diverse functions like Regional Institute of Medical Science, Lamphel market, CRPF cantonment, Langol Housing Complex, Central Agricultural College etc.; (b) Sangaiiprou Complex in the south-west bears the Leirik Memorial Hospital, FCI godown, Imphal College, Little Flower School etc.; (c) Takyel Complex in the south of Imphal comprises of State Academy of Training, Sports Authority of India, Takyel Industrial Complex, Industrial Technical Institute, Government Polytechnic etc.; (d) Chingmeirong-Mantripukhri Complex in the north has Tasar Experimental Centre, High court, PWD workshop, TB and Leprosy Hospitals, Agricultural and Poultry Farms, Government Offices etc.; and (e) Porompat complex in the north-east having mechanized weaving centre, Jawaharlal Nehru Hospital, Shopping Complex, Dairy farm, Government Offices etc. So the urban structure of Imphal city appears the combination of Concentric Zone Model and Multiple Nuclei designs. Being the capital of state, Imphal city centralizes by locating all the key functions in the organisation of system of settlements.

**Lamsang Town**

*Lamsang* is a small town situated in the west of *Imphal* city having 6,260 populations in 2001, of which more than 50 percent belongs to agriculture. Two small rivers, the Nambul and Luwanglei flow through the town area from north-west to south-east and the Imphal–Kangchup road runs east west. The Langol hill borders the entire north-eastern part providing abundant foothill grazing field. The settlements in
this total area of 4.99 km² can be grouped into three segments viz., Lamdeng, Lamsang and Taothong localities. The town is well connected with Imphal covering the distance of 12 km by bus and jeep services. SDO office, police station, high school, training institute of nurse (RDO), town committee office, pharmacy, retail shops, pan shops, scooter workshop, market etc., are the important functions, which are distributed by the side of roads. So, the structure of town is represented by a few amenities along the side of roads and residential areas surrounded by paddy fields (Figure 14-B).

**Moirang Town**

Moirang town emerged on the old habitat site of Moirang clan and its environment is related to the Khamba-Thoibi epic of Manipuri society. It is situated in the south-west part of the Manipur valley within the distance of 45 km from Imphal city (Figure 14-C). Being a lake-shore town, it has a pleasant climate and beautiful scenic views and attracts a lot of domestic tourists and foreign visitors. In 2001, the town has 17,178 persons living in an area of 6.59 km². Many of the inhabitants have the occupation of agriculture and fishing. It is the meeting point of Thanga road and Kumbi-Sangang road connecting various rural settlements, the arrangement of internal morphology of this historic town is seen with rows of retail shops, pharmacy, tea hotel, rice hotel, cloth shop, hardware, jewelry etc. At the bifurcation point of Thanga road and Kumbi-Sangang road the main market is located where hundreds of women vendors are selling vegetables fishes, handloom and handicraft products daily. Moirang College, bank, INA statue and museum, shrine of
Thanging God, police station, higher secondary school, veterinary office and excise office are some of the policy functions in the town. Its outlying features of lake, Kiebul lamjao Santuray Park and Sendra tourist centre are additional attraction to it.

**Wangjing Town**

Wangjing town is situated along the National highway 39 between Thoubal and Kakching towns, within the range of 30 km towards the south of Imphal city (Figure 14-D). The Wanging stream dissect the township from east to west, and in both sides of the stream, the Heirok road in the east and the Tentha road in the west extend from it. The market shed is located just near the National highway 39 accommodating more than 70 women vendors daily and is surrounded by post office, tailoring house, retail shop, rice hotel, pan shops, tea hotel, pharmacy, excise office, etc. Besides, bank, Y.K. College, polo ground, higher secondary school, and high school are some of the policy functions in the morphology of town. A compact residential area spreads along sides of roads and on the fringe; paddy fields are seen showing the importance of agriculture of the inhabitants.
Notes and References

Abler, Ronald et al. (1971): Spatial Organisation the Geographer’s view of the world; Prentice Hall, INC, Englewood cliffs, New Jersey.


3 The Formula of Nelson for Classification of towns is:

\[
\sigma = \sqrt{\frac{\sum d^2}{N}} \quad \text{where,} \quad \sigma = \text{Deviation}
\]

\[
d = \text{difference from the standards}
\]

\[
n = \text{Number}
\]